

MISSOURI CONSERVATIONIST

VOLUME 82, ISSUE 5, MAY 2021
SERVING NATURE & YOU

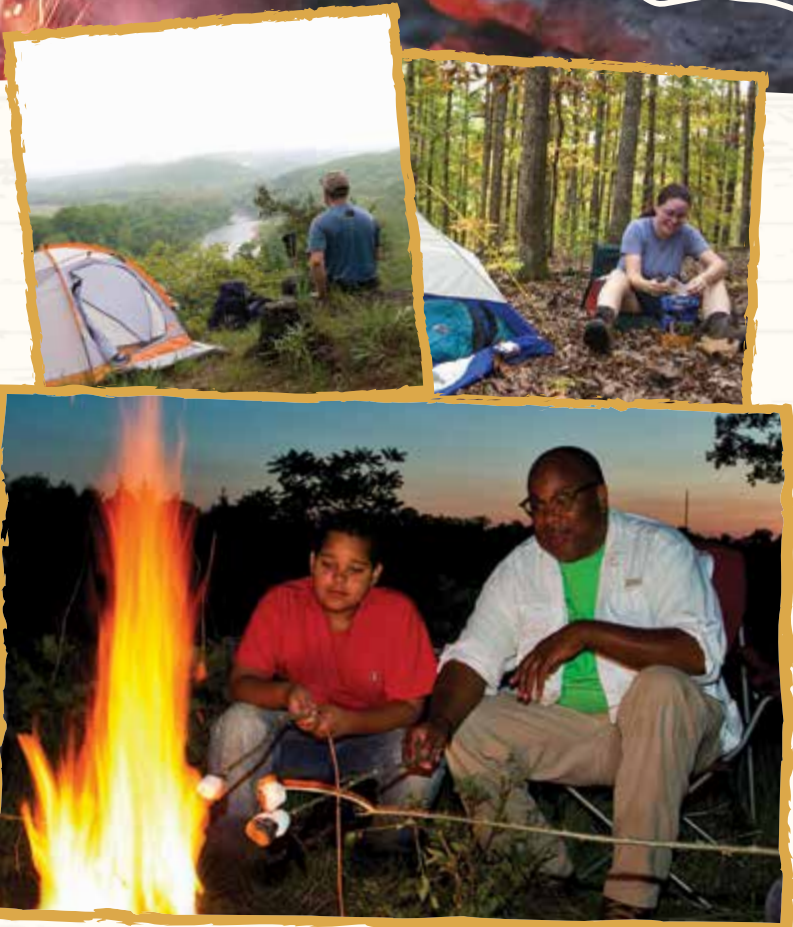




When was the last time you connected with nature?

Maybe it was just a few years ago, or maybe it's been a little longer. Think back to when adventure could happen in your own backyard — where the birds chirp on a spring morning. The smell of the damp air after a thunderstorm. The sight of flowers blooming. The feel of grass between your toes.

It's time to make that connection again, and **Never Lose Touch.**



For ways to reconnect with nature, visit mdc.mo.gov/NeverLoseTouch.

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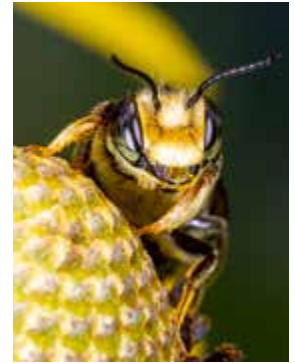
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Pipeline swallowtail



MISSOURI
CONSERVATIONIST



ON THE COVER

A leafcutter bee snags some pollen from a gray-headed coneflower.

NOPPADOL PAOTHONG

100mm macro lens, f/14
1/200 sec, ISO 500

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Letters to the Editor

Submissions reflect readers' opinions and may be edited for length and clarity. Email Magazine@mdc.mo.gov or write to us:

MISSOURI
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CHAMPION TREES
In your March *Conservationist*, the first thing that caught my eye was Jane Mudd's painting on the cover. Spectacular!

Janice Ainsworth
Lathrop

CHAMPION TREES

As a child growing up in the middle of Kansas, it was an adventure to visit with grandparents in southwest Missouri and marvel at all the trees. I really enjoyed the articles and pictures about trees in the March issue [*The Mighty Ones II*, Page 10]. Keep up the great work of maintaining the outdoors for all.

Joyce Guth St. Charles

What a wonderful surprise to see the work of artist Jane Mudd gracing the cover of the March *Conservationist*. I thoroughly enjoyed the illustrated story of Missouri's champion trees as seen through this gifted painter's eyes. Missouri is blessed with so many talented artists, and I'm hoping you'll make use of this resource again in future issues.

Kevin Shults Columbia

CONSERVATION SUPERPOWER

Thank you for introducing us to James Karlslake, a young Missourian with award-winning conversation superpowers [*We Are Conservation*, March, Page 8]. Please continue to spotlight other conversation-minded Missourians. Their stories are inspiring and make me proud to be from Missouri.

Teresa Burritt Lee's Summit

LEARNING TO FISH

The image of the mother and her son fishing in the *Learning to Fish* article is so inspiring [March, Page 16]. You can see how the mother is working so diligently to teach her son how to fish, as she is so gingerly holding the rod, allowing her son to do the work. What a great mother! I liked this photo so much I downloaded it and placed it on my desktop.

David W. French St. Charles

A TWIST ON WILD EDIBLES

Excellent article on wild edibles in your March issue [*Wild Edibles*, Page 22]. We construct many buildings with natural materials. Cattails' mature fluff functions as an exceptional fiber that helps clay finishing plaster resist cracking as it dries. While not edible, it's still a great way to appreciate our natural resources.



Cattails

Kyle Yoder Rutledge

REACHING OUR MILITARY

My husband and I have enjoyed reading the *Missouri Conservationist* for many years. Our son, John, is in the Navy, stationed in Pearl Harbor. He asks us to send him our copies of the magazine. Last year, John took several issues of the *Missouri Conservationist* on a naval submarine in the Pacific for a six-month deployment. Our son says the sailors enjoy reading about Missouri wildlife and seeing the beauty of our state through the wonderful photographs.

Julie Bantle Fenton

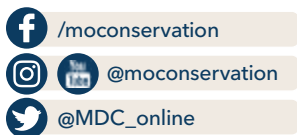
CORRECTION

In the March issue, we identified Dryad's saddle mushroom as *Pleurotus ostreatus* [*Wild Edibles*, Page 26]. It is *Polyporus squamosus*.



POLYPORUS SQUAMOUS: LARRY R. BECKETT

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Share your photos on Flickr at [flickr.com/groups/mdcreaderphotos-2021/](https://www.flickr.com/groups/mdcreaderphotos-2021/), email Readerphoto@mdc.mo.gov, or include the hashtag #mdcDiscoverNature on your Instagram photos.



1

1 | Baby red fox by [Dylan White](#), via Flickr



2

2 | Virile crayfish by [Christina Hoffman](#), via email

3 | Camp branch tributary of Big Creek by [Donna Davis](#), via email



3

MISSOURI CONSERVATION COMMISSIONERS



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Steven Harrison



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Barry Orscheln



Up Front

with Sara Parker Pauley

✳ I needed spring in a different way this year. I needed to see the vibrant magenta of redbud blossoms descend on the Missouri River hills — and the dogwoods burst forth in their white glory — to remind me that all is well. Perhaps like so many, I'm just feeling the effects of pandemic fatigue. But in February, winter's last blast of arctic air and snow ravaged local bluebird populations. Soon after, alarming news arrived that the overwintering numbers for monarch butterflies had plummeted another 26 percent, after a minor rebound in 2019. This was in addition to the news of a continuing global decline in overall insect populations, which could be devastating to the entire food web as insects pollinate the vast majority of earth's flowering plants (learn more about Missouri insect populations on Page 22). I know that, overall, nature epitomizes the very definition of resilience, but stories of life's fragility seem to have dominated the headlines this past year.

Yet spring has arrived, and with it the woodland wildflowers like blue-eyed Mary and wild sweet William are at the height of their glory. Male goldfinches are showing off their spring plumage at nearby bird feeders. On an early morning walk this week, I heard several gobblers announcing their triumph over winter's hardships. And just today, out in the garden, I saw the flicker of colored wings I'd been longing for, that of a bluebird. Perhaps it's a sign, a message for all of us, that resilience has the last word.

SARA PARKER PAULEY, DIRECTOR
SARA.PAULEY@MDC.MO.GOV

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Printed with soy ink



Nature LAB

by Bonnie Chasteen

Each month, we highlight research MDC uses to improve fish, forest, and wildlife management.

SPECIES OF CONSERVATION CONCERN

Caddisfly Study

✳ If you're a fly-angler, you've probably tied a caddisfly pattern or two. Whether as stream-dwelling larvae or mothlike adults, caddisflies tempt hungry fish.

Caddisflies can also be viewed as animal representatives of their associated habitat systems. This means their presence, abundance, and health indicate the condition of their native places.

One caddisfly species, *Glyphopsyche missouri*, occurs at Maramec Spring and nowhere else on Earth. Another, *Agapetus artesus*, also occurs at Maramec Spring. They represent fauna of the cave and karst/springs habitat system described in the Missouri State Wildlife Action Plan.

"However," said MDC Scientist Bill Mabee, "little is known about the distribution, life history, environmental requirements, or tolerance to environmental stress of either species." Mabee led a team to determine if the two species, neither of which had been studied in more than a decade, still occur within their native range.



Larvae and case of *G. missouri* (left) and *A. artesus* (right) were found in habitat dominated by cobble and small boulder substrates at Maramec Spring Branch.

Reaffirmed occurrence of two vulnerable species signals need for further studies to guide ongoing management

In the fall of 2017, Mabee's team scouted Maramec Spring Branch and the Meramec River to document the species' occurrence and characterize their aquatic habitat. They collected enough evidence to make a second visit in January of 2018.

"Our efforts reaffirmed populations of these two species persist in the Maramec Spring Branch," Mabee said. "We also were able to start filling knowledge gaps about these species' habitat-use during their early life stages."

To ensure maintenance of sustainable populations, Mabee said, more detailed studies of distribution, life history, and environmental requirements of these and other cave and karst/springs habitat system species are needed.

"The more we know about these species' needs, the better we can conserve them and the habitat elements — including stream characteristics and plant species — they depend on," he said.

Caddisfly Study at a Glance

MDC's Research Partners

Missouri State University, The James Foundation, U.S. Geological Survey

Management Implications

To ensure sustainable populations, more detailed studies of distribution, life history, and environmental requirements of *G. missouri* and other aquatic species associated with spring habitats are needed.

Objectives

- Determine if populations of either species persist in Maramec Spring Branch
- Characterize early life-stage habitat
- Obtain information on diet of *G. missouri* larvae

Methods

- Sampling: Collect larvae by hand and characterize habitat at collection sites
- Taxonomy: Identify larvae, case-making materials, and gut contents

Findings

- Larval cases indicated use of fine gravel, slender sticks, shells of immature aquatic snails, and bits of red algae
- *G. missouri* specimens dissected for dietary analysis revealed fragments of several species of algae and moss

STREAM: ANDREA SCHUHMAN; LARVAE: BILL MABEE

In Brief

News and updates from MDC

FIRST BLACK BEAR SEASON SET THIS FALL

MDC SETS HARVEST QUOTAS, BEAR MANAGEMENT ZONES IN SOUTHERN MISSOURI

➔ MDC will offer the state's first black bear hunting season this fall, Oct. 18–27.

The Missouri Conservation Commission gave final approval of MDC's season framework, permit and harvest quotas, and other related regulations for hunting black bears in Missouri at its March 26 open meeting. The approved regulations limit bear hunting to Missouri residents and restrict bear hunting to designated areas of southern Missouri. Missouri residents will be able to apply during May for the October hunt with permit selection by July 1 through a random drawing of applicants.

Missouri's estimated 800 (600–1000) black bears are found south of the Missouri River, and primarily south of Interstate 44. MDC has established three Bear Management Zones (BMZ) in southern Missouri and will issue annual permit numbers and harvest quotas for each of the three BMZs. Each permit will be for a specific BMZ and may be used on public or private property within the BMZ.

Permit and harvest quotas for the upcoming Oct. 18–27 bear season will be:

BMZ 1: Permit quota of 200 issued with a harvest quota of 20 bears.

BMZ 2: Permit quota of 150 issued with a harvest quota of 15 bears.

BMZ 3: Permit quota of 50 issued with a harvest quota of 5 bears.

The season is limited to Missouri residents. It will begin each year on the third Monday in October and



MDC has set the state's first black bear hunting season for Oct. 18–27. It will be limited to Missouri residents and restrict bear hunting to designated areas of southern Missouri.

run for 10 days or until BMZ-specific quotas are reached. Once the specific harvest quotas are filled within each BMZ, the season for that BMZ will be closed. Hunters must call MDC each day before they intend to hunt to determine if the BMZ-specific quota has been reached. If harvest quotas are not reached, the season will close at the end of the 10 designated hunting days.

"Being able to add this iconic species to the long list of hunting opportunities for Missourians is a testament to the decades of bear research and management by MDC staff," said MDC Director Sara Parker Pauley. "A limited annual hunting season will help manage the growing number of black bears in the state."

MDC proposed a limited and highly regulated black bear hunting season following years of public comment, including informational open houses in 2019 and a public-input process in 2020.

"A bear-hunting season in our state will provide opportunities for Missourians to participate in the sustainable harvest of this valuable wildlife species," said MDC Bear Biologist Laura Conlee. "As our black bear population continues to grow, a highly regulated hunting season will be an essential part of population management into the future."

Hunting hours will be a half-hour before sunrise to a half-hour after sunset. Hunters will be allowed to use both archery and firearms equipment with allowable methods being the same as those for deer and elk, except the use of an atlatl. Baiting and the use of dogs will not be allowed.

The harvest limit will be one bear per permit. Only lone black bears may be taken. Hunters may not take bears that are known to be in the presence of other bears, including female black bears with cubs. Bears may not be disturbed, pushed, harassed, or taken from a den.

continued on Page 6 »

BLACK BEAR SEASON

(continued from Page 5)

Hunters must wear hunter orange, make reasonable efforts to retrieve shot bears, and may not leave or abandon commonly edible portions.

All harvested bears must be Telechecked by 10 p.m. on the day of harvest, and a tooth from each harvested bear must be submitted to MDC within 10 days of harvest to aid with black bear research and management.

MDC will offer an online bear-hunting permit application period May 1–31 with a fee of \$10 per applicant. Individuals must be Missouri residents and will be allowed to apply to hunt in one of the three designated BMZs. Apply for the random permit drawing online at mdc.mo.gov/buypermits, through MDC's free MO Hunting app, through a permit vendor, or by calling 1-800-392-4115.

Drawing results will be available by July 1. Applicants can check to see if they have been selected for a permit at mdc.mo.gov/buypermits by logging into *Manage Your Account* and selecting *View My Special Hunt History*.

There will be no "sit-out" period for those selected to receive permits. Those selected will then be eligible to buy a permit at a cost of \$25. Selected hunters must be 11 years of age or older and have completed hunter education (or be exempt) by the time of the hunt to purchase a permit.

MDC is not issuing landowner-specific black bear hunting permits, however, a minimum of 10 percent of zone-specific resident black bear permits will be allocated to qualifying landowners. Zone-specific permits can be used anywhere in the specified zone on public or private property (with landowner permission). To qualify, landowners must have at least 20 contiguous acres within the BMZ for which they are applying.

Qualifying landowners must first submit their property information through MDC's Landowner Permit Application at mdc.mo.gov/landownerpermits before completing a black bear permit application.

Black bears were historically abundant throughout the forested areas of Missouri prior to European settlement but were nearly eliminated by unregulated killing in the late 1800s, as well as from habitat loss when Ozark forests were logged. However, a small number of Missouri black bears survived and reintroduction efforts in Arkansas helped to increase bear numbers in southern Missouri.

Over the last 50 years, bear numbers and range in Missouri have grown. The bear population is increasing approximately 9 percent annually and is expected to double in less than 10 years.

Additionally, Missouri's bear population is connected to a larger bear population in the surrounding states of Arkansas and Oklahoma, both of which have established bear-hunting seasons.

MDC's 2020–2030 Black Bear Management Plan will guide bear management in Missouri for the next decade. Learn more about black bears in Missouri and MDC management efforts at mdc.mo.gov/bears.

Ask MDC

Got a Question for Ask MDC?

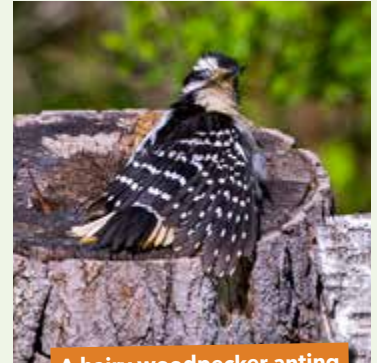
Send it to AskMDC@mdc.mo.gov
or call 573-522-4115, ext. 3848.

Q: My wife and I watched a blackbird pick up a millipede, spin it around, and rub it through its feathers and under its wings and tail. After 10 minutes, the bird dropped the millipede without harming it and flew away. Why did the bird do this?

→ This fascinating bird behavior is called "anting." Different species of passerine birds have been observed picking up ants — singly or in groups — and rubbing them on their feathers. Less commonly, birds are seen spreading their wings over an anthill to encourage the insects to swarm over their bodies. This behavior also occurs with millipedes, as you noted.

Why birds do this is not well understood. A common and plausible assumption is to acquire an ant's defensive secretions, which are known to hinder fungus, bacteria, mites, and other insects. Millipedes also have evolved potent defensive secretions to ward off their enemies.

However, in 2008 researchers tested a theory that this curious behavior may make ants more palatable. For example, ants in the subfamily Formicinae



A hairy woodpecker anting

produce formic acid as a defense mechanism when threatened. By rubbing the ants over their feathers, birds can induce the ants to emit the bitter-tasting acid, leaving them tastier to eat. The researchers discovered when the ants' acid-producing glands were removed, blue jays eagerly snapped the insects up without any anting behavior beforehand. But the jays engaged in the behavior when formic acid was present.

Anting episodes are commonly seen in late summer and early fall, when birds are likely to be molting — leading some researchers to also wonder if birds find the ants soothing to their skin.

For more on this topic, visit feederwatch.org/blog/anting-blue-jays-taking-a-bath-or-preparing-dinner.



Solitary sandpiper

Q: What is it?

➔ This is a solitary sandpiper. This medium-sized shorebird migrates from southern Mexico and the Caribbean through Missouri to its breeding range in Canada. These birds can trickle in starting in April through the end of May, and for a longer period in the fall between mid-July and September. They're rarely seen using mudflats alongside other migrating shorebirds, but they will set down on almost any puddle available. They also will stop at lakes, ponds, streams, and other waterbodies with muddy margins.

Solitary sandpipers resemble other

species of shorebird, so here are a few identifying characteristics to look for:

- They bob their heads constantly as they walk.
- The white eye ring is slightly more prominent than in other species.
- Wings and back are dark brown with small white spots, and legs are olive colored.

They are the only North American sandpiper species that doesn't lay its eggs on the ground. Rather, they recycle the nests of different tree-nesting songbirds. For more information, visit allaboutbirds.org/guide/Solitary_Sandpiper.



Mark Wilcoxon

CARTER COUNTY
CONSERVATION AGENT

offers this month's

**AGENT
ADVICE**

As temperatures rise, Missouri waterways become a mecca for recreationists. From boaters to floaters, waterways can quickly get crowded. To avoid conflicts on the water, be a good steward, and have a plan before you head out! Boaters, think about getting out early or staying out late to avoid the surge of floaters. Floaters, try not to block the river, especially if in a large group, so boaters and others can get through. Let someone know your boating and floating plans and routes for the day. For more information, visit short.mdc.mo.gov/Zcn. See you out on the water.

**What
IS it?**

Can you guess this month's natural wonder?

The answer is on Page 9.



MIGRATORY GAME BIRD AND WATERFOWL HUNTING SEASONS

2021 Migratory Game Bird Hunting

Mourning Doves, Eurasian Collared Doves, and White-Winged Doves

Season: Sept. 1–Nov. 29
Limits: 15 daily and 45 in possession combined total for all three species
Hours: One-half hour before sunrise to sunset

Sora and Virginia Rails

Season: Sept. 1–Nov. 9
Limits: 25 daily and 75 in possession combined for both species
Hours: One-half hour before sunrise to sunset

Wilson's (Common) Snipe

Season: Sept. 1–Dec. 16
Limits: 8 daily and 24 in possession
Hours: One-half hour before sunrise to sunset

American Woodcock

Season: Oct. 15–Nov. 28
Limits: 3 daily and 9 in possession
Hours: One-half hour before sunrise to sunset

2021–2022 Waterfowl Hunting

Teal

Season: Sept. 11–26
Limits: 6 daily and 18 in possession
Hours: Sunrise to sunset



Wood duck

Nontoxic Shot Requirements

Shells possessed or used while hunting waterfowl and coots statewide, and for other species designated by posting on public areas, must be loaded with material approved as nontoxic by the U.S. Fish and Wildlife Service. Get more information on nontoxic-shot requirements, allowed types, and conservation areas requiring use at short.mdc.mo.gov/Zgt.

Ducks

Season:
• North Zone: Oct. 30–Dec. 28
• Middle Zone: Nov. 6–14 and Nov. 20–Jan. 9, 2022
• South Zone: Nov. 25–28 and Dec. 7–Jan. 31, 2021

Bag Limit: 6 ducks daily with species restrictions of:

- 4 mallards (no more than 2 females)
- 3 wood ducks
- 2 black ducks
- 2 canvasbacks
- 2 hooded mergansers
- 2 redheads
- 2 scaup for first 45 days and 1 scaup for last 15 days
- 1 mottled duck
- 1 pintail

Possession Limit: Three times the daily bag or 18 total, varies by species

Hours: One-half hour before sunrise to sunset

Coots

Season: Same as duck season dates in the respective zones
Limits: 15 daily and 45 in possession
Hours: One-half hour before sunrise to sunset

Snow Geese (White and Blue Phases) and Ross's Geese

Season: Nov. 11–Feb. 6, 2022
Limits: 20 blue, snow, or Ross's geese daily with no possession limit
Hours: One-half hour before sunrise to sunset



Blue-winged teal

For more information on migratory bird and waterfowl hunting, visit short.mdc.mo.gov/ZZn and select the specific species, or refer to the *Migratory Bird and Waterfowl Hunting Digest 2021–2022*, available beginning in July where hunting permits are sold and online at short.mdc.mo.gov/Z8L.

White-Fronted Geese

Season: Nov. 11–Feb. 6, 2022
Limits: 2 daily and 6 in possession
Hours: One-half hour before sunrise to sunset

Canada Geese and Brant

Season: Oct. 2–10 and Nov. 11–Feb. 6, 2022
Limits: 3 Canada geese and Brant in aggregate daily, 9 in possession
Hours: One-half hour before sunrise to sunset

Light Goose Conservation Order

Season: Feb. 7, 2022–April 30, 2022
Limits: No daily or possession limits
Hours: One-half hour before sunrise to one-half hour after sunset
Methods: For the taking of blue, snow, and Ross's geese, hunters may use shotguns capable of holding more than three shells and recorded or electronically amplified bird calls or sounds or imitations of bird calls or sounds

Youth Hunting Days

North Zone: Oct. 23–24
Middle Zone: Oct. 23–24
South Zone: Nov. 20–21
Limits: Same as during regular waterfowl season
Hours: Same as during regular waterfowl season

Falconry Seasons

Falconry Season for Doves

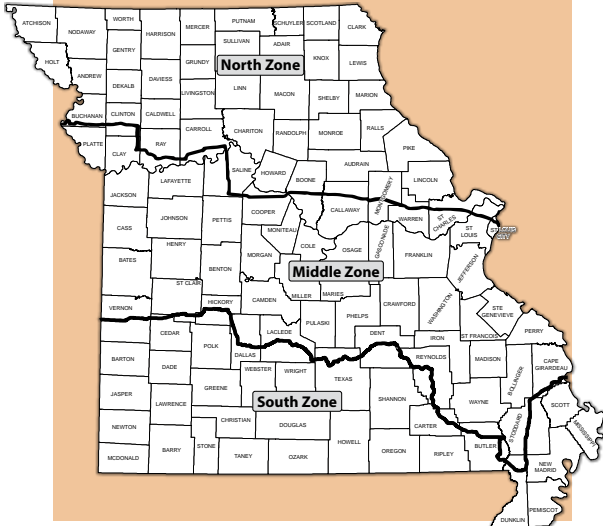
Season: Sept. 1–Dec. 16
Limits: 3 daily and 9 in possession, singly, or in the aggregate (any ducks, coots, or mergansers taken by falconers must be included in these limits)
Hours: One-half hour before sunrise to sunset

Falconry Season for Ducks, Coots, and Mergansers

Season: Open during waterfowl seasons (teal, youth, and duck) and Feb. 10, 2022–March 10, 2022
Limits: 3 daily and 9 in possession, singly or in the aggregate, during the regular duck hunting seasons (including teal and youth seasons) and extended falconry seasons (any doves taken by falconers must be included in these limits)
Hours: Sunrise to sunset during the September teal season, one-half hour before sunrise to sunset during the remaining seasons

Hunting Zones

Waterfowl hunting in Missouri is divided into three zones: North, Middle, and South. Boundaries for the North zone have changed for the upcoming seasons. For more information, visit short.mdc.mo.gov/Zq8.



SEND TICKS FOR RESEARCH STUDY

Most people who have ventured through Missouri's outdoors have encountered ticks. These creepy crawlers cling to clothes and skin in search of a meal. Some tick species and the bacterial pathogens they carry can also cause illnesses in people.

MDC and A.T. Still University in Kirksville are asking people to save ticks they encounter and mail them to the university. The ticks will be used for a two-year scientific research study to help better understand the statewide distribution of tick species and the human pathogens they carry. Ticks will be identified by species and life stage and tested for four species of bacterial pathogens.

The study is scheduled to continue through September 2022. For instructions on submitting a sample, visit the university's website at atsu.edu/ticks.

Learn more about ticks from the MDC online *Field Guide* at short.mdc.mo.gov/ZD8.



American dog tick

Ticks, such as this American dog tick, drink the blood of humans and other mammals and can also cause illnesses in people. MDC and A.T. Still University are asking Missourians to save ticks they find and send them to the university for scientific research to learn more about ticks and pathogens they may carry.

WHAT IS IT?

HICKORY TREE LEAVES

Hickory tree leaves emerge, leaving behind the pinkish-red petal-like leaves that covered and protected them through the winter. Missouri has eight species of hickories, divided into two groups — pecan hickories and true hickories. Pecan hickories have more than seven sickle-shaped leaflets and an elongated, flattened terminal bud. True hickories have mostly five to seven leaflets with a large egg-shaped bud at the end of each twig. By fall, hickory leaves turn golden yellow.



Shagbark hickory

MDC TO OFFER FIVE PERMITS FOR 2021 ELK SEASON

MDC will issue five permits for hunting bull elk for the 2021 season this fall. At least one permit will be for qualifying area landowners with the remainder for the general public.

MDC has designated a nine-day archery portion, running Oct. 16–24, and a nine-day firearms portion, running Dec. 11–19. The five permits will be for bull elk and will be valid for both portions. All permits will be assigned through a random drawing. Only Missouri residents are eligible to apply for and purchase these permits.

"The timing of the season was designed to come after the peak of elk breeding during late September and early October and to avoid, as much as possible, the elk season coinciding with portions of the firearms deer season," explained MDC Elk and Deer Biologist Aaron Hildreth.

There will be a \$10 application fee for all applicants. Those selected for each of the five permits must pay a \$50 permit fee. All permits are nontransferable.

MDC will limit the random drawing to one application per-person, per-year with a 10-year "sit-out" period for those drawn before they may apply again.

Beginning this year, at least 10 percent of the elk-hunting permits will be awarded to approved landowners with 20 or more contiguous acres in Carter, Reynolds, or Shannon counties. Again this year one permit will be set aside for a qualifying landowner.

All elk-hunting permits, including those allocated to approved landowners, can be used in Carter, Reynolds, and Shannon counties, except the refuge portion of Peck Ranch Conservation Area.

"The allowed hunting methods for each season portion will be the same as for deer hunting," Hildreth said. "The permits will allow for the harvest of one bull elk with at least one antler being 6 inches or greater in length. Successful hunters must Telecheck their harvested elk by 10 p.m. on the day of harvest, like for deer."



Joe Benthall, Mount Vernon, was the first of five Missouri hunters to harvest an elk in Missouri. He is shown with his 5x5 bull elk harvested on National Park Service property near Log Yard in Shannon County.

To apply for an elk permit, applicants must be Missouri residents at least 11 years of age by the first day of the hunt. Those selected to receive a permit must have their hunter-education certification or be exempt by age (born before Jan. 1, 1967) before they may purchase the permit. All applications must be completed online or at a local vendor.

Apply for the random elk-permit drawing May 1–31 online at mdc.mo.gov/buypermits, through MDC's free MO Hunting app, through a permit vendor, or by calling 1-800-392-4115.



To be considered for the elk-hunting permits allocated to approved landowners, qualifying landowners that have at least 20 acres in Carter, Reynolds, or Shannon counties are required to submit their property information through MDC's Landowner Permit Application at mdc.mo.gov/landownerpermits before applying for an elk-hunting permit.

Results of the random elk-permit drawing will be available by July 1. Applicants can check to see if they have been selected for an elk-hunting permit at mdc.mo.gov/buypermits by logging into *Manage Your Account* and selecting *View My Special Hunt History*.

For more information on elk hunting in Missouri, visit short.mdc.mo.gov/Znd.

A scenic photograph of a river winding through a lush, green forest. In the foreground, a sandy and rocky shoreline is visible. In the middle ground, two people are in a red canoe on the water, one of whom appears to be handling a fish. The background is filled with dense trees and foliage.

Seeking Catfish Dinner in Prairie Rivers

FISHING THE
PRAIRIE RIVERS
IN MISSOURI'S
NORTHERN
CORNERS

by Bill Graham

Catching river
catfish in Missouri's
northern corners

PHOTOGRAPH BY
DAVID STONNER



The Platte River's gumbo mud banks hold a bank pole in place just fine.

Prairie rivers have a nature all their own, and the ones flowing from Missouri's northern corners attract catfish, often big fish "stocked" by two mightier rivers. Catfish from the Missouri and Mississippi rivers move into feeder streams in spring and linger into summer. Even big catfish will swim far upstream. Anglers embracing the nature of silty rivers catch them on set lines or with stout rods and reels.

"When you go out on the river in the morning and you see one of your bank poles bouncing, you know a big one is on," said Larry Colstion, of Tracy, a town on the banks of the Platte River, north of Kansas City.

Lengthy rivers such as the Platte and the Fabius flow out of northwest and northeast Missouri. They don't get the same fanfare as the clear-water Ozark streams, though people do float them for fun in canoes and kayaks. They are fed by water from springs, seeps, and clear-water creeks, albeit not large gushing springs. Their waters were

once filtered by native prairies, woodlands, and bottomland forests. Today, they flow past towns and through farming country.

Sometimes the currents move past rocky ledges and hills. Most often they flow in winding channels carved over centuries in soil, clay, and shale. Their waters often run murky to muddy with silt carried by rainwater runoff. Yet, during low flows in winter or dry times, the waters revert to almost clear, musky green, pre-settlement shades.

Tinted or murky, the nutrient-rich water holds biological life including catfish at the top of the food chain. Whether sitting on bank fishing with rod and reel or working bank lines or trot lines from small boats, the makings for a catfish dinner are near.

Darrick Garner watched the current push against his fishing line as the Fabius River curved around a sandbar and against a bend on the other shore, north of Hannibal.

"They catch some really nice flatheads in this section of the river," Garner said, as the water dropped from the hills toward the Mississippi valley.





Baiting Up

On a summer afternoon, Colstion and his granddaughter, high schooler Abby Colstion, launched their aluminum boat at an MDC ramp at the Platte Falls Conservation Area and motored upstream. He has fished the river since boyhood. She is learning his well-honed techniques. The younger angler picked the spots to place bank poles. Her favorites have deep water in places where fish food such as insects falls from trees overhanging the water. She pointed to a muddy bank. Her grandfather steered the boat's bow into the bank and held it steady in the current with the motor.

"You want to check the depth?" Abby asked. He grabbed a paddle pushed it downward in the water for an old-fashioned depth check, then remarked, "I didn't find the bottom, that ought to do."

The Colstions fish with a pattern. They move upstream, setting poles and baiting hooks at promising spots. When all are set, they stop and fish with rod and reel for a while. Then they move downstream, checking the poles and pulling off fish or rebaiting hooks if necessary. Early the next morning, they run the lines again, retrieving the poles unless they are fishing again that night.

The poles are three-quarter inch white PVC pipe cut in 5-foot lengths. Five feet of cord tied through a hole drilled in the end is tipped with a 4-ounce weight, swivel, and then 96-pound test leader line.

"We're optimistic," Larry Colstion said. "The 96-pound test line is just in case a big one comes along."

Hooks vary from size 6/0 to 8/0 for single hooks, or similar treble hooks to hold soft baits like chicken livers. Catfish living in silt-stained water feed by scent more than sight. Smelly bait to attract them varies from chicken gizzards to shrimp. They also use commercial stink bait, using a syringe to inject it into a small balloon and giving the balloon tiny punctures to release scent. The chicken gizzards, which hang tough on a hook, are soaked in a cherry Kool-Aid and garlic mixture.



Abby Colstion baits up with Kool-Aid and garlic-soaked chicken gizzards for Platte River catfish.

"We've found it works better than just straight gizzards," Larry Colstion said. "In early spring, we seem to catch more fish on gizzards, by late summer we catch more on shrimp."

Abby Colstion took a pole and thrust the butt end into the mud. She threaded three bait shrimps on the hook and dropped it into the water. Her grandfather took notes on a piece of cardboard. He tracks what each hook is baited with and the result. Their Missouri Conservation ID numbers are written on the poles. Black or red paint on the line-tie end helps them re-find poles while moving on the river.

They motored upstream, moving the boat carefully around or over sunken logs in a surprisingly strong current. Easing back off a sand bar not visible in the stained water was sometimes necessary. Navigation can be tricky in prairie streams if they are running low. Abby pointed to another spot to set a pole and they nosed the boat into the bank.

"This is flathead country here," her grandfather said. "It's a deeper hole of water and there are a lot of stumps around."

CATFISH: JIM RAHERT; OTHERS: DAVID STONNER

Blue Catfish reach large sizes.

Channel catfish are Missouri's most popular sport fish.

Flathead catfish like to feed on live food.



Larry and Abby Colstion's bank line reward, a big channel catfish.



Running Lines

Gumbo mud holds the PVC poles firmly in the bank. They bend downward when a fish is hooked. Using willow trees for poles is a traditional way. Some anglers tie lines off on springy tree limbs or branches. Some set trot lines tied to stumps and trees.

"The biggest catfish I've caught out of the Platte weighed 25 pounds," Larry Colstion said. "But I've seen 40- and 50-pounders come out of here. We catch blues, channels, and flatheads. Abby says she likes the fight the flatheads give the best."

They finished setting poles, checked them again, then got out on a sandbar to stretch and fish with rod and reel. One small channel cat was landed and then they headed home for the night.

A foggy mist hung over the water early the next morning. The river had risen 6 inches from upstream rain. Songbirds chirped from tall silver maples, cottonwoods, and sycamores lining the banks in a prairie river world. Upland stretches, if not channelized, are not far different from what explorers Lewis and Clark saw in 1804 and 1806 when they trekked inland on streams feeding the Missouri.

The first hooks checked by the Colstions were bare. Small fish probably nibbled the bait off. But soon they found a pole and line moving. Abby pulled a hefty channel catfish topping 2 pounds into the boat. The next pole was bouncing harder. Her grandfather helped her with the line as she telescoped the net under an 8-pound channel catfish thrashing the water. They finally landed it, a big one for the live well and a fish fry later.

When they moved back downstream, the lines were run once more and the poles gathered back into the boat. Sometimes they just take time to enjoy their fishing haven, a place on moving water where the green-topped trees and grasses arise from brown earth, a wild place.

"I just love it out here," Larry Colstion said.



Whether using fishing poles or trotlines, canoes and kayaks help anglers reach deep holes in smaller rivers like the Fabius.

The Fabulous Fabius

Darrick Garner and fishing partner, Jonathon Bentzinger, eased a canoe out into the Fabius River one morning in late summer. The river ran low amid drought, but there were still many fishable pools as they paddled away from the ramp at MDC's Soulard Access in Marion County, north of Hannibal. Upstream, three of the major Fabius forks draining much of northeastern Missouri eventually merge. The upper forks are fishable for several types of fish, too. The Fabius flows into the Mississippi River a few miles downstream from the access.

Garner and Bentzinger's first stop was a trot line set upstream from the landing. No fish were hooked off this set, but they have caught them there in the past.

"We're using garlic and salted chunks of cut Asian carp for bait," Garner said. "We're getting the scent out there for sure."

They then paddled the canoe and a kayak downstream and over to a large sandbar to fish with rods and reels. They cast toward logs in the water and their baits settled to bottom in a deep pool. The current was steady despite low water flow.

Both men live in the Taylor area, near the Fabius. Garner grew up fishing in the region. He had a stint as an MDC fisheries management biologist in northwest Missouri. He's now back in the northeast as a commercial fisherman on the Mississippi. But he still fishes the Fabby, as locals call it, for fun and food.

"There are flatheads in the 40- to 50-pound range," he said. "We'll fish here and upstream in spring and early summer. In August when the water is low, we'll go puddle jumping (wading). A lot of folks fish from the bank, and they'll catch the heck out of channel catfish."

The Catch

Bentzinger felt a tug on his line and set the hook with his spinning rod. He reeled in a channel catfish, a pound or so and big enough to eat.

Nightcrawlers, small cut baits, and prepared stink baits are favored for channel catfish. Live baits such as minnows, shad, or goldfish work best for flathead catfish. Blue catfish like cut shad or carp. Fish seem hungriest when gorging on a shad kill or after a rise in the river washes new food downstream. Casting bait near root wads and sunken logs can be productive. In normal flows, fish can move far inland during the spring.

"I've caught fish 10 or 15 miles upstream from here," Garner said.

Bentzinger landed two more fish, a carp, then another channel catfish. Their acquaintance, Joe Hirner of Palmyra, paddled his canoe downstream and waved. Hirner hefted a stringer with a limit of frying-size channel catfish. He caught them with spinning rods using stink bait fished in deep spots near banks. Such catches make prairie rivers fun places to fish, Garner said.

"I usually take my family and friends pole and line fishing," he said. "You can catch some pretty nice fish out here."

The Other Streams

Several other streams on the state's northern corners offer good catfishing.

The Salt River is a major catfish stream in the northeast region, said Travis Moore, MDC fisheries management biologist. It arises in the rolling uplands and flows to the Mississippi.

"We also have some smaller streams, which get some attention," Moore said. "They include the North River north of Palmyra, the Wyaconda River in the LaGrange and Canton area, and the Fox River in Clark County on the Iowa border. These streams are smaller, but still get a fair amount of fishing pressure by locals for channel catfish and the occasional flathead."

In the northwest, several rivers flow from the hilly uplands into the Missouri River bottoms. Channelized stretches are often too shallow for good fishing. But some lower pools and natural stretches in the uplands offer good fishing.

"Catfish definitely move up our smaller tributaries in the spring," said Tory Mason, MDC fisheries management biologist. "Water in the smaller tributaries warms the quickest so they are a good place to target."

North of St. Joseph, anglers fish in the lower Nodaway River. Boaters usually access the stream at the mouth of the river. Farther north, the Nishnabotna River flows into the Missouri. Boaters usually fish the lower end, entering the mouth or by launching at MDC's Watson Access. Shad guts are preferred baits for channels in early spring, the other natural baits in summer. Blue catfish like cut fish for bait like shad, skipjack, or goldeye.

"Deep holes in the smaller tributaries can hold a lot of fish in the spring," Mason said, "and they are usually biting." ▲

Bill Graham is MDC's media specialist for the Kansas City and Northwest regions. He's a lifelong hunter, angler, and camper, and enjoys hiking and photographing Missouri's best wild places.

Finding Places to Fish



MDC manages several public access sites for north Missouri rivers. Some have boat ramps. Others simply offer bank fishing access or perhaps have places to launch canoes or kayaks. Some MDC conservation areas border these streams and provide ample bank fishing access.


Anglers should approach prairie rivers with some caution. Banks can often be high and steep. In wet weather, they can be slippery. Many anglers prefer to fish from shore with partners. Some partners who plan to walk the banks carry rope in case a rescue in muddy conditions is needed. Water is often deeper than it appears, too. However, anglers can usually find a safe place to fish.

Anglers fishing from boats and using the PVC pipe for bank lines may find it handy to carry a rubber mallet to drive poles into the mud if they can't be shoved in. River bottoms can be rocky even if banks are mucky, and they can hold hidden stumps or tree trunks. If your outboard motor propeller uses shear pins, carry spares.

Study the *Wildlife Code of Missouri*, available at short.mdc.mo.gov/Z8T, for regulations pertaining to trot lines and set lines. Also, check fishing regulations for the stream section you are planning to fish. Carry out all trash.

To find a place to fish, visit short.mdc.mo.gov/Zq5. To learn more about catfish in Missouri, visit short.mdc.mo.gov/Zft.





Although they're not considered native to Missouri, these peculiar creatures are here to stay.

PHOTOGRAPH BY
JIM RATHERT

Tiny Tanks

NINE-BANDED ARMADILLOS ARE TOUGH, TENACIOUS ... AND EVERYWHERE (BUT MAINLY ON THE SIDE OF THE ROAD)

by Jill Pritchard

Believe it or not, there once was a time when nine-banded armadillos didn't exist in Missouri. Now they're spotted in most places across the state — just not alive. These mammals have many monikers, the most fitting perhaps is “Texas speedbump” due to their unfortunate fate of being hit by cars. Another common nickname is “pocket dinosaur” because of their odd, Jurassic-like appearance, which should have made them a front-runner for a role in Steven Spielberg's blockbuster. But whatever you call them, nine-banded armadillos are bizarre members of Missouri's wildlife.

Little Armored One

With their strange armored bodies, armadillos resemble more of a worn-out football than your typical wildlife. Did you know their closest living relatives are sloths and anteaters? Pretty odd for the only living mammals that wear shells. Armadillo is Spanish for “little armored one.” They get that name from the nine moveable “bands” in their midsection, but not all nine-banded armadillos actually have that many bands. Many believe these animals roll up like a roly-poly when they’re scared. But only the three-banded armadillo, which solely resides in South America, can roll up into a ball.

An armadillo’s armor isn’t bulletproof, despite legend to the contrary. In fact, their “armored” plates are covered by a layer of keratin, the same protein that is found in hair and nails.

These tiny tanks can weigh up to 15 pounds. They only have hair between hardened plates of skin that encompass their body, as well as their head, legs, and tail. Their head, short legs, and tail are also covered with plates. Their toes have well-developed claws that make great tools for digging.

“The nine-banded armadillo cannot be confused with any other mammal in Missouri,” noted MDC Urban Wildlife Biologist Erin Shank. “They have many odd habits and behaviors that just leave you scratching your head.”

Armadillos Got Talent

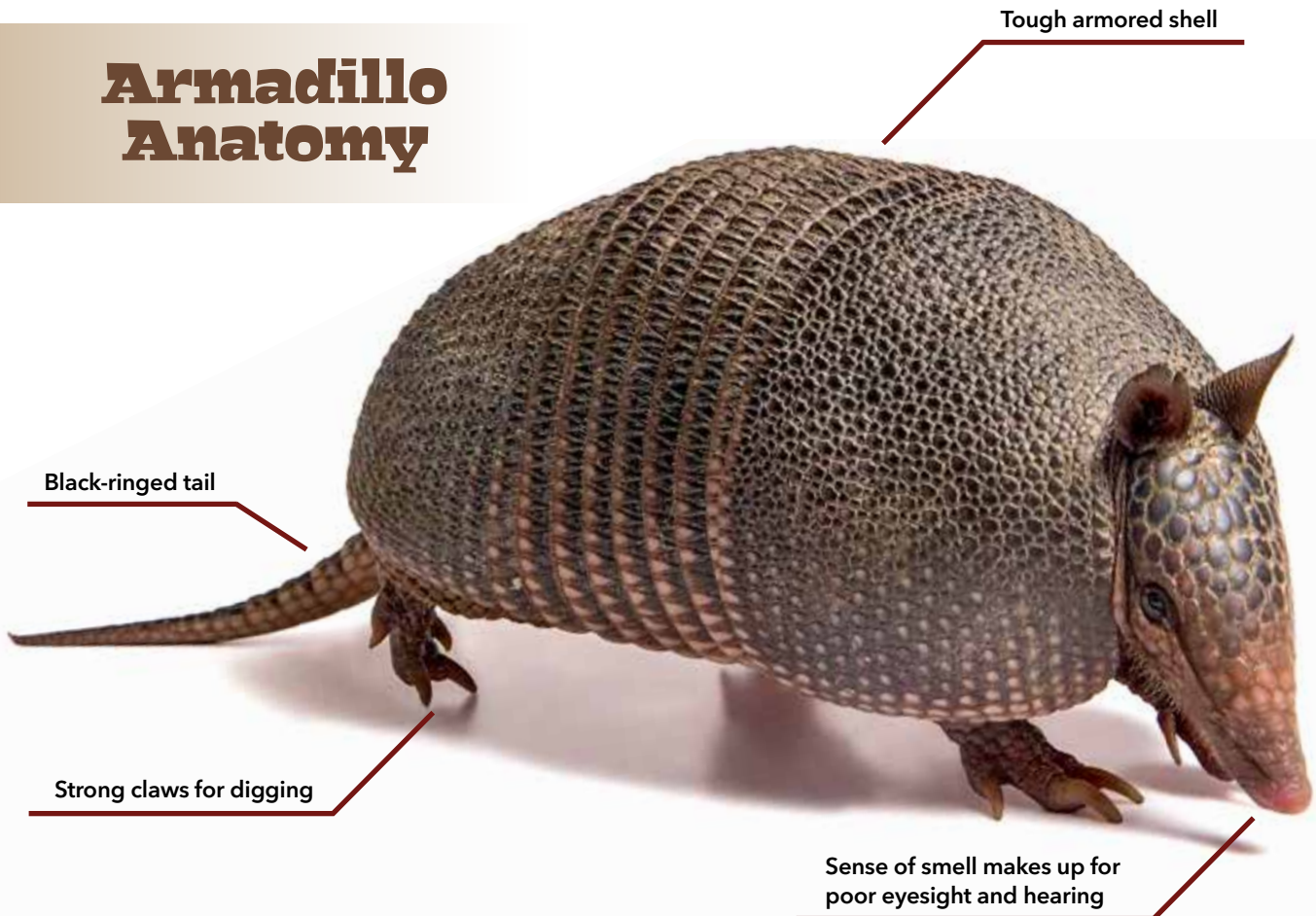
One of those odd behaviors is what commonly leads to an armadillo’s demise. This species can jump straight up into the air, as high as 3 feet, when it’s scared. Considering how short an armadillo’s legs are, this skill is impressive.

“An armadillo jumps into the air to scare away predators,” Shank explained. “This usually startles the predator long enough for the armadillo to make a quick getaway. Unfortunately, this same tactic doesn’t have the best success rate when an armadillo is crossing the street. That’s why you see so many dead armadillos on the side of the road.”

In addition to their tendency to imitate a Mexican jumping bean, armadillos have another odd talent — swimming.

“Armadillos can actually swim and float across bodies of water by gulping air into their intestines to make themselves more buoyant,” explained Shank. “They can even hold their breath for up to five minutes and float across bodies of water, or they can sink to the bottom like a rock and just walk across the bottom. It’s possible that their ability to swim has allowed them to expand to new areas and establish new territory.”

Armadillo Anatomy





Crossing the Border

So, how did these tiny tanks come to Missouri? These critters first moved into the United States in the 1850s from Mexico. They entered Texas and have been expanding north ever since. Their range is thought to be limited by extreme cold, but armadillos have been popping up farther and farther north.

“One hundred and fifty years ago, you really didn’t see armadillos north of the Rio Grande River,” Shank noted. “But because of large-scale landscape changes and conversion to agriculture, they have been able to expand their range. And they’re not done. It is very feasible to think that armadillos could move as far north as New York or as far west as Nebraska.”

Although armadillos didn’t always reside in Missouri, they are now considered a “native” species because they migrated here on their own, rather than being introduced to the region. And with their unique lifecycle, armadillos are permanent residents of the Show-Me state. Their breeding season begins in the summer, followed by a two to three month delay when the embryo divides into four cells before each one implants in the uterus.

The **nine-banded armadillo** cannot be confused with any other mammal in Missouri.

“This results in four identical offspring,” said Shank. “After four months implantation, the quadruplets are born with no shell around early-to-mid-spring. Young are weaned around 3 months old and become mature around 12–15 months. One fascinating thing about their reproduction cycle is that a mother can actually delay the development of the young in the uterus for up to a year if conditions aren’t favorable for bearing young.”

Their lifespan of up to 20 years, coupled with their reproductive success, means that it only takes a small number of armadillos to establish populations in new areas. Ever wanted to age an armadillo? Check out their coloring. Younger adults are tan-gray with pink highlights. Older armadillos have a gray coloring.



Sustenance and Surroundings

Though the nine-banded armadillo is commonly seen laying on the side of the road, live armadillos prefer to roam in forests or grassland habitats. They seem to like oak-hickory or shortleaf pine forests. Because they dig burrows in the ground, they select wooded bottomlands, brushy areas, and fields with ground cover and loose soil.

What does one of Missouri's weirdest-looking mammals eat? Mostly insects, such as ants, beetles, and flies. They can smell beetles, larvae, and ants up to 6 inches underground. They are also known to consume earthworms and the occasional reptile, as well as fungi and fruit.

Armadillos don't have the best eyesight, so they hold their long snout close to the ground to sniff out their grub. Their sharp claws dig to expose the food, which is then flicked into their mouth using their long, sticky tongue. A nine-banded armadillo can slurp up thousands of ants for one meal using their tongue. But in their hunt for dinner, armadillos can wreak their fair share of havoc on lawns and gardens. Excavating burrows to bear their young can also lead to conflicts with property owners.

"There's no hunting or trapping season for armadillos," explained MDC Wildlife Damage Biologist Jim Braithwait. "But, the *Wildlife Code of Missouri* specifies that damage-causing armadillos may be trapped or shot to prevent further destruction."



Armadillos **swim** by gulping air into their intestines to make themselves more buoyant.

They also **excavate burrows** to bear their young, which makes them pests to property owners.



Dealing with Annoying Armadillos

Braithwait is one of six wildlife damage biologists employed by MDC. Their job is to help Missourians with controlling nuisance and unwanted wildlife. Out of the six wildlife damage biologists, Braithwait has dealt with the most calls concerning armadillos.

“I think I’ve been dealing with them since they migrated here,” laughed Braithwait. “I’ve responded to well over 100 nuisance calls. Many people are surprised at just how much damage they can do by digging and rooting around in the ground. Most calls I receive, people think they’re dealing with something else. They’re surprised when I tell them they’ve got an armadillo issue.”

Braithwait said armadillo nuisance issues begin in March as the weather warms up and they become active. He notes that a freshly watered lawn can be what attracts armadillos to a property.

“When you water your garden or your lawn, it attracts all the insects, grubs, and worms,” said Braithwait. “And those grubs are mainly what armadillos feed on. So, they come onto the property and sniff out their food, but in doing so, they’re digging holes and causing some damage. So, one thing I tell a lot of people is just lay off watering their lawn for a few days.”

If turning off the hose still doesn’t solve the problem, Braithwait recommends using “seasoned” traps. But we’re not talking about traps that have been salt-and-peppered.

“Metal traps can work, but we have seasoned traps we lend out to land or property owners that work extremely well,” he explained. “The seasoned traps are big wooden box traps about the size for a raccoon that hold scent. I believe they work so well because armadillos are so driven by scent. And the more these wooden traps catch armadillos, the stronger the scent gets in the traps. I’ll have the property owner place the trap in the area the armadillo has been working, and by morning, they’ve usually been trapped.”

Braithwait strongly encourages residents to handle armadillos as little as possible, and discourages relocating them.

“It’s probably best not to relocate them, especially on public areas,” he said. “You’re taking a chance of moving an animal that might have disease and just moving a problem to a different area. But if you do have to handle them, just be cautious and wear gloves.”

Armadillos and Leprosy: The Facts

One of those diseases armadillos carry is Hansen’s disease, the bacteria that causes leprosy. This condition can lead to disfigurement and nerve damage. Armadillos are used in leprosy research because their body temperatures are low enough for them to contract the most virulent form of the disease. They also do not have a very strong immune system, making them an ideal model for many types of medical research.

According to the Centers for Disease Control and Prevention, it may be possible that armadillos can transmit leprosy to humans, but the risk is very low and those who come into contact with the animals are unlikely to become infected.

There have been no armadillo-transmitted leprosy cases in Missouri.

With the nine-banded armadillo’s expansion and reproductive rate, it’s safe to say they’re here to stay in Missouri. Just be sure to keep an eye out on the roads this summer! ▲

Jill Pritchard is MDC’s statewide news services coordinator and the host of MDC’s Nature Boost podcast. She saw her first live armadillo while hiking in 2019.



For more information on the nine-banded armadillo, visit MDC’s online *Field Guide* at mdc.mo.gov.



Insects IN NEED

GLOBAL DECLINES HAVE LOCAL CONNECTIONS AND OPPORTUNITIES

by Bonnie Chasteen

Featuring purple prairie coneflower, a Metropolitan St. Louis Sewer District stormwater project along the CORTEX Station benefits aquatic insects as well as pollinators like the declining monarch.

PHOTOGRAPH BY DAVID STONNER



Monarch butterfly

Last May, *National Geographic* featured a story by Elizabeth Kolbert on global insect declines called *Where Have All the Insects Gone?* In it, she explored growing evidence that the world’s vital bugs are “disappearing at alarming rates.” Her story prompted one *Conservationist* reader to ask if Missouri’s insects are in decline, too.

To frame an answer, I consulted MDC Scientist Doreen Mengel. She had been working with research partners to study the effects of neonicotinoids, a widely used and highly potent class of insecticide, on Missouri conservation areas. Mengel and her partners conducted two studies, one on cropped areas in Missouri’s public wetlands and another on soybean fields planted with neonicotinoid-treated seeds and bordered by wildflowers assumed to be insecticide-free. These studies aimed to help MDC’s managers know if neonic-treated crops planted for wildlife like deer and turkey were affecting our Missouri ecosystems and native insect populations.

In both cases, the studies found that neonicotinoids were present. In wetlands, concentrations in water and sediment negatively affected aquatic insect abundance. In soybean field soils, neonics reduced the species richness of native bees.

Since Mengel had been thinking about insects and their threats and conservation in such detail, I hoped she could help me tell the reader how Missouri’s insects are faring. She offered no easy answers.

“As with all things that involve dynamic populations and models,” she said, “there is likely no black-and-white answer and certainly no silver bullets.”

Insects are short-lived, she said, and their populations can rise and fall dramatically, depending on local conditions and weather. In addition, insects face many threats. Aside from pesticides like neonicotinoids, which can be widespread in agricultural areas, other pressures include “parasites, habitat loss, climate change, and invasive species,” she said.

Added to these threats, all of which can merge in highly affected areas, is the fact that we just don’t know as much about insects as we’d like to.

Our conversations were just the beginning of my education about why it’s so hard to know for sure how Missouri’s insects are doing.

It's Complicated

MDC Heritage Entomologist Steve Buback keeps track of the state's insects and their welfare. He specializes in pollinators like the monarch, and he also heads up MDC's efforts to restore the federally endangered American burying beetle on Wah'Kon-Tah Prairie Conservation Area (CA), a 3,000-acre prairie remnant near El Dorado Springs. He explained why it's hard to say, definitively, if insects are declining in Missouri.

"There's lots of anecdotal evidence (in the Midwest), but we don't have the long-term studies (like those in Europe and the Western U.S.) needed to provide those numbers," he said. "If we started (those studies) now, we still wouldn't know for several decades."

Buback estimates Missouri has around 25,000 insect species, "but no one truly knows," he said. "There are over 450 bee species alone, which is more than there are species of birds, and there are more grasshopper species than there are of reptiles. We are currently working to get the number (of insect species in the state), but it will probably take a lifetime and a lot more people working on it," he said.

Buback also echoed Mengel's point that it can be hard to know exactly what's driving a species' decline.

Missouri's efforts to restore the American burying beetle illustrate the challenge of returning a native insect to what seems to be suitable habitat.

This carrion-eating beetle once lived in 35 states, but, as America's vast prairie landscapes declined, so did the beetle's numbers. It hasn't been seen in Missouri since the 1970s. About 10 years ago, MDC partnered with St. Louis Zoo to raise and release some adult beetles at Wah'Kon-Tah Prairie CA. Although the restoration team's annual monitoring efforts have detected signs of reproduction — adult beetles and grubs — the population is far from stable. During 2020 monitoring, the COVID-19 pandemic kept the zoo's monitoring staff at home, leaving the task to Buback's team. They found only one beetle.

"We don't actually know the cause of their decline," Buback said. "Some theories are related to carrion availability, competition from other burying beetle species, light pollution, or potential disease issues.

"We have been working on this species for over a decade now, and we are just getting to the point where we have population estimates. But we don't yet have the knowledge to identify causes or to fix them."

He explained that lack of knowledge is part of the process. "Any species we start to learn more about, it just leads to more questions."



Annual monitoring traps often attract far more carrion beetle species like the American carrion beetle, margined burying beetle, and red-lined carrion beetle (top photo) than American burying beetles (left photo).

MDC Heritage Entomologist Steve Buback speculates that competition from these beetles may be one of the many forces slowing Missouri's American burying beetle restoration effort, which began in 2011.

While globally secure, the olive-green swamp grasshopper is critically imperiled in Missouri, likely due to loss of wetland habitat.



To see more examples of Missourians working to help insects, check out our flipbook version online at mdc.mo.gov/conmag/2021-05.

Long-Term Studies Detect Signals of Change

If we need more research, especially long-term studies, what about MDC's Missouri Ozark Forest Ecosystem Project (MOFEP)? Launched in 1991, this comprehensive effort aims to measure the forest's response to management for 100 to 200 years. Had anyone studied insects in the first 30 years?

Buback introduced me to Robert Marquis, recently retired from the University of Missouri–St. Louis Biology faculty. During his career, he worked with MOFEP partners to conduct a 20-year study of leaf-chewing insects (think moth and butterfly caterpillars, beetles, grasshoppers, walking sticks, and katydids) on Missouri oaks. The goal was to understand the impacts of forest management on them. In the process, the study tracked their declines and resilience following mid-spring frosts and summer droughts. These data could potentially help the team detect evidence of climate change.

"We knew if we did see a signal of climate change on declining populations, this (MOFEP study area) would be the place because it's so isolated and thus relatively undisturbed," Marquis said.

Marquis' team showed that impacts of short-term events could last up to five years, but, in 20 years, the study found no evidence for a general decline in abundance. However, he said, "those short-term events make it difficult to see the long-term events of climate change."

"It could be that the actual frequency (of detrimental mid-spring frosts) is increasing over time. (Some) evidence suggests that it is. That would be a signal of climate change. We could have more droughts, too," he said.

Marquis noted that the manager's job is to provide habitat for native communities to live in. "That person could be really good, but if climate change is disrupting the weather, no matter what you do, you're going to be stuck. The manager can affect local living conditions for plants and animals, but climate change of course is the result of policies and activities happening at a global level, and they only can be ameliorated with a global effort."

That sounds grim, I said. "How can we hope to manage?"

"I'll say two things," Marquis said. "We finished up last spring sampling butterfly communities near MOFEP and over near Branson on sites that had not been burned and other locations that had been. We found a huge beneficial impact in areas that had been managed with fire for nectar plants (like coneflower and blazing star).

"If you know what you're doing, and you actively manage the habitat, you can have a positive impact," he said.

Monitoring is Essential

Until we have more data from more long-term studies, monitoring helps us track insects of special concern or significance, as Buback's work with the American burying beetle shows.

Community and Private Land Conservation Branch Chief Bill White is excited about a new way MDC is working to keep tabs on Missouri's bumblebees.

"They're easy to identify without a microscope," he said. "And photo-monitoring helps us track presence and population size over time," he said. "It really helps us answer in a more specific way, *Are insects declining in Missouri?*"

The new web-based program is a partnership with Quail Forever, the University of Missouri, and the Xerces Society for Invertebrate Conservation, and it invites citizens statewide to participate.

"First you need to select somewhere to monitor, whether that is in your backyard, farm, or a local park or natural area," White said. "The Missouri Bumblebee ATLAS Project has online tools to help you ID Missouri bumblebees. Then all you need to do is take photos and upload them to the database at least a couple of times a year."

Buback added that bumblebees can be a good indicator of available pollinator habitat. "They're long-lived, and they need a diversity of blooming flowers throughout most of the year," he said.

To learn more and get involved, visit MoBumblebeeAtlas.org.

Black swallowtail caterpillars feed on members of the carrot family. Adults nectar on clover, milkweed, thistles, and phlox.



A common eastern bumblebee feeds on a gray-headed coneflower. Bumblebees can be good indicators of available pollinator habitat.





Katydid eat foliage. Birds, snakes, and other treetop predators prey on them.

Nature's Essential Workforce

If Earth's invertebrates vanished, the rest of the planet's lifeforms would soon follow. Countless land and water insects make up our essential workforce, sustaining life for all.

- Invertebrates provide food for wildlife. According to entomologist Doug Tallamy, it takes 9,000 caterpillars to fledge a nest of chickadees.
- They manage waste. Without insects like the federally endangered American burying beetle, dead plants and animals and dung would never rot, and nutrient cycling would slow or cease.
- They control pests. Predatory insects like wheel bugs eat plant-killing insects like Japanese beetles, saving farmers billions annually.
- They pollinate our food. No pollinators like monarchs and bumblebees means no tasty apples, blueberries, or tomatoes. Many of these crops are better pollinated by native wild bees than by domesticated European honeybees.
- They make soil hold water. Without ants and other soil bugs, soil would harden, plants would die, and every rainstorm would become a gully-washing flashflood.

Our mission benefits insects

MDC is a science-based agency with strategic and wildlife action plans that are habitat focused. "Our efforts to restore and conserve habitat statewide naturally benefit insect communities," said MDC Natural Community Ecologist Mike Leahy.

"As our research has shown, there's pretty good correlation between intact and functioning plant communities that are buffered from insecticide application and high levels of insect diversity and abundance.

"Landscape context is important, too," he added. This is because insects and plants are co-evolved, meaning that some species of plants can't survive without some species of insects, and vice versa.

Because Missouri is 93 percent privately owned, MDC depends on partners to achieve our mission at the local level. In recent years, we've worked with hundreds of agencies, local governments, nonprofits, businesses, and private landowners to create, restore, and conserve almost half a million acres of pollinator habitat.

How You Can Help

Start seeing insects

Monarchs are magnificent, but Missouri has tens of thousands of other watchable insects to notice, name, and care about. A good starter field guide is MDC's *Show-Me Bugs*. It introduces you to 50 insects and other invertebrates you're likely to see in your yard, garden, or farm. It's available at most MDC nature centers. Another good resource to help identify insects is the MDC online *Field Guide*, available at mdc.mo.gov/field-guide.

Give them habitat

Even if you live in an apartment in town, you can provide habitat for native insects. In fact, a recent study found that St. Louis hosts 45 percent of Missouri's native bee diversity. Plant a few blooming native wildflowers like butterfly milkweed and purple beardtongue in a pretty container on your balcony or porch. They will soon attract nectar-sipping pollinators. If you're new to native plant gardening, check out grownative.org for plant lists and designs that work in sun or shade. If you farm, contact your county's private land conservationist (PLC) at mdc.mo.gov/contact-engage. Your PLC can help you add native plant borders to your crop fields and drought-resilient native grasses and wildflowers to your forage system.

Also, leave the leaves where they fall in the fall. Leaves shelter over-wintering cocoons like that of the giant Polyphemus moth.

Avoid insecticide use if possible

MDC Forest Entomologist Robbie Doerhoff cautions homeowners against using lawn insecticides. "When you put out grub granules, they kill nearly every insect they come into contact with. And sometimes the insecticide is taken up by flowering plants, making them toxic to bees and butterflies," she said.

Along with crop monitoring, borders of native wildflowers selected to provide blooms all season long can be part of an effective insect-control program. In addition to pollinators, they harbor pest-eating native predator insects like ambush bugs and parasitic tachinid flies.

Help monitor them

As we've seen, just keeping track of the presence and abundance of insects can help us know if their populations are secure or declining — and what may be helping or hurting them. Check out the Missouri Bumblebee ATLAS Project at MoBumblebeeAtlas.org and learn to monitor native bumblebee species where you live.

Be an advocate

Encourage your local government to adopt community conservation practices that provide habitat for pollinators and other wildlife in town. Visit mdc.mo.gov/community.

Join or start a Master Naturalist chapter

The Missouri Master Naturalist program has chapters all over the state, and many of them are involved in insect studies. To find a chapter near you, visit short.mdc.mo.gov/Z8u.

A Homegrown Conservation Area

Research and monitoring can help us know more about Missouri's insects. Restoring and conserving their essential habitat can help us keep them secure in our state.

Since publishing *Bringing Nature Home: How You Can Sustain Wildlife with Native Plants* in 2007, renowned entomologist and author Doug Tallamy has taught Americans to see insects, which need native-plant habitat, as bird food. Last May, a National Wildlife Federation survey reported that one in four Americans purchased a plant specifically to benefit birds, bees, or butterflies. In *Nature's Best Hope*, published in 2020, Tallamy wrote that if each of us turned half our lawns into native plants, we could create a homegrown national park "the equivalent of nearly ten Yellowstone."

Here in Missouri, we can start by creating a homegrown conservation area. With so many partners like the Missouri Prairie Foundation and Missourians for Monarchs, the Show-Me State is rich in local sources of information, help, and good examples of habitat restoration. With this wide network of experts and our common store of know-how, we can make the whole state of Missouri safer for insects and all the creatures that depend on them — including us humans. ▲

Staff writer Bonnie Chasteen enjoys writing about science and nature for the *Conservationist*. Her favorite native Missouri insect to watch is the grass-carrying wasp.

True to its name, the prairie-nesting grasshopper sparrow eats grasshoppers.



When Mark and Diane Burger bought their 3-acre Kirksville property five years ago, they wanted to reduce mowing chores and use native plants to bring in pollinators. They sought help from their MDC regional office to get started. "It's just been wonderful," Diane said.

The Burgers love seeing and hearing bobwhite quail, bluebirds, and meadowlarks in their half-acre prairie. "It's such a joy listening to all the birds," Diane said.



Get Outside

in **MAY**

→ Ways to connect with nature



Spidey Senses

Are your “spidey senses” on high alert? It may be because **furrow orbweavers** become conspicuous around homes this time of year. They often build their webs below the eaves of homes, under porches, and near porchlights that attract the flying insects they eat. The webs are often parallel to a wall or window, built within a few inches of the surface. Best to leave these webs and spiders be. They provide free, all-natural extermination services, reducing populations of mosquitoes, gnats, flies, and many other insects that pester us.

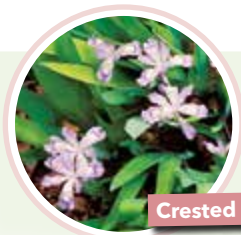
VIRTUAL

Native Plants

Thursday • May 20 • noon–1 p.m.

Location: Virtual from Anita B. Gorman Discovery Center
Registration required at [deeproots.org/native-plants-at-noon](https://www.deeproots.org/native-plants-at-noon)

We'll tour the native landscape at MDC's Anita B. Gorman Conservation Discovery Center. Guided by native landscape specialists Alix Daniel and Cydney Ross, this monthly series features a live look at native plants of interest throughout the year. This program is a partnership with Deep Roots.



Crested iris

Mary Had a Little ... Toad?

Male eastern narrow-mouthed toads chorus in the southern half of Missouri from mid-May through the rest of the summer. The call is an unusual bleating, nasal “baaaa,” which sounds like a lamb.



Natural Events to See This Month

Here's what's going on in the natural world.



Opossum young emerge from their mother's pouch.



Ring-necked pheasant crowing at its peak.



Wild strawberries ripen in grasslands.

May is a 'Flutter

May skies are alive with the flutter of several varieties of butterflies. Red-spotted purples are just one example. They fly from May into October. The **red-spotted purple** is a stunning butterfly, even though the spots are orange, not red, and blue is more prominent than the subtle violet hues. This species is an example of a Batesian mimic — the lookalike pipevine swallowtail is toxic to its would-be predators. The red-spotted purple is palatable but has a color pattern that mimics the toxic species. Predators avoid both of them on sight.



Hoary bat

May Gets Batty

Hoary bats, one of about 14 bat species in Missouri, are commonly seen against the night sky in May, silently flying amongst the trees and rooftops. These mammals are important as predators of agricultural pests, as pollinators, and as seed dispersers.

May Day

May Day, observed on May 1, is usually celebrated with the gift of flowers. But in Missouri, you can celebrate with flowers all month long! Wildflowers are in bloom and beautifying the landscape. Look for **coneflowers**, Jack-in-the-pulpits, showy lady's slipper orchids, Missouri primroses, and many others. For help identifying your find, visit short.mdc.mo.gov/ZDJ.



Bobolinks migrate and nest in northern Missouri.



Female crayfish carry their young on their abdomen.



RECONNECT WITH NATURE

Adventure can happen anywhere. Download the free **MO Outdoors** app for great places to go birding near you.



Places to Go

SOUTHEAST REGION

Sand Prairie Conservation Area

Former sandbars provide unique habitat

by Larry Archer

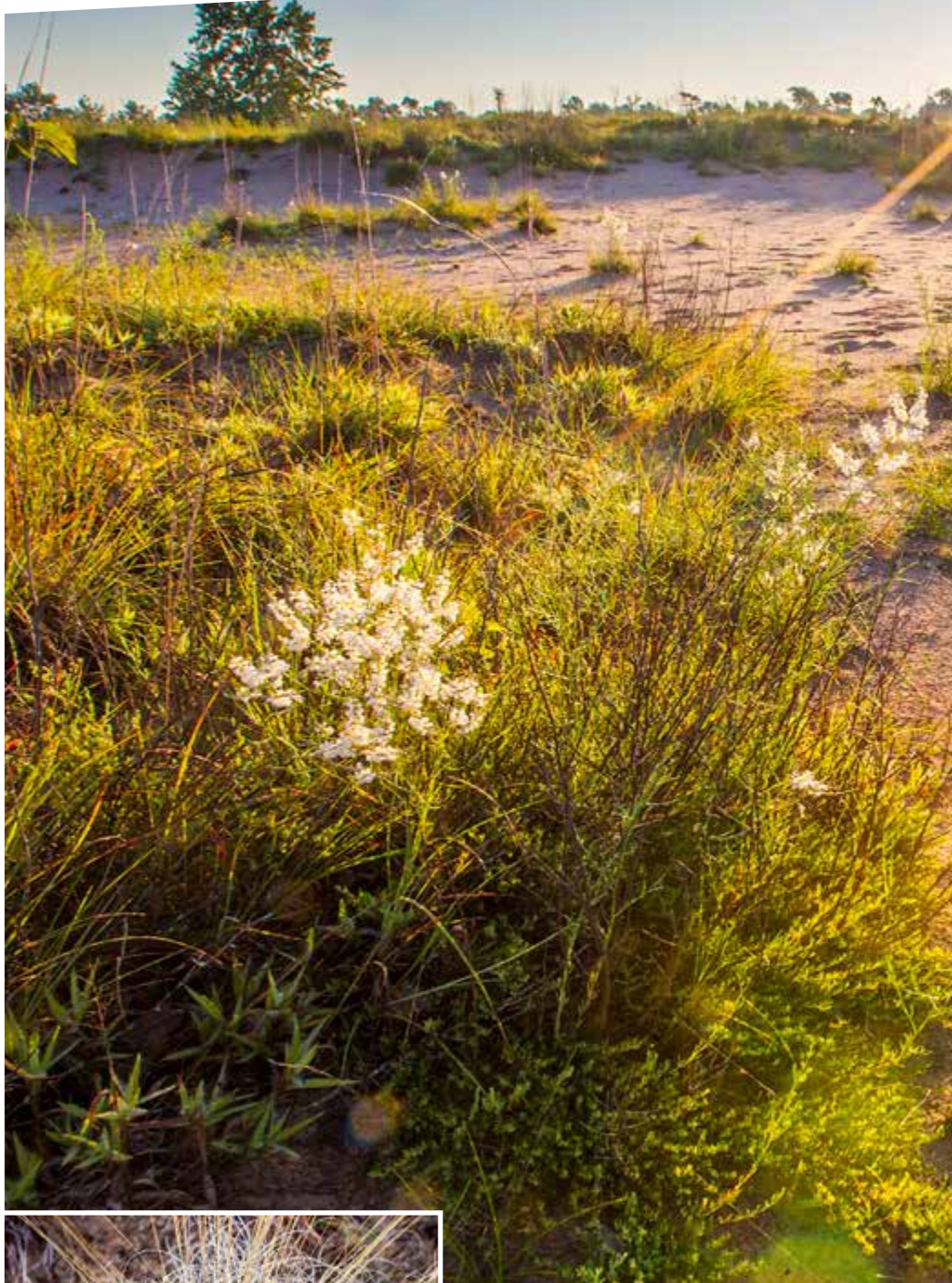
✦ **Part prairie, part sandbar,** Sand Prairie Conservation Area (CA) offers visitors a look at one of Missouri's rarest natural communities.

Located on 200 acres in southeast Missouri's Scott County, Sand Prairie CA's unique habitat is the result of river channels that formerly flowed through the area, according to MDC's Mississippi Lowland East District Supervisor Tim Kavan.

"It's basically the alluvial deposits of the Ohio River, Mississippi River channels," Kavan said. "The area is about 300–350 feet above sea level, and it's basically an old remnant sandbar from those river channels that ran through this area many years ago."

The area draws a wide variety of bird species, but come spring, the area's amphibians make themselves known, he said.

"When we get those warm spring rains and get a few impoundments of water that might stick around for 48 to 72 hours, the prairie opens up to a chorus of frogs — eastern spadefoot and Illinois chorus frogs," he said. "There's not a lot of swamp or shallow impoundments on the area, but they don't need much either. You can witness the ambiance from anywhere on the area if the timing is right."



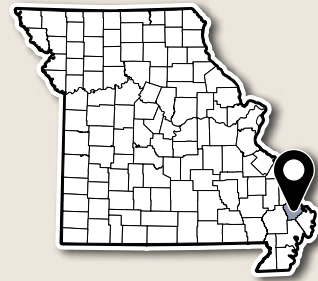
"The area is dominated with splitbeard bluestem. You also get things like tickseed coreopsis, prickly pear cactus, snout bean, dotted beebalm."

—Mississippi Lowland East District Supervisor Tim Kavan

DAVID STONNER



The landscape of Sand Prairie Conservation Area includes the white flowering blooms of American jointweed (*Polygonella americana*), and the tracks of hikers and animals. The area also includes a variety of native warm season prairie grasses common to the sand prairie (inset).



SAND PRAIRIE CONSERVATION AREA




consists of 200 acres in Scott County. From Interstate 55, take the Benton exit (80) to Highway 77 southeast (left) for approximately 2 miles, then County Road 333 north (left) approximately 2 miles to the area.

37.0955, -89.5042

short.mdc.mo.gov/Zby

573-290-5730

WHAT TO DO WHEN YOU VISIT

-  **Birdwatching** Included in the Great Missouri Birding Trail (short.mdc.mo.gov/ZbF). The eBird list of birds recorded at Sand Prairie CA is available at short.mdc.mo.gov/Zbt.
-  **Hiking** No designated trails, but area is open to hiking.
-  **Hunting** Quail and rabbit

DISCOVER MO OUTDOORS

Users can quickly and easily find outdoor activities close to home, work, or even while traveling with our free mobile app, MO Outdoors. Available in Android or iPhone platforms at mdc.mo.gov/mooutdoors.



WHAT TO LOOK FOR WHEN YOU VISIT



Short-eared owl
winter only



Lark sparrow



Eastern spadefoot



Loggerhead shrike



Little Wood Satyr

Megisto cymela

Status	Size	Distribution
Common	1¼–1¾ inches	Statewide

Little wood satyrs are common sights between May and August, skipping along wooded trails. They occur in places where woodlands meet open, grassy areas, open woods, and brushy fields, and sometimes in city yards.

Two large, dark eyespots adorn all four wings of adult little wood satyrs. The caterpillars are greenish brown with dark lateral stripes and a dark line down the back. The surface has many small bumps that each produce a short brownish hair. The head is off-white, and there is a pair of whitish horns on the last segment.



Did You Know?

This butterfly's name gives homage to its preferred habitat — woodlands — but also is derived from Greek mythology. A satyr (pronounced SAY-tur) was a type of woodland deity. Perhaps the bouncing flight of the butterfly reminded its namer of the revelry the satyrs were fond of.



LIFE CYCLE

Adults fly from May through August. Males are active most of the day, skipping through fields and brushy areas in search of females. Females lay single eggs on grasses or at the base of tree trunks. There is one large hatch in May and early June, followed shortly after by either a partial second brood or a delayed emergence of part of the first brood. Caterpillars feed at night, with partially grown caterpillars overwintering.



FOODS

Larvae feed on grasses. Adults feed on sap, fruit, and aphid "honeydew" (the sugary secretions that result from feeding on plant sap). They rarely visit flowers.

Outdoor Calendar

MISSOURI DEPARTMENT OF CONSERVATION

FISHING

Black Bass

Impounded waters and non-Ozark streams:
Open all year

Most streams south of the Missouri River:

- ▶ **Catch-and-Release:**
March 1–May 21, 2021
- ▶ **Catch-and-Keep:**
May 22, 2021–Feb. 28, 2022

Bullfrogs, Green Frogs

June 30 at sunset–Oct. 31, 2021

Nongame Fish Giggling

Impounded Waters, sunrise to sunset:
Feb. 16–Sept. 14, 2021

Streams and Impounded Waters,
sunrise to midnight:
Sept. 15, 2021–Feb. 15, 2022

Paddlefish

Statewide:
March 15–April 30, 2021

On the Mississippi River:
March 15–May 15, 2021
Sept. 15–Dec. 15, 2021

Trout Parks

Catch-and-Keep:
March 1–Oct. 31, 2021



For complete information about seasons, limits, methods, and restrictions, consult the *Wildlife Code of Missouri* at short.mdc.mo.gov/Zib. Current hunting, trapping, and fishing regulation booklets are available from local permit vendors or online at short.mdc.mo.gov/ZZf.

Buy Permits and Permit Card

Buy Missouri hunting and fishing permits from numerous vendors around the state, online at mdc.mo.gov/buypermits, or through our free mobile apps, MO Hunting and MO Fishing.



Permit cards are an additional way to show proof of most permits. Buy a new permit card for a one-time fee of \$2 at mdc.mo.gov/buypermits. Buyers can select from four images: bass, buck, bluebird, or mallard duck.



HUNTING

Black Bear

Oct. 18–27, 2021

Bullfrogs, Green Frogs

June 30 at sunset–Oct. 31, 2021

Coyote

Restrictions apply during April, spring turkey season, and firearms deer season.

Open all year

Crow

Nov. 1, 2021–March 3, 2022

Deer

Archery:
Sept. 15–Nov. 12, 2021
Nov. 24, 2021–Jan. 15, 2022

Firearms:

- ▶ **Early Youth Portion (ages 6–15):**
Oct. 30–31, 2021
- ▶ **November Portion:**
Nov. 13–23, 2021
- ▶ **Late Youth Portion (ages 6–15):**
Nov. 26–28, 2021
- ▶ **Antlerless Portion (open areas only):**
Dec. 4–12, 2021
- ▶ **Alternative Methods Portion:**
Dec. 25, 2021–Jan. 4, 2022

Elk

Archery:
Oct. 16–24, 2021

Firearms:
Dec. 11–19, 2021

Groundhog (woodchuck)

May 10–Dec. 15, 2021

Pheasant

Youth (ages 6–15):
Oct. 30–31, 2021

Regular:
Nov. 1, 2021–Jan. 15, 2022

Quail

Youth (ages 6–15):
Oct. 30–31, 2021

Regular:
Nov. 1, 2021–Jan. 15, 2022

Rabbit

Oct. 1, 2021–Feb. 15, 2022

Squirrel

May 22, 2021–Feb. 15, 2022

Turkey

Archery:
Sept. 15–Nov. 12, 2021
Nov. 24, 2021–Jan. 15, 2022

Firearms:

- ▶ **Spring:** April 19–May 9, 2021
- ▶ **Fall:** Oct. 1–31, 2021

Waterfowl

See the *Migratory Bird and Waterfowl Hunting Digest* or visit short.mdc.mo.gov/ZZx for more information.



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on Instagram**

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Gray treefrogs' musical, birdlike trill makes a pleasant evening soundtrack this time of year. Go outside and tune in! In addition to providing the evening's entertainment, these small amphibians help make your outdoor time more pleasant by dispatching many of the flying insects that would normally bug you.

📷 by **Noppadol Paothong**