SUMMER
2016
VOLUME 37
NUMBER 2

# Missouri Prairie Journal

The Missouri Prairie Foundation

*Protecting Native Grasslands*

1966 – 2016 50th anniversary campaign

**Prairie Moths**

**Prairie Spiders**

**Gardening for Monarchs**

**Lighting a Fire for Prairie**

# Message from the President

NOPPADOL PAOTHONG/MDC

MISSOURI PRAIRIE FOUNDATION
Protecting Native Grasslands
1966–2016
50th anniversary campaign
GOLDEN OPPORTUNITY FOR PRAIRIE PROTECTION
Prairies Now and Forever

*Join us at the MPF Annual Dinner and Silent Auction August 6*

Fewer than two months after you receive this issue of the *Missouri Prairie Journal*, MPF will hold its Annual Dinner—be sure to mark August 6 on your calendar now and plan to attend this special event that will be held in the Ballroom in the Reynolds Alumni Center of the University Club at the University of Missouri in Columbia.

As you know, this year MPF is celebrating its 50th Anniversary, and, in honor of that, this year's Annual Dinner promises to be especially enjoyable and significant. In addition to the elegant setting, the gourmet food, and fiddle music by Grammy-nominated Howard Marshall, attendees will have an opportunity to participate in a silent auction offering unique items—so come prepared to take part in this fun activity and look forward to purchasing an experience, service, or an item you've been wanting! The auction items will be available on-line prior to the dinner to provide you with an opportunity to view them and to get a head start on bidding for any item. Details will be available soon via the MPF e-news and at moprairie.org. Proceeds from this auction will be used to benefit the prairies we all love.

This year at the Annual Dinner, MPF will present its annual awards to individuals who have made outstanding contributions to the cause of prairie, and the Grow Native! Prairie Pioneer Award will be bestowed on an individual who has done exceptional work as a pioneer to promote native plants. We hope you will join us in honoring these very special dedicated people as they receive their awards.

Because 2016 marks the centennial of the Migratory Bird Treaty, which provides protection for birds migrating across international boundaries, MPF is especially pleased that the speaker for the evening will be Dr. Jane Fitzgerald with the American Bird Conservancy, presenting on our native grasslands and the birds that need them.

We look forward to having you join us August 6 as we celebrate at our special 50th Anniversary Annual Dinner! See back cover for more, and be sure to watch for your invitation in the postal mail with details and RSVP information.

Doris Sherrick, *MPF President*

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

# Summer

2016 VOLUME 37, NUMBER 2

10

14

18

22

4


**2** Message from the President

**4** **MPF Update**
**Prairie Conservation, Education, and Outreach**
*By Carol Davit, Jerod Huebner, and Doris Sherrick*

**8** **50th Anniversary Campaign Update**
*By Carol Davit*

**10** **Prairie Moths**
*By Phillip E. Koenig*

**14** **Grassland Spiders and Prairie Vegetation Variability**
*By Jesus Gómez*

**18** **Lighting a Fire for Prairie**
*By Carol Davit*

**22** Grow Native! **Gardening for Monarchs**
*By Susie Van de Riet*

**25** Steve Clubine's Native Warm-Season Grass News

**29** Jeff Cantrell's Education on the Prairie

**30** Prairie Postings

**Back cover** Calendar of Events



Editor: Carol Davit,
phone: 573-356-7828
info@moprairie.com

Designer: Tracy Ritter

Technical Review: Mike Leahy, Bruce Schuette

Proofing: Doris and Bob Sherrick

The *Missouri Prairie Journal* is mailed to Missouri Prairie Foundation members as a benefit of membership. Please contact the editor if you have questions about or ideas for content.

Regular membership dues to MPF are $35 a year. To become a member, to renew, or to give a free gift membership when you renew, send a check to

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

or become a member on-line at www.moprairie.org

General e-mail address
info@moprairie.com

Toll-free number
1-888-843-6739

www.moprairie.org

Questions about your membership or donation? Contact Jane Schaefer, who administers MPF's membership database at janeschaefer@earthlink.net.


On the cover:
**Prairie is big sky country: Dan Zarlenga captured both the summer Milky Way and ashy sunflowers in bloom at MU's Tucker Prairie in Callaway County. Zarlenga imaged the starry night sky in the background using a long exposure, and then lit the foreground plants in a separate exposure using light painting. This composite image was created by blending the two images together.**

# MPF UPDATE

## Prairie Conservation, Education, and Outreach


MIKE LEAHY

The 50th anniversary of the Missouri Prairie Foundation (MPF) calls to mind milestones throughout the organization's history. MPF's first publication was the *Prairie News*, organized and edited by Dick Dawson and friends. It was in 1979 that the *Missouri Prairie Journal* began, with Jerry Overton its first editor. Thirty-seven years of continuous publication—and with no advertisements—is a pretty impressive track record.

In 1994, Jane Heitman became the editor, and two years later, MPF president Warren Lammert approached me—I was working at the Missouri Botanical Garden at the time—and asked me if I would take a turn.

Two decades later, as I reflect on my own 20-year anniversary as editor, I continue to do what I set out for myself in this capacity: cover as many aspects of the prairie ecosystem as I can—as well as how prairie has impacted and continues to influence our culture, economy, and spirit. I, and future editors, will never want for material for the *Missouri Prairie Journal*, because of the rich biological diversity of prairies, new discoveries of how prairies benefit us, new prairie management and species-monitoring techniques, and the fascinating people who devote their careers and energy to studying prairie.

Without the contributions of authors, photographers, and illustrators, who generously offer their writing, photographs, and illustrations, we would have no *Missouri Prairie Journal*. Hats off to all who contribute to the magazine!

The elegant design of the *Missouri Prairie Journal*, for the past decade, is due to the talent of graphic designer Tracy Ritter. It is bittersweet for me to inform readers that this issue is the last that Tracy has designed. She is pursuing a new career path—that of elementary-middle school art teacher, a new endeavor at which she will excel. I am pleased, however, that MPF member Janice Wiese-Fales is stepping in as the new magazine designer. Like Tracy, Janice not only has years of design experience, but also a deep love for the natural world.

This year marks another anniversary for me: Five years as the MPF executive director. I'm grateful to continue to carry out work of a great organization, made up of exceptional board members, members, and a small staff working together to conserve priceless resources. Thank you for your support!

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

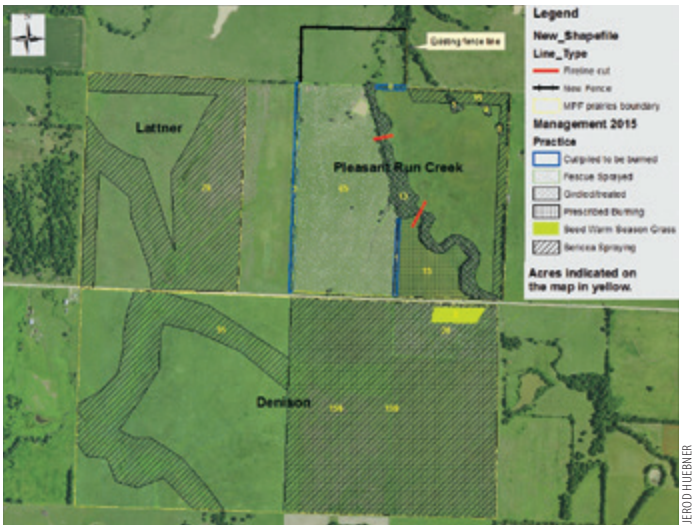
## Prairie Stewardship

CAROL DAVIT

Since I joined the MPF team in July 2015, I've enjoyed carrying out stewardship activities on MPF's prairies, working along side board members, volunteers, and Carol to conserve these gems. Annual management work plans for each site guide our work, and management practices we completed in 2015 set the stage for a great year in 2016.

MPF's prairie stewardship is made possible thanks to the financial contributions of our loyal members and other supporters. Here's a sampling of recent stewardship accomplishments:

- In the 2015–2016 fall/winter burn season, prescribed burns were completed on 17 different burn units across 16 MPF prairies: Linden's, Golden (original, Stump, and Norman tracts), Denison, Pleasant Run Creek, Gayfeather, Stilwell, Coyne, Welsch, Stark, Schwartz, Snowball Hill, La Petite Gemme, Friendly, and Drovers prairies for a total of 973 acres. Burn units are particularly showy the year following a prescribed burn so this presents a great opportunity to get out and see an abundance of blooming wildflowers on these prairies.
- Portions of several prairies were treated for tall fescue (*Festuca arundinacea*), which had encroached from neighboring properties and roadsides. Treatments were made both in fall 2015 after native vegetation had gone dormant, and in the spring before most native plants had emerged, with




JEROD HUEBNER

BOB SHERRICK

JEFF CANTRELL

JEROD HUEBNER

**MPF's Director of Prairie Management Jerod Huebner oversaw significant restoration work at MPF's complex of Pleasant Run Creek, Lattner, and Denison prairies in 2015–2016, as identified above. At right, Huebner led an MPF prescribed burn at Snowball Hill Prairie and flagged plants for seed collection at Carver Prairie. Burned portions of MPF prairies were showy with wildflowers, such as false garlic (*Nothoscorum bivalve*; above), blooming at Linden's Prairie this past spring.**

a grass-selective herbicide so early emerging forbs would not be harmed. Known invasions were treated on 13 MPF prairies totaling 304 acres. This fescue control work, as well as control of sericea lespedeza (*Lespedeza cuneata*), brush control, and other stewardship and restoration work on MPF prairies and several prairies owned by the Missouri Department of Conservation (MDC), is supported via a cooperative funding agreement with MDC.

- Other invasive species—mostly in isolated patches or individual plants—were treated through the winter and spring months including Japanese honeysuckle (*Lonicera japonica*), wintercreeper (*Euonymus fortunei*), and sweet autumn clematis (*Clematis terniflora*). These plants hold their leaves late into the winter while native vegetation is dormant, making the winter an ideal time for herbicide treatment. With a very mild winter like we had this year, treatment was effective all winter long on plants with remaining leaves.
- Thanks to a $25,000 grant from the Robert J. Trulaske, Jr. Family Foundation and a $2,500 grant from the Missouri Conservation Heritage Foundation, we completed much restoration at Pleasant Run Creek, Denison, and Lattner prairies in 2015 and early in 2016. This work included control of invasives over 372 acres, native grass seed broadcast in areas undergoing restoration, prescribed burns in two units, trees girdled from 12 acres, trees cut from almost one mile of fence, two fire lines cleared of trees, baseline pollinator survey completed, and in-depth botanical assessment completed.
- This past spring, we began seed collection for upcoming prairie reconstructions on our newly purchased Carver, Snowball Hill, and Pleasant Run Creek prairies. All of these prairies have high quality original remnants on site. They also have some form of degraded areas ranging from fescue pasture to crop ground that are in need of prairie reconstruction. MPF intends to collect much of the seed needed to reconstruct these degraded areas from the adjacent remnants or from nearby prairies. For information on how to help out with seed collection efforts on the above prairies or to get involved with management on any of our prairies, please contact me at jerod.huebner@gmail.com or 417-414-4700.

—**Jerod Huebner**, director of prairie management

## Outreach and Education

MPF board members, staff, and volunteers educated people about prairie and native plants, helped recruit new members, raised funds, and increased MPF's visibility at many events this past spring. Here are some highlights:

- MPF established a new website, nationalprairieday.org, to support National Prairie Day outreach. Prairie organizations across the country and media outlets throughout Missouri received a fact sheet on this special day founded by MPF, and were invited to list their prairie events at the site.
- MPF President Doris Sherrick organized, and carried out with volunteers, three MPF Native Plant

**MPF thanks all supporters who chose MPF** as a recipient of their gifts on May 3, the date of the St. Louis Community Foundation's annual *Give St. Louis* event and the Community Foundation of the Ozarks *Give Ozarks* event. More than $1,300 was donated to MPF via these on-line fundraising drives.


JEFF CANTRELL


CAROL DAVIT


DAN ZARLENGA


JEFF CANTRELL

**MPF Technical Advisor Jeff Cantrell led a Breeding Bird Investigation at Chute Ridge Glade on U.S. Forest Service land in Barry County, top, and MPF Vice President of Science & Management Bruce Schuette led three tours of MPF's Snowball Hill Prairie, including this one on April 9, center.**

**Dan Zarlenga gave a presentation on night photography for MPF in Golden City on May 7.**

**Missouri Master Naturalists explored and learned at MPF's Linden's Prairie, right.**

Sales in Kansas City in April, netting more than $11,000 for MPF's conservation work. Two other MPF native plant sales were held at Bass Pro Shops® in Columbia and at Town & Country Whole Foods Market® in May.

- Board members, volunteers, and staff tabled MPF booths at the Warrensburg Earth Day event, Leggett & Platt Earth Day event in Carthage, MO; Federated Garden Clubs of Missouri conference; Shaw Nature Reserve Native Plant Sale; and the Conservation Federation of Missouri's Conservation Day at the Capitol. MPF materials were provided for many other partner events, including the Maritz Employees Green Vendor Fair and Grace the Earth Foundation's May 7 event in Lockwood, MO.
- Staff delivered presentations on prairie at the Springfield Conservation Nature Center and on monarchs and pollinators to Missouri Department of Transportation road management staff.
- MPF organized a Night Photography and Star Gazing event in Golden City and on Golden Prairie on May 7, and planned for the 7th Annual Prairie BioBlitz on June 4 & 5 at Linden's Prairie and for the special free screening of *Jens Jensen The Living Green* film in St. Louis on June 18.
- Through staff participation, MPF continued involvement with the Missouri Monarch and Pollinator Conservation Collaborative, a group of more than 20 agencies and organizations creating a statewide plan for the conservation of these important species.


ABBIE HARRIS

**Pop Up Prairie Director Leigh Harris, in gray T-shirt, center, and the rest of the Pop Up Prairie planting crew in McDonald Park, St. Louis. Pop Up Prairie was one of two MPF Prairie Garden Grant awardees for 2016. The group used its $500 grant to purchase native plants for the garden to benefit pollinators.**

## Two MPF Prairie Garden Grants Awarded

Because of the high quality of proposals submitted, MPF made two grant awards in the spring of 2016—one to Harrisonville Elementary School, MO, for the development of a Monarch Waystation Butterfly Berm—and one to Pop Up Prairie, a new nonprofit organization in St. Louis. Harrisonville Elementary School will be reporting on its project later this year.

Pop Up Prairie's mission is public education about the benefits of prairie plantings to urban areas. The group's geographic focus is St. Louis, specifically the Tower Grove neighborhood. This past spring Pop Up Prairie used its MPF grant to purchase native plants for a sunny 10 x 20 foot garden to benefit pollinators in the entrance to McDonald Park.

The individuals who turned out for the planting of the garden included the president and vice president of the Tower Grove South Neighborhood Association as well as other volunteers and residents who were walking by and lent a hand. "The planting was a blast!," said Pop Up Prairie Director Leigh Harris. "It was a great community effort and has already generated positive feedback and interest from the neighborhood." Harris also reported that many residents along Bent Avenue, a street that runs from McDonald Park to Tower Grove Park, are interested in the group's next idea of planting a native corridor between the two parks.

Congratulations to both groups!

## Grow Native! Program Update

MPF's Grow Native! program continues to expand, and is fostering the current, record-high demand for native plants. In 2016, there are more than 110 Grow Native! professional members, who are supplying native plants and native plant services to meet this demand.

This year, Grow Native! Committee members and MPF staff are busy fulfilling action steps included in the 2016–2020 Grow Native! Strategic Plan, now available at grownative.org. The plan, developed in 2015, is providing the path for annual work plans and continued growth of the native plant marketing and education program.

Here are some highlights of spring 2016 program activity:

- The Missouri Invasive Exotic Plant Species Task Force, which operates under the auspices of Grow Native!, organized a successful invasive species session, attended by more than 100 conservation professionals at the Missouri Natural Resources Conference held in early February. Speakers, **top right, from left**, were Bill Ruppert, Bruce Henry, Dr. Quinn Long, Jerod Huebner, and Matt Arndt.


TINA CASAGRAND


CAROL DAVIT

- Two successful Grow Native! workshops were held: *Native by Design: Landscapes Beyond Beauty* on February 26 in Edwardsville, IL, featuring Dr. Doug Tallamy, **above**, with attendance near 300. *Natives Get Us Back to Our Roots* was held in the small town of Arcadia, MO on May 14, with speakers including Grow Native! Committee member Bill Ruppert and Julie Norris with the Missouri Department of Consevation.
- Runge Conservation Nature Center, Jefferson City, hosted a Grow Native! plant sale on March 26.
- Several Grow Native! Committee members gave presentations on natives, including Chair Betty Grace's talk at the Andrew County Historical Museum in Savannah, MO, and more than ten presentations on natives delivered by Bill Ruppert in Missouri and Illinois. Committee members also staffed informational booths at Monsanto's Earth Day, Kirkwood Earth Day, Hillermann's Nursery, and other events.

## Harrisonville Elementary School Paints for Prairie

MPF's recent acquisition and publicity of Snowball Hill Prairie near Harrisonville, MO, and concern for monarch butterfly populations coalesced for the focus of Harrisonville Elementary School's annual April Art Fair, spearheaded by art teacher Rachel Henderson.

In January, Henderson began preparing all 600 students of the school for art projects they would create, illustrating their understanding of prairie and the connection to native pollinators including the monarchs. Students learned not only about pollinators, but also about life in the prairie soil and the beauty and diversity of prairies.

When the big day arrived this past spring, the halls of the school were lined with displays of the students' artwork. Each production was a reflection of the special significance of prairie to the individual artists. Not only did students gain a significant understanding of prairie through the projects, but their families and staff members were also part of the learning process.

To further promote a connection to prairie and to the monarch, Henderson contacted MPF for the possibility of supplying milkweed and native nectar plants to give out to families attending the art fair. Because MPF had grant funding to provide milkweeds for occasions such as this as well as others, families of all students received a milkweed to take home and plant. The interest and enjoyment was evident on the smiling and excited faces of the students as they delighted in showing off their exhibits and in receiving a milkweed.

The project didn't end with the art fair, however. Henderson also involved the students and their families in an ongoing fundraiser to help with the acquisition of Snowball Hill Prairie, and by the evening of the big event $11 had already been raised. Contributing to the prairie purchase will surely serve to further connect the students to the prairie. Hats off to Ms. Henderson and her students on this successful endeavor!

—**Doris Sherrick**, MPF president


DORIS SHERRICK PHOTOS

**Harrisonville Elementary School students captured plants, roots, animals, and more in their prairie artwork this past spring.**

PAT WHALEN

## UPDATE

**50th Anniversary Campaign Funds Received, Awarded, or Pledged**

**GOAL $4 million** end of 2016

**$3.75 million as of 4/16***

**$3 million**

**$2 million**

**$1 million**

MISSOURI PRAIRIE FOUNDATION
Protecting Native Grasslands
1966–2016

50th anniversary campaign

GOLDEN OPPORTUNITY FOR PRAIRIE PROTECTION

# Prairies Now and Forever

*Fifty years ago, the founders of the Missouri Prairie Foundation (MPF) took a stand to ensure that Missouri will **always have rich, beautiful prairies**. Now in its 50th anniversary year, MPF presents all prairie enthusiasts and those who love native landscapes with a **golden opportunity** to invest in future prairie protection by **contributing to the Missouri Prairie Foundation's 50th Anniversary Campaign**.*

## Campaign Goal **$4 million** in gifts and pledges. This campaign fundraising goal, established in 2014, for three years, will enable the Missouri Prairie Foundation (MPF) to purchase more land, steward it carefully, and increase and sustain the staffing necessary to continue building future support for prairie and native plants.

## Allocation of Campaign Gifts

**Approximately $2.5 million** in gifts and other funds received, pledged, or awarded to date during the 50th Anniversary Campaign has been designated by the donors or award agencies for the recent acquisitions of Joplin, Linden's, Pleasant Run Creek, Snowball Hill, and Carver prairies, and for the acquisition of future properties. This high rate of prairie acquisition in only three years is certainly something to celebrate, and it is thanks to you, our supporters! About $1 million total has been/will be used during 2014, 2015, and 2016 to carry out daily prairie stewardship, education, Grow Native!, and administrative operations of MPF. The remainder of unrestricted funds received to date and by the end of the campaign will be divided between the Stewardship Fund and the Endowment Fund. Thank you for making these amazing accomplishments possible with your generous contributions to MPF's 50th anniversary campaign.

While MPF is getting closer to meeting its $4 million fundraising goal for the three-year campaign period, it is important that we continue to receive additional gifts, especially for MPF's Stewardship and Endowment Funds. The Campaign goal includes raising $1 million for MPF's Stewardship Fund, to provide a secure source of funds for future prairie stewardship expenses, as it continues to acquire land, and to raising $1 million for MPF's Permanent Endowment Fund, to provide a permanent source of funds for non-stewardship operating expenses, so that MPF has a stable financial foundation well into the future.

*In the spring 2016 issue of the *Missouri Prairie Journal*, the amount raised was incorrectly noted.

## Prairie Champions and Patrons

MPF has established Prairie Champion and Prairie Patron giving opportunities for individuals, businesses, philanthropic foundations, and others with the means to give cash or securities at various levels. Since MPF's campaign began in 2014, campaign funds awarded, received, or pledged as of 4/16 include:

**Prairies Now and Forever Champion** ***$1 Million or More***

**Big Bluestem Champion** ***$500,000 or More***
The Conservation Fund
Estate of Ms. Linden Trial
Award for prairie acquisition from U.S. Fish and Wildlife Service and Missouri Department of Natural Resources

**Prairie-Chicken Champion** ***$250,000 or More***

**Sunflower Champion** ***$100,000 or More***
Ed Schmidt
Platte Land Trust
Robert J. Trulaske, Jr. Family Foundation
Award for land acquisition and restoration in the City of Joplin from the U.S. Fish and Wildlife Service and the Missouri Department of Natural Resources

**Monarch Champion** ***$50,000 or More***
Joseph C. Koster Revocable Trust
Andrew Love, Edward K. Love Conservation Foundation
Mrs. Pat Jones
Rudi Roeslein, Roeslein Alternative Energy

**Blazingstar Champion** ***$25,000 or More***
William T. Kemper Foundation
LUSH Fresh Handmade Cosmetics
Gina Miller
Doris and Bob Sherrick

**Gold Patron** ***$10,000 or More***
Ronald and Suzanne Berry
Horne Family Foundation
Hulston Family Foundation
Steve and Jeannie Maritz
Susan Lordi Marker and Dennis Marker
Margaret Holyfield and Maurice Meslans
Tom and Anne Smith

**Silver Patron** ***$5,000 or More***
Anonymous
Anonymous
Rusty and Prae Hathcock
Warren and Susan Lammert
Ann Lovell, in honor of her parents, John and Dorothy Stade

**Pledges include:**
Anonymous, $5,000
Dr. Clifford Welsch, $120,000

**Each contribution moves MPF closer to fulfilling its campaign, and each donor of any gift amount is an honored supporter. *You* can make a difference for prairies by helping MPF reach this goal at your desired level of giving. Gifts or pledges may be lump sums or annual amounts. Prairie Champions and Prairie Patrons may receive significant recognition and a generous package of amenities.**

## How to Make A Campaign Gift of Cash or Securities

To make a tax-deductible, 50th Anniversary Fundraising Campaign gift of cash, please send a check to

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

For information on making a tax-deductible campaign gift of securities, patron recognition and amenities, and other details about the Missouri Prairie Foundation's 50th Anniversary Campaign, visit the Donate page at www.moprairie.org, call 573-356-7828, or send a message to info@moprairie.com.

# Susan Lordi Marker $7,500 Monarch Match for 2016

### Kansas City artist and MPF member Susan Lordi Marker invites all prairie supporters to participate in her 2016 $7,500 Monarch Challenge.

**Donations received to date towards the match total more than $1,870—please donate today!**

"Like so many other MPF members and supporters," said Lordi Marker, "I am extremely concerned with the dramatic decline of monarch butterflies, as well as the rarity of our rich prairies that provide habitat for monarchs and thousands of plants, pollinators, and other insects and animals. So I decided to do something about it, and I hope you will join me.

"We need prairies for the critical role they fill in our ecosystem, but also, as creative human beings," said Lordi Marker, "we can enrich our lives by just the experience of being in the prairie, walking, listening, observing. As an artist, the prairie is my inspiration to create—to be surrounded in an environment alive with color, texture, moving shapes, sounds, and scents—all at once. It is truly an experience for all the senses! For me, the prairie is good for the soul."

To make a tax-deductible Monarch Challenge gift in 2016, which will help MPF protect and improve the prairies it owns for monarchs and thousands of plant, insect, and other wildlife species, please send a check to Missouri Prairie Foundation, c/o Martinsburg Bank, P.O. Box 856, Mexico, MO 65265-0856, with a "Monarch Challenge" note, or make a donation on-line at http://www.moprairie.org/monarch-challenge. You may make an anonymous donation if you wish.

Many thanks to Susan Lordi Marker for her generous offer to match up to $7,500 in donations, and those who have donated to the 2016 match to date:

David Catlin
Mary Clasby-Agee
Lillian and Alan Collins
Suzanne Crandall
Jo Anna Dale
Erin Dameron
Monica Fox
Elizabeth and Scott Galante
Wil and Andrea Hardiman
Margaret Mayer
Veronia Mecko
Christine Moses
David Newkirk
Stan and Susan Parrish
Susan Pyle
Linda Regan
Greg Roberts
Julianne Sarff
Aaron J. Scott
Zach Smith
Kristy and John Stiber
David and Jennifer Urich

# Prairie Moths

By Phillip E. Koenig

BETSY BETROS

**Much attention has been given to butterflies, from the spectacular monarch and regal fritillary to the small inconspicuous skippers that many people find difficult to identify. Moths, however, outnumber butterflies by ten to one in number of species, and this ratio is likely the same for butterflies and moths that depend exclusively on native grasslands—also known as prairie-obligates. Being primarily nocturnal and frequently very small, moths are mostly unseen creatures, yet both prairie-obligate moths and habitat generalists play an important role in the ecology of our native grasslands.**

## Restricted Niche

We are a species that can adapt to environments that are hostile by wearing protective garments, building houses, and heating and cooling these shelters to maintain our body temperatures. Most species, however, including most moths, are not able to adapt and must find a narrow niche that is suitable to their survival.

When we convert prairies for agricultural use and development, we benefit by having readily available food on the table, or places to live or do business, but we eliminate rare habitat for moths and many other creatures that cannot survive without prairie.

**The goldenrod stowaway moth (*Cirrhophanus triangulifer*), top right, is one of roughly 3,000 moth species in Missouri. It occurs on prairies and other habitats. The giant eucosma moth (*Eucosma giganteana*) lays its eggs, center, on the leaves of host plants.**

MJ HATFIELD

## Eggs

Moths have different techniques for depositing their eggs where the larvae are most likely to survive. Most species lay their eggs on leaves or stems of their specific host plants so the newly hatched larvae can easily find their food. Others use a more primitive technique. Ghost-moths (Hepialidae) for example, a family not found in Missouri, spray their eggs over an area that contains their host plant, with the intention that some of the eggs will land in the right place.

## Larval Host Plants

Competition is great and often results in a single species of plant being divided into several niches for different species to use for food. One moth species may feed exclusively on seeds, another on leaves, another boring in the stem to eat stem tissue, and another boring into the roots.

Seed-eaters live on the surface of large seeds or live inside the seed capsule or fruit. Leaves are used in several ways. Some species sit, usually on the underside of the leaf, and eat from the edge. Some tie two leaves together with silk and hide inside for protection. Others fold a leaf and tie it together. Bending a leaf is quite a task for such a small creature, but it is accomplished by attaching a thread of silk across the leaf and allowing the silk to shrink, pulling the edges together. By repeating the process many times, the leaf eventually folds.

Another technique is to mine the leaf by burrowing into it and living between the upper and lower dermal leaf layers. Stem and root borers live inside the plant where they gain protection from predators.

## Pupae

Caterpillars use various means of protecting themselves when they become immobile pupae. Most moths pupate on the ground, usually in leaf litter. Some larvae burrow into the ground and pupate; the adults climb out of holes

MJ HATFIELD

MJ HATFIELD

**The *Schinia grandimedia* moth (no common name; caterpillar larva and adult above) depends exclusively on prairie for its survival.**

JIM WIKER

JIM WIKER

**IN 2015, LEPIDOPTERIST JIM WIKER MADE AN EXCITING FIND: the rattlesnake master borer moth (*Papaipema eryngii*), named in 1917 but discovered in Missouri only in 2015. This prairie-obligate moth depends on prairies for its existence, the larvae boring into the roots of rattlesnake master (*Erynigium yuccifolium*). The moth rarely comes to light, and the way to get adult specimens is to rear the larvae. Many more moth species may be discovered in Missouri if we know how to look for them.**

before expanding their wings. Others create a cocoon made of silk or tie leaves together with silk and pupate inside.

## Adults

Most adult moths are nocturnal and feed on nectar, and in the process do pollinate some plants. Moth-pollinated flowers are usually night blooming and are white or yellow and fragrant, which helps the moths find them. In the case of moth-pollinated plants, the moth and plant depend on each other and one cannot survive without the other. The plant provides food for the caterpillar and nectar for the moth, while the plant is dependent on the moth for transporting pollen. Some orchids, for example, may allow only one species of sphinx moth to reach the nectar. Pollen becomes attached to the nectaring moth that then transfers it to another plant of the same species—this prevents pollen from being wasted on a different species of plant.

It is important to note that not all flower visitors are pollinators. Some are unable to transfer pollen from certain plants and are considered nectar robbers. Other moth species are attracted to tree sap, rotting fruit, and carrion.

## Moth Courtship and Reproduction

Moth courtship is very basic. When the female is ready to mate, she "calls" by giving off a pheromone. A male can detect this odor from a mile away by using sensitive chemoreceptors located on the antennae. For this reason, males usually have much more elaborate antennae than the females of the same species. It is less likely that a male will respond to the pheromone of a related species then its own. Also, related species in the same area may "call" at different times of night.

The first male to arrive is accepted by the female. If more than one male arrives at the same time, a jostling match ensues. Adulthood is brief and is only long enough for the moths to mate, find a host plant, and lay eggs. A moth can lay hundreds of eggs, but only two have to reach adulthood to replace their parents and continue the species.

Some moths do not have mouth parts and cannot feed. They are unable to provide pollination services, but do serve as a protein-rich prey for many other animals.

## Overwintering

Moths use various techniques to survive the winter. Eggs can be laid on a stick or on the ground where they remain until the warm weather has returned. Caterpillars can be found under rocks and bark in the winter. Pupae are often in plant duff, under ground, or in cocoons. A few species overwinter as adults and can be seen flying on warm winter nights. There are no known moth species that migrate to warmer climes for the winter and return back to summer here as the monarch butterfly does.

## In Defense of Moths—and Moth Defense

A friend of mine recently asked me "What good are moths?" My reaction to this was that animals do not have to be beneficial to humans to be "good." They are our fellow inhabitants of the planet and deserve to be here.

Besides their inherent value, moths play an important role in the food chain by converting vegetation into fat and protein for many other species. They are in such demand as a food source for birds and other animals that a newly

Invertebrates: *the little things that run the world* –E.O. Wilson

hatched moth caterpillar has a very slim chance of surviving to adulthood.

The primary defense of moths against extinction is their extraordinary reproductive ability. Some caterpillars protect themselves by hiding inside their host plants, looking like their host plants or looking like something unpalatable such as bird droppings. Some have long hair-like setae that can be annoying in a predator's mouth or can provide a defensive layer against parasitic wasps. Some caterpillars can sequester poisons from their host plants or make the chemicals themselves. This may not save an individual's life, but it is likely to make the predator nauseated so it will remember not to eat that species again.

## Predators of Moth Eggs

Eggs are often attacked by parasitic wasps that put one or more of their eggs in the moth's egg. Eggs can also be accidentally eaten by larger herbivores.

## Predators of Larvae

When we think about bird survival, we are grateful for moth larvae, which are important prey for birds and other animals. When we think about moth survival, we think of many animals as moth predators.

Birds are blamed for the demise of many caterpillars, but they have a lot of help. Reptiles such as lizards and snakes feast on insects as do amphibians.

Insects also take a large toll. Beetles, ants, and wasps eat many of them. Some wasps lay one or more eggs on caterpillars. When the maggots hatch, the larvae bore into the caterpillar and consume its fatty tissue while the caterpillar continues to eat and make more fat for the parasite. When the caterpillar reaches its maximum size it may die, and the parasitoid finishes its meal. In some cases, the caterpillar is able to pupate and the wasp pupates inside of it.

## Predators of Adults

Moths are safe from most birds at night, but bats are nocturnal and their sonar system enables them to locate and eat large quantities of moths—which is good news for bats, a group of animals we also care about. Some moths can hear the bat's sounds and take evasive action. Other moths can produce a sound that

## MOTHS THAT OCCUR ON PRAIRIES AND OTHER HABITATS

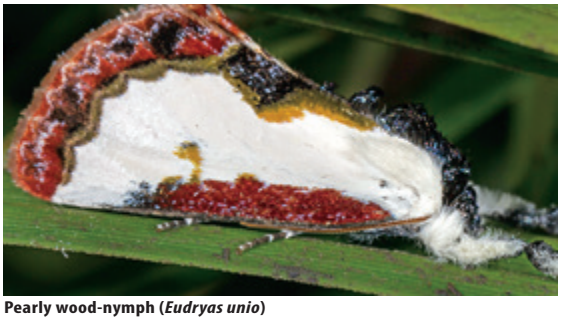
Confused eusarca (*Eusarca confusaria*)

Clover hay worm (*Hypsopygia costalis*)

Harnessed tiger moth (*Apantesis phalerata*)

Painted lichen moth (*Hypoprepia fucosa*)

Large clover casebearer (*Coleophora trifolii*)



Pearly wood-nymph (*Eudryas unio*)

Spiny oak-slug (*Euclea delphinii*)

Gray scoopwing (*Callizzia amorata*)

PHOTOS ON THIS PAGE BY JON RAPP

**A sampling of the many moth species documented at MPF's La Petite Gemme Prairie.**

either confuses the bat or tells it that the moth is not edible.

During the day, most moths sit quietly and unnoticed. Most are cryptic and match their surroundings very well. If they don't, sharp-eyed carnivores will eat them and the moths will not contribute its genes to the gene pool, assuring that the next generation will be more cryptic. Some moths use scare tactics to evade predators. For example, a brightly colored hind wing, sometimes with a conspicuous spot that resembles a large eye, is usually covered by a cryptic forewing. If the moth is disturbed, it moves its forewings forward in preparation to take flight and in so doing, reveals the contrasting hind wings and startles its predator. This can give the moth a little more time to escape. If a species of *Catocala* moth (a genus of underwing moth), for instance, takes flight in the day when disturbed, its bright red hind wings are easily seen as it flies to another spot in the forest, lands, and covers its hind wings again. A bird will continue looking for the red color and fly past the moth.

## Herbivory

Caterpillars eat plants, and plants respond to defend themselves. The delightful aromas of our treasured spices are not there to please us. These are secondary chemicals that are not needed by the plant other than to deter herbivores. This trick works against most herbivores, but some moths can avoid these chemicals by eating only the parts of the plant that contains fewer chemicals or by having evolved to tolerate them and storing them in their own body to make them unpalatable to their predators. Some plants have hairy leaves, pointed edges, or thorns to give herbivores trouble. Some leaves have a high amount of silicon in them to wear down the herbivore's mandibles.

## PRAIRIE-OBLIGATE MOTHS

BETSY BETROS

MJ HATFIELD

**The pink streak moth (*Dargida rubripennis*), above; the Hulst's flower moth (*Schinia hulstia*), below left; and the clouded crimson moth (*Schinia gaurae*), below right, are three of roughly 190 prairie-obligate moth species in Missouri.**

BETSY BETROS

BETSY BETROS

MJ HATFIELD

**Larva and adult of *Sciota rubescentella*, a prairie-obligate, whose caterpillars weave themselves into the inflorescences of lead plant (*Amorpha canescens*).**

## Prairie Obligates

There are roughly 3,000 species of moths in Missouri. Many of them can be found in tallgrass prairie, but many are not dependent on the prairie for their survival. They may be there because nectar sources are available, but usually live in a neighboring habitat.

However, some species cannot survive outside a prairie. The publication "Contributions to the Understanding of Tallgrass Prairie-Dependent Butterflies and Moths (Lepidoptera) and their Biogeography in the United States" (a Bulletin of the Ohio Biological Survey by Metzler et al. 2005) lists all of the prairie-obligate Lepidoptera species. While the exact number of prairie-obligate moth species in Missouri is unknown, from Metzler et al.'s publication, a rough estimate is about 190 species.

## Conclusion

Of all the moths that live in Missouri, very few are considered pest species and require control to protect our food supply or other resources. Most are getting along without our help, but those that require quality prairie to survive are dependent on prairie management. Without the efforts of the Missouri Prairie Foundation and other concerned public and private prairie owners, many of our moths would be extirpated from the state.

MPF member **Phillip E. Koenig** is a retired electronic engineering technician with a long-held interest in butterflies and moths. Koenig is, among his various naturalist pursuits, the database manager for Hietzman's Lepidoptera of Missouri Database. He lives in O'Fallon, MO.

Invertebrates: *the little things that run the world* –E.O. Wilson

# Grassland Spiders and Prairie Vegetation Variability

MJ HATFIELD

## Research at Konza Prairie reveals that spider diversity in prairies is dependent on diverse vegetation, maintained by disturbance.

By Jesus Gómez

**GRASSLANDS ACROSS THE WORLD** are characterized by their high productivity and capacity to support diverse communities of plants and animals with a high abundance of animal consumers. These dynamic biomes evolved under disturbance from fire and grazing (Fuhlendorf and Engle 2004), with bison as the primary grazers in North America. Since European settlement, bison have been replaced by cattle throughout most of their historic range.

When we hear the word "prairie," we often think about diverse wildflowers, birds, or large mammals. Even though these are ecologically important and appealing groups of organisms, the truth is that invertebrates drive the largest component of biodiversity in terrestrial ecosystems, including grasslands.

Among arthropods, predators including spiders play an important ecological role in regulating insect herbivore populations. Spiders are a taxonomically diverse and ubiquitous group of terrestrial predators characterized by wide variability in morphology and size, ecological and functional diversity, richness of hunting strategies, and habitat preferences (Schmitz and Suttle 2001, Wise 2006).

### Both Predator and Prey

Trophic levels refer to levels of the food chain. Spiders are considered part of the secondary predator trophic level, as they are both significant predators of other invertebrates and also prey for many animals—from birds to the larvae of parasitic wasps.

Spiders are generalist predators that feed on a diversity of prey species and sizes—up to many times their own size—as long as they can subdue their prey. Within arthropod food webs, spider species occupy a wide range of trophic positions, ranging from primary to top predators. In order to reduce competition and predation by other spiders (both by individuals from other species or the same species) or other organisms, spiders exhibit the ability to partition their habitat at a fine scale (Schmitz and Suttle 2001, Wise 2006) by being active at various times of day and by occupying different habitats within grasslands. Spiders therefore exist in a world where they must negotiate the structural complexity of their habitat in order to search for prey while simultaneously avoiding their predators and parasites.

### Konza Prairie: the Research Site

Grasslands managed with multiple fire frequencies and bison or cattle grazing, like Konza Prairie Biological Station (KPBS) in Kansas, support a shifting mosaic of local habitat types ranging from frequently grazed prairie "lawns" on recently burned areas to woodland-grassland transition zones along riparian corridors. This management thus creates gradients of vegetation structure and/or richness of dominant vegetation across cover and habitat types, with more than 600 plant species (Collins and Calabrese 2012), thus supporting a diverse community of consumers, including spiders, at multiple trophic levels (Dennis et al. 1998, Joern 2005, Moran 2014).

## WANDERING SPIDERS


M.J. HATFIELD


ELLEN WELTI

**The hunting grounds of crab spiders are flowers, where these wandering spiders lie in wait to ambush insect prey. Prairie management that favors a diversity of flowering forbs supports a diversity of these non-web building arachnids.**


JESUS GÓMEZ


CHAD HEINS

**Wolf spiders and jumping spiders exhibit distinct hunting strategies. Wolf spiders wait for prey to be within striking range before attacking; jumping spiders actively stalk their victims, using vegetation to conceal themselves as they close the distance to their quarry.**

At KPBS, approximately 140 spider species have been documented through multiple studies conducted by members of the Joern Laboratory at Kansas State University (Jesus Gómez unpublished data). Studies revealed that the KPBS spider community partitions its habitat temporally, with some species actively hunting during the day, but most active at night, to avoid diurnal vertebrate predators. Grassland spider community abundance and species richness increase over the growing season, peaking towards late summer/early fall across all habitat types studied by our group. The spider community documented at KPBS was largely dominated by small species having a body length of less than 1 centimeter.

We have documented that the median number of spider species per site (40 meters x 30 meters) in the summer was 14 while in the fall it was 18. The maximum number of spider species collected at one site was 34 in the summer and 38 in the fall, along a woodland/grassland transition zone.

How does a grassland habitat support more than 100 species? We believe that this is because of the fire and grazing disturbances that promote the formation and maintenance of diverse grassland habitats (Fuhlendorf and Engle 2004) where vegetation cover is dominated by grasses, but plant community diversity is largely driven by forbs, or broad-leaved herbaceous plants (Joern and Laws 2013). Habitat disturbances play a critical role, allowing uncommon plant species to express themselves, which in turn offers an increased richness of plant resources for herbivores, pollinators, and predators, including spiders.

### Hunting Strategies of Spiders

How can spiders be an important group of predators if they are so small? What they lack in size they make up in numbers of species and individuals. Besides their species richness and abundance, spiders also exhibit a large variety of hunting strategies unique to different spider families.

The broadest distinction that can be made among spider hunting strategies is sedentary web-builders versus the more active non-web-building wandering spiders. Within these two categories are many specialized hunting strategies. For example, there are wandering spiders (non-nest builders) that are sedentary, like wolf spiders (Family: Lycosidae) and crab spiders (Family: Thomisidae)—these groups wait for their prey to be in striking range before attacking; conversely, there are wandering spiders like jumping spiders (Family: Salticidae) that hunt like jaguars: they actively stalk their prey using vegetation to conceal themselves while closing the distance to their quarry before pouncing.

In contrast, web-building spiders rely on their webs to capture prey for them, as fishermen rely on nets to catch fish. Still, spider webs differ in many key aspects including web shape, web size, orientation (vertical, horizontal, or diagonal) of the web in relation to the surrounding vegetation, and web height within the vegetation.

Additionally, web-building spiders differ in their levels of activity, with some spiders sitting and waiting on their webs until prey falls on their webs, while some web-building spider families are known to wander away from their webs and actively chase prey in the vegetation or on the ground. Some web-building spiders take an even more active approach to capturing prey by using sticky silk lines and actively "fishing" for insects, in similar fashion to what we do with fishing poles.

The combination of overall spider species diversity, richness of hunting strategies, and the grassland habitat preferences of different species results in spider predators occurring across all available habitat types and vegetation strata at KPBS. Because they partition their grassland habitat at a fine scale (Schmitz and Suttle 2001, Wise 2006), spiders are found from the ground to the top parts of vegetation, existing as an ever-present and constant threat to prey. Thus, spiders are a key predator in grassland ecosystems.

## Spider Communities and Vegetation Diversity

Like many other consumer groups, such as insect pollinators, spiders exhibit tight relationships with vegetative structure or the availability of key vegetation resources. For example, crab spider (Family: Thomisidae) species richness, abundance, and distribution in grasslands is closely associated with the abundance and distribution of flowers in the landscape, as flowers are the preferred hunting ground of this type of spiders.

For other spider groups like web-builders, their distribution, abundance, and species richness on grasslands is limited by the availability of key structures for web anchoring, like woody vegetation or tall grasses. The local composition of web-building species is also influenced by other factors like the height of woody plants or grasses, density of branches, distance between plant anchors, and so on. On grasslands, web-builder species richness and abundance is maximized along the transition between woody vegetation and grasses, driven by the richness of structures for web anchoring.

Fire frequency and grazing interactions indirectly shape the grassland spider community. Our research showed that local spider assemblages ranged from sites with fewer than 10 spider species to sites that supported up to 38 species. Regarding hunting strategies, sites with low species richness also had a low richness of hunting strategies (five hunting strategies). Sites with high species richness also supported functionally complex spider assemblages (up to 16 hunting strategies). This is due to the direct effect of these disturbances on vegetation structural complexity (vegetation height and plant canopy closure) and spatial differences of the vegetation, leading to a grassland system overlaid by a mosaic of different spider assemblages.

Open grassland habitats that are burned every one, two, and four years and grazed by bison are characterized by a greater abundance and richness of flowering plant species than any other parts of KPBS (Collins and Calabrese 2012). Grazed habitats exhibited higher variability in vegetation height, reduced plant canopy closure, and greater plant diversity than non-grazed habitats across the landscape, regardless of burn frequency.

The diversity of key vegetation resources on grazed habitats promoted spider richness thus sustaining the second most species-rich and functionally complex spider communities after the woodland-grassland transition habitats on tallgrass prairie in northern Kansas. The spider community on bison-grazed habitat was dominated by wandering spider species. Although web-building spiders could also be found in these habitats along shrubs stands, their richness and abundance were relatively low. Among wandering spiders, richness and/or abundance metrics were dominated by members of these families: Thomisidae [(crab spiders), whose distribution correlates with flowers on the prairie], Salticidae (jumping spiders), and Oxyopidae [(lynx spiders), which take advantage of the heterogeneity in vegetation structure to stalk and ambush their prey]. Other wandering spider groups that were also more common in habitats grazed by bison than in any other grassland habitat type were ground spiders like wolf spiders (Lycosidae) and ground spiders (Gnaphosidae).

The habitat with the lowest spider richness was found in study plots that were burned every 1 or 2 years, and received no grazing disturbance for at least 30 years, which promoted homogenous vegetation cover dominated by a few warm-season C4 grasses. The canopy structure of these habitats was continuously closed, which favors a lower number of spider species when compared to other grassland habitats at KPBS.

Even though the spider richness was lower in these non-grazed, but frequently burned areas, this habitat still supported a similar number of individuals (density of spiders) than grazed open grassland. This suggests that an increased abundance of one kind of vegetation structure favors an abundance of the few species that utilize this vegetation resource (grass leaves or grass inflorescence), as their hunting ground since they may experience a lower level of interspecific competition, lower interspecific predation, or higher hunting success. For example, members of the families Anyphaenidae (ghost spiders), Philodromidae (running crab spiders), the jumping spider *Marpissa pikei*, and the orb weaver *Acanthepeira stellata* were three to four times more abundant in ungrazed habitats than anywhere else, even though they were found in every habitat and sampling period (Gómez unpublished data).

## Woodland-Grassland Habitats

Woodland-grassland transition habitats were high in spider density, species richness, and richness of hunting strategies for both wandering and web-building spider species. These hot-spot habitats are characterized by a rapid, steep increase in vegetation structural complexity and heterogeneity between the grass layer and the woody-dominated canopy, which have escaped intensive fire and grazing. Additionally, this habitat had high volumes of insect biomass, suggesting that availability of food sources that could be partitioned by different spider predators were not limited.

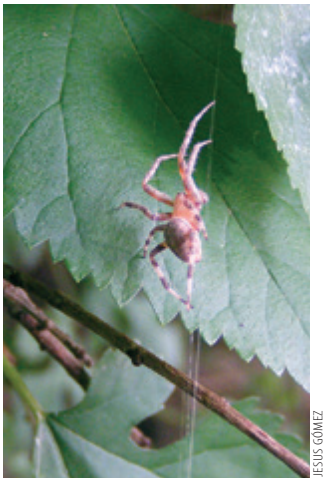
These hotspots sites commonly include woodland-open grassland habitats located in lowlands and along drainage basins where trees dominate the vegetation canopy, and clonal shrub islands

encroach into open-grasslands habitats at the expense of grass cover dominance.

Web-builders, which are otherwise nearly absent on open-grassland habitats due to the lack of appropriate structure for web anchorage (with increasing distance from woodland-grassland transition, as demonstrated by Gómez et al. 2016), reached abundances to the point that it was nearly impossible to walk 2 meters without finding a web (Gómez unpublished data).

Spider families present in these habitats were the funnel web builders (Agelenidae), doily-sheet web builders (Linyphiidae), irregular-all-directions web builders (Theridiidae), and orb-weavers (Araneidae). The species richness of web-building spiders at KPBS was driven by members of the family Araneidae, which reached peak diversity along the riparian woodland-grassland transition habitats. In addition to the high diversity of web-building spiders, these habitats supported assemblages of wandering spiders with species diversity and richness of hunting strategies comparable to those found on open-grasslands habitats. Spider assemblages along grassland-woody habitats transitions, it appears, are representative of two different habitat types co-occurring in these ecotone hotspots.


MJ HATFIELD


JESUS GÓMEZ

**In the study at Konza, the author and his colleagues found that web-building spiders were most abundant in areas of woodland-grassland interface, where tree branches and other vegetation provided ideal "anchors" for web building.**

## Conclusion

Fire and grazing interactions indirectly influence spiders, a major predator of arthropods in terrestrial ecosystems, through their direct effect on vegetation structure and plant species diversity. This vegetation template is what spiders—at once both potential prey and predator—must respond to in order to find the key resources (food, shelter, etc.) that will facilitate their persistence in the habitat.

Finally, in order to maintain and/or improve spider species and hunting strategy richness across grassland landscapes, we find that grassland habitats must be managed with multiple combinations of fire and grazing disturbance regimes in order to create and maintain a shifting mosaic of habitat types.

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**Jesus Gómez** is a doctoral student in the Division of Biology at Kansas State University with an interest in community ecology, particularly in the topics of how spatial and temporal heterogeneity affects biodiversity, species assembly rules, predator-prey interactions, functional diversity, landscape ecology, ecosystem management, and conservation. Hailing from Puerto Rico, where he studied marine biology, Gómez finds that grassland systems are not unlike oceans in the diverse strata of habitats they provide for different plant and animal communities.

**For 50 years, the Missouri Prairie Foundation's grassroots efforts have sparked public interest in protecting the state's remaining prairie treasures.**

CHRISTINE CHIU

# Lighting a Fire for Prairie

By Carol Davit

Fifty years ago, a small group of Missourians held a meeting at Boone Tavern in Columbia, MO to talk about prairie. Or rather, the disappearance of it.

This was 1966, nearly one hundred years after the introduction of the first steam-powered tractor, which marked the beginning of accelerated land conversion to row crops. Even before statehood, the plow had begun turning over Missouri's legacy of 15 million acres of tallgrass prairie. By mid-20th century, less than one percent of the state's original prairie was all that remained. The vast native grasslands that once rolled unbroken across much of Missouri were gone, with remaining fragments isolated and their wildlife value much diminished.

Members of the group were alarmed at the loss of prairie—an ecosystem that once covered at least one-third of the state. Among the citizens in the group were its founders, Bill Crawford and the late Don Christisen, who were also career biologists with the Missouri Department of Conservation.

"In those days, the Department's funding for prairie acquisition was limited," said Crawford, "and there was little awareness among the public about how quickly prairie was disappearing. So we asked, 'What about prairie?' and citizens all over the state signed up as members. We started a fire. Prairie had been a forgotten resource, but the Missouri Prairie Foundation came along at the right time."


MPF PHOTO

**MPF's land acquisition program began with the purchase of Friendly Prairie in 1969. Over the years more properties came under the MPF fold, including 76 acres of Gayfeather Prairie in 1976 and its most recent purchase, the 163-acre Carver Prairie in Newton County. Today MPF owns 20 properties totaling more than 3,200 acres. For 50 years MPF's members, board of directors, staff, and volunteers have led the way toward greater conservation, knowledge, and appreciation of Missouri's prairie resources.**

## Saving Prairies

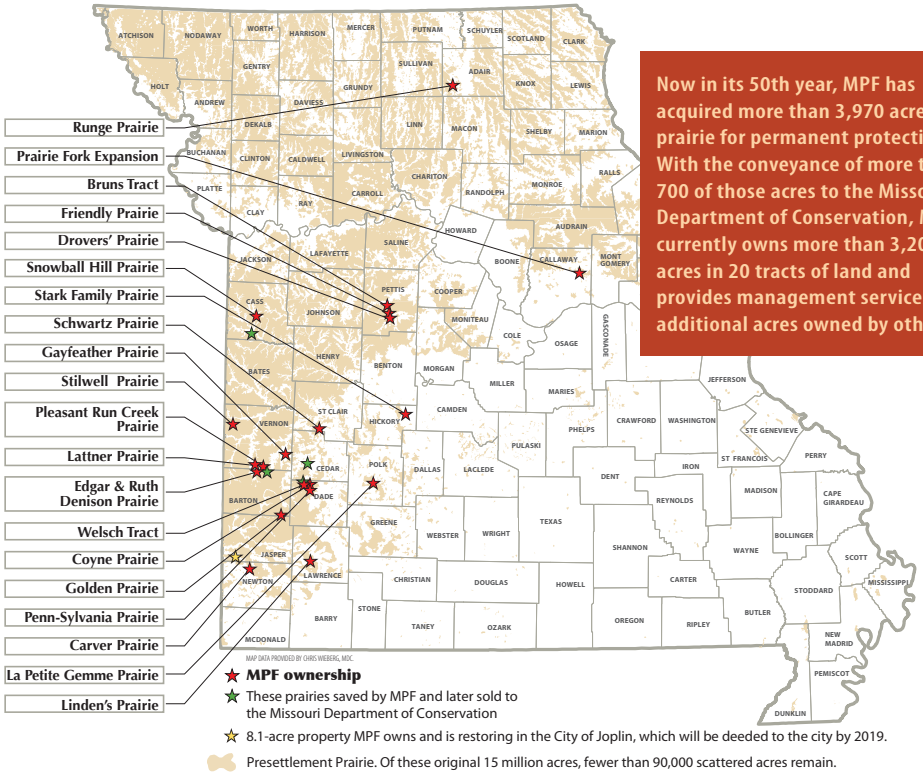
The first members of the Missouri Prairie Foundation (MPF)—including its first president, physician Dr. Maurice Lonsway of St. Louis—were determined to save prairie and help Missourians understand the importance of doing so. An article in the *Missouri Conservationist* helped inform the public about the new organization.

In 1969, MPF had enough money to mail out a typewritten member newsletter, but not much else. So when it borrowed $10,000 to buy the 40-acre Friendly Prairie that was for sale in Pettis County, it was a big deal. "That purchase," wrote long-time MPF member Joel Vance, "showed the world that [MPF] was serious about putting cash on the line."

CHRISTINE CHU

*"We asked 'What about prairie?' We started a fire. Prairie had been a forgotten resource, but the Missouri Prairie Foundation came along at the right time."*

—MASTER CONSERVATIONIST BILL CRAWFORD, CO-FOUNDER OF THE MISSOURI PRAIRIE FOUNDATION




**Now in its 50th year, MPF has acquired more than 3,970 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 3,200 acres in 20 tracts of land and provides management services for additional acres owned by others.**

**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.**

A few years later, MPF went on to buy the now 630-acre Golden Prairie in Barton County, named a National Natural Landmark in 1975 and a designated Missouri Natural Area in 2015.

Through the support of its members and other funders, MPF has continued to acquire and protect land over the past five decades. Through constant and vigilant management—including invasive species control, tree removal, and prescribed fire—MPF maintains a high level of biodiversity on prairies it owns.

Since 2010, MPF has increased its land holdings with the purchase of the 80-acre Welsch Tract in Dade County, the 8.1-acre Urban Prairie in Joplin, the 171-acre Linden's Prairie in Lawrence County, the 180-acre Pleasant Run Creek Prairie in Vernon County, the 74-acre Snowball Hill Prairie in Cass County—only 35 miles south of Kansas City—and the 163-acre Carver Prairie in Newton County. As of May 2016, MPF owns 20 tracts of land totaling more than 3,200 acres.

In addition to the land MPF owns, the organization has protected and helped conserve thousands more acres through its outreach, advocacy, and education efforts. In the 1970s, MPF and other conservation groups successfully advocated for the establishment of Prairie State Park in Barton County, the first parcel of which was purchased in 1980. Today, at nearly 4,000 acres, the park is Missouri's largest publicly owned prairie.

"From accelerated prairie acquisition to 20 years of native plant sales in Kansas City," said Doris Sherrick, current MPF president, "MPF continues to be a leader in native prairie protection, advocating for prairie, prairie reconstruction, the use of native plants in built and agricultural landscapes, and monitoring the effects management has on the many components of the prairie ecosystem. MPF is the only organization in the state focused solely on prairie. That focus, together with the passion of its members and governing body, provide for an effectiveness in achieving its mission that is probably not possible for other environmental organizations or governing agencies."

## Grassroots Advocacy—for Grass Roots

MPF emeritus board member Lowell Pugh, of Golden City, has fond memories of his decades-long friendship with Don Christisen, MPF's co-founder. "We were the first Missourians to talk with Katherine Ordway about prairie conservation," said Pugh. In 1972, Pugh and Christisen escorted Ms. Ordway, the famous prairie philanthropist from the East Coast, from the Springfield airport


MERV WALLACE

JEFF CANTRELL

CAROL DAVIT

**With a limited staff that was not established until MPF's 32nd year, volunteers have always been a driving force of the organization, including its hard-working board of directors (right) who meet quarterly—often on or near a prairie—and individual volunteers like Ric and Jean Mayer, top center. In 2012, an additional fleet of volunteer power was added: the members of MPF's Grow Native! Committee, above.**

CAROL DAVIT

**MPF has partnered with other groups to jump-start native grassland projects. In 1980, MPF provided funds for the first seeding for Shaw Nature Reserve's prairie planting, Gray Summit. In the late 1990s, MPF gave funding for restoration of the Kennedy Woods Savanna in Forest Park, St. Louis (above). Stewardship of the savanna got a boost in May 2016 from a volunteer planting crew led by MPF member Gary Schimmelpfenig, far left in hat.**

BRUCE SCHUETTE

**Blazing stars light up MPF's Schwartz Prairie in St. Clair County. Within its 240 acres, more than 330 different native plants have been documented. MPF's La Petite Gemme Prairie has been found to have the highest plant diversity, on a 1/4-meter scale, of anywhere in the state. The high number of species on MPF prairies is due to the natural diversity of the sites and are maintained thanks to MPF's steadfast management.**

to tour Barton County prairies. Shortly after her visit with Pugh and Christisen, Ms. Ordway provided funds enabling The Nature Conservancy to begin purchasing prairie tracts.

In 1998, MPF spearheaded the formation of the Grasslands Coalition—20 conservation groups and private landowners working together to pool resources and truly make a lasting impact on landscape-scale, viable native grasslands. The Coalition identified several "Prairie-Chicken Focus Areas" around the state as the best remaining locations to focus conservation efforts for prairie-chickens and other prairie species. These Focus Areas laid the groundwork for the establishment of grassland Conservation Opportunity Areas (COAs) by the Missouri Department of Conservation, part of Missouri's Comprehensive Wildlife Strategy.

In 2011, the Department of Conservation approached MPF to consider becoming the new home of the Grow Native! native plant education and marketing program. In 2012, MPF took on this new endeavor, and Grow Native! has blossomed in many directions since then with expanded workshops and other educational offerings, and by extending the area it reaches beyond Missouri to include the lower Midwest. Grow Native! currently enjoys the support of more that 110 professional members who in turn receive marketing services from Grow Native!

While administered by MPF, much Grow Native! programming is overseen by native plant professionals who volunteer their time as Grow Native! committee members. Recently, committee members and MPF staff crafted the program's 2016–2020 strategic plan that will guide the programs growth over the next five years.

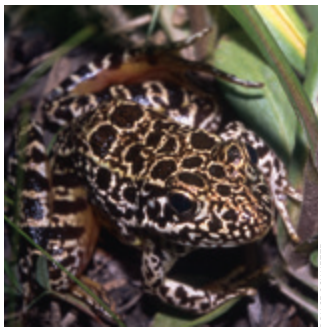
## Pooling Prairie Resources

MPF's partnerships with other conservation groups and private landowners enable the restoration, management, and protection of prairie on a larger scale than any one group or individual could accomplish alone. MPF generates enthusiasm among landowners to improve prairie habitat, shares technical knowledge with them, and leverages funding for restoration work by serving as a grantee or grant partner on many projects.

JEFF CANTRELL

JEFF CANTRELL

**MPF organizes many events open to the public to learn about Missouri's prairie heritage, including its annual MPF Prairie BioBlitz. As MPF member and butterfly and moth expert Phil Koenig of O'Fallon, MO said, "MPF's Prairie BioBlitz brings citizen naturalists of all ages together to learn from and help the experts find the treasure of species that live on the prairie. We cannot conserve what we do not know."**



BRUCE SCHUETTE

**MPF prairies provide habitat for thousands of plants and animals, including at least 13 species of conservation concern, such as upland sandpipers, northern crawfish frogs (left), Mead's milkweed, and prairie mole crickets.**

VAN WISKUR

**Thanks to the efforts of MPF President Doris Sherrick and the other volunteers involved before her, MPF has been a leader in promoting native plants for landscaping projects for more than 20 years, through its annual native plant sales in Kansas City. In recent years, MPF has been organizing native plant sales in other parts of the state as well.**

MPF provides management services for some prairies owned by the Missouri Department of Conservation through a cooperative agreement, and the Department also provides management services to some MPF properties. For more than a decade, MPF has conducted prescribed burns and invasive species control for the Ozark Regional Land Trust's Woods Prairie. MPF has also controlled invasive species on land owned by The Nature Conservancy, Kansas City Parks and Recreation, and Powell Gardens.

In addition, MPF has helped jumpstart restoration and reconstruction projects. For example, in 1980, MPF provided $4,000 for initial seeding of the now more than 200-acre prairie planting at Shaw Nature Reserve in Gray Summit. In the late 1990s, MPF provided funding for restoration efforts of the savanna within Kennedy Woods of Forest Park in St. Louis.

## Engaging Future Prairie Stewards

The vision statement of MPF is "to awaken and engage the passion of others to protect and restore native grassland communities, for the benefit and enjoyment of present and future generations." MPF—its board members, staff, and members—go about encouraging the prairie spark in many ways.

Since its founding, MPF has organized and promoted prairie symposia, seed-collecting workshops, hikes, and prairie and glade restoration workdays; sponsored lectures and traveling photography exhibits; and continues to host numerous prairie-related events throughout the year including its annual Prairie BioBlitz and to publish the *Missouri Prairie Journal*.

Advice and restoration information from individual MPF members has helped introduce others to prairie, including Rudi Roeslein of St. Louis, now an MPF technical advisor and an avid prairie restorationist. "I think my life used to be a lot simpler before my prairie love affair started and invaded my waking and sleeping hours with plans on how to save and restore it," said Roeslein. "We can never completely reconstruct a real prairie but make a facsimile. That is why MPF's work to conserve original prairie is so critical in giving us the bench mark of what we have to shoot for and what we need to preserve. My prairie restoration work—and my current business project to use diverse prairie plantings for feedstock for bioenergy has been a hopeful journey that has made my life richer."

When Crawford looks back at the history of MPF, his pride in the organization is obvious. "Although there is much prairie conservation work to be done by all prairie partners in the state," said Crawford, "MPF has done what it set out to do," he said. "It created an awareness of the importance of prairie among citizens and continues to do so to this day."

—adapted from a 2011 *Missouri Conservationist* article by **Carol Davit**, MPF executive director and *Missouri Prairie Journal* editor

## MPF Establishes National Prairie Day

In its 50th anniversary year, MPF not only continues prairie conservation work in the state, but also founded National Prairie Day, registered on the National Day Calendar as the first Saturday in June, to enhance public awareness on a national scale of what prairie is, educate about its value, and motivate all who learn about prairie to be inspired to support prairie conservation, restoration, and enjoyment. This year, National Prairie Day was Saturday, June 4, 2016. **For more information, visit nationalprairieday.org.**

GROW native!
Missouri Prairie Foundation

# Gardening for Monarchs

By Susie Van de Riet

***Create a beautiful and captivating garden where monarch butterflies and other beneficial insects will thrive.***

www.HenryDomke.com

What do butterflies, bees, wasps, beetles, flies, and moths have in common with us? We all share similar habitat or environmental needs: Food, space, place to reproduce, shelter, and a poison-free environment. In order to attract these beneficial insects, many of which are critical pollinators of native plants and our food crops alike, we need to meet their habitat needs.

You can create or enhance a garden to provide the best possible habitat scenario for monarchs and to be aesthetically pleasing to you as well. Steps in this process include choosing the best plant food sources for all stages of the monarch life cycle, identifying the best location for a monarch garden, considering what other gardening practices would be beneficial to them, and arranging plants in a way that looks attractive to you.

## Food

The plants at the heart of the current "monarch movement" include milkweeds. Word of caution: Don't do what I did when I first put milkweed in my own yard years ago for monarchs and pick the caterpillars off the plant for fear that "They are eating all of my milkweed!" Milkweed species are the food source for the monarch caterpillar—without milkweed plants to eat, monarchs would cease to exist.

My three favorite milkweeds are the early summer-blooming butterfly weed (*Asclepias tuberosa*), mid-late summer blooming marsh milkweed (*Asclepias incarnata*), and early-mid summer blooming common milkweed (*Asclepias syriaca*). These three species are also recognized by monarch experts as three of the most important for monarchs in the lower Midwest, along with whorled milkweed (*Asclepias verticillata*), green milkweed (*Asclepias viridiflora*), and spider milkweed (*Asclepias viridis*) also being important monarch larval food sources in this region.

Milkweed is also an important nectar source for adult monarch butterflies. The abundant flowers are a great "landing pad" for monarchs, bees, and other pollinators.

Native coneflowers, asters, blazing stars, and goldenrods are also excellent choices for nectaring adults and will attract other pollinators too. Be sure to include species that collectively provide a long period of blooms, with late-summer and fall-blooming blazing stars, asters, and goldenrods. This is especially important to fuel migrating adults and gives them the strength and nourish-

SUSIE VAN DE REIT

BRUCE SCHUETTE

**Monarch butterflies lay eggs singly, usually on the underside of leaves of milkweed, so the hatching caterpillars have an instant food source.**

ALAN BRANHAGEN

**Plant milkweeds and other plants that provide nectar close together, like common milkweed and coneflowers, to provide food for the complete life cycle of monarchs.**

SCOTT WOODBURY

**This large mass of butterfly milkweed maximizes food per square foot for monarchs, so the insects use less energy flying in order to lay eggs or find nectar.**

SUSIE VAN DE REIT

ment they need to make their journey south.

It is essential to include both wildflowers that provide nectar as well as milkweeds in a garden to meet all food sources needed for the monarch's life cycle.

## Location, Location, Location!

Pollinators love the sun, and monarchs are no exception to this rule. Much of their body heat is lost to the air, so sunning themselves is a way to absorb more warmth for flight. This is why a south-facing, sun-exposed location is a preferred monarch garden location, although not absolutely necessary—I have seen monarchs in full sun and part sun locations alike, but more frequently in full sun locations.

Picking an area that is somewhat sheltered from high winds is ideal as well; monarch butterflies are strong fliers, but more delicate butterfly species and other floral visitors may benefit from the shelter, optimizing your garden's enticement factor.

## Gardening Practices

An effective way to attract the attention of an adult monarch as it is flying through your yard or neighborhood is to group species of wildflowers in clusters, perhaps three to five plants per cluster, so that each clump is at least three feet wide. This way, monarchs can easily spot potential egg-laying and nectaring opportunities. This practice also provides the most nectar per square foot, requiring less energy of the butterfly to move from flower to flower to get the most nectar possible.

Milkweed leaves, especially those of common milkweed, can become tough and less palatable to monarch larvae by late summer. To encourage more tender foliage and bushier growth habit, in early to mid-summer you can trim milkweed stems back to leaf nodes so the plant is one-third its original size, **as seen directly above**.

One last practice that is particularly important to refrain from is the use of pesticides, especially insecticides. Nothing can more quickly undo all of your positive efforts towards creating a safe and beautiful habitat for monarchs than poisoning it. Many insecticides do not discriminate between one insect over another. Before you spray, ask yourself why? If you feel it is critical that you spray, know what you are spraying and do your research first. If you can avoid

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SUSIE VAN DE RIET

**Planting milkweed as a larval monarch source will also benefit adults of monarchs and other butterflies, like these great spangled fritillaries.**

**The balanced look of this garden is achieved with taller plants in the back—including the untrimmed common milkweed in the center—and a border of pavers. The milkweed is a larval food source, and the white mountain mint blooming in the foreground is an attractive nectar source for monarchs and other insects.**

spraying any insecticides, especially outdoors, please do.

## Easy On The Eyes

Making monarch gardens look intentional and beautiful as opposed to a patch of weeds starts with understanding the growth habits of plants you have chosen. For example, is it a low-growing, compact plant that should be in the front of the garden where all can see it, or in the middle or back where it is a little more concealed from human eyes?

If you don't plan on trimming back your plants, I recommend this placement for milkweeds: common milkweed in the back of a garden so it can be concealed later in the summer when its leaves turn an unimpressive brown; swamp milkweed in the middle as it can get tall and lanky; and the shorter and more compact butterfly milkweed in the front.

Group plants of the same species together and this will produce a more formal look and impactful pops of color. Make sure to include borders around your garden such as a strip of mowed turf, a border of sedges or grasses, stones/pavers, fencing, or a strip of ground cover—borders underscore that a garden is intentional.

If you know certain plants will get tall and lanky, such as blazing stars or New England aster, you can stake them or trim them back to one-third of their size in early to mid summer, and you can plant them closely with other groups of plantings so they support each other.

## Gardening for More than Monarchs

I'm personally a big fan of gardening for many other insects that are just as fascinating as monarchs, but receive less attention. When you garden for monarchs, know that many other insects will benefit from your work. It is as much of a joy to observe the comings, goings, and routines of the wasps, bees, flies, moths, beetles, skippers, and other butterflies in your garden as it is the monarchs.

You may be upset if you see that other caterpillars are eating your milkweed plants too—I say let them! These other insects have as much of a right to the milkweed as monarchs, and certainly, monarchs and other insects coexisted among the milkweeds long before we gardened for them.

**Susie Van de Riet** is a Grow Native! Committee member, owner of St. Louis Native Plants LLC, a Forest Park Forever gardener, and loves educating others about the strong connection between native plants and wildlife.


JOAN CLUBINE

# Greater Prairie-Chicken Trapping for Illinois

This past March, I returned from the Smoky Hills in Kansas trapping greater prairie-chickens for the Illinois Department of Natural Resources (IDNR). Some Illinois colleagues and I had trapped and translocated chickens to Illinois in 2014 as part of a three-year plan to revitalize the gene pool on Illinois' Prairie Ridge Nature Sanctuary (PRNS) complex. Returning in 2015 was not possible because the Illinois governor had cut out-of-state travel for the IDNR staff. IDNR prairie-chicken project leader Bob Gillespie and PRNS manager Scott Simpson were able to get financial support from Audubon of Illinois and University of Illinois to contract with me to coordinate a trapping in 2016, using some Missouri folks I'd select and some Illinois staff and volunteers. I recruited MPF board member David Young, MPF member Donnie Nichols, Kathy Cooper, George Hartman, Larry and Garry Houf, and a Kansas bison rancher friend, Wayne Copp.

The first thing we do when we arrive in the Smoky Hills in March is census the number of males associated with known leks in the four-county area where we've trapped since 2008. There are several non-territorial males on leks that won't be there in April so the March count gives us a much better idea of the total population. The only leks we don't count are those on and within one mile of four long-term Kansas Wildlife and Parks census routes where we can't trap—we don't want to affect long-term census records. We've counted between 600 and 800 males annually. Our protocol is to take no more than 20 percent of the males and hens from any lek to ensure the stability of the lek and population and only from leks with at least ten males. So far, it seems to be working. The population has remained stable or increased except for the drought years of 2012–13 in which the population dropped 20 to 25 percent, perhaps due to poor hatching and chick survival and conversion of some critical Conservation Reserve Program (CRP) tracts adjacent to native rangeland to cropland. CRP tracts are normally too tall and rank in normal or above-rainfall years, but greater prairie-chickens may use them during droughts when the grasses and forbs in the tracts are shorter due to low rainfall.

The best habitat is moderately grazed native rangeland free of trees. Cedar, Osage orange, Siberian elm, and autumn olive are woody threats to native range and prairie-chicken habitat. Several ranchers are cutting trees and a few in the Smoky Hills burn frequently enough to control cedars, but habitat is being lost where ranchers don't burn or cut trees faster than it is being gained elsewhere.

### Kansas Wildfire

Perhaps you followed the large Anderson Creek wildfire in the Kansas' Red Hills in March. It was where we held the Patch-Burn Grazing Working Group meeting last August and, in fact, burned 95 percent of Ted Turner's Z-Bar Bison Ranch where we met the last day of the meeting. I am sad to report that Z-Bar Ranch Manager Keith Yearout and his wife Eva, our hosts that day, whom I wrote about in the spring 2016 issue, lost their house in the fire. Eva and their children were able to save some personal belongings before the fire reached the house, but everything else was lost. They moved to the guesthouse for a time.

Approximately 367,620 acres, some estimates much higher, of grassland in Oklahoma and Kansas were burned by the fire, which was driven by 40 mile per hour winds before light rain and snow helped fire crews control it. One other house, several cattle, livestock hay, and lots of wood fence posts were also lost.


GEORGE HARTMAN


DONNIE NICHOLS

**MPF Board Member David Young was part of the March 2016 greater prairie-chicken translocation crew, comprised of, below from left, George Hartman, Wayne Copp, Kathy Cooper, David Young, Larry Houf, Steve Clubine, Garry Houf, and Donnie Nichols.**


GEORGE HARTMAN


STEVE CLUBINE


WALT FLICK

**Little bluestem emerging after the Anderson Creek Wildfire,KS.**

**In the foreground are skeletons of eastern red cedar (*Juniperus virginiana*), and in the background, many more alive that have invaded this Kansan grassland. While native to much of the Midwest, prior to European settlement cedars were confined mainly to cliff edges. Since then, suppression of fire has led to the rapid spread of cedars into glades, prairies, and other natural communities, resulting in a degradation of open habitat that is detrimental to hundreds of native plant and animal species in original habitats.**

Another ranch that was pretty much completely burned, except for the ranch house or facilities, was Ted Alexander's. His son Bryan was interviewed by the media and said that the silver lining to the fire was that a lot of invasive red cedar was eliminated and pretty well took care of his prescribed burn plan for the next ten years. At last summer's meeting, Alexander said they needed to burn 100,000 acres a year to get ahead of the red cedar problem so that too is ahead of schedule for awhile.

Cattle were lost that probably were caught against fences in heavy grass. Yearout reported they lost only three heifer bison near the corrals—the rest of the 700 bison cows plus last summer's calves and bulls took refuge on a prairie dog town and survived. It's remarkable how the bison had the instinct to locate there. Perhaps too bad so many other ranchers have destroyed their dog towns. Turner's staff worked to maintain and expand their dog town, and they have plans to re-introduce the blackfooted ferret.

The prairie burn was difficult to control because of the 40-plus year old cedars that developed from failure to use prescribed fire to manage the native prairie rangeland. Hot spots continued for several days because of cedars.

This, too, could happen in much of Missouri in the near future. We have a huge eastern red cedar epidemic throughout the state that will get dramatically worse very soon unless a concerted effort is planned now for their control. In a recent trip to northwestern Missouri and southwestern Iowa, I was stunned by all the land that is covered with small cedars. Within 30 years, 60 to 70 percent of the non-cropped land in this region will be a cedar forest, having a huge impact on grassland flora and fauna, including popular game species like deer and turkey.

Stopping the change will take a coordinated, unified effort from landowners and agencies. Small areas may be controlled by chemically treating or cutting individual trees (stump herbicide treatment isn't necessary for cedars), but for every tree so treated, hundreds of smaller ones remain. The only solution is a well planned burning program that will include road rights-of-way and private and public land. Without such a plan, we are headed for a biological catastrophe in the form of eastern red cedar, moving across the landscape like a big green glacier.

Yours for better grasslands,
Steve Clubine

## Summer Grazing

In April, I bought steers and heifers for summer grazing to sell to grass-finished beef customers. I usually buy a few of a friend's surplus calves whose grass genetics I know. If I have customers for grass-finished beef, I'll buy some 700 pounders and graze them on native warm-season grasses from May through August, then cool-seasons grasses through mid-October when I send them to a processer. By then they will be around 1,000 to 1,100 pounds.

I will also buy several sub-500 pounders from the local sale barn to graze through July, selling them through the same sale barn about the first of August by which time they will have put on over 250 pounds. My gain the last two summers through mid-October has been just shy of 400 pounds averaging 2.27


STEVE CLUBINE

pounds daily. Only native warm-season grasses and forbs will give that high a rate of gain through the summer. This year, the family from whom I buy the cattle wants to buy them back for their customers, and another grass-finished producer wants me to custom-graze a few of his until he's ready to finish them.

I've been accused of over-feeding my animals by buyers at the sale barn because my steers were so fat. Buyers for feedlots want skinny animals on which they can put on a lot of pounds with grain. It can be tricky getting a high enough price per pound to compensate for the cheaper grass gain. Prices plummeted last fall and are not likely to rise to the height of the previous two years in which gross profits of $400 per head in 150 to 180 days were pretty well assured. It will take careful figuring to net $100 to $200/head this and future years. However, I am convinced that the best way to do it is to have native warm-season grass and forbs in the grazing package, a fact very few agronomists or producers in this part of the country know.

As my native grass and forb plantings have gotten better, I've been able to carry more animals. This will be the fourth year, so I am nearing peak carrying capacity and will begin patch-burn grazing. I did that in 2015 to some extent because large areas had too much heath aster and ragweed or were too wet to carry a fire, so I had to high-clip portions. The high amount of rain received in April and May of 2015 also forced me to delay turning steers onto the native grass and forbs as early as I would have liked because the animals would have sunk into the new sod, so I left them on cool-season grass until early May. While they did very well on the cool-season grass, they would have gained even better on the new warm-season grasses. I had them on the native plantings by May 4 this year.

I'm hoping that by selling after the first of August (after achieving exceptional early gain), I can avoid both having animals that are too heavy and the price depression that typically occurs in early fall. It also means my native grass and forbs will get more rest in the late summer.

The gain a stocker producer can get on native warm-season grasses and forbs is one of the best kept secrets in the cattle world—but it shouldn't be a secret any longer. Flint Hill ranchers know it well, but many Missouri producers and agronomists don't seem to have a clue or don't believe it if they see it. The only warm-season grasses that University of Missouri Extension (UME) promote are introduced (invasive) ones—Old World bluestems and bermudagrass. Average daily gain on these is normally 0.4 pound less than on big bluestem and indiangrass according to grazing trials conducted by the Missouri Department of Conservation.

## Rancher Gains Greater Appreciation of His Prairie

TROY IFLAND

**Bill Sprouls, winner of the 2015 Aldo Leopold Award from the Kansas Association of Conservation Districts. The award is presented in honor of renowned conservationist and author Aldo Leopold, who called for an ethical relationship between people and the land they own and manage. Award applicants are judged based on their demonstration of improved resource conditions, innovation, long-term commitment to stewardship, sustained economic viability, community and civic leadership, and multiple use benefits. The Leopold Conservation Award Program in Kansas is made possible thanks to the generous support of Clean Line Energy Partners, Ducks Unlimited, ITC Great Plains, NextEra Energy Resources, Westar Energy, Kansas Department of Wildlife, Parks and Tourism, DuPont Pioneer, The Mosaic Company, and The Lynde and Harry Bradley Foundation.**

Through range management short courses, bird surveys, and more, Bill Sprouls, a southeastern Kansas rancher, has become much more appreciative of his prairie that he once thought only as a place to graze his cattle. Sprouls began improving the degraded 2,200 acres of prairie he and his wife, Peggy, bought several years ago by removing hedge and cedars and improving and transforming the formerly overgrazed pastures into tall, native prairie.

Short-courses offered by the Natural Resources Conservation Service and Kansas State University taught him appreciation for wildflowers, native pollinators, and other insects instead of just stocker animal gain. Working with Kansas Department of Wildlife, Parks and Tourism (KWP&T) to conduct annual breeding bird surveys on his ranch gave him a greater appreciation of all wildlife native to his prairie. "I'm getting so much more out of it now than I used to," Sprouls told the group at an award ceremony at the annual Kansas Association of Conservation Districts (KACD). Sprouls has also worked with Kansas State University to perform studies on the effects of patch-burn grazing on pollinator populations.

On a down note, Sprouls says the extra effort to burn only part of each pasture has him contemplating whether he can continue patch-burn grazing. "My neighbors burn all their pastures, working together and often burning several sections at a time road to road. This makes it more difficult and takes more time and crew to burn only part of mine." Bill has several thousand leased acres in addition to that which he owns, a lot to get burned during the very short burn window.

Sprouls received the 2015 Aldo Leopold Award from the KACD. When accepting his award, Sprouls relayed an interesting anecdote about barn owls. He said, "I got excited about having barn owls, and one evening an owl flew out of my barn. I contacted my friends at KWP&T and they said they'd be right out with a barn owl box. As we approached the barn, an owl flew out. They said, 'Uh-oh.' 'What?' I said. 'That's a great-horned owl,' they said. 'What do they eat?' I asked. 'Barn owls!' they replied." They put the box up anyway and Sprouls happily reported that he now has barn owls. "All this is to say that, because of my exposure to prairie wildflowers, pollinators and other insects, wildlife, and the like," said Sprouls, "I have a much greater appreciation for my prairie than when I just looked at it from the standpoint of producing beef."

## Economics of Weed Control in Forage Management

There are many claims by herbicide companies that weed control produces more grass for cows, and many studies by university agriculture departments on forage quality of grasses—but none that tell the forage value of forbs. Forbs, otherwise known as broad-leaved plants including wildflowers, or, "weeds" by some, are assumed by many farmers and agronomists to be of little value for grazing and therefore should be controlled.

Any range conservationist worth his salt, however, knows that native forbs have value in the herbivore diet. In addition to the protein and calories they provide, forbs are often good sources for minerals—like "mini-mineral blocks," I heard a range conservationist once say. It may be that researchers are basing their claims on forbs that are collected, dried, and ground for forage quality analysis, and not on the their palatability and forage quality when they are green and growing in a pasture.

# Native Warm-Season Grass News

**A Landowner's Guide To Wildlife-Friendly Grasslands**

STEVE CUBINE

**Some cattle producers may consider native forbs, or broad-leaved plants, to be "weeds." However, native forbs add important nutrition to the diet of livestock, and research has demonstrated that pasture weed control is not supported by profitability or healthier, more productive animals. Not only do forbs benefit cattle, they are absolutely crucial to prairie ecosystem health.**

At the 2015 Patch-Burn Grazing meeting, Audubon of Kansas executive director Ron Klataske asked Oklahoma State University (OSU) Department of Wildlife and Range Management researcher Dr. Sam Fuhlendorf if he knew of any studies that showed the forage quality of native forbs. Fuhlendorf said no, but he was asked by a superior to look into the economics of rangeland weed control soon after he arrived at OSU. "I put it off for many years, feeling I had more important research to do, but when I finally did it, it was one of the most gratifying studies I ever did and the results were quite surprising. There are lots of studies that show more grass if broadleaf herbicides are used to kill forbs, but only one that relates to animal performance, i.e. gain per acre or gain per animal. In that study, animals either gained no more or not as well on sprayed native range. While vegetation composition was different (i.e., grass to forb ratio), total biomass of forage produced, gain per animal, and gain per acre were no different." Thus, weed control is not supported by profitability or healthier, more productive animals. Economics improve only for herbicide companies, distributors, suppliers, and commercial applicators.

Another surprising outcome of the study was when it was published and hit the agriculture media: Herbicide companies and livestock producers demanded that OSU fire Fuhlendorf. "Only tenure," Fuhlendorf said, "may have saved my job."

Many ranchers think that prairie forbs are weeds, that cattle don't eat weeds, only grass. Herbicides companies have mounted major propaganda campaigns to convince ranchers and get them to buy and apply herbicides. However, there is no valid research showing that broadcast application of broadleaf herbicides is economical, and loss of prairie forbs has had a significant negative impact on prairie pollinators and other insects and wildlife that depend on native forbs.

## Upcoming Meetings/Conferences

**July 17–20, 2016:** North American Prairie Conference, Normal Marriott & Conference Center, Normal, IL. http://nap2016.illinoisstate.edu

**August 24–26, 2016:** Patch-Burn Grazing Working Group Annual Meeting, August 24-26, 2016, Childress Community Center, 237 Commerce Street, Childress, TX. Field trip to Matador Wildlife Management Area. http://www.gpfirescience.org/events-webinars-source/2016/3/3/patch-burn-grazing-annual-meeting

**August 29–31, 2016:** Eastern Native Grass Symposium, Tropicana Hotel, Evansville, IN. http://bringbackbobwhites.org/2016/03/15/eastern-native-grass-symposium-location-dates-set/

**November 1–4, 2016:** 11th Biennial Longleaf Pine Conference, Savannah, GA. https://www.facebook.com/The-Longleaf-Alliance-234117983275518/?fref=nf

## MPF Prairie Workshops

**July 24, 2016:** MPF's Prairie School. Vice President of Science and Management Bruce Schuette and Director of Prairie Management Jerod Huebner will lead this day-long prairie stewardship workshop at MPF's Carver Prairie. This learning opportunity is geared to landowners, prairie enthusiasts, students, and young professionals. Topics covered will be Missouri's prairie history, prescribed fire, herbicide types, uses, application rates, and safety, Carver Prairie restoration efforts, and in-the-field plant identification. 11:00 a.m. to 5:00 p.m. Bring lunch; cold drinks provided. $40 per person for non-MPF members; $30 per person for MPF members. Details and registration information at moprairie.org. Questions? Call 417-414-4700.

**September 23, 2016:** Grow Native! Workshop on Converting Non-native Landscapes to Prairie Grasses and Wildflowers, and their maintenance. Hosted by Powell Gardens, Kingsville, MO. Great speakers include Alan Branhagan, Dr. Quinn Long, Mike Leahy and Matt Bunch. Topics will include history of native grasslands in the Kansas City area, eliminating non-native vegetation, seeding mixes and rates, planting maintenance, aesthetic and ecological considerations of plantings, and tour of prairie remnants and plantings at Powell. Lunch included. Geared to parks and recreation professionals, landowners, municipal planners, landscape designers, and landcare professionals. $50 per person for non-MPF members; $40 per person for members. Register at grownative.org.


CYNDI COSBILL

# Feathered Curricular Connections to Art and Science: Exhibiting & Presenting Field Trip Data

## Part 2 of a three-part bird series in honor of the Migratory Bird Treaty Centennial

A practice many outdoor educators and naturalists may overlook, but can use to great benefit, is to simply stop for a moment during a hike or other activity to observe and reflect upon one's surroundings. It is beneficial to take a break from walking on a trail or on a prairie and deliberately listen carefully and look in all directions, especially up.

A school class field trip or a home school or scout group can very easily observe avian life on our native grasslands. In many instances, a school bus or youth group's van can pull alongside a fence right along a country road and observe perching dickcissels, grasshopper sparrows, and indigo buntings. The vehicle sometimes serves as a blind and the whole group can identify, photograph, and learn firsthand from their observations.

While some grassland bird species—especially native sparrows—tuck into grass in the presence of a large group, meadowlarks, dickcissels, flycatchers, and kingbirds often perch on top of prairie shrubs or along fences, where they can be easily viewed. Lastly, overhead observations are a treat for the whole group, and depending on the time of year, turkey vultures, raptors, gulls, terns, swallows, and American white pelicans can provide a grand educational show.

The summary and discussion from a field trip can be just as exciting for the students as the experience itself. One option an engaged teacher or youth leader can consider is to combine further research of field observations with the creation of art boards. These displays can be exhibited in a trophy case or school library, used for a special presentation, or submitted as science fair entries.

Let the student's creativity flow, but give guidelines on the components of the set-up. A title, journal page or data sheet, and a three-dimensional figure or diorama will be suitable for an art board layout. The 3D model or scene can be easily constructed with paintable white modeling clay or homemade salt dough. The inspiration from the field experience can be conveyed in a student's art, journal sheet, or presentation to a class.

JEFF CANTRELL

A bird I like to highlight on most trips is the turkey vulture. While not exclusive to grasslands, turkey vultures are easily spotted overhead in open grassland settings. This nomad of the skies, and its role as a scavenger, can be overlooked in plain site—but not if specific research and presentation activities are planned around it.

Criteria for a sample turkey vulture art board can be:

- Feature the bird's identifying field markings in the artwork
- List four facts about the prairie habitat where it was observed
- Include four points regarding the ecological importance of the vulture
- Write a title and design a layout for the art board, keeping in mind that it may be exhibited.

Research and presentation development allow students to re-experience a prairie outing, and learn more about bird life history in the process. Moreover, exhibit presentation give peer students and reviewers a chance to practice pausing, observing, and reflecting.

Any questions on using the outdoors to teach youth/adult groups or interpret nature can be relayed to Jeff at swampcandle1@gmail.com or 417-476-3311 or work 417-629-3423.

**GLEs: LO.1.A.1a., EC.1.A.4.a, EC.3.C.4.b., IN.1.B.4.a., IN.1.D.4.a.**

# News from **Feaster Glade**

CÉCILE LAGANDRE

**The author has known since early childhood that debarking rose bushes is a satisfying and intoxicating activity. The quickly dehydrating vascular tissues form patterns extraordinary both to feel and to inspect.**

Eliminating non-native, invasive multiflora rose (*Rosa multiflora*) at Feaster Glade is an art. A good season for this restoration task is, of course, when the plants are most vulnerable: before they start photosynthesizing and while they are depleting their winter root reserves. I successfully eliminated several bushes in sensitive areas where herbicide use wasn't advisable with this spring method, followed by vigilance. I learned from Theresa Cline, an MPF member and Hi Lonesome Master Naturalist, that this early spring window is short, but coincides with the time they are easily spotted—in Feaster's case, only Missouri gooseberry (*Ribes missouriensis*) greens up its own shorter canes at the same time.

Under a late March drizzle, I staggered distractedly through a rocky Ozarkian hollow adjacent to our glade. Left and right, signs of emergence from winter slumber quizzed my botanical memory bank—elderberry (*Sambucus canadensis*), Ohio buckeye (*Aesculus glabra*)… My thoughts quietly returned to task and focused upon a leafing individual, innocent of any premeditated wickedness, but all the same pronounced guilty, and given a death sentence. Its buried root ball bore a dozen canes, most of them woody—clearly an older plant. A meter and a half above its base, brittle older and green newer branches intertwined and arched to form a pergola worthy of a private wedding ceremony. However, I knew from previous experience that all this weepy romanticism was hiding a painful secret.

My goal was of course to cut the base of the canes, but much work needed to be accomplished before reaching it with my favorite 15" pruners/loppers designed for arthritic hands and for my (long haul) arm strength. (Giving a haircut to a thorny overgrown plant requires time and patience…) I began by trimming sections at the flimsy ends of each canes, assuring myself these loose thorny segments didn't remain hanging in mid-air ready to misbehave. With extreme care, I reached for a mis-fallen one when on my naked forearms appeared smeared dirty blobs and oozing lines. I realized the prickly fairy had descended upon me only when my hat disappeared in thin air and the worst happened—a couple of ENORMOUS prickles landed forcefully on my scalp. I was glad to be working with roses that day, and not honey locusts. My short loppers revealed their primary function as an escape tool.

After what seemed like a long and twisted conversation, I was able to reach the base of this particular rose bush. When I straightened up—with little woody branches hanging up from my hair—a faint aroma of spicebush deposited a welcomed rewarding pleasure in my brain.

—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*.

## Planned Giving for Prairies

Your ***annual membership and other gifts*** to MPF are vital to our ongoing prairie conservation work. By establishing a ***planned gift*** to MPF as well, you can also ensure that we can continue our work well into the future. Below are several ways to make a planned gift:

- **Create a charitable remainder trust.** You will receive fixed payments for the rest of your life and have a charitable deduction. Charitable remainder trusts offer payment rates that are more attractive than many other investments, with the rate amount determined by your age. In addition, you have the satisfaction of knowing that the remainder of your gift will benefit MPF.
- **Give appreciated stock or bonds.** You will provide a larger gift to MPF—and avoid capital gains liability.
- **Put a bequest in your will or trust (cash, specific property, or a share of the residual estate).** You will make a gift for MPF's future that doesn't affect your cash flow or portfolio now, but will provide an eventual estate tax deduction.

Those wishing to make a bequest to MPF may find the suggested wording helpful: *I bequeath ___% of my residuary estate (or $___) to the Missouri Prairie Foundation, a nonprofit conservation organization, with its address at P.O. Box 200, Columbia, MO 65205 for its ongoing programs in prairie acquisitions, stewardship, and education.*

If you have already made a planned give to MPF, or plan to, please let us know. For more information contact us: Missouri Prairie Foundation, P.O. Box 200, Columbia, MO 65205, toll-free phone: 1-888-843-6739, or email at info@moprairie.com.

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You shop. Amazon gives.

Amazon will donate 0.5% of the price of your eligible AmazonSmile purchases to MPF whenever you shop on AmazonSmile. AmazonSmile is the same Amazon you know. Same products, same prices, same service.

Visit http://smile.amazon.com for details. Thank you for supporting MPF when you shop with AmazonSmile!

FRANK OBERLE

## Memorials

MPF thanks "the Cline Kids:" **Carol Cline Hammer**, **Caryn Cline**, **Emilee Cline**, and **John David Cline** for their gift in memory of former MPF board member and treasurer **John Cline**, who passed away on January 27, 2016. John Cline devoted much energy, for many years, into making MPF the strong organization it is today.

MPF also thanks **Martinsburg Bank**, where John Cline worked, and **Louesa Runge Fine** for their gifts in memory of John Cline.

MPF thanks the following individuals for their gifts in memory of MPF member and former Missouri state ornithologist **Jim D. Wilson**:

**David Harris**
**Thomas A. and Anne E. Hutton**
**Edward M. and Rita Kallal**
**Steve R. and Anika Rudloff**
**Norman Stucky**

MPF thanks the following individuals for their gifts in memory of Jane Wooldridge Schwab:

**Alton and Edwina Beaver**
**Kay Caskey**
**Lon J. and Mary Lou Douglas**
**Katherine Ehlmann**
**Daniel and Samantha Green**
**Karen Jennings**
**Joan and Brian Johnson**
**Patricia Kloppel and Laura Smith**
**Jeanne Lafser**
**Jane Lale**
**Chip and Theresa McGeehan**
**Martha Meenen**
**Ed and Lou Michael**
**Mr. and Mrs. Natsch, Jr.**
**David Nunn**
**Bill Olson**
**Tom and Majel Parker**
**Bruce and Jan Sassmann**
**M.S. and B. W. Schaffer**
**Judge Cotton Walker**

MPF thanks **Freone Hollinger** for her gift in memory of **DeAnna Joyce Underwood**.

## Call for Hunting Lease Bids

MPF relies on revenue of many kinds to carry out its mission–dues from its loyal members, donations, grants, rental income, plant sales, and other income sources. Income generated from its prairies, such as careful seed collection, also help MPF carry out its conservation work.

In this vein, MPF would like to offer MPF members the opportunity to bid on an exclusive lease to hunt at its 376-acre Stilwell Prairie in Vernon County, for the deer archery and youth archery deer season. This lease would be for five years. Those interested in submitting a sealed bid for this privilege should contact MPF Executive Director Carol Davit at info@moprairie.org for the lease and send sealed bid to MPF no later than July 30, 2016. Minimum bid for one year: $2,500.

**Clarification from spring 2016 issue:** The $5,000 gift donated by Ann Lovell in 2015 listed in the Annual Report was in honor of her parents, John and Dorothy Stade.

## Buy Your MPF 50th Anniversary Poster Today


MPF has produced a special 50th Anniversary poster, featuring the beautiful landscape of MPF's Linden's Prairie and a sampling of the many creatures that live in our priceless prairies. The poster, which measures 16" x 20", will be for sale at upcoming MPF events for $6 (or two for $10). You may have one shipped to you, in a mailing tube, for $10 by contacting MPF Board Member Anita Berwanger at prairiegodmother@outlook.com.

### MPF *50th* ANNIVERSARY CAMPAIGN MEMBERSHIP GOALS

To broaden its membership support, which will **increase MPF's prairie protection capacity and also strengthen the collective voice for prairie conservation**, MPF has established the following membership goals by the end of 2016:

- Grow membership to 2,000 or more by 2016.
- Welcome 50 or more new lifetime members.
- Recognize 30 or more lifetime members as Crawford & Christisen Compass Society Members in 2014, in 2015, and in 2016.

### 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
You may also contribute on-line at www.moprairie.org/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): $2,000; Crawford & Christisen Compass Society: Annual Gift of $1,000 or more from existing lifetime members (cumulative or lump sum in a year)

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

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Protecting Native Grasslands

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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

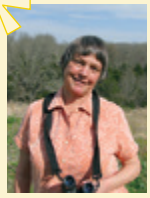
## Missouri Prairie Foundation Events

**July 23, 2016**—Dedication of MPF's Carver Prairie, 2:00 p.m. All are invited to take part in the dedication of MPF's latest acquisition, the 163-acre Carver Prairie near the town of Diamond, MO in Newton County. Following remarks, guests can take part in a guided tour of the prairie. Refreshments will be provided. The dedication will be preceded by the MPF Board of Directors third quarter board meeting at 10:00 a.m. To RSVP to the dedication, call 888-843-6739 or info@moprairie.org. Map and directions to Carver Prairie are at moprairie.org/where-we-work.

**July 24, 2016**—MPF's Prairie School. Vice President of Science and Management Bruce Schuette and Director of Prairie Management Jerod Huebner will lead this day-long prairie stewardship workshop at MPF's Carver Prairie. This learning opportunity is geared to landowners, prairie enthusiasts, students, and young professionals. Topics covered will be Missouri's prairie history, prescribed fire, herbicide types, uses, application rates, and safety, Carver Prairie restoration efforts, and in-the-field plant identification. 11:00 a.m. to 5:00 p.m. Bring lunch; cold drinks provided. $40 per person for non-MPF members; $30 per person for MPF members. Details and registration information at moprairie.org. Questions? Call 417-414-4700.

**September 17, 2016**—MPF Native Plant Sale, 10:00 a.m. to 2:30 p.m. (or until sold out). Missouri Department of Conservation "Monarch Mania" Event, Anita B. Gorman Conservation Discovery Center 4750 Troost Ave., Kansas City, MO 64110. The Discovery Center is partnering with MPF to offer a native plant sale to benefit monarch butterflies. Missouri Wildflowers Nursery will be providing plants that are desired by monarchs (and other wildlife) and will look great in your home landscape. New England aster, buttonbush, purple coneflower, several species of milkweed, including marsh milkweed, along with a wide selection of other pollinator species will be for sale. Jump-start your 2017 pollinator garden! A portion of proceeds will be donated to MPF to help conserve vital pollinator habitat on its native prairies. Questions: contact: 816-716-9159. If you wish to preorder your choices for pickup on the 17th, contact Missouri Wildflowers Nursery: 573-496-3492 or email: mowldflrs@socket.net

**September 23, 2016**—Grow Native! Workshop on Converting Non-native Landscapes to Prairie Grasses and Wildflowers, and their Maintenance. Hosted by Powell Gardens, Kingsville, MO. Great speakers include Alan Branhagan, Dr. Quinn Long, Mike Leahy, and Matt Bunch. Topics will include history of native grasslands in the Kansas City area, eliminating non-native vegetation, seeding mixes and rates, planting maintenance, aesthetic and ecological considerations of plantings, and tour of prairie remnants and plantings at Powell. Lunch included. Geared to parks and recreation professionals, landowners, municipal planners, landscape designers, and landcare professionals. $50 per person for non-MPF members; $40 per person for members. CEUs available for landscape architects. Register at grownative.org.




**August 6, 2016**—MPF Annual Dinner & 50th Anniversary Fundraiser. Dr. Jane Fitzgerald with the American Bird Conservancy will present *Prairies Past, Grasslands Present, and the Birds that Need Them*. During the social hour, enjoy drinks and Missouri fiddle tunes from Grammy-nominated Howard Marshall and fellow string musicians as you place your bids during the silent auction. Dine with fellow prairie supporters and help us celebrate MPF's 50 years! University of Missouri, University Club, 704 Conley Avenue, Columbia, MO. $90 per person, or $850 for a table of 10 ($700 for a table of 10 for lifetime members), drinks included; two complimentary tickets for existing lifetime members or new lifetime members (new lifetime membership: $2,000 individual, household, or business). Watch for your personal invitation in postal mail.

**September 24, 2016**—MPF Hike to Ava Glades 10:00 a.m. to 4:00 p.m. Natural Community Ecologist Mike Leahy with the Missouri Department of Conservation will be our guide as we explore the largest dolomite glades in North America within the Mark Twain National Forest Ava Ranger District south of Ava, MO (Douglas and Ozark Counties). This landscape of xeric prairie-like habitats supports both prairie flora and fauna and specialized glade plants and animals. We will explore glades that exceed 100 acres along the Gladetop Trail National Scenic Byway that are part of the proposed Ava Glades Missouri Natural Area. Moderately strenuous hiking over rocky terrain. To RSVP send a message to info@moprairie.org or call 888-843-6739.

**October 8, 2016**—MPF Annual Meeting and Evening on the Prairie, preceded by Prairie Day activities organized by the Hi Lonesome Chapter of Missouri Master Naturalists. The MPF Board of Directors meeting will be held on October 9, 2016 in the same location. Watch for postcard mailing.

**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.**