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"...identifying, designating, managing and restoring the best remaining examples of natural communities and geological sites encompassing the full spectrum of Missouri's natural heritage"

Editor's Note

Celebrating 100 Years of the Migratory Bird Treaty Act

In 1913, at the height of the millinery trade when birds were hunted for their charismatic feathers, bird conservation organizations became aware of the disappearance of many bird species. With a constituent movement, the government enacted the Weeks-McLean Law that declared that "all migratory and insectivorous birds to be within the custody and protection of the Federal government." This law prohibited the spring hunting and marketing of migratory birds and the importation of wild bird feathers for women's fashion. By 1916, the Migratory Bird Treaty was established as a Convention Treaty between the United States and Great Britain (on behalf of Canada) for the Protection of Migratory Birds to "assure the preservation of species either harmless or beneficial to man." By 1918, Congress passed the Migratory Bird Treaty Act, signed by President Woodrow Wilson in July. The Migratory Bird Treaty Act (MBTA) protects over 1,000 migratory bird species by making it illegal to "pursue, hunt, take, capture, kill or sell live or dead birds, feathers, eggs and nests except by permit or regulated hunting." This year marks the 100th anniversary of this monumental legislation, celebrated by the Audubon Society and *National Geographic* as "Year of the Bird."

Since enacted, the MBTA has included "incidental take," or activities that directly and foreseeably, but not purposefully, harm birds, such as tar sands and oil spills. For decades, the incidental take rule has encouraged industry to mitigate threats to birds in design and implementation of projects. Even though this facet of the MBTA is not known for punitive purposes, throughout the country the MBTA serves as an encouraging piece of bipartisan legislation

Snowy Egrets were hunted to near-extinction to support the millinery trade in America. Today, with protection from the Migratory Bird Treaty Act, populations are stable and can sometimes be seen in Missouri wetlands like Eagle Bluffs Conservation Area and Pershing State Park.

Photo by Paul McKenzie

to protect birds. In December 2017, the principal deputy solicitor at the U.S. Department of the Interior issued a 41-page memorandum that reinterpreted the Migratory Bird Treaty Act. This memorandum concluded that the MBTA applies only to "affirmative actions that have as the purpose the taking or killing of migratory birds, their nests or their eggs." In response, a bipartisan group consisting of 17 former Dept. of Interior officials representing the Nixon, Ford, Carter, Reagan, both Bushes, Clinton and Obama administrations sent a memo expressing deep concern about the "ill-conceived opinion."

In this issue, we focus on the positive legacy of the MBTA in Missouri. Read about the monumental recovery of the Bald Eagle, how the Missouri Department of Transportation monitors and tracks nesting birds in their road projects, and articles from leaders in the field of bird conservation. Missouri is on track to install migratory bird tracking towers on major flyways to more precisely monitor bird migration through our state. With changes in home range of multiple species of birds, tracking bird movement in Missouri will prove beneficial to the national bird conservation movement. Perhaps these articles and other outlets celebrating Year of the Bird will help inspire readers to do what they can to protect migratory, resident, and breeding birds in Missouri.

— Allison J. Vaughn, editor

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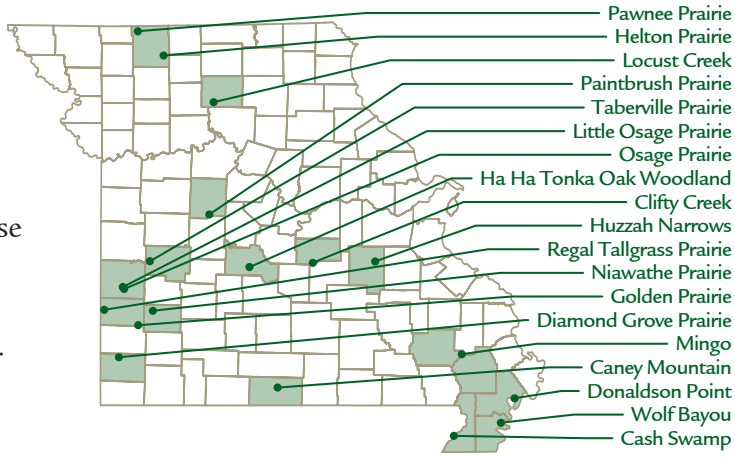

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NATURAL AREA NEWS

The Missouri Natural Areas Newsletter is an annual journal published by the Missouri Natural Areas Committee, whose mission is identifying, designating, managing and restoring the best remaining examples of natural communities and geological sites encompassing the full spectrum of Missouri's natural heritage. The Missouri Natural Areas Committee consists of the Missouri Department of Natural Resources, the Missouri Department of Conservation, the U.S. Forest Service, the U.S. Fish and Wildlife Service, the National Park Service and the Nature Conservancy.

Missouri Department of Natural Resources
The Nature Conservancy

Photo by Paul McKenzie

Fig 1. Adult Bald Eagle at Eagle Bluffs Conservation Area, south of Columbia, Missouri, 21 April 2018.

Bald Eagles in North America

An Endangered Species Success Story

by Dr. Paul M. McKenzie

In recent months, the Endangered Species Act (ESA) (Act) has come under attack by various factions due to claims that too few species have been recovered since the Act was passed into law in 1973. Currently, there are approximately 2,339 species on the U.S. Fish and Wildlife Service's list of endangered and threatened species[1].

Because only about 54 of these species[2] have been recovered, some believe that the recent criticisms of the Act are justified. However, most of the remaining listed species face significant threats, and these populations have not rebounded to the point where they no longer meet the definition of an endangered or threatened species to the level that they can be proposed for removal from the list. Recovered species provide evidence that the ESA works and that many species would be headed for extinction without the protections of the Act.

1 https://ecos.fws.gov/ecpo/reports/box-score-report

2 https://ecos.fws.gov/ecpo/reports/delisting-report

Of the species that have experienced recovery to the point of viable populations, the American Bald Eagle proves the greatest success story. Since 1782, this majestic species has served as our national symbol. In the 1960s and 1970s, this species experienced a significant population decline due to the widespread use of DDT; this precipitous decline subsequently helped spur an environmental movement, coupled with the publication of Rachel Carson's classic environmental novel, *Silent Spring*. While some statutes such as the Migratory Bird Treaty Act (MBTA) of 1918 and the 1940 Bald Eagle Protection Act (now the Bald and Golden Eagle Protection Act: BGEPA) provided some protection of Bald Eagle parts, nests, or eggs, when the species was listed under the Endangered Species Preservation Act of 1967, it helped identify further conservation efforts, and even further protections from the Endangered Species Act of 1973. In 1963, a time when the species populations were at their lowest levels, an estimated 487 breeding pairs existed in the lower 48 states. In Missouri, only 5 to 6 Bald Eagle nests existed in the 1980s, and only 10 by the summer of 1993 (Robbins, 2018). With the ban on DDT and other detrimental pesticides, reintroductions through hacking programs at historical sites, outreach activities, and the concerted and collaborative recovery efforts of numerous federal, state, and private entities, the species exhibited a remarkable recovery. Nationally, the number of breeding pairs increased[3] to over 5,000 by 1997 and 9,789 by 2007, a time when Bald Eagles were deemed recovered in the lower 48 states.

During the last census it was estimated that there were between 13,000 and 14,000 nests in the conterminous U.S. (U.S. Fish and Wildlife Service 2016). In Missouri, the nesting population increased to 48 nests in 2000, 150 nests in 2007, 260 nests in 2015 to now about 394 nests (Robbins 2018; Janet Haselrig, Missouri Department of Conservation, pers. comm., July 2018). Even in the Columbia, Missouri area, multiple Bald Eagle active nests exist at the Eagle Bluffs Conservation Area south of Columbia and one active nest is at the University of Missouri South Farms near the KMOU TV 8 facility. The success of the Bald Eagle is a triumph of the Endangered Species Act. Without the recovery efforts by so many federal, state, and private partners, it is likely this species would remain listed under the ESA and face numerous threats to viability. While the ESA protections no longer exist for Bald Eagles, it remains protected under the valuable MBTA and the BGEPA.

Dr. Paul M. McKenzie is a retired Endangered Species Coordinator for the U.S. Fish and Wildlife Service in Columbia, Missouri. He continues to volunteer for the USFWS to pass on his long legacy of endangered species knowledge.

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3 https://www.fws.gov/midwest/eagle/recovery/biologue.html

Photo by Missouri River Bird Observatory staff

Missouri River Bird Observatory continues to survey bottomland hardwood forests in southeast Missouri to gain more information on bird species using these uncommon landscape types.

Monitoring Missouri's Bird Populations in Natural Areas

by Dana Ripper

Missouri's natural areas serve as a bastion of biodiversity for Missouri's flora and fauna. At the Missouri River Bird Observatory (MRBO), we focus much of our monitoring efforts on determining the density and abundance of birds in Missouri's most imperiled habitats. By default, our examinations of bird use of these habitats are often within bottomland forest and grassland natural areas.

After surveying tens of thousands of acres in Missouri each year since 2012, and documenting over a quarter million birds, we can confidently state that Missouri's natural areas are an exceptional component of our state's conservation legacy. When we hear the term "Natural Area," our pulses quicken and we become more passionate and hopeful about the natural communities they represent.

The diversity of birds in Missouri results from the diversity of quality habitats and the integrity of the landscapes containing them. As an integral part of the high quality natural communities that remain, birds have much to tell us about the plight of those treasured resources and give us insight into how Missouri's avian natives may fare under the most ideal habitat conditions.

Bottomlands

In 2015, MRBO began an assessment of the response by breeding forest birds to management using point-count surveys. The Lower Mississippi Valley Joint Venture (LMVJV) methods used provided a baseline for future studies and were designed to test bird response to stand improvement activities and provide guidance for adaptive management over time.

Natural areas within bottomland forests surveyed by MRBO include the southeastern gems of Wolf Bayou (Black Island CA-Wolf Bayou Unit), Cash Swamp (Ben Cash Memorial CA), Donaldson Point (Donaldson Point CA), and Mingo (Mingo NWR). Within these areas significant numbers of birds were found using swamp, riverfront forest, wet-mesic bottomland forest, and oxbow/slough community types.

A major impetus of this study is the fact that bottomland hardwood forests of the Mississippi Alluvial Valley (MAV) have undergone a loss of more than 80% over the past 150 years. Most losses occurred within the 20th century, and were driven by a variety of human land-use factors including conversion to agriculture and urban development. Bottomland hardwood forest-dependent bird species have undergone associated steep declines. Two, the Ivory-billed Woodpecker and the Bachman's Warbler, became extinct in the 20th century. Other formerly common bottomland dwellers such as Cerulean Warbler and Swallow-tailed Kite have been largely or entirely extirpated from Missouri's bottomland hardwood forests. Some species (e.g. Eastern Wood-Pewee) with distributions that include the northern or eastern U.S., also inhabit other forest types, such as upland, high-elevation and/or mixed coniferous-deciduous forests. In many cases, however, those habitat types have also been largely converted and the conservation of the MAV bottomland hardwood forest provides an important contribution to the persistence of many species.

MRBO documented 2,980 individual birds of 51 species of breeding birds using the bottomland forest sites that we surveyed. Within the smaller subset of natural areas, we recorded 421 individual birds of 37 species. Several high priority species were found in relatively high numbers: Acadian Flycatcher (n=39), Yellow-billed Cuckoo (n=18), Prothonotary Warbler (n=26), and Eastern Wood-Pewee (n=18). Data suggest that Acadian Flycatcher and Yellow-billed Cuckoo populations are relatively high and evenly distributed across sites. Prothonotary Warbler and Eastern Wood-Pewee populations were abundant at a subset of sites.

Grasslands

Grassland bird populations have declined precipitously as the result of habitat loss, fragmentation, and degradation of quality — a multitude of anthropogenic disturbances. One can only imagine the amount and distribution of grassland birds that once inhabited the over 12 million acres of native prairie in Missouri. It is logical to wonder how grassland-obligate populations are faring with all but <1% percent of native prairie lost since European settlement.

There are varying degrees of population decline amongst our grassland birds. Those like the once-numerous Greater Prairie-Chicken and to a slightly lesser extent, Northern Bobwhite Quail, are most sensitive to the shrinking landscape acreage. Conservative

Photos by Missouri River Bird Observatory staff

Henslow's sparrows depend on a distinct shrub layer surrounded by a rich grass-forb mix for successful nesting.

Diamond Grove Prairie Natural Area is a heterogeneous prairie landscape full of conservative plants and animals.

plant species may survive in even the smallest prairie remnants — if those lands are very well-managed — but many avian species are more immediately effected by area size.

Grassland species that survive in smaller landscapes must still find specific structural characteristics that meet their full life-cycle needs. Grasshopper Sparrows require thinner, sparser vegetation comprised of fewer forbs, as compared to their close kin, Henlow's Sparrows. Yes, birds are more mobile than other classes of organisms, but where can they fly to that provides the structural components they've adapted to as well as the invertebrate communities requisite to feed their young? Often, they can be found occupying a poor-quality grassland (e.g., one dominated by fescue), but those areas become ecological sinks.

Grassland natural areas surveyed by MRBO include: Diamond Grove Prairie, Golden Prairie, Helton Prairie, Little Osage Prairie, Locust Creek, Niawathe Prairie, Osage Prairie, Paint Brush Prairie, Pawnee Prairie, Regal Tallgrass Prairie (Prairie State Park), and Taberville Prairie. Of the 120,000 birds documented during MRBO's grassland breeding bird surveys, we documented 9,482 individuals of 97 species on the smaller subset of natural areas.

Missouri's natural areas and well-managed restored landscapes are the only places remaining that can sustain source populations. We have all witnessed the dwindling populations of Greater Prairie-Chickens. Too, there is the amazing Loggerhead Shrike, a.k.a. "the Butcher Bird," which MRBO surveyors now encounter even less frequently than Prairie-Chickens. The losses of these 'canaries in the coal mine' are likely due to more insidious and inconspicuous causes than

Species Conservation Ranking

Species	MRBO suggested rank	Justification	ABC[1] rank	Jacobs[2] rank	BBS[3] trend MO 1966-2012	BBS[3] trend MO 2002-2012	BBS[3] trend ETGP[4]	MO BBS[3] *n* (1966-2013)	MRBO *n* 2014
Greater Prairie-Chicken	10	<100 remaining in Missouri	16	1	not given	not given	-5	455	4
Loggerhead Shrike	9	extreme declines in region & state; declines obvious to MO observers	13	3	-6.99	-8.5	-5.71	2010	21
Henslow's Sparrow	8	high ABC rank, MO is range core; but marked increases in region & state	16	2	8.44	9.82	3.64	476	1041
Bell's Vireo	8	high ABC rank, neg trend in MO, MO is range core; but, shrub habitat not rare.	16	5	-1.73	-0.32	-0.6	958	587
Common Nighthawk	8	rare in natural habitat (common only in MO towns), high ABC rank, rangewide declines	15	not rated	1.01	1.31	-1.12	463	3
Bobolink	7	relatively high ABC rank, regional declines but increasing in MO; stable in north part of range	13	10	4.57	2.09	-3.55	1761	974
Western Meadowlark	7	rangewide & MO declines	13	9	-3.51	-3.85	-5.52	4251	41
Grasshopper Sparrow	7	mod. ABC rank, but strong declines in state, region, and adjacent regions	12	6	-2.12	-2.36	-4.06	12281	992
Eastern Meadowlark	7	rangewide & MO declines	12	9	-2.32	-2.69	-2.57	80248	1175
Northern Bobwhite	7	continued declines despite habitat restoration	11	4	-3.01	-3.54	-3.21	55057	328
Field Sparrow	6	mod. ABC rank, declines in MO, but habitat not lacking, also wide range	12	7	-1.79	-0.92	-1.75	29489	773
Upland Sandpiper	5	increasing in some parts of range, including MO	12	11	0.72	0.76	-1.71	1008	84
Dickcissel	5	relatively low ABC rank, high overall population, but neg. trends in MO	10	8	-1.35	-0.87	-1.04	69257	4232
Sedge Wren	4	low ABC rank, but declining in MO (small sample size); indicative of quality wet prairie habitat	8	not rated	-3.77	-4.44	1.05	122	88

1 American Bird Conservancy (ABC)
2 Breeding Bird Survey (BBS)
3 Brad Jacobs, Missouri State Ornithologist
5 Eastern Tallgrass Prairie Region (ETGP)

habitat loss; it is particularly due to synthetic agricultural chemicals used in row-crop and livestock production. Other species such as Northern Bobwhite Quail, Dickcissel and Eastern Meadowlark appear to be holding in Missouri, though even these species experience sometimes alarming year-to-year population fluctuations.

MRBO keeps a finger on the pulse of grassland bird densities and abundances across the state each year. Statistically rigorous estimates show yearly fluctuations in densities and indicate some concerning long-term trends. Natural areas' bird metrics are generally consistent.

In one component of MRBO's grassland monitoring, property-specific "bird-friendliness" indices, are generated that may be of interest to land managers and others. This Bird-Friendliness Index is derived as follows: The density of each target species (generated using Program Distance where n>15 for a property) is multiplied by the Conservation Rank of each species (see Figure 1). This value is then multiplied by the Shannon-Wiener Diversity Index for the property to obtain a composite score. By including diversity indices, density (as opposed to abundance), and a relative conservation value for each species, properties of varying sizes can be fairly evaluated for their contribution to grassland bird populations. This is one way that MRBO assesses the year-to-year success of habitat management and restoration.

Although we can put a solid metric on the conservation value of a given site to birds, there are many other organisms which need further study and resulting metrics to more fully express the enormous conservation value of our natural areas.

For further reading on MRBO's work in imperiled habitats of Missouri, please see available reports at our website[1].

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1 http://mrbo.org/mrbo-reports

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Pine Woodland Restoration Impacts to Breeding Birds

by Melissa Roach

The sheer diversity of natural community types in Missouri is enough to keep any outdoor enthusiast busy exploring. One region in particular holds a special place in my heart, the Ozark Highlands. I have spent many a spring and summer working in those beautiful rolling hills, and as part of my Master's research for the University of Missouri I studied the diverse suite of birds that breed there. Working under the supervision of the outstanding Dr. Frank Thompson, we set out to answer a pressing question: how breeding birds and vegetation respond to restoration treatments in pine woodlands and savannas of the Ozark Highlands.

According to *The Terrestrial Natural Communities of Missouri* by Paul Nelson, woodlands are distinct natural communities characterized by an open to closed canopy ranging from 30% to 100% closure, a sparse midstory, and a dense ground flora of forbs, grasses, and sedges. Woodland communities are strikingly different from mature forest communities which possess a closed canopy with multi-layered shade tolerant shrubs, vines, and sedges. Savannas are described as grasslands with widely spaced open grown trees and a distinct shrub layer. Distinct from woodlands, savannas are strongly associated with prairie grasses and a very open canopy of less than 30% closure. Since both communities have canopy gaps and lack a midstory, ample sunlight is able to reach the ground, which results in their characteristic lush ground cover and shrub layer.

Savannas and woodlands were historically

Pine woodland restoration continues on the Mark Twain National Forest with the desired condition of open woodlands with a rich understory of grasses, forbs and sedges.

maintained by natural and anthropogenic fire, grazing by large ungulates, and other natural disturbances such as wind throw or insect outbreaks. Fire, however, is particularly important in maintaining the open midstory that makes these communities so distinct. Mixed pine-oak and oak woodlands once covered 13 *million* hectares in the Midwest but were drastically reduced to a mere 2600 hectares after European settlement. The region lost virtually all savanna and woodland because of over-harvesting of timber, conversion to agriculture, overgrazing, or degradation to closed-canopy systems caused by long periods of fire suppression. Not surprisingly, this loss affected the Ozark Highlands in southeastern Missouri, once dominated by oak or shortleaf pine woodlands at the time.

Savannas and woodlands are ecotonal or transitional communities that contain characteristics of both the grasslands to the west and the forests to the east. This vegetation gradient can support bird species from normally distinct habitat types which results in increased species diversity because both woodland generalists and early-successional species are able to utilize the same area. Pine savanna and woodland are critical for specialists such as the federally endangered Red-cockaded Woodpecker, once common in the Ozarks but was sadly extirpated from Missouri in 1946. They likely serve as vital habitat for other species of concern such as Red-headed Woodpeckers, Prairie Warblers, and Blue-winged Warblers.

Today, federal and state agencies are undertaking considerable efforts to restore the open pine communities that once dominated this region of the Ozark Highlands. It is unclear how this active management, in the form of prescribed fire and tree thinning, affects the breeding bird community. Previous studies examined the effects of oak woodland restoration in Missouri, but very little research exists on breeding bird communities and pine

Photo by Melissa Roach

woodland restoration. We set out to determine how breeding birds and the vegetation responds to restoration treatments. The primary questions for the focus of my research were: are the birds using restored areas and are they successfully breeding there?

Abundance Surveys

We conducted this study from 2013–2015 in the Ozark Highlands within the Collaborative Forest Landscape Restoration Project (CFLRP) underway on 139,900 hectares in the Mark Twain National Forest (MTNF). We conducted bird surveys at 251 monitoring points that covered the full range of restoration activity (i.e., untreated oak woodlands compared to areas receiving little to substantial treatment). We surveyed the abundance of 15 breeding bird species (Table 1) that were either a species of concern or birds we hypothesized that may show a strong response to management activities. We utilized 10-minute distance-sampling surveys mid-May through early July wherein observers recorded the time of detection and exact distance away for each focal bird detected. We surveyed all 251 monitoring points once per breeding season in each of the three years. We measured vegetation structure at each point count location in the 2013 breeding season and calculated larger-scale vegetation measurements using ArcMap. We also obtained the management history for all points for the previous ten years to calculate prescribed fire and tree thinning events.

We examined a thorough list of models containing potentially important combinations of management and vegetation variables that could affect the abundance of each focal species (Roach, 2017). Every species showed support that at least one management and one vegetation variable affected abundance. We found 9 species that were overall positively related to pine woodland restoration: Blue-winged Warbler, Eastern Towhee, Eastern Wood-Pewee, Kentucky Warbler, Pine Warbler, Prairie Warbler, Red-headed Woodpecker, White-eyed Vireo, and Yellow-breasted Chat. While certainly a diverse list of birds, most of these species are either early-successional species that require shrub cover for nesting, woodland generalists that can occupy a range of habitat types, or pine specialists. These species responded positively to management treatment(s) and also some aspect of the vegetation created by restoration activity. Of these 9 species, 7 had positive relationships with fire activity showing the importance of prescribed burns in this system.

Only 5 of our 15 species were negatively related to pine woodland restoration, and this was actually consistent with our original hypothesis. Acadian Flycatcher, Black-and-white Warbler, Ovenbird, Wood Thrush, and Worm-eating Warblers are species that breed in mature forest, and therefore, should avoid areas of

Table 1. Focal species for abundance surveys.

Early-successional	Generalist or Pine Specialist	Mature Forest
Blue-winged Warbler [b]	Eastern Wood-Pewee [a]	Acadian Flycatcher
Eastern Towhee [a]	Pine Warbler	Black-and-white Warbler
Kentucky Warbler [b]	Red-headed Woodpecker [b]	Ovenbird
Prairie Warbler [b]	Summer Tanager	Wood Thrush [b]
White-eyed Vireo [a]		Worm-eating Warbler [b]
Yellow-breasted Chat [a]		

[a] species of regional concern [b] species of regional and range-wide concern

woodland restoration because it is not the right habitat for them. Three of these species (Black-and-white Warbler, Ovenbird, and Worm-eating Warbler) nest directly on the ground in leaf litter; therefore, they avoid burned areas until adequate leaf litter develops again. One species, the Summer Tanager, showed little response to restoration likely because it is a generalist species that breeds across the spectrum of natural community types.

Reproduction Surveys

To further investigate how pine woodland restoration might affect nest success, we monitored reproductive success for a subset of our 15 focal species in areas that overlapped with our abundance surveys. We hypothesized that restored pine woodland would serve as high quality breeding habitat for disturbance-dependent, early-successional species while generalist species would also benefit but to a lesser degree. In the 2014 and 2015 breeding seasons, we searched for and monitored nests of 3 shrub-nesting species (Eastern Towhee, Prairie Warbler, and Yellow-breasted Chat) and 3 canopy-nesting species (Eastern Wood-Pewee, Summer Tanager, and Pine Warbler). We purposely selected species with differing natural histories to cover the range of nest placement from ground level to high canopy. Similar to our abundance surveys, we collected vegetation and management variables to examine their impact on each species' nest survival.

We monitored 462 nests over the two breeding seasons: 208 shrub nests and 254 canopy nests. Species showed positive relationships directly with management treatment or indirectly with vegetation patterns resulting from treatment. Shrub-nesting species had greater nest survival in areas that had been thinned while canopy-nesting species had greater nest survival in areas with fewer trees, a direct result of tree thinning (Roach et al., 2018).

Conclusions

With pine woodland restoration well underway in this area of the Ozark Highlands, it is important to understand how management techniques affect the vegetation structure which, in turn, determines the breeding bird community. We were able to determine how the abundance of 15 species changes along the savanna-woodland-forest gradient and in response to prescribed fire and tree thinning. Essentially, we answered the question of whether or not birds were using restored areas, which is an important first step. But simply being in an area doesn't necessarily mean that the habitat is high quality. Pine woodlands might attract early-successional species and woodland generalists, but can they actually produce offspring there? Both our shrub-nesting and canopy-nesting species had high rates of nest survival in restored areas. Pine woodlands appear to be providing the necessary vegetation for nest placement, concealment from predators, and ample food to support fast-growing nestlings.

We hope our findings will aid land managers in creating effective treatment regimens and further support restoration efforts in the Mark Twain National Forest and beyond. It is also hoped that awareness of pine woodland restoration will lead to a greater appreciation of this unique community. These areas are beautiful, diverse, and provide critical habitat for many different species, not just birds, and are just one of the many reasons that make the Ozark Highlands a truly remarkable place.

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Missouri Bird Conservation Initiative's Impact to Bird Habitat

by Allison J. Vaughn

Stepping into the woodlands on a bright May morning, the chattering of Red-headed Woodpeckers filled the air. There were eleven birdwatchers in our group, including Missouri's First Lady who would later address us with a Proclamation celebrating May 11, 2013 as Migratory Bird Day. The group consisted of Steering Committee members of the Missouri Bird Conservation Initiative, a partnership of 74 organizations committed to working together to sustain healthy habitats for birds. Migratory Bird Day is one of MoBCI's annual events to bring attention to our organization's successful partnerships for bird conservation, while highlighting a migratory bird that has benefited from the wide-ranging conservation projects that the partners conduct. The Trumpeter Swan was the chosen bird in 2013, largely due to the importance of Missouri's restored wetlands to wintering pop-

Affectionately called "Stumptown," with the help of a Missouri Bird Conservation Initiative grant, park staff and seasonal crews cleared this 8-acre glade that overlooks Spencer Creek. Located in the Ha Ha Tonka Oak Woodland Natural Area, the glade served as the perfect setting the following spring for the Missouri First Lady's proclamation.

Photo by Allison J. Vaughn

ulations and the recent increase in flocks of these majestic birds. Annually, too, partners and representatives from the Initiative participate in Conservation Day at the Missouri State Capitol, a day designed to bring conservationists from all across Missouri together for a day of promoting and supporting our natural resources and outdoor heritage.

MoBCI was formally established in August, 2003 following the written commitment of 28 organizations to unite in the pursuit of all-bird conservation. These organizations spanned interests in birds to include local Audubon chapters, government land managing agencies, not-for-profit organizations, universities, as well as groups with an interest in hunting birds like Ducks Unlimited and the National Wild Turkey Federation. The early days of the Initiative did not see a great unification between hunting and non-hunting groups, with the room full of representatives split down the middle; but it was widely accepted that if unified, all of these bird conservation groups could have a powerful voice. Through the years, members of the hunting and non-hunting communities have come to know and understand each other better over time, to build personal relationships with one another as individuals, and to form relationships among their respective organizations — organizations with vastly different interests and missions. The common theme for all of MoBCI's partner organizations is the bird habitat which promotes both great birding and quality bird hunting.

Missouri's Initiative is a "step down" of the international integrated North American Bird Conservation Initiative which strives to conserve, support, and enhance bird populations and their habitats. Like NABCI, Missouri's partnership organization is dedicated to conserving birds across geopolitical boundaries, across taxonomic groups, and across landscapes. A primary focus of MoBCI, now 74 partner organizations strong, is to provide grant dollars to organizations for on-the-ground habitat restoration that benefits birds. It is the MoBCI Grants Program that brought us to the Ha Ha Tonka State Park Oak Woodland Natural Area with Missouri's First Lady for Migratory Bird Day.

In 2011, MoBCI awarded Ha Ha Tonka State Park a $15,000 grant for ecosystem restoration efforts to occur on a 9 acre dolomite glade community. This grant application was one of eight grant applications approved that year, with direct MoBCI funds totaling $106,000. At Ha Ha Tonka State Park, previously conducted bird surveys revealed thriving populations of birds declining across their range, including Partners In Flight Watch List birds like Prairie Warblers, Field Sparrows, Red-headed Woodpeckers and Northern Bobwhite Quail. With the grant dollars and a 1:1 match, park staff and hired crews worked to improve bird habitat through the removal of Eastern red cedar, an evergreen tree that had choked out the natural vegetation and degraded the natural integrity of the area. Grant dollars also allowed for the implementation of prescribed fire, an important management tool for ecosystem restoration projects in Missouri's Ozark Highlands. By 2013, two years after grant dollars were used for cedar clearing and a prescribed fire, this dolomite glade was teeming with wildlife, and the previously bare soil resulting from years of shading was a lush carpet of native woodland and prairie flora which continues to support a multitude of insects, vital to the nesting indigo buntings and other breeding birds in the area. This was the perfect setting for the Procla-

mation of Migratory Bird Day in Missouri, and for a celebration of all-bird conservation efforts that MoBCI helps to accomplish every year.

Annually since 2004, MoBCI receives between three and twenty requests from various not-for-profit organizations such as the Missouri Prairie Foundation and local Audubon Society chapters, private landowners, state agencies and other land management groups seeking grant dollars through the Grants Program. Funding for grants derives from a portion of hunting and fishing permit revenues and a dedicated 1/8th of 1% Missouri sales tax earmarked for the Missouri Department of Conservation to enable conservation and protection of Missouri's wildlife and wildlife habitats. Over $1 million has been granted from the Department for the MoBCI grants program. Grant dollars must be matched 1:1 by the grantee, either in matching funds or in-kind donations, which results in a net gain of double the impact, all slated for on-the-ground habitat work. Strong grant applications include working partnerships and collaboration between entities, such as local Audubon Society chapters assisting with bird monitoring, and financial donations to support the habitat work. With the coming together of such a diverse array of organizations, recent partnerships have included the Audubon Society of Missouri and the Ruffed Grouse Chapter of the Quail and Upland Wildlife Federation, with the Audubon chapter providing monitoring of Ruffed Grouse in the project area, and the Ruffed Grouse enthusiasts working with the Audubon chapter on understanding the importance of early successional habitat for this target game species in Missouri. Applications must exhibit a direct link between the work funded and benefits to specific birds and their habitats. At Ha Ha Tonka State Park, for example, dolomite glade and woodland birds like Yellow-Breasted Chats, Orchard Orioles and Eastern Wood Pewees benefited most from the cedar removal and prescribed fire projects.

Because of the nature of the grant applications and the inclusive "all bird conservation" approach to the organization's mission, funds for habitat improvement can be applied to groups as varied as the Missouri State Parks system, The Nature Conservancy, the National Wild Turkey Federation, and the City of Ste. Genevieve, among others. So, grant dollars help bird populations ranging from migratory songbirds to game species such as Northern Bobwhite Quail and Wild Turkey. Across the board, most organizations that apply for grants focus their dollars on species witnessing regional declines that can be reversed with habitat restoration efforts. Furthermore, in 2016, with funds generated from the Initiative's annual conferences and silent auctions, the Initiative offered a challenge grant to partner organizations up to $1,000. The matching grant dollars and partnerships serve as support of a North American Wetlands Conservation Act grant application for wetland restoration at Schell-Osage Conservation Area, a wetland complex that plays host to birdwatchers and waterfowl hunters alike. Partners including the Greater Ozarks Audubon Society, Audubon Society of Missouri, Missouri Prairie Foundation, National Wild Turkey Federation, and River Bluffs Audubon Society donated $4,000 to the grant application, funds which MoBCI matched 1:1 for a net total of $8,000 of non-federal funds, a requirement of the grant application. Perhaps more significantly, the Initiative will serve a partner along with the matching organiza-

tions for this significant wetland restoration grant application.

Partnerships are key to strong grant applications. Because of the diversity of partner organizations, relationships have formed between a wide array of partner organizations, and groups like the Audubon Society of Missouri assist both financially and with in-kind match such as bird monitoring. Other bird conservation organizations are now providing financial support for bird habitat projects directly through their own fundraising efforts.

MoBCI eagerly funds long-term multi-year projects like the National Wild Turkey Federation's habitat restoration efforts that cross political borders with the inclusion of land in Missouri and Iowa. Beginning in 2008, the southern Iowa and northeast Missouri landscape lent itself to large-scale savanna-woodland restoration that would benefit Wild Turkey and other wildlife. The strategic conservation work spearheaded by the National Wild Turkey Federation in Missouri and Iowa netted funding through MoBCI beginning in 2009 with a 4:1 match by other partners for thinning projects and prescribed fire implementation. To date, MoBCI's funding for this project and match totaling $180,000 has impacted 64 tracts of private lands and achieved 552 acres of prescribed burning, 1,112 acres of hardwood thinning to open the canopy to allow for greater woodland floral diversity, and many more acres of woodland and savanna restoration efforts through timber stand improvement and woody cover control. The vegetative structure created by these MoBCI-funded projects provides ideal nesting and brooding habitat for Wild Turkey, and the restoration of woodland habitat benefits a wide array of birds including Red-headed Woodpeckers, Northern Bobwhite Quail, and a suite of warblers declining across their range. The National Wild Turkey Federation is one of many organizations who receive grant dollars to apply to habitat restoration for the benefit of birds. As MoBCI partnerships grow, with available grant funding and a greater outreach to bird conservation organizations, the goal remains to improve habitat over thousands of additional acres in Missouri for the benefit of all birds and biodiversity.

Photo by Allison J. Vaughn

Two years after the cedar removal project, the Spencer Creek area glade was awash in long-lived perennial forbs and hosted not only a thriving invertebrate population, but nesting Indigo Buntings and Field Sparrows.

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Bird Conservation in the Missouri Department of Transportation

by Evan Hill

In my position as Environmental Specialist at the Missouri Department of Transportation, I often find myself working in urban and developed landscapes, quite at odds to the environment found in a natural area. One of my duties is to survey construction projects for impacts to migratory birds. MoDOT plays an important role in the protection of birds during the migration and breeding stages of their life-history. There are two federal acts that protect birds in Missouri and across the nation: the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. These two documents govern the actions of MoDOT and other agencies, ensuring that construction activities do not impede migration and breeding efforts of birds in this state. Many species have adapted to survive, and often thrive, in an anthropogenic landscape. Peregrine falcons often nest on tall buildings and other large structures. While bald eagles don't nest on man-made structures, they often nest near areas being developed for human use. MoDOT has developed a JSP, or job special provision, that prohibits activities that would disturb bald eagles during their breeding season. Any MoDOT bridge project has the potential to disturb nesting swallows and eastern phoebes. Cliff swallows, and sometimes eastern phoebes, nest on bridges and culverts that are set for replacement or rehabilitation. I have surveyed bridges that have had hundreds of swallow nests attached to them. In order to protect these birds during this important stage of their life-history, I ensure that a JSP is included in the bid document that prohibits the contractor from disturbing the active nests. MoDOT further protects birds and other wildlife by creating habitat to replace habitat that was destroyed by construction activities. These stream and wetland mitigation areas, along with Sensitive Areas, are important in providing resources for wildlife affected by land use changes. However, there is only so much benefit that can be gleaned from creating habitat; often it is more beneficial to preserve the original natural habitat in the first place. This is why the Natural Areas Program is so important-some of these resources simply can't be recreated elsewhere should they be destroyed or altered.

The unique biological and geological conditions protected by the Missouri natural areas program are often sources of great species diversity and richness. Many rare species of plant and animal can be found only in the environments preserved in these natural areas, and while birds are inherently more mobile than other fauna and may not be restricted to these areas, the conditions found in natural, undisturbed habitats offer some of the best opportunities for bird-watching in the state. In a state with such an altered landscape due to development, agriculture and ecosystem degradation, these locations provide critical breeding habitat for many species of birds. Natural areas are of interest to birders in an immediate sense because they can provide excellent birding opportunities. Those factors that benefit birds also benefit birdwatchers. The association between better birding and natural areas is practical, and perhaps betrays

a bit of self-interest on the part of the birder. But there is a deeper message that begins to take hold. In stark contrast to natural areas, many people participate in the hobby of birding in relatively disturbed, altered landscapes such as public parks, lakes, local nature trails, and even their own backyards. In fact, the majority of birdwatchers report that they do the majority of their birdwatching on their own property. However, the differences between natural areas and the backyards and parks frequented by the average birder are more than just physical.

Generally speaking, when environmental professionals, scientists, and land managers decide on how a piece of land will be used, there is a choice between two possible options: conservation or preservation. While these terms might, at first glance, seem quite interchangeable, there is a vast difference between the two with regards to intent. Conservation implies that the resources on the land will be used, however abstemiously, in a properly sustainable fashion. Preservation is the complete and total protection of the land from any consumptive use. At the core of a natural area is a philosophy of preservation. Natural areas represent some of the last remnants of historical habitat that could be found in Missouri prior to westward expansion and the alteration of the landscape by humans. While it is true that the rules for public use vary depending upon the organization that owns a natural area, all share the philosophy of preserving these jewels of undisturbed biological and geological diversity so that the unique characteristics of these environments can remain unaltered from their biodiverse, best remaining example state. Preservation is especially relevant to birders because birding is an outdoor recreational activity that does not "use" the land for any consumptive purpose. Indeed, many natural areas operate on a "leave no footprint" mandate that perfectly aligns with a birdwatcher's motivations.

Photo by Missouri Department of Conservation

Clifty Creek Natural Area features a large natural bridge formation used by birds as nesting habitat.

One of my favorite recent birding experiences at a natural area took place at the Clifty Creek Natural Area in Maries County. So much of my concern for birds on the job as an Environmental Specialist revolves around bridges and other man-made structures being used by birds as nesting habitat. It comes as no surprise that the natural bridge at Clifty Creek resonated with me during that adventure. It is important to be reminded of the natural structures and environments disappearing from the landscape that are so import-

ant for birds and other wildlife. Simply visiting a natural area can provide a deep lesson in how our use of the land affects the biota, and birding becomes a convenient means to convey that message. After gaining a greater understanding of the natural world, a visitor to a natural area can begin to appreciate the tremendous differences between them and the altered landscape in which the typical birder participates in the hobby. This, in turn, could influence the people to attempt to build these natural characteristics into the landscaping of their own backyards and to push for their inclusion in their local parks and green spaces. Thanks to significant outreach and education, many Missourians are aware of the importance of planting native vegetation, but when they can see a truly natural landscape for themselves — and the incredible biological and geological diversity it can hold — the message is that much stronger. Perhaps as more people visit these areas and see the great diversity not only of bird life but of flora and other wildlife, we may see fewer Bradford pears and other invasive plants in landscaping, and more native trees and flowers throughout our neighborhoods and public green spaces. The visitors to these places may begin to see the Japanese honeysuckle in the understory of the local nature trail and recall their time at a natural area when the understory was carpeted in herbs and wildflowers, and the air was filled with the music of summer migrants. Few places in the state can convey such a powerful message of the importance of preservation.

Evan Hill is an Environmental Specialist at the Missouri Department of Transportation

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Calendar of Events

January 27–30, 2019
79th Midwest Fish and Wildlife Conference
Cleveland, Ohio
www.midwestfw.org

February 5–7, 2019
Missouri Natural Resources Conference
Osage Beach, Missouri
www.mnrc.org

March 5–7, 2019
Missouri River Natural Resources Conference
Pierre, South Dakota
www.mrnrc2019.com

June 2–5, 2019
2019 North American Prairie Conference
Houston, Texas
www.northamericanprairie.org

July 23-25, 2019
Fire in Eastern Oak Forests Conference
State College, Pennsylvania
www.oakfirescience.com

October 8–10, 2019
2019 Natural Areas Conference
Pittsburgh, Pennsylvania
www.naturalareas.org

Birding and Herping the Ozark Glades

by Dr. Julie Jedlicka and Dr. Mark Mills

Exiting the curvy Ozark highway with our eyes focused on south facing slopes and a GPS unit, we (two college professors and 3 undergraduate assistants) pulled off the gravel road and bushwhacked through oak-hickory woodlands in search of glades and their associated wildlife. Glades are characterized as dry, rocky, open landscapes harboring a mix of prairie and glade flora and fauna. Due to a history of overgrazing, fire suppression, development, and other factors, glade habitat has decreased in Missouri in the past 200 years. Our task was to look beyond the plants and catalog the bird, amphibian, and reptile diversity that also call these ecosystems home. Our two year project, funded by the Missouri Department of Conservation, included sampling over 50 glades on conservation areas, including a number of designated Missouri natural areas including Caney Mountain Natural Area.

Some glade sites were less than an acre in size and when we found them, a dense thicket of oak brush and Eastern red cedar trees had invaded, blocking any sunlight from hitting the rocks below. On the other extreme, some sites were over 100 acres, and as we climbed the first hilly expanse and witnessed the morning fog rise, the sublime vastness of the vistas, the undulation of the hills, produced a strange desire to yodel. Other creatures besides us are drawn to these secluded, rocky meadows insisting on calling out their presence in a dawn chorus. Birds use Ozark glade communities throughout their life histories, and some of our state's rare breeding bird

Dr. Mills with a banded Prairie Warbler during the survey project.

Photo by Chris Watson

Photo by Dr. Mark Mills.

Yellow-breasted Chat being removed from mist net.

species call these habitats home. Early morning sampling is part and parcel of bird study, so our team regularly set out for the glades at 4:30 a.m. We sampled the birds using three different methods: (1) mist netting, (2) point counts, and (3) targeted playbacks. Consequently, while we were only able to spend a day or two at each glade, the combination of three methods gave us opportunities to sample the bird community hiding in the brush.

Mist netting is a hands-on sampling activity where a thin mesh net is opened, stretching from the ground to 10 feet high and is effectively invisible to birds. We checked the nets every 30–45 minutes, gently unwrapped the captured birds, then gathered as much data as possible including species, sex, age, fat, breeding status, wing cord (length), and weight. We then fit the birds with USGS-issued aluminum bands that allow researchers to trace those birds back to our study. For example, this year we banded a pair of Common Yellowthroat Warbler on May 18th at Danville Conservation Area. On May 24th, six days later, the male flew into a mist net in Michigan. Because we banded the bird in Missouri, we are able to follow that individual on its migratory path between its breeding and overwintering grounds, learning where it chooses to stop and for how long — important information for conservation and management.

The point counts we performed are standard avian sampling protocols, but instead of capturing birds physically, one uses avian vocabularies to record the songs, calls, and physical presence of birds in a radius (usually 50 meters) around your point location. MDC provided a list of 18 bird species to search for at all glade sites. If we did not record their presence during mist netting or point counts, we conducted a brief playback sampling where we turned on our portable speaker to play a recording of that species' song. Because many birds are territorial during the spring and summer months, the height of breeding season, an individual of that same species may react aggressively to the presence of this mimicked intruder by approaching quickly, singing loudly, and making their presence known.

On the list of target bird species, two of those species are on the National Audubon Society's 2016 State of the Birds Watch List[1], a

1 http://www.stateofthebirds.org

compilation that combines population data trends to identify bird species that are at risk of becoming threatened in the near future. One of those species, a treasure of the glades that was relatively common at all our sites (and makes birders in Northern Missouri jealous), is the Prairie Warbler. The male is flashy yellow with prominent black striping on the flanks and both a black eyeline and mustache stripe with a song a series of ascending buzz-like notes. Prairie Warblers are tail-waggers, greeting us as we entered the open glades. Since 1966, The North American Breeding Bird Survey estimates that the population of prairie warblers has declined by 66%. Fortunately, they remain prominent inhabitants on Missouri glades.

Summer Tanagers also proved to be a common glade species. Males are the only completely red bird in North America and the females are mustard yellow. Both sexes communicate with each other often with loud "Chicki-tuki-tuck" calls. This species is a specialist at catching bees and wasps. Summer Tanagers catch the insects in mid-air, bring them to a branch, and rub their prey's abdomen against the branch to remove the stinger before eating it. Because the Summer Tanager specializes in forest gap and edge habitat, they are readily found in and around glades.

Late spring and into the breeding season, secretive birds ramp up their activities and undertake overt displays. Ten months out of the year, elusive Yellow-breasted Chats hide their yellow breasts and grey heads (with white spectacles) in dense scrub looking for insects and berries. However, when they arrive on their breeding grounds in spring, usually in shrubs associated with glades and glade edge habitat, males sing a loud, complex array of cackles, gurgles, whistles, and screams that remind some of improvisational jazz. While the musical complexity of the Yellow-breasted Chat call remains amazing, I find more impressive the flying courtship displays the male undertakes. In the heat of the day, the male descends quickly from a high perch and conspicuously swoops downwards with exaggerated wing beats while singing. This action is then repeated multiple times. One would never know that these birds are normally quite difficult to find outside the short courtship window.

Recent fossil, genetic, and morphological evidence now clearly positions birds as the only living descendants of dinosaurs. No longer in Class Aves, all birds are in Class Reptilia (Subclass Aves) and are more closely related to Tyrannosaurus Rex than T. Rex was to Stegosaurus. To reflect this lineage and our sampling of the glades, we now present a brief example of how we sample non-avian reptiles and amphibians (also called herps, collectively) on the glades and present a few key findings.

Just as flashy and beautiful as any glade bird is the Eastern collared lizard. The large turquois green males proudly sit on large rocks bobbing their heads, performing lizard "push-ups," and surveying their territories. In fact, the poster child (or should we say "poster herp") for certain good quality glade habitat in the Ozarks is the collared lizard. In the past two years, we documented collared lizards at 12 of the 53 glades we sampled. While collared lizards are a signature glade species, their range does not occur throughout the Ozarks.

Much less obvious, but no less impressive, are the herps that spend most of their time hiding under rocks or underground. The variable ground snake and the red milk snake are quite colorful but seldom seen members of the glade natural community. Much more drab snakes such as the flat-headed snake and the rough earthsnake are gray, tan, or brown and quite small.

We documented 20 species of herps inhabiting Missouri glades, including those men-

tioned above. The most common species was the prairie lizard (commonly called a fence lizard), found in a variety of habitats throughout southern Missouri. These hot and often dry habitats do not seem like ideal habitats for amphibians, but we routinely discovered pickerel frogs on our surveys. We also documented various glade-dwelling invertebrates such as tarantulas, scorpions, black widow spiders, and lichen grasshoppers.

Similar to the birders, the herp team systematically searched the glades using standardized methods. Spacing ourselves in a line along a transect across the glade, we visually searched for active or less secretive organisms and lifted rocks and logs, being careful to place each item back into its original position. We tracked the numbers of items we lifted, as well as how much time we spent searching so we could standardize our search effort to compare glades throughout the Ozarks. State Herpetologist Jeff Briggler provided collection records from the last five years; this valuable historical data were particularly helpful because it provided a longer sampling history of the herp community to supplement our two-year study period.

How does Missouri manage and maintain good, high-quality glade habitat throughout the Ozarks? Depending on the glade's current condition and history, the typical management practices include cedar removal and prescribed fire. Because many of the plant and animal species living on glades are prairie species, it is not surprising that fire plays an important role. As part of our research, we confirmed that glades actively managed with fire contained the highest species richness of native plants and, coincidentally, attracted the most herp and bird species. These globally significant natural communities harbor rich floral and faunal diversity, and are well represented in the Missouri Natural Areas Program.

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Eastern collared lizards can be found sunning on some Ozark glades.

Photo by Chris Watson

Dr. Paul M. McKenzie Retires

by Mike Leahy

Dr. Paul M. McKenzie worked as an Endangered Species Coordinator for the U.S. Fish and Wildlife Service for 28 years and served as the agency representative on the Missouri Natural Areas Committee. His expertise in the fields of botany and wildlife and keen sense of ecological functioning will be missed. McKenzie possesses an intense passion and interest in protecting federally listed species and studying a wide array of Missouri's faunal and floral diversity — especially birds, odonates, butterflies, grasses and sedges. Despite a heavy workload while employed, he enjoyed the opportunity to be in the field to observe the species he was committed to protect and to share his knowledge with others. He thrives on maintaining strong partnerships with representatives from numerous federal, state, and private entities. Despite his retirement, he now serves as a volunteer with the USFWS so that he can pass down the knowledge he learned from others during his career.

He and his wife Becky of nearly 42 years are constantly entertained by four cats: Snooter, Yoda, Sparky and Jazzylou. His hobbies include bird watching, deer hunting, morel hunting, trout fishing, and looking for rare plants, especially grasses and sedges. He enjoys writing scientific articles and has had over 100 manuscripts published in peer-reviewed literature. He is an ordained minister at United Community Cathedral, a multi-cultural fellowship that is committed to serving Columbia and surrounding communities. ❧

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Photo by Susan Farrington

Paul McKenzie, a noted sedge expert, with *Carex gracillima*.

"While I joined the Missouri Natural Areas Committee more recently than several current members, my participation generated some of the most memorable moments of my career. I always admired the expertise exhibited by other members of MoNAC as I always believed that the members represented some of the highest level of ecological and botanical knowledge of anyone in the Midwest. To be a part of such an elite group was a dream come true. MoNAC is one the most exemplary partnerships I had the pleasure being involved with during my long career with the Fish and Wildlife Service. To be part of a group that strives to protect and properly manage the highest quality natural communities in Missouri was an experience that brought immense satisfaction, and one that greatly enhanced my professional career. I was humbled to be able to add just a small part to the wealth of knowledge that exists within MoNAC. I retired knowing that the protection of Missouri's unique natural communities and their rich faunal and floral diversity is in good hands."

— Dr. Paul M. McKenzie

Huzzah Narrows Natural Area Designation

by Mike Leahy

Huzzah Narrows Natural Area (HNNA) captures a suite of characteristic aquatic and terrestrial natural communities and geologic features that are representative of the Meramec River Oak Forest Breaks Land Type Association of the Meramec River Hills Ecological Subsection. The 757-acre HNNA occurs on the Huzzah Conservation Area in Crawford County and is owned and managed by the Missouri Department of Conservation. Seventeen different natural community types occur here, supporting 352 native vascular plant species (35 species with a Coefficient of Conservatism value ≥ 7), 70+ native fish species, three Meramec Basin endemic crayfish species, and 123 bird species (75+ breeding). The Huzzah and Courtois Creeks that course through this area have been designated by the Missouri Department of Natural Resources as Outstanding State Resource Waters. The riparian corridor surrounding the Huzzah and Courtois Creeks supports a robust population of the Cerulean Warbler, a species of conservation concern. Fifteen caves are known within the boundary of HNNA, of which three are in the top twenty in the state for cave biodiversity, including Jagged Canyon Cave, ranked as number nine with 64 recorded species, 7 of which are troglobites. HNNA lies on a 24K topographic quadrangle with the sixth greatest cave density in Missouri (97 caves). All told, ten species of conservation concern occur at HNNA.

HNNA occurs within the Missouri Department of Conservation's Shoal Creek Woodlands Priority Geography — a location emphasized for increased conservation effort, partnership, and investment to ensure long-term landscape health and natural community integrity. Along with the LaBarque Creek watershed, the Huzzah and Courtois drainages are considered the healthiest, highest quality portions of the Meramec Basin, all ranking "'Very Good' for excellent hydrology, in-stream and floodplain connectivity, riparian corridor condition, and diverse biological communities.

Photo by Sarah Kendrick, Missouri Department of Conservation

Dolomite cliff at Huzzah Narrows Natural Area.

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