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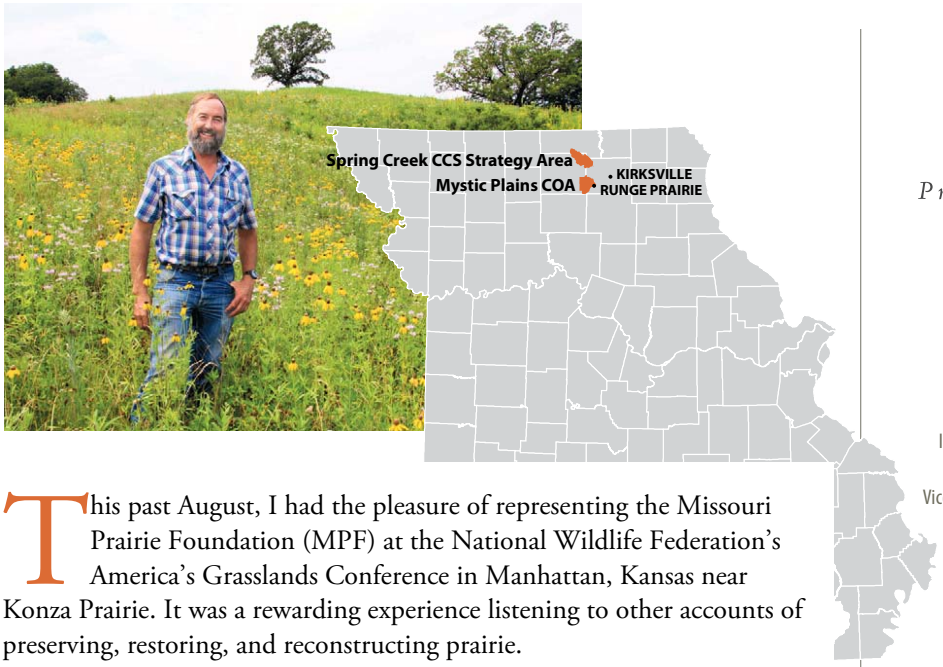
Missouri Prairie Journal

The Missouri Prairie Foundation

Protecting Native Grasslands

Savannas and Woodlands of Northern Missouri

Message from the President



FRANK OBERLE

This past August, I had the pleasure of representing the Missouri Prairie Foundation (MPF) at the National Wildlife Federation's America's Grasslands Conference in Manhattan, Kansas near Konza Prairie. It was a rewarding experience listening to other accounts of preserving, restoring, and reconstructing prairie.

The one thing that really struck home with me was when a cattle rancher from southern Kansas was asked what he thought of the disaster assistance program for cattle that is currently being considered. He said he really didn't want to become dependent on it; he might be tempted to not keep as much in his savings account—and then went on to explain his savings were not in the bank, but in the prairie soils that grew his grass.

In stark contrast to visiting the expansive Konza Prairie, I recently took a trip to the Mystic Plains Conservation Opportunity Area near Kirksville, Missouri, where MPF's Runge Prairie is located. I was shown many sites in the area such as the one I'm standing in, above, with remnant characteristics, both prairie and savanna. Many of these areas—while not rocky enough to prevent plowing—have enough topography that would make it unwise to plow.

I am convinced that, while relatively little attention has been given to northern Missouri in the search for remnant grasslands, this region of the Dissected Till Plains merits more attention for preservation of remnant grassland areas. In this issue, the feature articles focus on savanna and open woodlands of northern Missouri. I hope you enjoy it, and that you can help us as you are able with our 2013 Campaign for Prairies.

Jon Wingo, *President*

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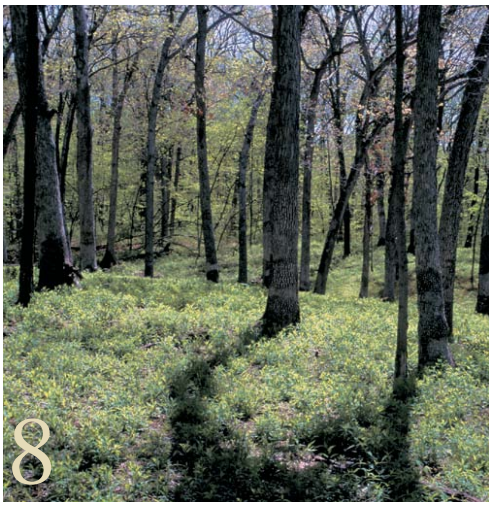
MISSOURI PRAIRIE FOUNDATION
Protecting Native Grasslands

The mission of the Missouri Prairie Foundation (MPF) is to protect and restore prairie and other native grassland communities through acquisition, management, education, and research.

Contents

Fall/Winter

2013 VOLUME 34, NUMBER 3 & 4



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On the cover:
Photographer Frank Oberle—also a native seed grower and a northern Missouri prairie and savanna champion—captured the beauty of the open-grown oaks, wildflowers, and native grasses of this northern Missouri savanna.

MPF UPDATE

Prairie Conservation, Education, and Outreach

ALYCIA MCGEE

From left, MPF's Executive Director Carol Davit with MPF member Anita Randolph at the Missouri State Employee Charitable Giving Campaign kickoff on August 21. Workplace giving is one of the many ways you can support MPF's 2013 Campaign for Prairies. See www.moprairie.org, Donate page for details.

BRUCE SCHUETTE

CAROL DAVIT

Dr. Peter and Dr. Pat Raven at MPF's Coyne Prairie in July. MPF is delighted to announce that Dr. Peter Raven will be the speaker for MPF's 2014 Annual Dinner, to be held in Springfield on August 23, 2014. At left is prairie hyacinth, which grows at Stark Prairie.

Since the last update I wrote in the summer issue, the Missouri Prairie Foundation (MPF) has been hard at work protecting prairie, seeking funding to conserve more, and carrying out many outreach and education activities to inform more people of the importance of prairie and the use of native plants.

In addition, MPF has some exciting news: the acquisition of a new prairie! This past May, MPF was bequeathed a 38-acre original prairie from the Ann Louise Stark Trust. The prairie, located approximately five miles east of Cross Timbers in Hickory County, contains dry mesic, mesic, and wet-mesic prairie. While signage is not yet posted, members are welcome to visit the property, which can be accessed at the intersection of Highways P and F (the south side of P and east side of F). A map and detailed directions are available at www.moprairie.com, Where We Work. MPF is grateful for the gift of this prairie.

MPF was also honored to host Dr. Peter Raven, and his wife, Dr. Pat Raven, on a tour of MPF's Schwartz, Golden, Penn-Sylvania, and Coyne Prairies in July. Dr. Peter Raven, a leading botanist and advocate of global conservation and biodiversity, is president emeritus of the Missouri Botanical Garden, was honored by TIME magazine as a "Hero of the Planet," and holds scientific appointments at numerous botanical and academic institutions around the world. Dr. Pat Raven enjoyed a 30-year career in public gardens including appointments at historic arboretums and parks in New York and served as executive director of the Mercer Arboretum and Botanic Gardens in Houston, Texas.

MPF's work would not be possible without your support and generosity. If you have not done so already, please consider contributing to our 2013 Campaign for Prairies with a tax-deductible gift today.

Be sure to check the back cover of this issue for fall and winter prairie birding trips and volunteer workdays. We look forward to seeing you on the prairie.

– Carol Davit, executive director and *Missouri Prairie Journal* editor

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CASEY GALVIN

MPF's 2013 Campaign for Prairies

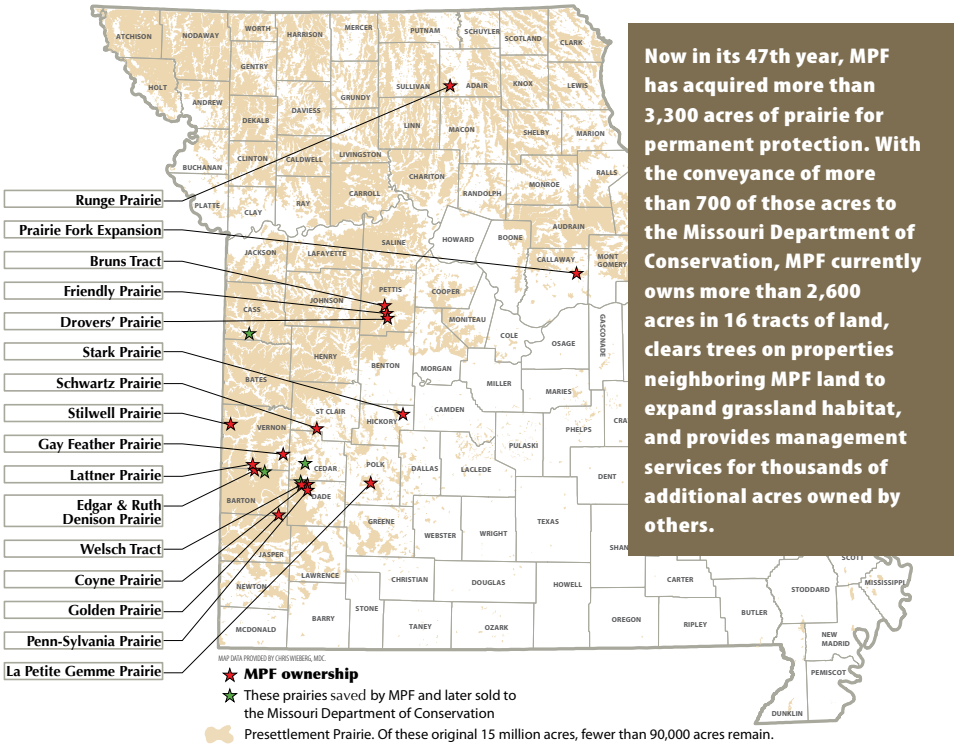
You can demonstrate your love of prairie and support MPF's work by helping us fulfill our 2013 Campaign for Prairies. There are many ways you can contribute to our $300,000 fundraising goal, which will allow us to carry out our operations and meet our 2013 budget:

Maintain your current membership, and, if you are able, increase your membership level. **Consider** gifts of cash or securities in addition to regular membership dues. **Contribute** to MPF through Earth Share, a workplace-giving program. MPF is #8426 in the Missouri State Employees' Charitable Campaign and #81779 in the Combined Federal Campaign. **Ask** your employer to match your contribution to MPF. Many workplaces offer employee matching gift programs. A list of many such employers is at www.moprairie.org, Donate page. **Recognize** birthdays, weddings, and other special events of your family members and friends with contributions to MPF in their honor.

MPF is an efficient operation with sound finances. MPF has no office and only two staff members who work out of their homes or in the field. MPF has no debt, the board of directors adopts only balanced budgets, and MPF conducts an independent annual audit. Your contributions to MPF are carefully managed to optimize investment in prairie conservation and the promotion of native plants.

Please send membership dues and other cash donations to
Missouri Prairie Foundation, c/o Martinsburg Bank, P.O. Box 856, Mexico, MO 65265-0856

To make a gift of securities or other contributions, please contact MPF at 888-843-6739 or view the Donate page at www.moprairie.org.



Now in its 47th year, MPF has acquired more than 3,300 acres of prairie for permanent protection. With the conveyance of more than 700 of those acres to the Missouri Department of Conservation, MPF currently owns more than 2,600 acres in 16 tracts of land, clears trees on properties neighboring MPF land to expand grassland habitat, and provides management services for thousands of additional acres owned by others.

RICHARD DATEMA

MPF's Prairie Operations Manager Richard Datema controlled the invasive sericea lespedeza (sprayed bright green with herbicide) at Powell Gardens, and removed trees (below) to improve grassland habitat in the Golden Grasslands Conservation Opportunity Area.

Ecologists rank temperate grasslands—which include Missouri's tallgrass prairies—as the *least conserved, most threatened* major terrestrial habitat type on earth. Prairie protection efforts in Missouri, therefore, are not only essential to preserving our state's natural heritage, but also are significant to national and even global conservation work. MPF is the only organization in the state whose land conservation efforts are dedicated exclusively to prairie and other native grasslands.

Prairie Protection Update

From May through early September, MPF's Prairie Operations Manager Richard Datema continued to improve degraded prairie on private land south of MPF's Welsch Tract. Datema cut, piled, and burned trees from 3,880 feet of fence line, improving habitat for grassland wildlife, including ground-nesting birds.

The two parcels of land, totaling 240 acres, are directly west of 240 acres of high quality prairie owned by a private individual (80 acres) and MPF (the 160-acre Penn-Sylvania Prairie). The total block of land owned by MPF and three private individuals is 640 acres or one square mile, and less than one-half mile from the Missouri Department of Conservation's and The Nature Conservancy's Niawathe Prairie. Improving this block, which lies within the Golden Grasslands Conservation Opportunity Area, is important for statewide native grassland habitat improvement priorities. This work was funded in part by the National Wild Turkey Federation and a grant from the Missouri Bird Conservation Initiative.

During the same time period, Datema also controlled sericea lespedeza at MPF's Stilwell, Golden, Coyne, and Penn-Sylvania Prairies, the Missouri Department of Conservation's Bristow Conservation Area, and the Missouri Department of Conservation's and The Nature Conservancy's Osage Prairie. In addition, Datema controlled invading woody growth at Jerry Smith Park prairie, owned by Kansas City Parks and Recreation, and controlled sericea lespedeza at Powell Gardens.

"I was thrilled how thorough Richard was," said Alan Branhagen, director of horticulture at Powell. "He went above and beyond by moving on to other woody issues as appropriate. I think because of his work the past couple years we have reduced the sericea in our native prairie remnants to very low numbers and hope we can continue with his help to keep this pernicious invasive out!"

RICHARD DATEMA PHOTOS

MPF's 2013 invasives control work was funded by MPF members and two 2013 Wildlife Diversity Fund grants.

This past summer, MPF developed a restoration plan for its 376-acre Stilwell Prairie, which contains high quality limestone prairie where the federally threatened Mead's milkweed (*Asclepias meadii*) grows, but also much wooded area that needs to be restored to prairie. The plan calls for prescribed burning, bull-hogging of many acres of brush, and control of invasive herbaceous plant species.

MPF is grateful for the following sources of funding for MPF's work at Stilwell Prairie: the U.S. Fish and Wildlife Service, a Missouri Bird Conservation Initiative grant, a Missouri Conservation Heritage Foundation grant, a Wildlife Habitat Incentive Program (WHIP) contract from the USDA, and MPF members.

MPF at Whole Foods Market® in June

JESSICA SERRATI

Many thanks to, from left, MPF volunteer Gretchen Loudermilk, MPF summer volunteer intern Maddie Johnston, MPF volunteer Caroline Sant, and MPF board member Jan Sassmann for being at the Whole Foods Market store on Brentwood Blvd. in St. Louis on June 15. They shared information with customers about the vital links between native plants, native pollinators, and the many foods native pollinators provide for us.

On June 12 and 15, MPF teamed up with Whole Foods Market's "Share the Buzz" pollinator awareness campaign to provide education about the importance of native pollinators and their natural habitats.

At the Town & Country Whole Foods Market, MPF President Jon Wingo led a walking tour of the oak savanna restoration at Town & Country Crossing; Mo. Dept. of Conservation Natural History Biologist Mike Arduser gave a talk on native bees and other pollinators and how they are critical to our food crops and natural world; and MPF Emeritus Board Member Bill Davit led demonstrations of cordage making and "Nature's Crayons"—the use of natural materials like petals to create artwork.

Many thanks to all volunteers at both stores and to Whole Foods Market for this outreach opportunity.


CAROL DAVIT


CAROL DAVIT

Artist Dawn Wagner, top, painting the Longs' prairie planting, and above, festival goers enjoying the day.

Bethany Springs Prairie Festival

A huge thank you is due to MPF members Joe and Theresa Long for hosting and organizing the Bethany Springs Prairie Festival (formerly called the Prairie Paint Out) at their lovely property near Hermann, Missouri on June 22 and 23.

An estimated 500 people attended this free event and enjoyed guided tours of the Longs' 14-year-old prairie planting led by Joe and Theresa's son Dr. Quinn Long and Dr. James Trager. In addition to learning about prairie, event goers shopped for art and other fine hand-made items, enjoyed a botanical marionette show produced by Earth Mirror Marionettes, enjoyed live music from October Surprise and the Handlebar Band, and sampled wine provided by MPF past president Randy Washburn and Röbller Vineyards.

MPF is grateful for all who contributed to the events of the weekend, including the nine artist vendors who donated 30 percent of their sale proceeds to MPF, and many volunteers who made the festival possible.

Eighteen artists registered for the Prairie Paint Out portion of the festival and spent the weekend creating paintings of the property. Paintings were displayed at the end of the weekend and judged by McKendree University Art Professor Mr. David Ottinger. The $1,000 Purchase Award, donated by MPF Technical Advisor Rudi Roeslein, went to Dawn Wagner. The First Place Award went to Marty Coulter, Second Place to Michael McClure, and Honorable Mention to Emily Beaven. Photos of their paintings are at www.bethanysprings.com.

Many thanks to Bethany Springs Prairie Festival sponsors Roeslein Alternative Energy, Whole Foods Market, Hereford Printing Resources, Artmart, Theresa and Joe Long, Randy Washburn, the Art Center Gallery, and Lydia Johnson Bed & Breakfast.

MPF is also grateful to Maddie Johnston, MPF's volunteer summer intern, for her help during the festival.

MPF's Fourth Annual Prairie BioBlitz

More than 80 Prairie BioBlitz volunteer participants convened at MPF's Denison and adjacent Lattner Prairies in Barton and Vernon Counties on June 1 and 2, 2013. Following an intense storm that brought downpours throughout much of Missouri on May 30 (and also blew the big tent down), volunteers got most of the tent back up and enjoyed a sunny weekend of biological exploration and fun on these beautiful prairies.

Many thanks to the BioBlitz leaders for their time and expertise. Together with volunteers, leaders documented many species, including six planthoppers, 11 ants, and 10 additional native vascular plant species, bringing the known plant total to date to 291. The delicious food everyone brought for the potluck dinner was much appreciated, as were Stan and Susan Parrish, Ric and Jean Mayer, and Bob Elworth for cooking delicious jambalaya and other dishes over the fire.

Save the Dates! MPF's Fifth Annual Prairie BioBlitz will be held June 7 and 8, 2014 at Gayfeather Prairie in Vernon County.

ELIZABETH McINTYRE

PHIL KOENIG

CAROL DAVIT

ROBERTA VOGEL-LEUTUNG PHOTOS

Squier Park Receives MPF's 2013 Prairie Gardens Grant

Squier Park, an historic, urban core neighborhood in Kansas City, was the recipient of the MPF Prairie Garden Grant of $500 last spring. With matching funds from the Missouri Department of Conservation, the Squier Park Neighborhood Association beautification committee and volunteers planted two 500-square-foot prairie gardens on a traffic triangle on Manheim Road.

These additions to small prairie plantings funded in 2012 by the Kansas City Missouri Neighborhood Self Help Fund consisted of species that were showy and short, joining with the currently semi-formal triangle character. Each new garden has a backdrop of prairie dropseed with fall blooming asters and goldenrods. The centers display a swath of little bluestem grass mixed with tap-rooted forbs such as butterfly weed, pale purple and yellow coneflowers, a variety of blazing stars, and purple prairie clover. Shorter mounding and spreading species that include Missouri primrose, purple poppy mallow, alum root, cream wild indigo, prairie coreopsis, and wild petunia fill in the sides and front.

This past summer's rains have encouraged amazing first-year growth of natives and weeds, so volunteers have been busy with maintenance. Squier Park showed off its new prairie gardens during its fall homes tour on October 6, which attracted people from around the metro area. Squier Park also installed two interpretive signs with the help of the Kansas City Missouri Parks Department, which waters during dry spells.

Neighborhood children are creating a mosaic sun dial for a third triangle corner, and will be the recipients of future prairie educational programming once the plantings are more established.

Congratulations to Squier Park!

Inviting Country

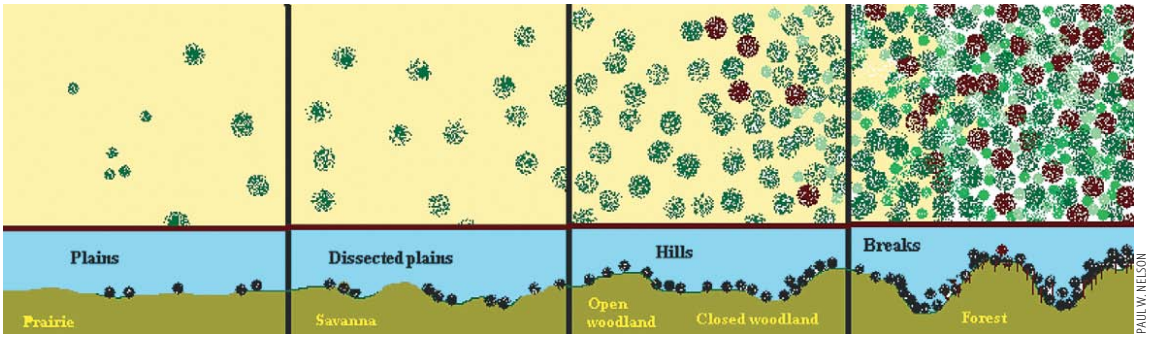
Savannas and Woodlands of Northern Missouri

By Mike Leahy

Savannas and woodlands are fire-dependent natural communities that occurred intermingled with tallgrass prairies across the landscape of large portions of Missouri until the 19th century. This mosaic of prairie, savanna, and woodland was especially pronounced in northern Missouri. Today degraded but restorable savanna and woodland natural communities are scattered across northern Missouri, and both public and private conservation organizations and private landowners are restoring these important components of Missouri's natural heritage.

"In the timbered portions of the county, there was absolutely no brush. The trees were very massive and the ground underneath was covered with prairie grass. The massive trees, the prairie flowers and grass all combined to make this a truly beautiful and inviting country."

—Thomas Dockery, 1855, describing the wooded lands of Adair County, Missouri (Violette 1911, Ladd 1991)



PAUL W. NELSON

Prairies often occupied the broad plains and ridges of northern Missouri with savannas found on rolling terrain where fire intensity and frequency would have been diminished. Woodlands were typically associated with the dissected terrain adjacent to stream systems. Fires, primarily of human origin with occasional lightning fires during droughts, would have propagated rapidly and with great intensity across level to gently rolling prairies. The fire's intensity would have lessened upon reaching more dissected terrain or a firebreak such as a stream. These variations in fire behavior based on prevailing winds, topography, and stream/wetland systems (firebreaks) resulted in the mosaic pattern of prairie, savanna, woodland, and forest found in northern Missouri in the 1800s.

Defining Savannas, Woodlands, and "Northern" Missouri

Dockery described what today ecologists call a savanna natural community (Nelson 2010). Prairies, savannas, and woodlands intermingled and covered most of northern Missouri as late as 1830. **Prairies** are native grasslands dominated by warm-season grasses, sedges, and perennial forbs (broad-leaved plants) with very few trees (<10 percent cover). **Savannas** are grasslands interspersed with open-grown scattered trees or groups of trees. They are strongly associated with prairies and are dominated by prairie grasses and forbs. Tree canopy cover is usually <30 percent. **Woodlands** are a natural community with a sparse understory or mid-story, a ground layer rich in forbs, grasses, and sedges, and a tree canopy cover that ranges from 30 to 80+ percent closure.

Historically and today, all of these natural community types depend on frequent surface fires to maintain their characteristic composition and structure (on restored sites, one to three years for savannas and three to five years for woodlands). Fire-scar tree-ring analyses of ancient bur oaks in northwestern Missouri have provided direct evidence of historical fire regimes in northern Missouri (Stambaugh et al. 2006). By contrast, forests in Missouri, as defined ecologically, were burned infrequently and they are characterized by more shade-tolerant and fire-intolerant species such as sugar maple (*Acer saccharum*), maidenhair fern (*Adiantum pedatum*), and pawpaw (*Asimina triloba*).

BRUCE SCHUETTE

BRUCE SCHUETTE

This savanna (above) and open woodland (opposite) are within Cuivre River State Park in Lincoln County. Their restoration began in the early 1980s, largely thanks to Park Naturalist Bruce Schuette, who is also MPF's Vice President of Science and Management.

Northern Missouri is roughly demarcated by Interstate 70 on the southern boundary. This part of Missouri, roughly a third of the state, was visited by large ice sheets 400,000 years ago (Unklesbay and Vineyard 1992). During this glaciation event, large quantities of crushed rock, clay, and sand were moved around and deposited on top of the bedrock. These deposits are termed glacial till. Climatic conditions during the Pleistocene Epoch (1.6 million to 11,000 years ago) caused wind-blown silt deposits or loess to accumulate across the state with the deepest deposits in northwestern Missouri (north of St. Joseph and west of Highway 169). This loess and glacial till formed the parent materials for northern Missouri's typically productive soils (Nigh and Schroeder 2002).

JAMES HARLAN

The map above is an estimate of the extent of savannas and woodlands in northern Missouri in the 1800s (brown shading), based upon an analysis of data from Harlan (2008) derived from the field notes of the U.S. public land survey (1818–1855). Stars indicate St. Louis and Kansas City. Below is a map of the extent of prairie in northern Missouri in the 1800s (Schroeder 1981).

WALTER SCHROEDER


JAMES TRAGER


MDC

Two of many animals of savannas and woodlands: a mesic savanna ant species (*Formica obscuriventris*), tending aphids on pagoda plant (*Blephilia ciliata*), and an eastern wood pewee.

Dominant Plants of Savannas and Woodlands

In northern Missouri, bur oak (*Quercus macrocarpa*) and white oak (*Q. alba*) are typically the canopy dominants of upland savannas with lesser amounts of post and black oaks (*Q. stellata* and *Q. velutina*) and shagbark hickory (*Carya ovata*). Copses of dwarf chinkapin oak (*Q. prinoides*) are typical of upland savannas west of Highway 63. East of Highway 63, blackjack oak (*Q. marilandica*) is a savanna tree. Growing in the dappled sunlight below the crowns of mature savanna trees are woodland plants whilst in the open areas between the trees are typical prairie plants that grow best in full sun—big bluestem (*Andropogon gerardii*), purple prairie clover (*Dalea purpurea*), finger coreopsis (*Coreopsis palmata*), rough blazing star (*Liatris aspera*), rattlesnake master (*Eryngium yuccifolium*), prairie goldenrod (*Solidago speciosa*), and pale purple coneflower (*Echinacea pallida*).

Patches of oak and hickory saplings and shrubs such as dwarf chinkapin oak, hazelnut (*Corylus americana*), prairie willow (*Salix humilus*), hawthorns (*Crataegus* species), wild plums (e.g., *Prunus americana*), and sumacs (e.g., *Rhus aromatica*) provide an important habitat component in savannas, and their dominance ebbs and flows with fire cycles.

Having a wide range of tree canopy cover (30–80+ percent), woodlands vary considerably in the array of plant species at the ground layer found in any one spot. Frequent fires keep the mid-story or understory confined to patches, which allows for quite a bit of light to reach the ground even if the canopy is more closed. Canopy trees are about the same in woodlands as in savannas in northern Missouri—there are just more of them.

Characteristic, herbaceous woodland plants adapted to medium shade or dappled sunlight include purple milkweed (*Asclepias purpurascens*), four-leaved milkweed (*Asclepias quadrifolia*), woodland brome (*Bromus pubescens*), woodbank sedge (*Carex cephalophora*), Pennsylvania sedge (*Carex pennsylvanica*), purple coneflower (*Echinacea purpurea*), bristly sunflower (*Helianthus hirsutus*), pale-leaved sunflower (*Helianthus strumosus*), bottlebrush grass (*Hystrix patula*), violet bush clover (*Lespedeza frutescens*), beebalm (*Monarda bradburiana*), starry campion (*Silene stellata*), elm-leaved goldenrod (*Solidago ulmifolia*), blue aster (*Symphyotrichum anomalum*), smooth blue aster (*Symphyotrichum laeve*), and late horse gentian (*Triosteum perfoliatum*).

Animals of Savannas and Woodlands

Both savannas and woodlands provide habitat for a variety of animal species from ants to white-tailed deer (Packard and Mutel 1997, Nelson 2010). For example, the grassy and insect-rich environment of savannas and canopy gaps in woodlands provide excellent nesting and brood-rearing habitat for wild turkeys. Acorns and hickory nuts provide food resources for deer, squirrels, and turkeys. Abundant insects in restored savannas and woodlands, especially orthopterans, are important food for turkey poults. Native legumes, such as slender lespedeza, which are prolific in restored savannas and woodlands, provide important protein sources for many animal species. The Indiana bat, a federally endangered species, may utilize appropriate live and dead trees in savannas and woodlands for raising their young.

Fox squirrels are more common in savannas and open woodlands while eastern gray squirrels prefer woodlands. Breeding bird species of savannas include many species that are dependent upon patches of shrubs, including northern bobwhite, brown thrasher, eastern towhee, and field sparrow (Brawn 2006). Other priority savanna breeding bird species (Fitzgerald and Pashley 2000) include the red-headed woodpecker, eastern kingbird, and Baltimore oriole. As in prairies, the bullsnake, ornate box turtle, and prairie racerunner utilize savannas. Where ephemeral wetlands are available in or nearby a savanna, eastern tiger salamanders may occur.

Breeding bird species of woodlands include the red-headed woodpecker (more open woodlands), eastern wood pewee, summer tanager, and great crested flycatcher (Blake 2004, Brawn 2006, Grundel and Pavlovic 2007). Depending on the location in northern Missouri,

Northern Missouri Savannas and Woodlands to Explore

1 Dark Hollow Natural Area (Sullivan County)

2 Union Ridge Conservation Area, Spring Creek Ranch Natural Area (Adair, Putnam and Sullivan Counties)

3 Thousand Hills State Park (Adair County)

4 Long Branch State Park – Chariton River Hills Natural Area (Macon County)

5 Trice-Dedman Memorial Woods Nature Conservancy Preserve (Clinton County)

6 Cuivre River State Park – Lincoln Hills Natural Area (Lincoln County)

7 Bunch Hollow Conservation Area (Carroll County)

8 Ranacker Conservation Area (Pike County)

9 Rudolf Bennitt Conservation Area (Randolph County)

For descriptions and maps of these places, visit www.mdc.mo.gov and search on Conservation Atlas or Natural Areas.

woodlands provide habitat for the three-toed box turtle, five-lined skink, prairie lizard, and broad-headed skink.

Restored savannas and woodlands provide abundant wildflowers that support a diversity of invertebrates. Native sunflowers, asters, and other wildflowers offer nectar sources that attract many native pollinators including bees and butterflies. Certain species such as the northern cloudy wing butterfly (*Thorybes pylades*) utilize bush clovers (*Lespedeza* species) and tick trefoils (*Desmodium* species) as larval food sources (Heitzman and Heitzman 1996) and is found in some northern Missouri woodlands. Trager (1998) has documented a number of ant species that utilize savannas and woodlands. We really know very little about the insect ecology of our natural communities, and savannas and woodlands of northern Missouri are no exception.

Conservation Status

The Missouri Natural Heritage Program considers savannas and woodlands critically imperiled and vulnerable, respectively. In the 1800s it is estimated that northern Missouri was blanketed in about 7.4 million acres of prairie, 2.6 million acres of savanna, and 2.6 million acres of woodland (Harlan 2008). Today, in northern Missouri fewer than 6,000 acres of high-quality prairie remain (Missouri Natural Heritage Database 2013). There are approximately 2,000 acres of restored upland savanna and about 4,000 acres of restored upland woodland in northern Missouri.

These are staggering losses as most of the prairie (99.9 percent) was converted to agricultural production on the rich prairie soils. Savannas and woodlands were also converted to agricultural production, but many survived the plow because many are on the poorer soils and more hilly ground of northern Missouri. Many have suffered from severe overgrazing and may be unrecoverable. All have suffered from fire suppression leading to the shading out of the characteristic native plants. Some sites were logged unsustainably and have poor tree structure and composition.

However—as the articles that follow in this issue demonstrate—there are many acres of degraded savanna and woodland in northern Missouri undergoing dramatic restorations. This work is underway thanks to private and public partnerships, and the passion, determination, and hard work of many individuals.

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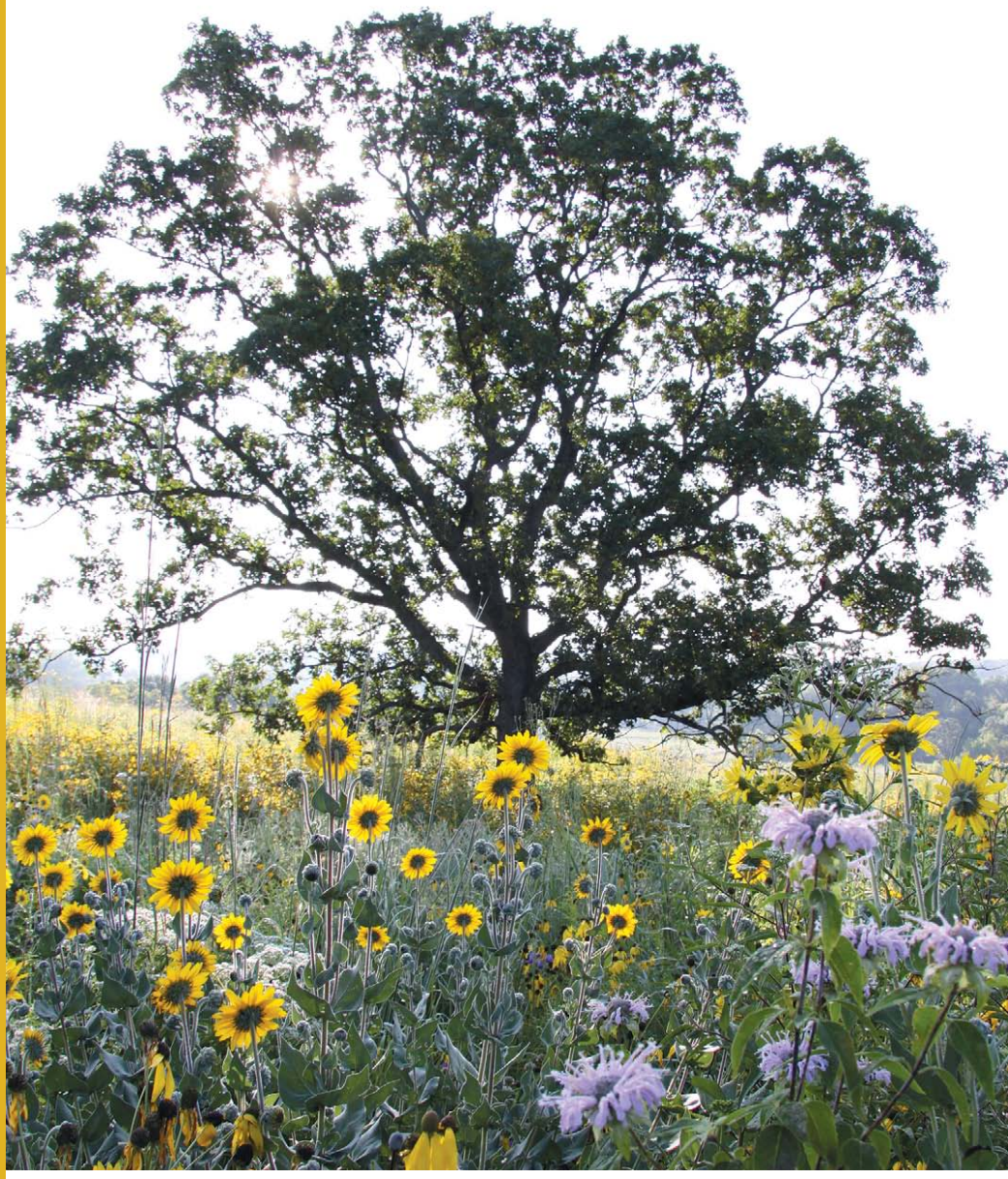
A community ecologist by training, Mike Leahy is the natural areas coordinator for the Missouri Department of Conservation and is a Missouri Prairie Foundation technical advisor.

Northern Missouri's **GRAND** Savanna and Woodland **PLAN**

Ambitious Restoration Efforts Underway on Private Land

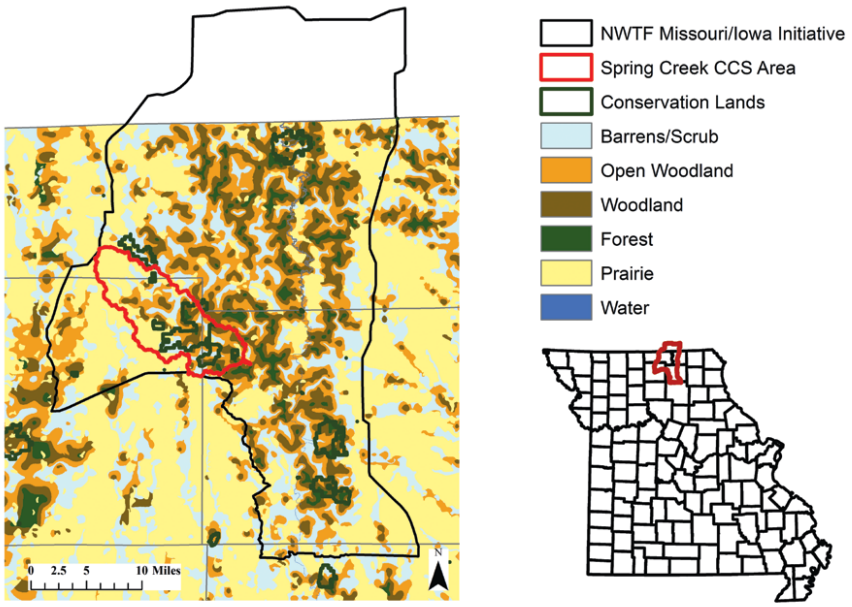
By John Burk and Chris Woodson

Oak savanna, which was once prevalent in the Midwest, has been reduced to just 0.02 percent of its original acreage. It was estimated to cover around 32 million acres in the Midwest prior to European settlement. Savannas and open oak woodlands provide vital habitat to a broad range of native plants and animals, and their conservation is important to federal, state, and conservation organizations, and to private landowners.



In terms of bird conservation, the U.S. Fish and Wildlife Service (USFWS), Partners in Flight, and the North American Bird Conservation Initiative have all identified restoration of savanna and open woodland habitats as a priority for declining birds. Eastern kingbirds, brown thrashers, field sparrows, red-headed woodpeckers, Baltimore orioles, and bobwhite quail, whose declining numbers are of concern to biologists, have some of the highest populations densities occurring in oak savanna and open woodland habitats.

These natural communities are also excellent for wild turkeys, which tend to live simultaneously at opposite ends of the successional scale. They need mature trees to roost in and trees to provide thermal and escape cover, as well as highly preferred food sources, such as acorns and hickory nuts (hard mast) and leaf buds, catkins, and berries (soft mast). However, turkeys also need grassland habitat for nesting and brood-rearing—ideally knee-high native grasses and broad-leaved plants. Although grassland species composition does not appear to be critical, the structure of the vegetation is important. It must provide enough overhead cover to protect them from predators, but must be open enough for a turkey poult or quail chick to maneuver through.



Historic land cover of the National Wild Turkey Federation Savanna and Open Woodland Restoration Initiative Area. See page 19 for a detailed map of the Spring Creek CCS Area.

MDC

Ideal Turkey Habitat

Savannas and open woodlands are therefore ideal habitat for turkeys, especially in the Midwest where creating other forms of nesting and brood-rearing habitats may require significant sacrifice from private landowners. Traditional non-native cool-season pastures and row crops do not provide nesting and brood-rearing habitats because the pastures are too thick and the crops don't have adequate insect densities to feed growing baby birds.

In most cases, restoring ideal habitat is just a matter of removing trees and shrubs from degraded woodland and savanna to open up the stand. Once sunlight gets to the savanna or woodland floor, the seeds of native vegetation that provides cover and insects are already there waiting to germinate. There is no need to sacrifice cropland or give up pastures to create turkey habitat. Open woodlands may even be better habitat than savannas because the higher percentage of tree cover provides an added layer of cover that may deter some avian predators that aren't as adept at flying through an obstacle course, and they also limit how far predators can see prey.

FRANK OBERLE

Collaborative Conservation—For Turkeys and More

In 2006 many members of the collective conservation community in Missouri selected the Union Ridge and the Thousand Hills Conservation Opportunity Areas (COAs) in northeastern Missouri as two of the most important areas in the state in which to conduct collaborative conservation. Oak savanna and open oak woodland restoration were prioritized as habitat goals for both of these areas.

These COAs have historically and collectively supported one of the highest turkey population densities on the globe. However, between 2005 and 2010, turkey numbers in the COAs declined by more than 40 percent. Much of the decline was attributed to successive years of poor reproduction due to unfavorable weather conditions. Heavy rainfall during nesting and hatching can be disastrous for ground-nesting birds, even when habitat conditions are good. Nonetheless, the turkey decline was seen as an opportunity to accomplish good conservation work by targeting a specific area and creating excellent habitat for when more favorable weather conditions returned.

This opportunity also fit well with the National Wild Turkey Federation's (NWTF) strategic plan for Missouri. Under its 2008 North American Wild Turkey Management Plan, the NWTF identified the following priorities, "increasing forest management, prescribed burning, and native warm-season grass establishment." Goals of the NWTF's new national "Save the Habitat. Save the Hunt." initiative include conserving four million acres of habitat, recruiting 1.5 million new hunters, and establishing access to 500,000 additional acres to hunting nationally. Each state involved in the initiative will achieve a portion of the four million acres using a focused approach with three to four focal landscapes driving mission delivery and goal achievement. The open woodland and savanna region in northeastern Missouri is one of these focal landscapes.

The challenge is that the majority of the region is in private ownership. Nearly 93 percent of the land in Missouri is privately owned, and managing land for conservation can be expensive. Therefore significant habitat enhancement on private lands usually

does not occur without cost-share funding from state, federal, or private sources to offset implementation costs. In 2009 the NWTF initiated a project within the Union Ridge and Thousand Hills COAs. The NWTF's dollars were matched with a Missouri Department of Conservation Bobwhite Quail Challenge Grant to offer private landowners cost-share funding for prescribed burning, timber thinning, and converting cool-season pasture to native warm-season grass.

The initial impact of this effort enabled six landowners to complete more than 100 acres of timber stand improvement (TSI), more than 34 acres of burning, and more than seven acres of native warm-season grass plantings. From this humble beginning, the effort blossomed in 2010, when other partners (USFWS Missouri and Iowa Private Lands Offices, Southern Iowa Oak Savanna Alliance, Audubon Society of Missouri, and the Missouri Bird Conservation Initiative (MoBCI)) expressed interest in what was being done and officially met to discuss expansion and define a larger landscape. The result was a collaborative Missouri/Iowa Initiative encompassing roughly 800,000 acres of restorable open woodland and savanna acres within the landscape.

In 2011, an additional $80,000 from initiative partners was utilized by 29 Missouri landowners to implement 310 acres of TSI, 305 acres of prescribed burning, 33 acres of heavy woody cover control, 39 acres of fescue eradication, and 17 acres of native warm-season grass plantings. An additional $20,000 MoBCI grant was utilized by 11 landowners to impact 102 acres of TSI, 98 acres of prescribed fire, and 33 acres of fescue eradication in 2012. The total impact to date includes the involvement of 46 landowners conducting TSI on 514 acres, implementing prescribed burning on 438 acres, establishing 40 acres of native warm-season grass planting, and implementing 33 acres of woody cover control. The 27 open woodland units restored by this project average 17 acres in size and are scattered throughout the initiative area.

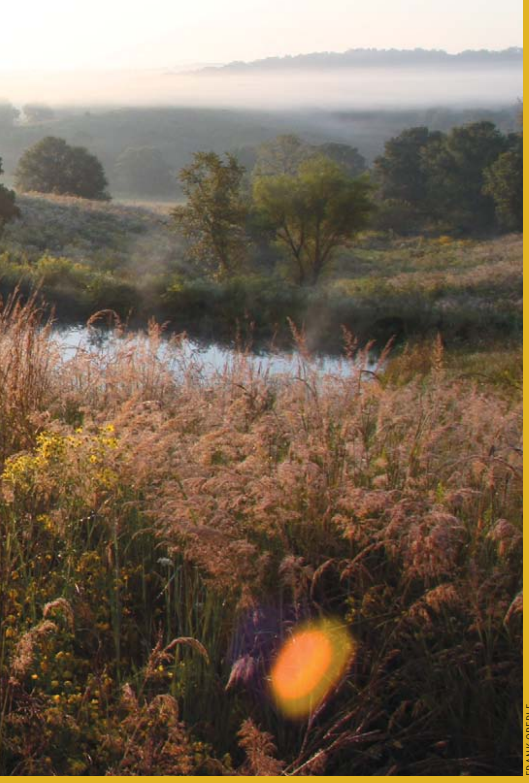
Wild turkeys and many other wildlife species need both the food sources and vegetative structure of open-grown trees, as well as the structure and food sources of prairie plants—woodlands and savannas provide both.

Further recognizing the importance of this landscape for open woodlands and oak savannas, MDC designated the core of the initiative's efforts in northern Missouri as the Spring Creek Comprehensive Conservation Strategy (SCCCS) Area in 2013. The SCCCS Area expands the former Union Ridge COA to more than 46,000 acres and designates this geography as a state priority for restoration of open woodland and oak savanna habitats.

Restoration efforts improve habitat for savanna and woodland-dependent plant species, which in turn support countless invertebrates and other animals. The resulting vegetative structure from restoration projects provides ideal wild turkey nesting and brood-rearing habitat as well as vital habitat for many songbirds with declining populations. Although it is impossible to accurately measure the actual influence of these units in terms of additional birds produced, it is probably safe to assume that their impact goes far beyond the actual acres improved. The NWTF and its partners intend to restore 4,000 acres of this landscape in Missouri over the next 10 years. At an average cost of $250/acre this goal will require two million dollars to accomplish.

If you are interested in learning more about the restoration of this important landscape and how to become involved, contact a NWTF Missouri staff member at http://www.nwtf.org/in_your_state/regional_directors.php, MDC Northeast Region Private Lands Services at (660) 785-2424, or the USFWS Missouri Private Lands Office at (573) 234-2132.

John Burk is the regional biologist for the National Wild Turkey Federation serving Missouri. John has spent his entire career working for the wild turkey on various research projects in Mississippi, Wisconsin, Missouri, and Texas. Chris Woodson is a private lands biologist stationed in Columbia, Missouri with the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program and assists landowners with wetland, riparian, and grassland restoration projects throughout Missouri.



FRANK OBERLE

Couldn't See **All the Woodland and Savanna** for the Trees!

By John Murphy

I sometimes liken my job as a private land conservationist to the TV show *American Pickers*, in which the hosts scour the countryside, looking for valuable relics, often in colorful, out of the way places. Instead of finding restorable, vintage motorcycles, I enjoy success when I come across a restorable, remnant natural community. What's been a great surprise is that in the northern Missouri counties where I assist landowners, I'm finding many more quality woodlands and savannas than anyone expected. Much like a picker on the show discovering an antique bike, I often find these communities in pretty rough shape. To showcase what I'm describing, I offer the following two case studies of restoration in Sullivan County, in the heart of the Spring Creek Comprehensive Conservation Strategy geography.

My woodland restoration example is a vast 780-acre tract of ground, owned by a partnership since the 1980s. One of those partners is Missouri Prairie Foundation member Mark Williams. The first time I met with Williams on site was in the spring of 2011, and his driving motivation was concern about our declining turkey numbers. He was interested in habitat work he could do that might help. Williams is sharp enough with his eye for management to observe that woody plant succession on his farm had dramatically altered the benefits for wildlife. In fact, one of the first things Williams told me over the phone before I visited was that he wanted to "*cut it and burn it*." When I saw acres of overcrowded post, blackjack, and chinkapin oak, and every opening with suppressed rough blazing star, leadplant, big bluestem, and bristly sunflower, I couldn't have agreed with him more!

JOHN MURPHY

Wild quinine, bristly sunflower, and rough blazing star are abundant in Mark Williams' woodland restoration.

Following a detailed inventory, I carved out the "woodland" units I observed as having the best restoration potential and developed a management plan. Through the use of contractors and partnerships with the Missouri Department of Conservation, the National Wild Turkey Federation, and the U.S. Fish and Wildlife Service, Williams began an aggressive campaign of timber stand improvement (TSI) and prescribed fire—a campaign that is ongoing today. In just two years of treatment, WIlliams has restored a phenomenal 60-acre woodland unit, and is planning to increase it to more than 130 acres by next summer.

One mile across the hills from Williams' property is a 53-acre tract of mostly open ground owned by Andy Pettit. Pettit invited me out to the property for the first time in the spring of 2011. He wanted advice on how to enhance his newly purchased property for wildlife.

Keeping in mind that the ground had a history of chronic overgrazing, it was tough to judge inch-tall vegetation in March, but I saw a few, straggling seed heads of rattlesnake master and a sprig or two of big bluestem seeking refuge under some shingle oaks. Seeing those plants, and the mottes of post oak in the open areas, I was cautiously optimistic. In the following two years, Pettit has worked very hard, cutting honey locust, cedar, and shingle oak. He completed some intensive TSI in a woodlot and worked with a contractor to complete a prescribed burn. The fruits of his efforts have been nothing less than spectacular. A good part of his farm is morphing into a showcase of a remnant savanna.

JOHN MURPHY

Rattlesnake master, rosinweed, New Jersey tea, and big bluestem are a few of the species mixed with post oak mottes in Andy Pettit's savanna.

John Murphy is a private land conservationist with the Missouri Department of Conservation, working with landowners in northeastern Missouri.

ROESLEIN FARMS SAVANNA RESTORATION

"Marginal Land" Becoming **Showcase of Good Stewardship**

By Sheldon Ripson

FRANK OBERLE

Landowner and Missouri Prairie Foundation Technical Advisor Rudi Roeslein stands amid rough blazing star (*Liatris aspera*) on his land, revitalized by prescribed fire and other restoration techniques.

It is remarkable how quickly land can bounce back from years of poor management. Less than two years after beginning a savanna restoration project on 150 acres of his northern Missouri farm, Rudi Roeslein is seeing native grasses, flowers, legumes, and other plants visible after decades of being suppressed by undesirable trees and non-native cool-season grasses. Roeslein is a private landowner with both purpose and passion to demonstrate the ecological and economic benefits of native prairie and other natural communities.

"This is an example of what can be done to a landscape that had high soil erosion and was quickly on its way to becoming another northern Missouri farm of marginal land with limited possibilities. Rebuilding this farm with a focus on its natural communities will take time and patience to make it a productive tract of land," said Rudi Roeslein, Missouri Prairie Foundation technical advisor and founder and CEO of St. Louis-based Roeslein and Associates, Inc. He recently started Roeslein Alternative Energy with a focus on native prairie biomass as a renewable fuel source.

Roeslein bought the now 1,600-acre Putnam County farm in 2008 initially for wildlife enhancement. Along with his son Derrick Roeslein, who serves as farm manager for Roeslein Real Estate, they are converting the property's highly erodible acres away from low-yielding corn and soybean production.

"Our good friend and native seed supplier Frank Oberle pointed us to John Murphy, the Missouri Department of Conservation's Private Land Conservationist in northeastern Missouri, who toured the majority of the farm and developed a plan that we have been putting in place," Derrick Roeslein said. As part of the plan, Murphy identified a 150-acre tract containing diverse remnant plant species and believed it would be best for savanna.

"That particular area was too steep to farm. I am sure it could have been over-seeded with non-native cool-season grasses and put into pasture. But there was evidence to suggest it would be worthwhile investing the money in savanna restoration to see what would come back," said Derrick Roeslein.

The Missouri Department of Conservation, in conjunction with the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program and the National Wild Turkey Federation, provided cost-sharing funds that essentially split the restoration expenses with Roeslein.

"The voluntary cost-share program helps private landowners restore native habitat for the benefit of declining, threatened, and endangered species," said Chris Woodson, private lands biologist for the U.S. Fish and Wildlife Service.

Roeslein's savanna restoration called for dividing the tract into two sections. In fall 2011, firebreaks were installed around the perimeter of the tract and between the two sections. The firebreaks were created using a combination of disking, tree sheering, bulldozer work, mowing, and over-seeding of wheat and

legumes. The firebreaks also serve as vehicle paths.

Next was woody cover control to remove undesirable trees and shrubs. Those woody species had prevented native warm-season grasses from receiving sunlight, keeping them dormant for generations.

"The sections were overstocked with undesirable trees invasive to native grasslands, woodlands, and savannas including eastern red cedar, honey locust, and autumn olive. There was also shingle oak, a native species that is quite aggressive and will take over native grasslands," Woodson said.

DERRICK ROESLEIN

The remaining stumps of the sheared trees were chemically treated to prevent them from re-sprouting, except for eastern red cedar, which does not resprout after cutting.

"The idea was to get rid of as many undesirable trees as possible and leave only the desirable post oaks, which will really define the savanna," Derrick Roeslein said. "We hired a contractor with specialized equipment and a reputation for doing good work. They did the north unit in the winter of 2011–12 and the south unit the winter of 2012–13."

Results were evident immediately with native grasses, prairie flowers, and legumes emerging in the first growing season following woody cover control. "Big bluestem and especially indiangrass began expressing themselves. Prairie blazing star really popped up almost immediately. It just shows the potential of what already existed," Woodson said. "Those plant species were not seeded. They already had established root systems. They just had been suppressed by lack of sunlight. So that was really exciting to see."

The south section was treated with a prescribed burn in early April 2012 when the non-native cool-season grasses were already green, to allow native warm-season grasses to compete. "They are on the right track to get the desirable habitat effects. The remaining mature post oaks and young post oaks that will grow are the big, open canopy savanna-type trees," Woodson said.

The north section was scheduled for a prescribed burn in spring 2013, but extremely wet conditions prevented that portion of the plan from being executed. "In the meantime we are using herbicide on any sericea lespedeza we find, as well as late fall herbicide applications on fescue. Next March we plan to prescribe burn the entire savanna," Derrick Roeslein said.

Woodson believes the grassland and herbaceous composition of the Roeslein savanna restoration will be nearly complete in the next five years. The existing desirable trees will mature in 30 to 50 years.

"The Missouri Department of Conservation's Union Ridge Conservation Area is widely regarded as a good example of northern Missouri savanna. When we look at Rudi's savanna, it is a young version of Union Ridge. They have the same species composition of savanna oaks. They are just at a younger stage," Woodson said.

Roeslein started exploring how to improve the wildlife carrying capacity of woodlands and savannas about two decades ago on another farm he owns in central Missouri. Although the learning curve was steep on the Osage County farm, especially for proper ground preparation and dealing with invasive species, Roeslein was better prepared for the Putman County project.

"Like every journey, there are many unexpected turns and twists and sidetracks. But this one has been extremely rewarding. I think the results really speak for themselves," Rudi Roeslein said. "I believe the ecological services that this tract of land will provide to society, my family, and the many people that come to see it are worth the effort. It will also continue to provide excellent hunting opportunities and prime habitat for many other species."

"This savanna will provide good habitat use for field sparrows, eastern kingbirds, Baltimore orioles, and other song birds in decline—all of which the U.S. Fish and Wildlife Service is concerned about," Woodson said. "We will also get some good habitat for bobwhite quail, turkeys, and many other species."

Savanna restoration is just one native project at the Roeslein farm. A significant additional project envisions using native prairie plantings and the biomass produced as a source of renewable energy.

"Hopefully this farm can be a demonstration model for the ecological and economic benefits of native prairie. That entails benefits for wildlife habitat, water quantity and quality, air quality, soil health, and pollination services," said Rudi Roeslein. "We hope to demonstrate there is a viable economic return to restoring marginal land to native vegetation rather than using it as cropland."

"The savanna is special because it is a true remnant section of the farm. We have not planted a thing over there. All the native plants in the savanna were already there. We just allowed them to flourish. To me, that represents the potential of this entire region for native plant species," Derrick Roeslein said.

Sheldon Ripson is a veteran electronic journalist and media executive based in St. Louis. He presently operates R5 Communications, a strategic communications consulting firm for businesses and non-profit organizations.

Aquatic Jewels Among the

The Savannas and Streams of **Union Ridge Conservation Area**

By Darren R. Thornhill

DARREN THORNHILL

I was first introduced to the burn unit of the 8,100-acre Union Ridge Conservation Area in September 2003. Being a native of central Missouri, this was my first fall in northeastern Missouri, and I was participating in my first prescribed burn for the Missouri Department of Conservation (MDC). The 1,700-acre unit had been burned three times prior to this since 1996, and the native plant community had responded dramatically. Indiangrass and big bluestem towered above my head and the fall wildflowers were beautiful.

Like many people, my limited knowledge of savannas stemmed from what I had learned in school about the great subtropical savannas of Africa—seas of grass with some trees mixed in. I knew this savanna was something different, however, something unique to northern Missouri, and I wanted to explore it. The following fall, I did just that, and what I found endeared me to the burn unit even more. I am a fisheries biologist by trade, a stream ecologist by training, and a creek freak at heart. The streams that flow through the burn unit landscape exhibited habitat whose outstanding quality is matched by that of the land draining into it.

Natural and Land Use History of Union Ridge Conservation Area

MDC's Union Ridge Conservation Area is in north-central Missouri two miles north of the town of Greencastle in Adair, Putnam, and Sullivan Counties. It was acquired by MDC in 1989. The burn unit is managed almost exclusively for the restoration and maintenance of its prairie and savanna communities.

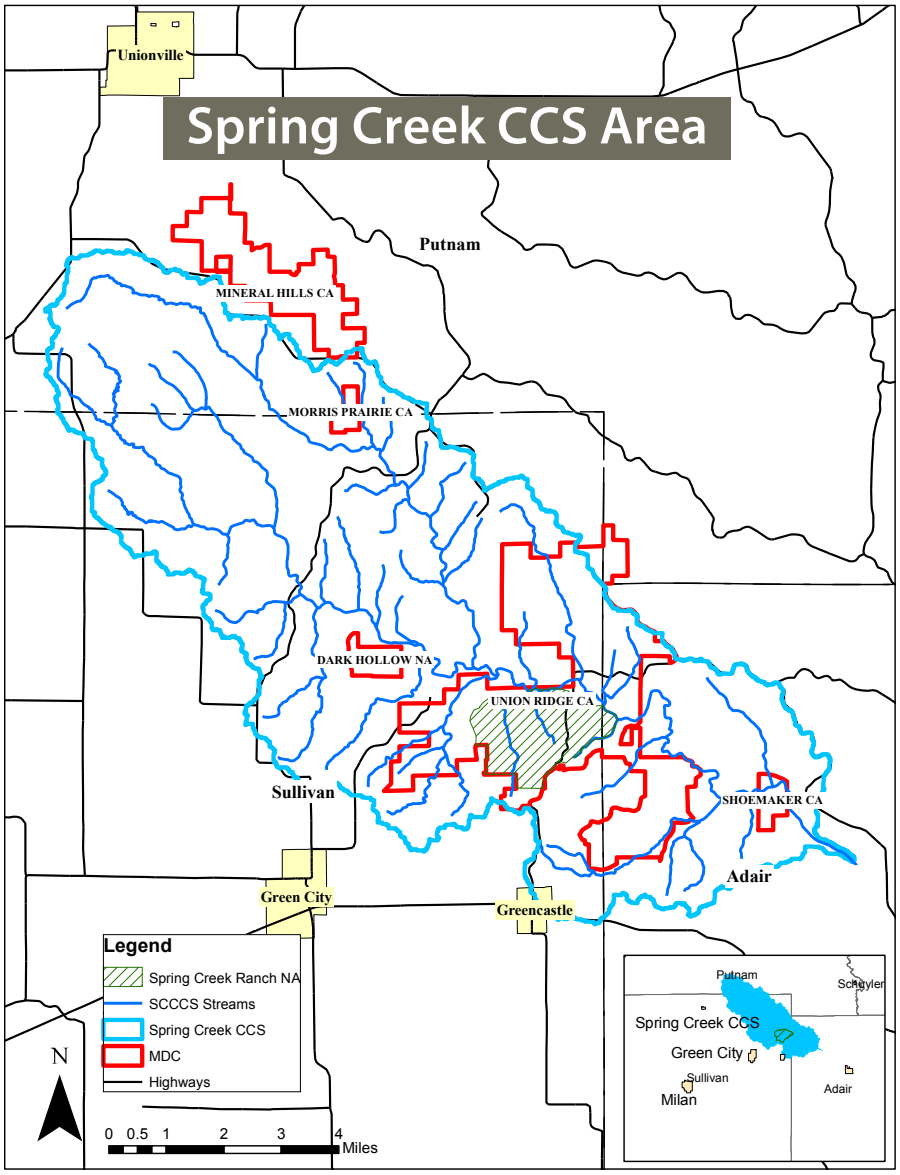
For the 90 years preceding the purchase of Union Ridge by MDC, it had been owned by one landowner and operated primarily as a livestock ranch. Bulldozing, aerial herbicide spraying, burning, and overgrazing were all employed by ranch owners to reduce forest encroachment and assist in the conversion to a fescue-dominated ground layer under scattered, open-grown oaks. Although these methods were quite abusive to the landscape, ironically, they may have been the saving grace for the remnant native plant community. The maintenance of open canopy conditions allowed the rich native flora to wait in dormancy until the return of a properly timed fire regime woke it from its rest.

Oaks

Union Ridge Conservation Area lies within two of the nine Land Type Associations (LTAs) that are found in the Central Dissected Till Plains north of the Missouri River: the Unionville Upland Prairie Plain and the Upper Chariton River Woodland/Forest Hills. The Unionville Upland Prairie Plains were historically 90 percent prairie with scattered seasonal wetlands and savannas. The Upper Chariton River Woodland/Forest Hills is the largest expanse of rugged, dissected hills in northern Missouri that historically consisted of narrow ridge top prairies that graded into woodlands, forested slopes, and valleys. The entire burn unit is classified as the Upper Chariton River Woodland/Forest Hills LTA. From an aquatics perspective, the streams on Union Ridge Conservation Area lie within the East Locust Creek Aquatic Ecological System Type (AES-Type) in the Grand/Chariton Ecological Drainage Unit. Streams classified in this AES-Type are typically surface water dominated, are turbid, have substrate comprised mostly of silt and sand, and generally lack riffle habitats.

Little historical information about the streams on Union Ridge exists, except for a single fish community sample on Spring Creek in 1983 and four fish community samples on four smaller streams in 1993. The number of species collected in these samples ranged from five to 12, which is typical for small streams in the Glaciated Till Plains. This likely led to the assumption by some that Union Ridge had no special aquatic habitats or fish communities. Interestingly, none of the fish community samples were conducted within the burn unit, which, at that time, was also mostly discounted in value due to the previous land abuse.

In 2005, intrigued by what I saw a year earlier during my exploration of the



Spring Creek Comprehensive Conservation Strategy

The Spring Creek Comprehensive Conservation Strategy (SCCCS) is a coalescence of the Union Ridge Conservation Opportunity Area, Union Ridge Aquatic Conservation Opportunity Area, Priority Forest Landscape, and Spring Creek Priority Watershed priority geography philosophies. At its core, the SCCCS is about focusing state-agency staff time and financial resources in a specific geography to conserve and improve its natural resources. The SCCCS relies on public and private partnerships and recognizes the necessity of private landowner cooperation for its success. The mission of the SCCCS is to conserve and improve the native prairie/savanna/woodland and aquatic communities on private and public lands within the confines of the designated geography. Highest priority is given to conserving existing high quality resources and providing them geographical connectivity throughout the Spring Creek watershed.

DARREN THORNHILL

DARREN THORNHILL

DARREN THORNHILL

Biologists survey for mussel species in Savanna Branch, which provides habitat for yellow sandshells, liliputs (above), and pondhorns, as well as 21 fish species, including the brassy minnow, at left.

burn unit streams, my crew and I sampled the fish community in a small, second order stream (later named "Savanna Branch") that flowed through the heart of the unit. We identified 21 different fish species, including the brassy minnow (*Hybognathus hankinsoni*), a species of conservation concern. The majority of the fish species we collected are habitat generalists and typically found in northern Missouri prairie streams. However, in addition to the brassy minnow, three species—creek chub (*Semotilus atromaculatus*), white sucker (*Catostomus commersoni*), and common shiner (*Luxilus cornutus*)—require small streams with intermittent flow, permanent pools, fairly clear water, and gravel and bedrock substrates. Additionally, we collected a blackside darter (*Percina maculata*), a species that prefers deep pools and gravel substrate of medium to moderately large streams.

The 21 species collected in Savanna Branch represent over 66 percent of the total recorded fish species for the entire Spring Creek basin. We also measured a very wide variety of depths within the stream, ranging from a few inches to over six feet in several areas. Large and small woody debris was present in sufficient quantity to provide excellent stream habitat for aquatic organisms. Substrate was highly variable, with some reaches being dominated by gravel, boulders, and bedrock. This was indicative of an exceptional aquatic habitat and fish community.

Spring Creek Ranch Natural Area

During this time period, the MDC Fisheries Division had requested its biologists to suggest possible aquatic areas for nomination to the Missouri Natural Areas System. Given its high quality stream habitat, diverse fish community, and large percentage of public land ownership in its watershed, I was confident that this small headwater stream would be an excellent candidate for an aquatic natural area. At the same time, MDC Natural History Biologist Greg Gremaud (now retired) was eyeing the burn unit for possible nomination as a natural area. Almost immediately, we recognized the opportunity to nominate an entire prairie/savanna/woodland landscape—terrestrial and aquatic—as a natural area, so we combined our ideas and pursued official status for the Spring Creek Ranch Natural Area.

In September 2009, the 1,769-acre Spring Creek Ranch Natural Area—the largest savanna remnant in the Central Dissected Till Plains of Missouri—was officially designated and conserves approximately 8.1 miles of prairie headwater streams. Savanna Branch comprises 3.5 miles of first order and two miles of second order stream channel, and the natural area encompasses more than 80 percent of its watershed. In addition to the 21 fish species, three mussel species—yellow sandshell (*Lampsilis teres*), liliput (*Toxolasma parvus*), and pondhorn (*Uniomerus tetralasmus*)—have been collected in Savanna Branch. The dry mesic loess/glacial till savanna measures approximately 1,104 acres and harbors at least 284 plant species, including conservative species such

CHRIS HELZER

DARREN THORNHILL

At least 284 plant species are known from Spring Creek Ranch Natural Area's savanna, including purple prairie clover (*Dalea purpurea*). The deep and extensive roots of the savanna's native plants benefit the area's streams by reducing runoff, thereby preventing flashiness of streamflows and subsequent streambank erosion.

as leadplant (*Amorpha canescens*), pale purple coneflower (*Echinacea pallida*), New Jersey tea (*Ceanothus americana*), finger coreopsis (*Coreopsis palmata*), and purple prairie clover (*Dalea purpurea*) throughout the unit.

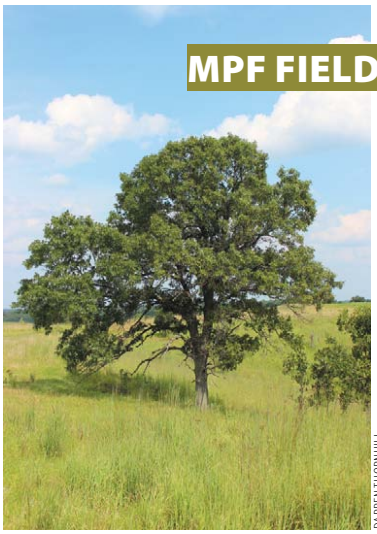
Streams Benefit from Savanna Restoration

Savanna restoration should not be viewed solely as beneficial to terrestrial ecosystems. Native plants have deep root systems that allow water infiltration deep into the soil and help reduce soil compaction. This provides several benefits to the streams that carve through the landscape. Water infiltration reduces runoff and decreases the flashiness of streamflows, which can cause excessive streambank erosion. Additionally, the water table is generally higher due to the improved soil conditions, which leads to higher base flows during dry periods. Native prairie plants are also known to reduce greater amounts of nitrogen and phosphorus from overland flow, mostly due to their enhanced root systems and better soil infiltration. This translates into less algal growth in the stream, which, if excessive, can reduce the oxygen available to aquatic organisms.

During the 2012 drought, ground water inputs to Savanna Branch maintained pools with depths up to three feet, providing refugia for numerous aquatic organisms. Similar-sized streams in the same area with watersheds lacking such a major native vegetation component shared a very different fate. The permanency of water in Savanna Branch, aided by its high quality savanna watershed, is no doubt a major factor in its high diversity of aquatic species.

Darren Thornhill has been a fisheries management biologist for the Missouri Department of Conservation in Kirksville since March 2003. He manages the fisheries in several small public reservoirs and conservation area ponds, assists landowners with pond and stream management in seven counties, and is the coordinator for the Spring Creek Comprehensive Conservation Strategy.

MPF FIELD TRIP



DARREN THORNHILL

MPF FIELD TRIP TO UNION RIDGE CONSERVATION AREA MAY 24, 2014

Save the date for a guided tour of this biologically rich area with MDC's Darren Thornhill and Ryan Jones. A 3.5-mile walking tour of Spring Creek Ranch Natural Area and its savanna and stream features is planned. Watch for details in the spring 2014 issue of the *Missouri Prairie Journal,* in MPF's e-news, and at www.moprairie.org.

GROW native!
Missouri Prairie Foundation

It Starts with a Plant

Choose Natives and Let the Ecological Buffet Begin

By Scott Woodbury

Over the decades there has been an endless march of wildlife showing up at my native plant buffet: I've noticed bees buzzing flowers to gather pollen, finches picking coneflower seeds, caterpillars nibbling milkweed leaves, ants licking spikenard nectaries, hummingbirds visiting trumpet flowers, bumblebees napping in rosinweed flower clusters, sparrows nesting in hawthorns, butterflies sipping nectar from all sorts of flowers, dragonflies prowling the prairie, wasps paralyzing spiders, crab spiders ambushing bees, and praying mantises looking back at me. This is just the tip of the biological iceberg that appears above ground in my small garden.

At a Wild Ones chapter meeting I attended long ago, I heard the words "plant it and they will come," but at the time I couldn't begin to understand what that meant. Did that simply mean that I'd attract thirsty butterflies to blazing star and milkweed or was I just providing a little extra food and cover for wintering birds? It took awhile for the words to sink in; what I discovered was more complex and required more time to discover. It took me hours and years and even decades to see the plant-insect animal relationships unfold before my eyes, and the life supported by my garden continues to surprise me every moment that I take the time to look.

MDC

Predators like this fence lizard, above, and crab spider, below, benefit from the insect prey attracted to native plants, and are themselves links in a larger food chain.

BRUCE SCHUETTE

What I've come to know is that virtually every living creature that enters my garden is there for a reason. I spied the stealthy bobcat that ate the snake in the tall grass that patiently ambushed the fence lizard by a log that munched a moth that came to the garden to feed on the sweet nectar of evening primrose. This particular chain of events began with a native plant, in this case, evening primrose, and took me years to observe. The more time I spend in the garden, the more of the biological iceberg becomes visible to me. I'm eager to come home to see what nature reveals to me and my six year old. Will the purple coneflower that feeds the bee, which feeds the dragonfly, which feeds the frog also feed a snapping turtle in the pond? And what then eats snapping turtles? Makes me wonder what I'll attract if I plant buffalo grass!

Encounters with nature like those I've mentioned above don't happen in a traditional garden devoid of native plants. This may be music to your ears if you don't like bugs, but there is a consequence, a major one. According to Dr. Doug Tallamy, author of *Bringing Nature Home*, 96

percent of terrestrial bird species feed their young on invertebrates. He also states that it takes 4,800 caterpillars to feed a nest full of baby chickadees. I wonder how many leaves it takes to feed 4,800 caterpillars? A task for my budding naturalist first grader! According to Tallamy, those caterpillars eat the leaves of native oaks, cherries, willows, plums, birch, pine, and hickory trees, to name the top few. Not ginkgos, as much as I love them. Not golden rain trees, or saucer magnolias. Natives attract wildlife, which evolved with our native plants over thousands of years. Without native trees, birds are in trouble, their decline due to habitat loss and a lack of suitable insect food for their young.

Tallamy and research associate K.J. Shropshire also compiled extensive lists of other plants, including perennial, herbaceous wildflowers that provide food for butterfly and moth larvae. Sunflower species, for example, support 73 species; goldenrods, 112! Non-native zinnias, only six, and hostas and daylilies: zero.

SCOTT WOODBURY

American toads are one of many appealing wildlife species you can help attract and support by gardening with natives.

My experience as a gardener tells me that there is so much more that could be happening in places where we grow lawn. Tallamy states that there are more than 40 million acres of lawn in the United States—there is much more lawn, in fact, than the acreage of all national parks combined.

This past August I visited a big chunk of that lawn in South County St. Louis. I consulted with city officials and park residents who hope to convert about one fifth of an acre from turf to native wetland plants in a couple of low areas. The rest of the 63-acre park is entirely mowed turf. My advice was to start small and go native, and to develop a native garden that suits the owner who may be a little gun-shy. Organize a team of volunteers who can maintain it, especially during the first two years, and then yearly thereafter. With careful planning, maintenance, and education this small native planting could flourish, support a diversity of insect and other species, and possibly inspire a neighborhood to imagine what could come next!

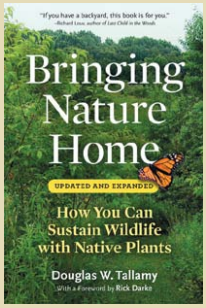
Horticulturist Scott Woodbury is the Curator of the Whitmire Wildflower Garden at Shaw Nature Reserve, where he has worked with native plant propagation, design, and education for 24 years. He also serves on the Missouri Prairie Foundation's Grow Native! Committee.

Top Ten "Beginner" **Natives**

If you or friends, family, or neighbors are interested in gardening with natives, but don't know where to begin, consider trying one or more of the following plants on this list. I recommend these species for their ease of maintenance, hardiness, multi-seasonal interest and wildlife potential. –Scott Woodbury

Shining bluestar (*Amsonia illustris*): rain gardening, drought and clay tolerant
Butterfly milkweed (*Asclepias tuberosa*): butterfly magnet
Aromatic aster (*Aster oblongifolius*): fall flowering
Blue wild indigo (*Baptisia australis*): bumblebee magnet
Palm sedge (*Carex muskingumensis*): rain gardening, low maintenance ground cover
Purple coneflower (*Echinacea purpurea*): goldfinch magnet
Copper iris (*Iris fulva*): rain gardening
Slender mountain mint (*Pycnanthemum tenuifolium*): butterfly magnet
Orange coneflower (*Rudbeckia fulgida* var. *umbrosa*): rain gardening, low-maintenance ground-cover
Prairie dropseed (*Sporobolus heterolepis*): drought tolerant, low-maintenance ground cover

Consult the native plant database at www.grownative.org for growing information. At the site, you can also find a list of landscape designers and landcare professionals to help you establish and maintain a planting or garden.



This 358-page softbound book by Dr. Doug Tallamy, published by Timber Press, is packed with information on how to sustain wildlife at home with native plants. *Bringing Nature Home* is written in an entertaining, easy-to-read style and accompanied by many color photographs. MPF is selling the book for $16, including shipping. Proceeds support MPF's Grow Native! program. To order a book, send a check for $16 made out to Missouri Prairie Foundation, along with your shipping address, and mail it to Doris Sherrick, 10807 E. 205th Street, Peculiar, MO 64078. Doris, MPF's Vice President, will mail you a copy.

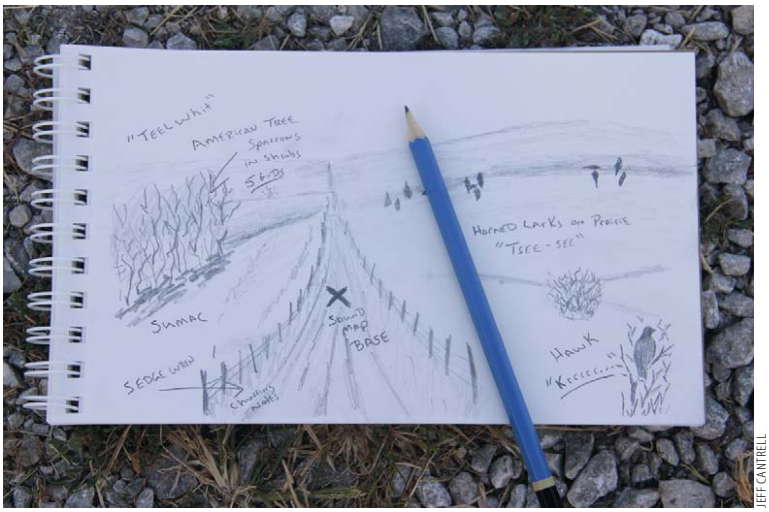

CYNDI COGBILL

Sound Mapping

Hone Students' Observation Skills with Prairie Sound Maps

Exceptional observation skills are among the best tools a biologist or enthusiast of the outdoors can possess. The same goes for students of all ages and grade levels—listening skills are beneficial for a lifetime of learning. Expanding and refining powers of observation can be an organized activity for homeschooled families and educators of public and private schools, as well as for adult groups. As teachers encourage more writing and nonfiction reading to their students, sound maps can enhance these activities.

To give observation exercises diversity and depth of knowledge, educators may target as many senses as possible—not just listening. By training the ear and using other senses, students can better establish a "sense of place." Feeling an affinity to a specific place can help make students feel part of the scene they are observing, and in some cases, a functioning part of the natural community.



JEFF CANTRELL

Sound maps engage learners and lead to learning about landscape features, geography, orienteering, wildlife census, and much more.

One way to accomplish this is to create a sound map of a native grassland. Certainly, sound mapping can be conducted on school grounds or a nearby park, but from an ecological standpoint, a "field experience" is appropriate.

First, have students space themselves out on the open area, close their eyes, and for a two-minute period listen with deep attention to detail of sounds around them. After the initial listening session, lead a discussion on what was heard. As a class, collectively make note of the items discussed. Were the sounds natural or manmade? Could students distinguish if the sounds were coming from near or far? The students can be as general or detailed in their description as the educator wishes (e.g., *bird* vs. *red-tailed hawk* or *buzzing sound* vs. *a prairie cicada*).

Next, separate the students again to conduct a sound map on a notebook or journal page. Students will observe again intently with their eyes open and ears alert. Have them place an "x" in the center of the page, and that symbol will represent the observer. The instructor may wish for them to sketch in cardinal directions and landmarks such as roads, fences, shrubby draws, marsh, etc. Now for a timed period the students will fill in the sounds they hear. They may draw or write notes indicating how far sounds are from the "x."

After completing the exercise, students will hopefully have gained a sense of place in that habitat and some awareness of the life that is going on all around them. Use discussion to explore who or what is calling/singing. Ask questions: Are animals associated with nearby cover or plants? Is the wind a factor? Did the students track movement of an animal by sound? Can they determine a population of certain organisms?

Mapping After School and After Work

One of my favorite sound mapping sessions is choosing a comfortable day in late fall or winter. This works nicely for educators of adult learners like master naturalists or any after-school youth group. The day length is shorter during this season with the sun setting around 6:00 p.m.—creating a window of time after work or school to investigate life at twilight. Often the prairie teems with activity around sunset with waterfowl moving overhead, northern harriers chirping, short-eared owls barking, and calls of blackbirds and winter sparrows providing material for wonderful group discussions—especially if coyotes add to the chorus at the end of the session.

Do you have a question about using prairies for in-depth learning for scout, school, or homeschool studies? Please feel free to contact Jeff at swampcandle1@gmail.com.

Missouri Grade Level Expectations: EC.1.A.6.a, IN.1.D.5.a, IN.1.D.6.a

Field Tours of Grassland Management

SUSAN HILTY

This year, I had the opportunity to meet with prairie landowners, ranchers, and researchers at two enlightening events—the Quail and Native Pollinators Day at the University of Missouri-Columbia's Bradford Research and Extension Center and the field day at Wayne and Julie Copp's Tallgrass Bison Ranch in Auburn, Kansas. Below are highlights from both experiences—I encourage you to attend these events in 2014.

This past summer, I ran the cows once through my new grass and forb planting to remove some of the annual grass and weed competition. July rain had given the annual ragweed a huge boost, and it was shoulder high. Animal performance was excellent on the summer annuals, much better than when they were returned to the cool-season grasses even though the latter remained quite green until the intense heat of August and September. The cattle grazed more where the grass was open than where the ragweed was dense and tall so I ended up having to have it high-mowed.

As winter approaches, I'll collect grass and forb seed where I can find it on nearby roadsides and prairie remnants and spread it on the new planting.

Yours for better grasslands,
Steve Clubine

Quail and Native Pollinators Day at Bradford Farm

Approximately 110 landowners and agency folks attended the Bobwhite Quail and Native Pollinator Habitat field day on June 20, 2013 at the University of Missouri's Bradford Research and Extension Center. Featured stops were early-successional habitat for bobwhite quail, flowers for native pollinators, cover crops, biomass crops, and more. I staffed a Truax grass drills booth most of the day so I didn't get to go on field trips until the last one of the day, but it was a good one.

Ray Wright, agriculture research specialist with the University of Missouri–Columbia, spoke on using diverse mixtures of native forbs and grasses as biomass for alternative energy, and Max Alleger, Missouri Department of Conservation (MDC), talked about the value of cover crops for

RAY WRIGHT

A diverse native biomass plot, with gray-headed coneflowers, rattlesnake master, and wild bergamot, at the University of Missouri's Bradford Research and Extension Center.

ground-nesting bird nest and brood cover and for controlling problem agricultural weeds. Wright said that bobwhite quail habitat has a greater emphasis on the research farm than it ever has because of interest expressed by visiting crop producers in providing for bobwhites.

Northern bobwhites are becoming less common in Missouri and other states. Traditional, chemical-based agriculture and tall fescue pastures leave little usable cover or insect foods for bobwhites or other wildlife. However, new developments—such as diverse native prairie grasses and forbs for biomass, and cover crops to help control glyphosate-resistant annual weeds, increase soil organic matter, and increase water infiltration—offer new hope for wildlife like bobwhites whose habitats include native early-successional ones.

Cover Crops: Wright commented that terraced crop fields may have been one of the worst disasters for agriculture because terrace channels were designed in this part of the cornbelt to carry water from heavy rain events gently off the field, preventing gullies. In the process, however, rainfall has less time to soak in and soils become progressively drier throughout the year and over years. Today's minimum tillage, no-tillage agriculture, and cover crops (between harvested crops) keep more plant residue on the field, which in turn increases organic matter, thereby reducing runoff and making the soil act like a sponge to retain moisture. One of the most striking examples of the effect cover crops can have that we saw at Bradford Farm was a strip that had had a cover crop and was almost totally devoid of marestail (*Conyza canadensis*), a problem crop weed, while traditional chemical agriculture strips on either side were heavy with glyphosate-resistant marestail.

MDC's Max Alleger pointed out that cover crops, which aid weed control and increase water infiltration, can also provide excellent nesting and brood cover for bobwhite quail. Timing of tillage or crop planting can be critical, however, because you don't want to encourage quail use for nesting only to destroy nests or broods during tillage or with spray equipment. If the field is going to be used for a summer crop such as corn or soybeans, it's better to work it up in late April or early May before nesting begins. Also, a summer smother crop of a diverse mix of warm-season annuals can provide nesting and brood cover while reducing the seed load of herbicide-resistant weeds.

Biomass: Wright also pointed out the versatility of native biomass cover versus introduced (and perhaps invasive) giant miscanthus (*Miscanthus giganteus*). Miscanthus is a monoculture, biomass crop having little value for hay or forage if a biomass market isn't available after the crop is ready for harvest post-growing season. Using native grasses and forbs for biomass provides producers the option of grazing or haying in mid-summer if the prospects of a biomass market aren't promising. (The biomass processing plant in west-central Missouri has been shut down for the last three years.) Native biomass also provides habitat for bobwhite quail, cottontail rabbits, native pollinators, and other wildlife while increasing soil organic matter and increasing rainfall infiltration.

My compliments to Ray Wright and Max Alleger for excellent field stops and comments.

Landowners Share Prairie Restoration Efforts

It wasn't in Missouri, but it wasn't far away. Wayne and Julie Copp, owners of Tallgrass Bison Ranch in Auburn, Kansas, which is a few miles west of Topeka in the northern Flint Hills, hosted a field day to view their 320-acre prairie. Their use of patch-burn grazing has resulted in excellent bobwhite quail and greater prairie-chicken habitat.

Wayne has spoken at several Missouri Bison Association meetings and at the Grazing for Prairie Restoration Seminar that preceded the 2001 Missouri Natural Resources Conference. Years ago, Wayne began burning parts of the native pasture where his bison had grazed little in order to shift grazing pressure. The idea worked wonderfully. He also noticed he had lots of quail, and this spring, saw his first brood of greater prairie-chickens since he first bought the prairie. He claims he killed several during haying the first year after purchase.

Inspired by the great plant, animal, and insect diversity, Wayne asked me if a couple friends (Stevie Collins and Marva Weigelt) and I would coordinate a field event for a group of grassland and wildlife enthusiasts. Sixteen folks, representing Audubon of Kansas, Kansas Chapter of the Native Plant Society, Missouri Department of Conservation staff, and six landowners attended the field tour and dinner. Seven stayed over for the morning trip to view prairie restoration following tree removal (some folks would have called it a forest), fence relocation to reduce an avian hazard, and prairie recovery following several years of heavy bison grazing on three nearby properties.


STEVE COOPER

Wayne Copp, host landowner, holds hi-tensile fence for guests to pass under during a tour of tree removal for prairie restoration on his neighbor's prairie near Auburn, Kansas. The tour group, by the way, suggested the fence be relocated from the top of the ridge where it was a hazard to avian grassland species.

Also featured on the tour were invasive plant control, tree removal by Wayne and nearby landowners to produce a larger area of habitat improvement for quail and prairie-chickens, and prairie regeneration. The event was entirely landowner conceived, driven, and hosted.

Wayne noticed that when he began patch-burn grazing, trails used annually by bison, which can cause erosion problems, were virtually eliminated because movements shifted with each burned patch. He also noticed that fences and gates were contributing to trails and erosion, so he removed all interior fences. Bison also will use vehicle tracks so Wayne limited vehicles to a central ridge trail. Sericea lespedeza, teasel, tall fescue, and tree sprouts are spot-treated using backpack sprayers except in some places where tall fescue must be broadcast sprayed with a boom sprayer or boomless nozzle sprayer.

Bison are noted for wallowing. Wallows are normally not large, about six feet in diameter, and usually found on ridges although they will sometimes use a drainage head-cut. When wallows fill with rainwater, they are ephemeral pools

MARVA WEIGELT

MARVA WEIGELT

At Wayne and Julie Copp's Tallgrass Bison Ranch field day, tour group members enjoyed seeing a bison wallow. When wallows fill with water, they create ephemeral pools for amphibian breeding. Group members also noted regal fritillaries and other butterfly species gathering nectar from the native wavyleaf thistle.

STEVE CLUBINE

for amphibians and reptiles. In unburned or all burned prairie pastures, wallows may be fairly static, that is, used annually, but with patch-burn grazing, use may shift. Unused wallows are usually vegetated with annual plants such as annual sunflower, ragweed, or swamp sumpweed.

The normally conspicuous burned and grazed patches were less noticeable due to the time of year, significantly greater rainfall this year, and reduced bison numbers because ponds went dry in the 2012 drought, which required Wayne to sell some animals. Wayne's normal stocking rate is 8 to 10 acres per animal unit for year-around grazing.

During the tour Marva Weigelt recorded these butterflies: regal fritillary, monarch, black swallowtail, eastern tailed-blue, pearl crescent, gray hairstreak, giant swallowtail, and orange sulfur. The following morning, on Howell Johnson's restored prairie pasture a few miles away, she identified checkered white, orange sulphur, northern cloudywing, eastern tailed-blue, little yellow, pearl crescent, and sachem skipper butterflies. Marva told the group that unburned prairie is critical for any insect eggs or larvae that overwinter in residual vegetation. Burning part of the prairie and irregular burns, which are typical with patch-burn grazing, are very important for prairie butterflies, bees, and other insects. Native wavyleaf and tall thistles are important nectar sources for butterflies although they will also use introduced musk and bull thistle (the introduced thistles have been greatly reduced by thistle head and rosette weevils).

Those who stayed overnight enjoyed a hearty breakfast in the little town of Dover followed by a tour of tree removal and prairie regeneration, comparing soil disturbance and prairie recovery using a tree clipper versus a bulldozer. Howell Johnson and David Whitaker used USDA's Environmental Quality Improvement Program (EQIP) to help pay for large-scale tree removal. Wayne did all his prairie work without government help, using his three sons and daughter. Wayne is already planning another event next year. I will be sure Missouri Prairie Foundation members know about it.

USDA Announces Results for 45th Conservation Reserve Program General Sign Up

The U.S. Department of Agriculture (USDA) has accepted 1.7 million acres nationwide into CRP, as offered under the 45th Conservation Reserve Program (CRP) general sign-up that ended June 2013. The Missouri Farm Service Agency, which administers CRP sign-ups, received 2,054 offers on more than 83,000 acres of land, demonstrating CRP's continuing appeal as one of our nation's most successful voluntary programs for soil, water, and wildlife conservation. Since 2009, the USDA has enrolled nearly 12 million acres not previously enrolled in CRP. Currently, there are more than 26.9 million acres enrolled on 700,000 contracts nationwide. Of this total, 1.1 million acres are currently enrolled in Missouri.

The total acres above include 177,130 acres in Missouri enrolled in CRP's Continuous Enrollment Programs, which target habitat conservation on especially important lands. For example, in March 2012, President Obama dedicated one million acres of CRP to Continuous Enrollment Programs to

conserve wetlands, grasslands, and wildlife. This year, nationwide farmers and ranchers have already offered more than 370,000 acres under Continuous CRP signup.

Under CRP, farmers, ranchers, and other landowners plant grasses and trees in fields and along streams or rivers. The plantings prevent soil and nutrients from washing into waterways, reduce soil erosion that may otherwise contribute to poor air and water quality, and provide valuable habitat for wildlife. In return for not cropping land accepted into CRP, landowners "rent" the idle land to the federal government and receive rental payments.

In 2012, CRP helped to reduce nitrogen and phosphorous losses from farm fields by 605 million pounds and 121 million pounds, respectively. CRP has restored more than two million acres of wetlands and associated buffers and reduces soil erosion by more than 300 million tons per year. CRP also provides two billion dollars annually to landowners—dollars that make their way into local economies, supporting small businesses and creating jobs.

In addition, CRP sequesters more carbon dioxide than any other conservation program in the country, and also reduces both fuel and fertilizer use. Yearly, CRP results in carbon sequestration equal to taking almost 10 million cars off the road.

The USDA selects offers for CRP enrollment based on an Environmental Benefits Index (EBI) comprised of five environmental factors plus cost. The five environmental factors are: (1) wildlife enhancement, (2) water quality, (3) soil erosion, (4) enduring benefits, and (5) air quality.

Ask Steve

Here are a couple questions I received at the Bobwhite Quail and Native Pollinators Field Day that could be helpful to some of you.

Question: ***If you were to plant one warm-season grass for grazing, what would it be?***

Answer: The short answer is big bluestem because it is the climax grass of the prairie.

However, I always plant a mixture, never a monoculture. The mixture may be predominantly big bluestem, but also will contain eastern gamagrass, little bluestem, and indiangrass, and maybe sideoats grama, switchgrass, prairie dropseed, Canada wild rye, Virginia wild rye, and several forbs. There are lots of reasons to plant a mixture instead of a monoculture. All the soils in a field aren't the same. Mixtures tend to establish better cover and more quickly, and are also more stable. Indiangrass, switchgrass, and sideoats grama often show up quicker and appear like the predominant cover, but give way in time to big bluestem, little bluestem, and eastern gamagrass.

Mixtures provide better wildlife habitat than monocultures especially if some forbs are planted at the same time. Livestock also gain better on mixtures than monocultures, according to studies done by Dr. Bruce Anderson, University of Nebraska–Lincoln. As the saying goes, "Mother Nature abhors a monoculture," and for good reasons.

Question: ***Which grazing method—continuous, management-intensive, or high stock density—is best for nesting and brood-rearing grassland wildlife?***

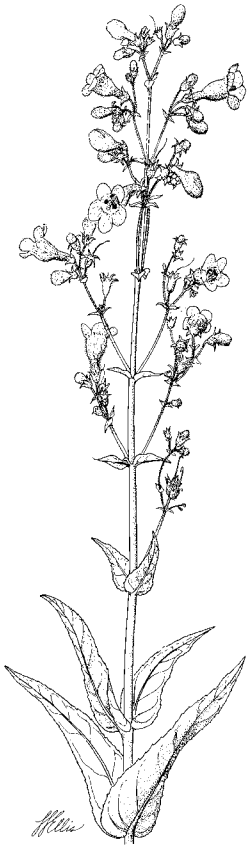
Answer: Short answer—light to moderate season-long continuous grazing is best for nesting habitat. Heavy continuous grazing, management-intensive grazing, and high stock density grazing all provide problems for nest survival.

Most grassland birds need structured residual cover for secure nesting. That means plant structure left over from the previous growing season or minimally disturbed during the current nest-site selection, egg laying, and incubation period. Light and moderate density grazing or adequate rest periods can provide this.

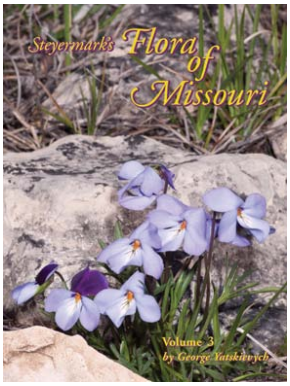
In our rainfall regime, native herbaceous cover gets too dense for optimum nesting and brood-rearing without grazing, although high-clipping may help reduce vegetation height and farm implement tracks can create "avenues" for wildlife movement. Management-intensive and high stock density grazing usually have stocking densities that are too high during the prime nesting period for nests to survive trampling. Some species may renest in new growth after the first grazing, but cover can become too dense for brood movement after hatching. Because of the long rest periods normally used with high stock density grazing, this method tends to be better for both grassland wildlife and plants, but can be improved for wildlife by using a light stocking rate a few weeks after the initial grazing to ensure travel corridors for wildlife.

MANAGEMENT QUESTIONS?

If you have prairie or native warm-season grass management questions, send them to me at steveclubine@embarqmail.com or 703 S. Main, Windsor, MO, 65360. I will try to include as many as I can in *Native Warm-Season Grass News*.



Volume Three of the **Flora of Missouri** Published



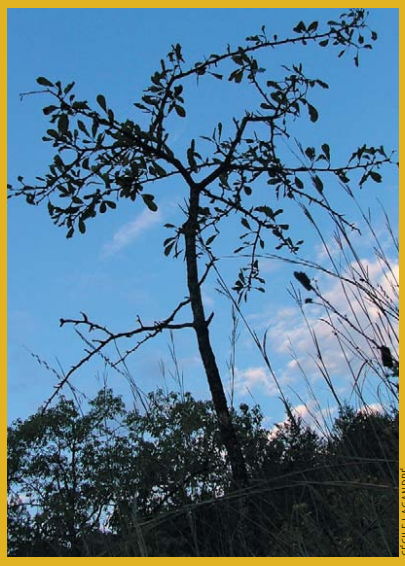
Congratulations to MPF member Dr. George Yatskievych on the publication of the final of his three volumes of the revised edition of *Steyermark's Flora of Missouri*. The Missouri Botanical Garden Press published the three-volume revision. The third volume contains treatments of the second half of the dicots, comprising 1,031 species and 124 hybrids in 84 plant families. It includes 194 full-page plates of black-and-white drawings illustrating nearly all of the plants and a distributional map for each species.

The book contains treatments of a number of large and economically important plant families in the Missouri flora, including the legume (Fabaceae), oak (Fagaceae), mint (Lamiaceae), mallow (Malvaceae), evening primrose (Onagraceae), plantain (Plantaginaceae), smart-weed (Polygonaceae), rose (Rosaceae), night-shade (Solanaceae), and grape (Vitaceae) families. Each species is described in detail, and there are lengthy notes on taxonomy, distribution, plant uses, and conservation concerns.

The Flora of Missouri Project is a collaboration between the Missouri Botanical Garden and the Missouri Department of Conservation. One of its main goals has been a revision of the late Dr. Julian Steyermark's exemplary manual, *Flora of Missouri*. The new edition has grown into a three-volume encyclopedia of Missouri plant life that is an essential reference for botanists, conservationists, land managers, gardeners, native plant enthusiasts, and anyone else with a need for information on the diversity, abundance, and taxonomy of the state's diverse flora.

Dr. George Yatskievych spent 26 years to complete the three volumes of the second edition of *Steyermark's Flora of Missouri*, which is approximately 3,600 pages in all and cumulatively treats 2,815 species plus 427 additional subspecies, varieties, and hybrids. The third and final volume is available from the Missouri Botanical Garden Press for $65.00, plus shipping. A 20% discount is available on orders received before November 1, 2013. For more information or to order, contact MBG Press Orders, Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166-0299; www.mbgpress.info, (314) 577-9534 or (877) 271-1930, or orders@mbgpress.org.

News from **Feaster Glade**


CÉCILE LAGANDRÉ

"The road of restoration work leads to a land of rewards," is what I hear, or gather, or understand the prairie grasses whisper in the wind. Where is my promised reward? Since seed grenades aren't used on Feaster Glade, we don't get to play with any entertaining explosives. Fire is an exciting tool to work with, apart from its scary potential escapes. Rewarding feelings hardly grow out of the multitude of Latin and English names I am constantly learning, forgetting, and relearning.

I strip the lower branches of a few red cedar trees, and, even before my husband Dave comes around with a chainsaw to remove/harvest their trunks, I recognize a tuft of poverty grass which, I imagine, no human being has laid eyes on forever. As my fingers caress the grass's curly beauty, my eyes drift onto a skeletal and knobby gum bumelia I had never noticed before. My jaw drops. Between shallow breaths, plenitude invades my thoughts and I understand at last… continual discoveries of the richness of this place are the best rewards.

The restoration work in our two-acre, adjacent savanna by the barn has also been providing rewards. After a winter 2012 prescribed burn, a fall 2012 herbicide application, and three seasons of selective Remedy application, this summer's vigilant sericea control has proven challenging—wandering through the unit to try and spot the darn things allows continuous opportunity to notice recovering flora. Being distracted by so many plant species (many new to me) with a few pounds of herbicide on my back has not proven an efficient way to either enjoy a state of completeness, or complete my work!

—MPF member Cécile Lagandré and her husband Dave Van Dyne have the privilege of calling Feaster Glade their own; Cécile shares tales of its restoration in the *Missouri Prairie Journal*.

Gum bumelia, a fascinating member of Feaster Glade, is a tree with multiple English common names (among them chittim wood, gum elastic, woolybucket bumilia, gum bully), and two scientific ones: the older obscure *Bumelia lanuginosa* meaning "European ash tree" + " wooly," and the brand new colorful *Sideroxylon lanuginosum*, translating to "iron wood-interior material" + "wooly." The confusion created by plant renaming, either DNA driven or for nomenclature clarification, is all forgiven in appreciation of the origins of the gum bumelia family name, Sapotaceae, from Natuatl, the Aztec's language.

In Memoriam

PHOTO COURTESY DIVISION OF BIOLOGICAL SCIENCES, UNIVERSITY OF MISSOURI

Dr. Clair Kucera at Taberville Prairie in 1978.

Dr. Clair Kucera (1922–2013)

MPF founding member Dr. Clair Kucera enjoyed a 58-year professional career as a professor, ecologist, author, and conservationist, and was known as a passionate environmental advocate and the reason the University of Missouri–Columbia's 160-acre Tucker Prairie Natural Area has been protected.

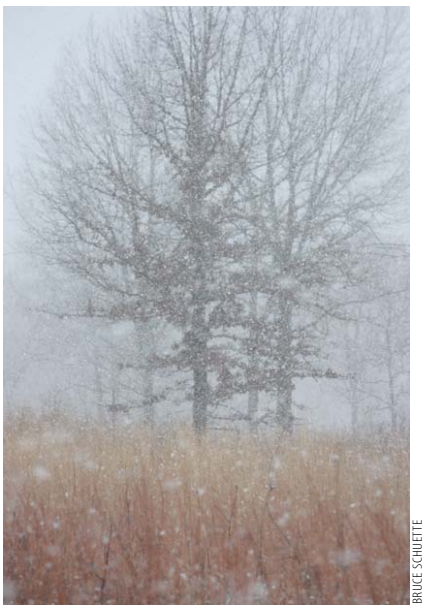
Dr. Kucera enrolled in Iowa State Agricultural College (now Iowa State University) after graduating high school in Iowa in 1940, but his studies were interrupted by World War II. Dr. Kucera enlisted in the Army in 1943 and attended officer training school in Oklahoma. He entered active duty in Europe, where he rose to the rank of first lieutenant attached to the 660th field artillery as a forward observer.

He spent a year in England after V-E day until his discharge in 1946, when he returned to Iowa state on the G.I. Bill and married his wife, Elizabeth Tremmel. In 1947, he graduated with a bachelor's degree in forestry. He went on to earn his master's degree and doctorate from Iowa State in plant ecology.

Dr. Kucera became the University of Missouri's first ecology professor in 1950 and over the ensuing 37 years taught plant geography, plant taxonomy, and environmental studies. In the early 1950s, Dr. Kucera learned about Tucker Prairie, owned by the Tucker family of Fulton, and took his classes there to learn. When the Tucker family announced they would sell their land, Dr. Kucera began to single-handedly raise money for the University to purchase the prairie.

Dr. Kucera retired from the University in 1987 and went on to pursue his interest in ecology through research. He published more than 60 journal articles and published four books, including *The Grasses of Missouri* and *The Challenge of Ecology*, published in English and in Spanish.

–content from a *Columbia Missourian* article on Dr. Kucera by Chanelle Koehn, 30 July 2013



BRUCE SCHUETTE

Memorials

In Memory of Bobbie Overly

MPF gratefully acknowledges Orbie Overly for his gift in memory of Bobbie Overly.

In Memory of Virginia Christisen

MPF gratefully agknowledges Robert and Patricia McHenry, Steve and Christine Sheriff, Ross and Crystal Peterson, and Elsie and James Mace for their gifts in memory of Virginia Christisen, wife of Don Christisen, MPF's co-founder. Mrs. Christisen enjoyed the beauty of nature and all things wild.

In memory of Clair Kucera

MPF gratefully acknowledges Alice Christensen, Brent Edwards, Bob and Phyllis Miller, Nancy Brakhage, Steve and Debbie Clark, Dr. Susan Flader, William and Susan Fales, Paul and Robin Wallace, David and Nancy Bedan, Herbert and Susan Tillema, Ron and Jan Haffey, Ivor Fredrickson, Lisa Cagle, Ron Throneberry, Jack Jacobs, Margaret Tyler, and Stephen Savage for their contributions in memory of Dr. Kucera.

Missouri Prairie Founda

Please consider adding your name to the growing list of MPF lifetime members. Lifetime membership is available for a gift of $1,000 or more and has no expiration. Lifetime membership benefits also include two complimentary admittances to MPF's annual dinner. Thank you, lifetime members, for your generous contributions to MPF.

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Call for Proposals for MPF's 2014 Prairie Gardens Grant

Gardening and conservation groups, parks, schools, and other entities are invited to submit proposals to MPF's Prairie Gardens Small Grants Program. In 2014, MPF would like to award $500 to help fund the establishment of a prairie garden or planting. Gardens must be available to the public and must incorporate native prairie species. Matching funds are not required, but proposals with secured matching funds may be evaluated higher than others.

Proposals should address explanation of purpose, include a budget and time frame for completion, and design, maintenance, and interpretation plans. Please limit proposals—including any diagrams or other graphics—to two typewritten pages. Letters of support are also welcome. Proposals should be submitted no later than March 3, 2014 and the grant award will be announced April 1, 2014. Proposals should include contact information. Send proposals to info@moprairie.com. Questions? Call 888-843-6739.

ROBERTA VOGEL-LEUTUNG

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Kenneth Spieckerman
Dorothy and John Stade
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W. Randall Washburn
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BRUCE SCHUETTE

YOUR MEMBERSHIP MATTERS!

Member support is crucial to MPF's work. If you are not a member, please send your membership dues today. If you are a current member, please note that your expiration date is printed above your name on the back cover. Prompt renewal helps our conservation work. If you are able, please consider increasing your membership level.

To become a new member, renew your membership, give a gift membership, or make an additional donation outside of annual membership, please send payment and address information to

Missouri Prairie Foundation
c/o Martinsburg Bank
P.O. Box 856
Mexico, MO 65265-0856

(Please use MPF's Columbia, Missouri address only for general correspondence.)

You may also contribute on-line via PayPal at www.moprairie.com, Donate.

If you have any questions about your membership, please contact Jane Schaefer, who administers MPF's membership database, at janeschaefer@earthlink.net or call 1-888-843-6739.

Membership Levels
(individual, family, or organization)

Regular and gift memberships: $35
Friend: $50
Supporting: $100
Contributing: $250
Sustaining: $500
Life (no membership expiration): $1,000
Crawford & Christisen Compass Society:
Annual Gift of $1,000 or more from lifetime members (cumulative or lump sum in a year)
MPF Silver Patron: Annual Gift of $5,000 to $9,999
MPF Gold Patron: Annual Gift of $10,000 or More

See www.moprairie.org, Donate, for contributor benefits.

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PLEASE NOTE that your MPF membership expiration date is now printed with your address. Renewing promptly will save MPF costs of mailing renewal reminder letters. To renew, see page 31.

Calendar of Prairie-Related Events

✻ Missouri Prairie Foundation Events

2014 MPF Board Meetings Save the Dates!

Members are encouraged to attend these meetings, all of which will be held at 10:00 a.m. unless otherwise noted.

Saturday, January 25, 2014 (inclement weather date: Saturday, February 1, 2014). Home of Dan and Margy Chiles, Bois D'Arc, MO, eleven miles west of downtown Springfield. Members are invited to join a potluck lunch and tour of the Chiles' Water Sense-certified, Department of Energy Challenge home at 1:00 p.m. following the meeting. RSVP to 417-788-2308 by January 21, 2014.

Saturday, April 12, 2014. Burns & McDonnell Headquarters, 9400 Ward Parkway, Kansas City, MO 64114. Members are invited to tour the rain gardens on the Burns & McDonnell campus at 2:00 p.m., following the meeting. RSVP for the tour to 888-843-6739 or info@moprairie.com by April 7. If you plan to attend the board meeting at 10:00 a.m. as well, please let us know.

Saturday, July 26, 2014. Prairie Fork Conservation Area, Williamsburg, MO.

Sunday, October 12, 2014. 9:00 a.m. Dr. Wayne Morton's prairie outside of Cole Camp, to follow Annual Meeting and Evening on the Prairie events the day before.

October 19, 2013—Wildflower Seed Collecting at Cuivre River State Park, Troy. Morning. Sponsored by St. Louis Audubon and Mo. Dept. of Natural Resources. RSVP to Bruce Schuette at basch@centurytel.net by October 15.

✻ **November 6, 2013**—2013 Grow Native! Professional Member Conference. Non-members welcome too! Speakers will present on using native plants to manage stormwater, native plants and needs of private landowners, and other topics. Hosted by University of Missouri-Columbia and Mizzou Botanic Garden. For registration form and other information, visit www.grownative.org.

✻ **Winter Birding with MPF Technical Advisor Jeff Cantrell**—Both programs below are free of charge. Dress for the weather. Suggested participant age: 12 years old to adult. Further instructions will be given prior to the events.

- **Jan. 11, 2014:** Short-eared owl & Bird of Prey Trip, Prairie State Park and Shawnee Trail Conservation Area, Barton County. Meet at the Prairie State Park Visitor's Center at 4:00 p.m. To register contact Jeff at swampcandle1@gmail.com or 417-629-3423.
- **Feb. 8, 2014:** Getting to Know Your Raptors: Bird of Prey Workshop. Jeff will conduct this free classroom workshop at Prairie State Park from 1:00 to 3:00 p.m. Jeff will cover easy field identification tips and the life history of our prairie raptors.

  Weather permitting, there may be an opportunity for short-eared owl viewing at a nearby conservation area after the class. To register, contact Prairie State Park at 417-843-6711 or Jeff at 417-629-3423 or e-mail Jeff at swampcandle1@gmail.com.

✻ **Feb. 15, 2014**—MPF Work Day at Coyne Prairie, 10:00 a.m. to 3:00 p.m. Volunteers are needed to clear and pile wood from a draw. Please bring gloves, handsaws, chain saws, protective gear, and a sack lunch. RSVP to richarddatema@att.net or 417-818-1138.

✻ **Feb. 22, 2014**—MPF Work Day at Stilwell Prairie. 10:00 a.m. to 3:00 p.m. Volunteers are needed to cut brush. Please bring gloves, hand saws, chain saws, protective gear, and a sack lunch. RSVP to richarddatema@att.net or 417-818-1138.

March 21 & 22, 2014—Partners for Native Landscaping: A Workshop for Homeowners, Missouri Botanical Garden, St. Louis. Keynote Speaker: Dr. Doug Tallamy. MPF's Grow Native Program is a partner in this event. See www.grownative.org for details.

✻ **April 19 & 26, 2014**—MPF Annual Native Plant Sales at the City Market in Kansas City, Mo. Both dates: 8:00 a.m. to 1:00 p.m.

✻ **May 24, 2014**—MPF Field Trip to Union Ridge Conservation Area in Adair, Putnum, and Sullivan Counties. See related article on pages 18–21 and watch for details.

✻ **June 7 & 8, 2014**—5th Annual MPF Prairie BioBlitz at Gayfeather Prairie, Vernon County, beginning at 2:00 p.m. on June 7. Watch for more details.

✻ **August 23, 2014:** MPF Annual Dinner with Dr. Peter Raven, President Emeritus of the Missouri Botanical Garden, recipient of the National Medal of Science, former Guggenheim Fellow, and TIME magazine "Hero for the Planet," among numerous other honors and achievements. Springfield. **Watch for details.**

Watch for more spring hikes, tours, and Grow Native! workshops in the spring 2014 issue of the *Missouri Prairie Journal*, at www.moprairie.org, www.grownative.org, and MPF's e-news.

E-news alerts provide MPF members with news about more events. Send your e-mail address to info@moprairie.com to be added to the e-news list. MPF does not share e-mail addresses with other groups.

Events are also posted at www.moprairie.org.