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MISSOURI PUBLIC SERVICE COMMISSION
FILE NO. EA-2019-0371

WRITTEN REBUTTAL TESTIMONY
OF
DR. KATHRYN BULLINER
ON
BEHALF OF
MISSOURI DEPARTMENT OF CONSERVATION

December 12, 2019

****DENOTES CONFIDENTIAL INFORMATION****

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REBUTTAL TESTIMONY OF DR. KATHRYN BULLINER

MISSOURI DEPARTMENT OF CONSERVATION

CASE NO. EA-2019-0371

I. INTRODUCTION

Q. Please state your name, title, and business address.

A. Kathryn (Womack) Bulliner, Ph.D., Resource Scientist, Missouri Department of Conservation's Agricultural Systems Field Station, 3500 S. Baltimore Street, Kirksville, MO 63501.

Q. What are your qualifications and experience?

A. I have a Ph.D. in Natural Resources from the University of Missouri where my dissertation focused on multi-scale factors that affected bat and insect abundance in savannas, woodlands, and forests throughout the Ozark Highlands of Missouri. My master's thesis focused on the foraging and roosting ecology of female Indiana bats during the maternity season in northeast Missouri. I have worked in bat ecology for more than 10 years and have been with the Missouri Department of Conservation ("MDC") since June 2017 as a Resource Scientist. My specific job duties include the review and approval of all Wildlife Collectors Permits as Missouri's bat biologist and serving as the response lead for white-nose syndrome ("WNS").

Q. Have you testified previously before the Missouri Public Service Commission?

A. Yes. I provided testimony in Case Nos. EA-2018-0202 and EA-2019-0010, both of which involved applications for Certificates of Convenience and Necessity for wind projects.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to respond to Ameren's Application and Direct Testimony, documenting MDC's conservation related concerns for bats related to the proposed solar facilities ("Projects"). I am familiar with the Projects and have reviewed responses to MDC data requests. Before I describe my concerns with the Projects and my proposed recommendations, I will provide background information with respect to bats in Missouri.

Q. Can you please provide a brief summary of your testimony?

A. Based upon information received to date from Ameren and records maintained by MDC, I am concerned about the impact of the Projects on the endangered Indiana bat, endangered gray bat, and threatened northern long-eared bat and the following bat species currently listed as species of state conservation concern – tri-colored bat, little brown bat, hoary bat, and silver-haired bat that are known to occur near the Project areas. Ameren has indicated it is not considering any post construction mortality studies for any of the Projects. Additionally, Ameren has stated

that there have not been any consultations with MDC or the Service regarding the Projects. Additionally, no Natural Heritage Review has been requested for any of the Projects. At the conclusion of my testimony, I make several recommendations that are necessary for MDC to understand the impact of the Projects on these species and to mitigate any adverse impacts. MDC has expended and will continue to expend substantial state resources in the protection of threatened and endangered bat species. The protection of these state resources are in the best interest of the public and should be considered in the siting, construction and operation of the Projects.

II. BACKGROUND ON BATS IN MISSOURI

Q. What bat species occur in Missouri?

A. Historically, 14 bat species are known to occur in Missouri. *See* Table 1.

TABLE 1. MISSOURI'S BAT SPECIES.

Common Name	**Scientific Name**
Indiana bat	*Myotis sodalis*
Northern long-eared bat	*Myotis septentrionalis*
Gray bat	*Myotis grisescens*
Little brown bat	*Myotis lucifugus*
Eastern small-footed bat	*Myotis leibii*

Southeastern myotis	*Myotis austroriparius*
Big brown bat	*Eptesicus fuscus*
Evening bat	*Nycticeius humeralis*
Eastern red bat	*Lasiurus borealis*
Tri-colored bat	*Perimyotis subflavus*
Hoary bat	*Lasiurus cinereus*
Silver-haired bat	*Lasionycteris noctivagans*
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*
Ozark big-eared bat[1]	*Corynorhinus townsendii ingens*

Q. Are there any bat species that are federally listed as threatened or endangered in Missouri?

A. There are three federally listed species found in Missouri. The Indiana bat and gray bat are federally endangered; the Indiana bat was listed in 1967 and the gray bat was listed in 1976. Both species were listed due to human disturbance during hibernation. The northern long-eared bat

[1] This federally endangered sub-species is presumed extirpated from Missouri (*See* Missouri Department of Conservation. 2018. Missouri species and communities of conservation concern checklist 2018. Jefferson City, MO). Presumed extirpation in this use means that a species has not been located despite intensive search efforts of historic sites and other appropriate habitat, and virtually no likelihood that the species will be rediscovered in Missouri.

was listed as federally threatened under the 4(d) Rule in April 2015 due to population declines related to white-nose syndrome.[2] An additional bat species, the tri-colored bat (formerly known as the eastern pipistrelle bat) was petitioned to be listed and is under a 12-month Species Status Assessment ("SSA") [3] by the United States Fish and Wildlife Service ("Service") after an affirmative 90-Day Finding.[4] The tri-colored bat has been proposed to be federally protected due to population declines related to WNS. A population crash in Missouri has resulted in listing it as a Missouri species of conservation concern ("SOCC"). *See* Table 2.

[2] The 4(d) Rule is one of many tools found within the Endangered Species Act ("ESA"). Typically, the Service uses the 4(d) Rule to issue regulations to incentivize positive conservation practices and to help streamline the regulatory process for minor impacts to threatened species under the ESA. This rule also describes what forms of take are or are not prohibited by the Service to protect listed species.

[3] An SSA is a thorough review of literature and often a request for updated data from state and federal agencies, universities, and other parties that may have relevant information regarding the species and potential threats to the species to determine whether the species warrants listing.

[4] A 90-Day Finding is the result of a quick review of a petition to the Service that determines if the petition presents substantial scientific or commercial information indicating that the petition action may be warranted.

TABLE 2. POPULATION COUNTS BETWEEN 2012/2013 AND 2016/2017 AT 183 MISSOURI HIBERNACULA FOR ALL DOCUMENTED BAT SPECIES POST-DISCOVERY OF WNS IN MISSOURI.[5]

Species	2012/2013	2014/2015	2016/2017	% change 2012 - 2017
Big brown bat	1,539	1,567	1,292	-16%
Eastern small-footed bat	2	0	0	-
Evening bat	0	0	1	-
Gray bat	67,053	50,565	60,239	-10.2%
Indiana bat	138,554	184,953	215,107	55.3
Little brown bat	5,624	9,478	748	-86.7%
Northern long-eared bat	4,591	2,281	2	-99.9%
Silver-haired bat	0	0	1	-
Tri-colored bat	24,105	24,318	11,147	-53.8%
Unknown bat	1,011	1,996	97	-
Totals	**242,479**	**275,158**	**288,634**	

In addition to the listing of species as endangered or threatened under federal law, MDC has a list of species of conservation concern. When a species becomes a SOCC, it means that all records in Missouri are tracked in the Natural Heritage Database ("NHD") mainly through MDC's Wildlife Collector Permit process but also Missourians can submit new records for species on the MDC website. Species are listed as SOCC for a variety of reasons, from population declines to rare occurrences. With respect to bats, Missouri SOCC include these federally listed species as well as: tri-colored bat, little brown bat, silver-haired bat, southeastern myotis, eastern

[5] Colatskie, S. (2017). Missouri Bat Hibernacula Survey Results from 2011-2017, Following White-nose Syndrome Arrival. *Missouri Department of Conservation, Technical Brief.*

small-footed bat, hoary bat. The tri-colored and little brown bat were listed as SOCC due to population declines from WNS. *See* Table 2. The hoary bat was listed in 2019 due to recent population count projections and the increased interest in wind energy within Missouri.[6] Hoary bats are also on the Service's radar for potential listing as one study has estimated up to a 90 percent decline in hoary bat populations in the next 50 years due to wind turbine strikes.[7] Hoary bats are killed by turbine collisions mainly in late summer through fall migration. [8,9]

Q. Describe relevant bat characteristics, especially for protected bats potentially impacted by the Projects.

A. All bats have some common characteristics. Bats are slow reproducing (one to four pups per year depending on the species) and are

[6] Frick, W. F., Baerwald, E. F., Pollock, J. F., Barclay, R. M. R., Szymanski, J. A., Weller, T. J., ... & McGuire, L. P. (2017). Fatalities at wind turbines may threaten population viability of a migratory bat. *Biological Conservation*, *209*, 172-177.

[7] Frick *et al.* (2017), *supra* n.6.

[8] Kunz, T. H., Arnett, E. B., Erickson, W. P., Hoar, A. R., Johnson, G. D., Larkin, R. P., ... & Tuttle, M. D. (2007). Ecological impacts of wind energy development on bats: questions, research needs, and hypotheses. *Frontiers in Ecology and the Environment*, *5*(6), 315-324.

[9] Arnett, E. B., Brown, W. K., Erickson, W. P., Fiedler, J. K., Hamilton, B. L., Henry, T. H., ... & Nicholson, C. P. (2008). Patterns of bat fatalities at wind energy facilities in North America. *The Journal of Wildlife Management*, *72*(1), 61-78.

long-lived (up to 20 years or more). All Missouri bat species mate in the fall and start gestation in early spring (approximately a 60-day gestation period). Female bats have offspring in late May through early June, depending on the weather. Missouri bats use two general life history strategies to survive winter: (1) hibernation (cave bats) or (2) migration (tree bats). Cave bats include the Indiana bat, northern long-eared bat, gray bat, tri-colored bat, little brown bat, big brown bat, small-footed bat, southeastern Myotis, Ozark big-eared bat, and Rafinesque big-eared bat. Tree bats include the eastern red bat, silver-haired bat, and hoary bat. Both life history strategies require migration in the spring and fall between summer (maternity grounds) and winter habitats. Migratory distances range from 50 to 1,000 miles depending on the species. Tree bats are thought to migrate longer distances than cave bats. Specifically, two bats that could be impacted by the Projects are the Indiana bat and the Northern Long-Eared Bat.

Q. Describe the characteristics of the Indiana Bat.

A. The Indiana bat (Myotis sodalis) is a federally endangered hibernating bat species found throughout much of the eastern United States. The range-wide population has decreased by 20 percent in the last ten years from 636,846 to 530,705. This decline is directly and indirectly linked to WNS. *See* Figure 1.

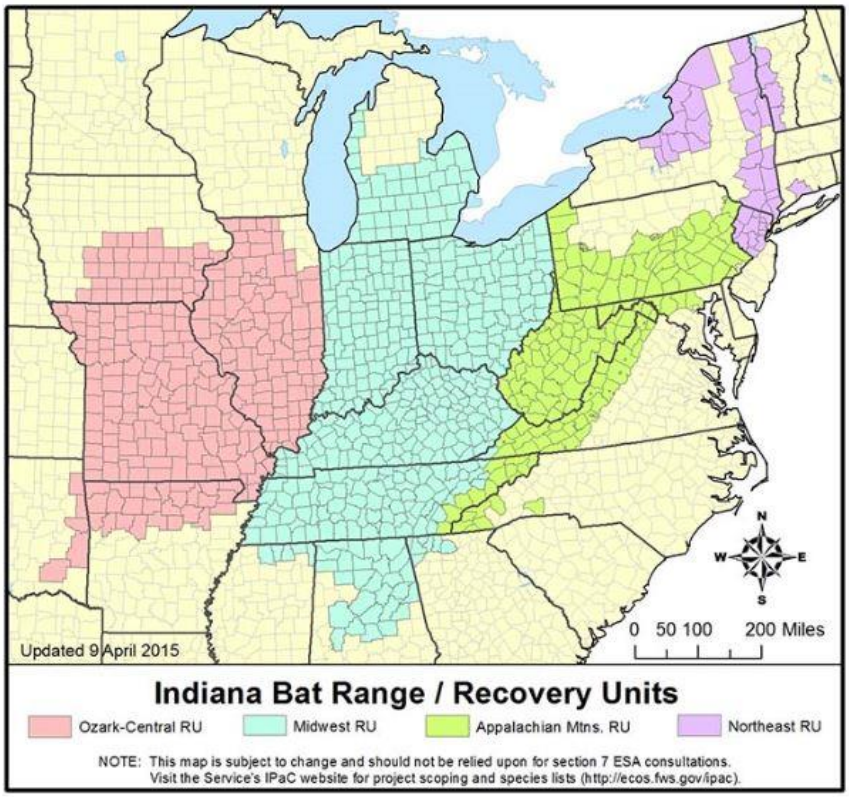

FIGURE 1. INDIANA BAT RANGE AND USFWS RECOVERY UNITS.

However, the Missouri Indiana bat population is estimated at 217,884 individuals in 2017 and shows a 0.9 percent increase. Missouri's population estimates make up 41.1 percent of the entire population. *See* Figure 2. Almost 198,000 of Missouri's Indiana bats hibernate in a mine at Sodalis Nature Preserve ("SNP") in Hannibal, Missouri.

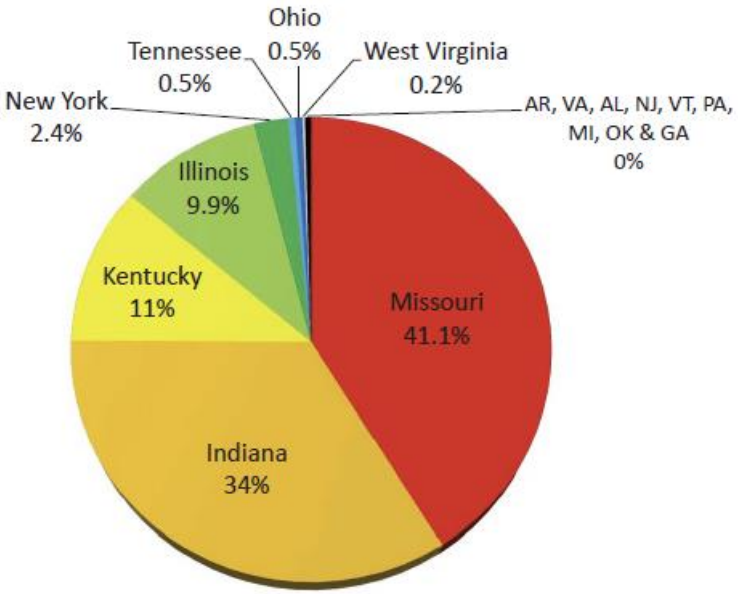

FIGURE 2. PERCENTAGE OF THE 2017 RANGE-WIDE INDIANA BAT POPULATION ESTIMATED DURING HIBERNATION (APPROXIMATELY 530,705 BATS) WITHIN EACH STATE.

Wing band recovery studies reveal that Indiana bat females migrate up to 290 miles from hibernation sites to maternity sites. Maternity sites for Indiana bat females are called roost trees. Females have one pup per year in late May or early June. Maternity colonies are generally comprised of multiple roost trees and can average 50-80 individuals. MDC has records of 100 or more female Indiana bats exiting a single maternity roost tree in northeastern Missouri. Female Indiana bats show high site fidelity to the same maternity sites and sometimes even the same roost trees, year after year. The northeastern part of Missouri is the core maternity habitat in

Missouri and falls within the "high-likelihood" zone for Indiana bats. *See* Figure 3.

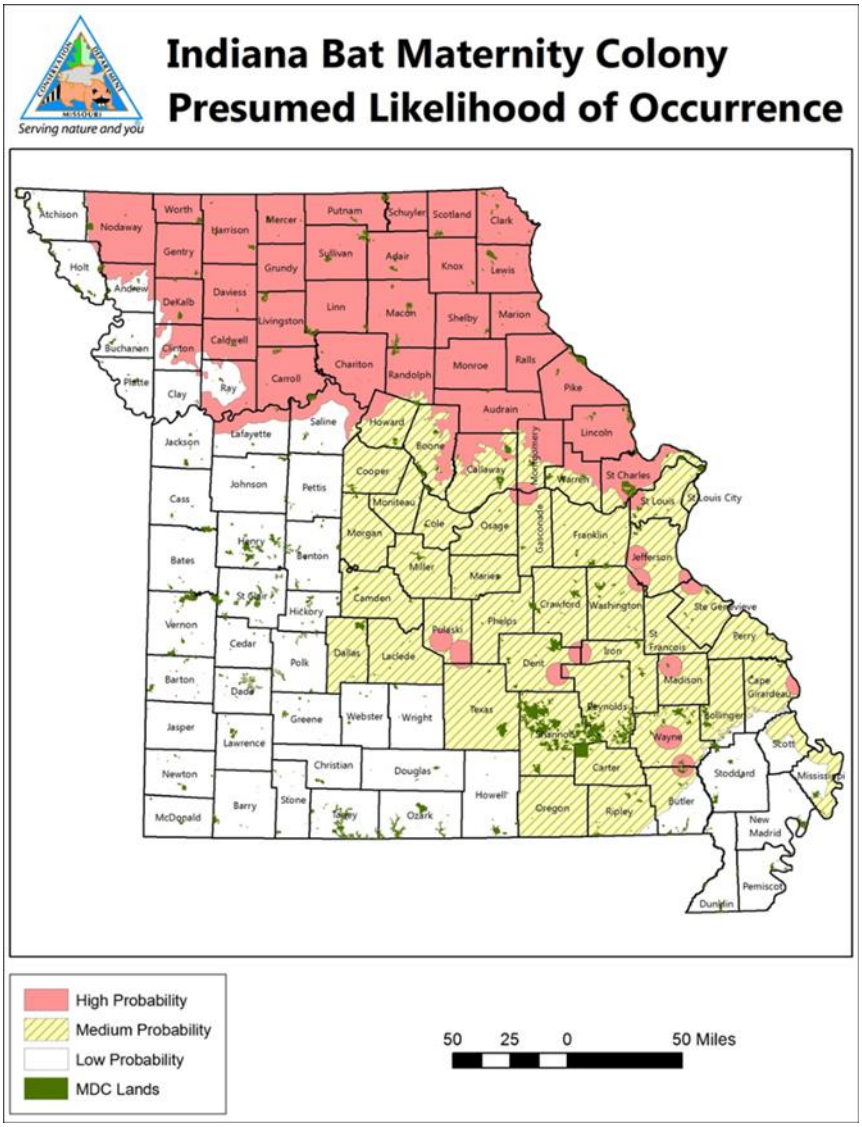

FIGURE 3. INDIANA BAT PRESUMED MATERNITY COLONY LIKELIHOOD OCCURRENCE MAP FROM GUIDELINES FOR AVOIDING AND MINIMIZING IMPACTS TO FEDERALLY LISTED BATS ON MDC LANDS.

Indiana bats feed on flying insects. They tend to forage among and adjacent to tree canopies and in forest corridors. Indiana bats usually forage in riparian and floodplain forest, but also may use upland forest, forest edges, old fields, and openings over ponds. Indiana bat home range sizes vary depending on the method used to calculate home range size, geographic location, and habitat within and surrounding study locations. A study in northern Missouri found that on average pregnant Indiana bats had a 50 percent core home range size of approximately 417 acres and 600 acres on average for lactating bats. Other home range studies using a variety of methods to calculate home range size found mean home range to be 205 acres in Vermont, 398 acres in Illinois, and 524 acres in Ohio. In Missouri the average maximum distance females traveled nightly from roost trees to forage was 2.3 miles for pregnant individuals and 3 miles for lactating bats.

Indiana bats can be found flying in a wide range of habitats during summer but wooded lots are necessary for roost locations. During the active season (March 15 – October 31), Indiana bats roost primarily under the loose bark of living or dead trees with a diameter-at-breast-height (DBH) over nine inches with high solar exposure. Male Indiana bats may roost singly or in small groups during summer; some males may be found with females in maternity colony areas although others remain near their hibernation caves.

Q. Describe the characteristics of the Northern Long-Eared Bat.

A. The northern long-eared bat was once found across much of North America. *See* Figure 4.

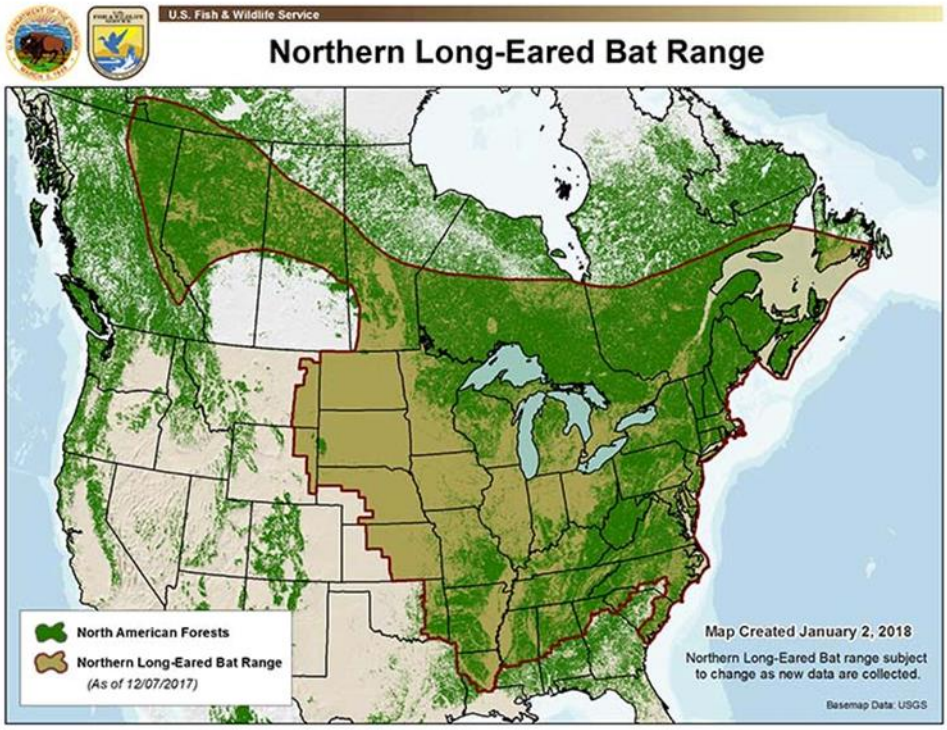

FIGURE 4. NORTHERN LONG-EARED BAT RANGE MAP FROM THE SERVICE.

The species hibernates in underground sites throughout the winter and uses a variety of wooded habitats during the summer maternity season. Northern long-eared bats were listed as threatened under the Endangered Species Act on April 2, 2015. Prior to its listing, the northern long-eared bat had been considered relatively common throughout much of its North

American range. While other negative influences on the population (i.e., habitat destruction and modification, overutilization, regulatory inadequacy, and collisions with wind turbines) have varying levels of local impacts, the leading reason for Federal listing is population declines due to WNS. Hibernacula counts indicate declines of 98–99 percent for northern long-eared bat across eight states in the northeastern United States. MDC has documented over a 99.9 percent reduction of this species in Missouri at repeatedly visited sites since winter 2012/2013. *See* Table 2.

During winter, northern long-eared bats hibernate in caves and mines. Nearly 300 northern long-eared bat hibernacula are documented across Missouri, primarily in the eastern and central Ozarks. *See* Figure 5. Hibernating individuals have been found in Missouri as far southwest as McDonald County and as far northeast as Marion County at SNP.

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The northern long-eared bat is presumed to occur throughout most of Missouri during the active season (i.e., non-hibernation period) and has been found to roost in cracks and crevices of rock bluffs, under loose bark of trees, or in man-made structures. Mist-net captures of this species have been reported from counties at or near all four corners of the state (Newton,

Nodaway, Clark, and Cape Girardeau counties). However, due to WNS Missouri's population has decreased by 99.9 percent in 183 hibernacula that were surveyed biennially since winter 2012/2013. *See* Table 2. Compared to Indiana bats, maternity colonies of northern long-eared bats are generally smaller (up to 30 to 50 individuals), and they often use smaller diameter trees. The structure of the roost tree and its immediate surroundings appears to be more important in roost site selection than tree species. Northern long-eared bat roost trees may occur in the forest understory and are often located on side slopes or ridge tops. Northern long-eared bats also show high maternity site fidelity and return to the same location annually although different trees may be used as roosts each year.

Q. Are there any additional threats to that Missouri's bat species are facing?

A. Yes, one of the most significant threats facing Missouri's cave bat species is white-nose syndrome ("WNS"). The disease has been document in northern long-eared bats, Indiana bats, tri-colored bats, little brown bats, and big brown bats could be impacted by the Project as described below. White-nose syndrome is caused by a white fungus, Pseudogymnoascus destructans, that infects the skin of hibernating bats. The disease can be devastating to bat populations and there is no known cure. Once it appears in a cave, WNS can kill up to 90-100 percent of bat species. WNS was first documented in

New York in 2006 and is now affecting bats in 33 U.S. states and 7 Canadian providences. *See* Figure 6.

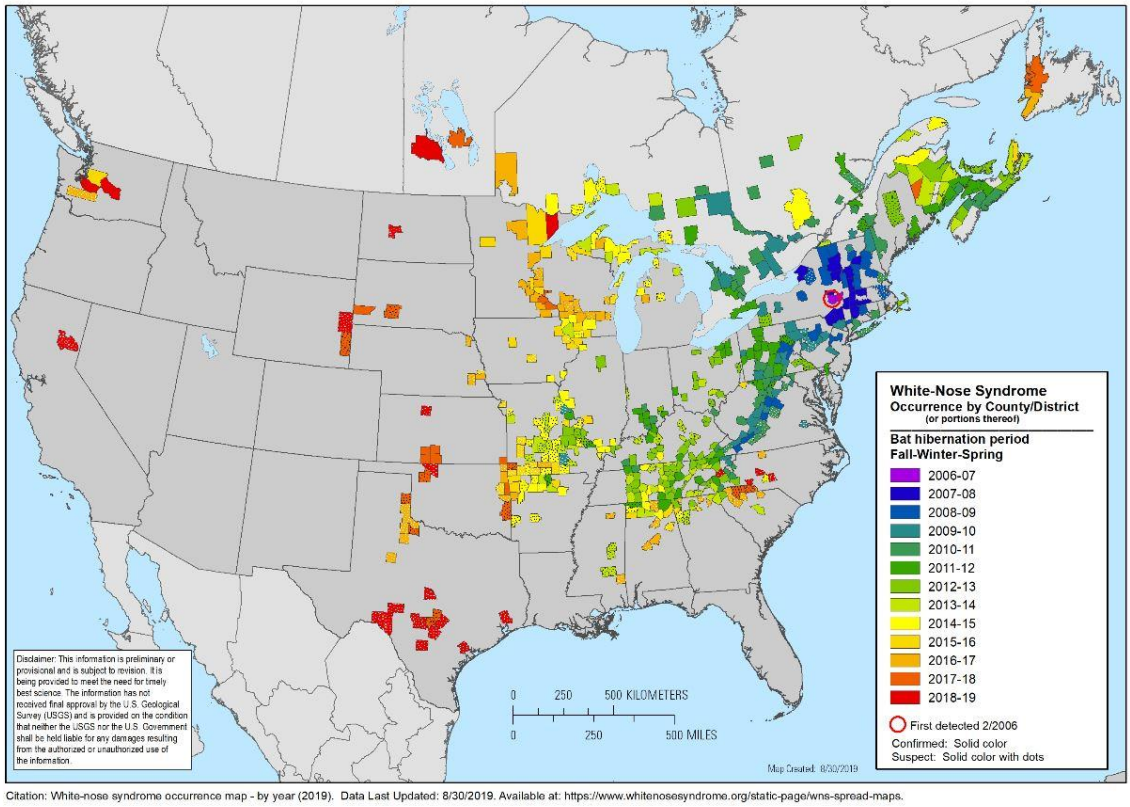

FIGURE 6. WHITE-NOSE SYNDROME SPREAD MAP CREATED BY THE SERVICE.

The presence of Pseudogymnoascus destructans (Pd) was documented in Missouri in April 2010, and the first WNS positive bat was found in March of 2012. Pd is the fungus associated with the WNS disease. MDC has coordinated and led WNS and Pd surveillance efforts along with partners from other state and federal agencies, non-profit partners, and private citizens to document the arrival and spread of WNS in Missouri. Although

there is little pre-WNS data for the majority of Missouri bat hibernacula, 183 hibernacula were surveyed during winters 2012/2013, 2014/2015, and 2016/2017. *See* Table 2. Northern long-eared bats, little brown bats, and tri-colored bats have seen the steepest decline in hibernacula population estimates similar to the declines seen in other states. *See* Table 2. The numbers for Indiana bats increased during this time likely due to additional locations within SNP being mapped and surveyed so these numbers do not necessarily reflect an actual change in population size. SNP is the largest Indiana bat hibernacula in the world. SNP is also a hibernaculum for the gray bat, northern long-eared bat, tri-colored bat, and little brown bat. All other major Indiana bat hibernacula sites in Missouri have seen a decline in numbers since the winter of 2012/2013 (Table 3), further highlighting the importance of SNP for Indiana bats.

As described above, reproductive rates are generally low for bats. Consequently, protecting critical summer maternity habitat resources and sites is one of primary mitigation strategies for addressing WNS, in hopes that any resistant individuals will reside and breed.

Year	Onyx - Crawford	Bear - Crawford	Copper Hollow Sinkhole - Franklin	Brooks - Pulaski	Great Spirit - Pulaski	Ryden - Pulaski	Bat Cave - Shannon	Martin - Shannon	Great Scott - Washington	Pilot Knob Mine - Iron	Scotia Hollow - Washington	Totals
1979	11,100	3,250	8,850	19,375	549	10,550	42,821	8,100	68,700	139,000	2,750	**176,045**
1981	5,325	1,750	5,200	11,850	1,792	5,800	32,800	2,425	72,350	125,130	3,100	**142,392**
1983	3,267	1,100	3,150	11,150	1,171	4,950	30,750	5,350	85,700	111,262	4,550	**151,138**
1985	2,250	650	1,050	5,500	500	2,000	30,450	3,550	77,950	97,391	3,400	**127,300**
1987	2,050	525	600	4,900	40	700	4,150	4,900	60,650	83,521	5,300	**83,815**
1989	1,575	400	250	5,200	35	1,359	4,275	2,600	38,875	69,652	5,150	**59,719**
1991	1,275	300	160	2,700	8	160	4,275	2,975	32,125	55,782	6,225	**50,203**
1993	700	225	125	1,550	625	80	6,175	2,250	22,750	41,912	4,550	**39,030**
1995	325	190	140	750	450	40	941	2,125	14,850	28,042	3,600	**23,411**
1997	260	95	175	600	195	14	450	1,500	11,875	14,173	1,615	**16,779**
1999	155	80	155	400	175	14	6,175	1,000	9,100	303	2,375	**19,629**
2001	265	105	185	235	285	10	89	2,460	8,250	647	450	**12,334**
2003	210	90	250	130	160	13	1,020	2,100	8,875	991	290	**13,138**
2005	180	100	250	70	40	10	0	1,300	6,450	1,334	150	**8,550**
2007	180	110	380	65	60	3	16	950	5,100	1,678	90	**6,954**
2009	118	106	323	21	1	2	2	913	4,674		41	**6,201**
2011	90	120	457	50	0	3	327	781	3,936		30	**5,794**
2013	113	125	706	41	120*	2	136	1,268	3,556		21	**5,968**
2015	58	9	354	0	63	0	703	2,986	2,824		15	**7,012**
2017	40	0	161	0	15	0	297	1,684	2,483		11	**4,691**

TABLE 3. INDIANA BAT POPULATION ESTIMATES IN 11 MAJOR MISSOURI HIBERNACULA FROM 1979-2017. THE SODALIS NATURE PRESERVE (SNP) IS A LARGE LIMESTONE MINE COMPLEX IN HANNIBAL, MISSOURI. SNP IS A PRIORITY 1 INDIANA BAT HIBERNACULUM WITH A 2017 SURVEY YIELDING AN ESTIMATED 198,000 +/- INDIVIDUALS. THIS TABLE WAS ADAPTED FROM ELLIOTT AND CLAWSON 2007.

III. ECONOMIC BENEFITS AND INVESTMENTS RELATED TO BATS

Q. Describe the economic benefits bats convey to Missouri citizens.

A. Several studies have quantified ecosystem services of bat species found in Missouri. Ecosystem services are the economic valuation of the benefits obtained from the environment that increase overall human well-being. As insectivores, Missouri bats are the primary predators to night time insects which include both agriculture and forest pest species. One study asserts that bats are likely one of the most economically important non-domesticated animals in North America.[10] This study modeled the economic importance of bat species in the United States and estimated the value of bats to the agriculture industry to be on average approximately $22.9 billion per year.[11] Two studies have estimated that female little brown bats consume over 100 percent of their body weight in insects each night during lactation, and 50 percent of their body weight during the rest of the active

[10] Boyles, J. G., Cryan, P. M., McCracken, G. F., & Kunz, T. H. 2011. Economic importance of bats in agriculture. *Science*, *332*(6025), 41-42.

[11] *Id.*

season.[12,13] Indiana and northern long eared bats are related to little brown bats, and likely consume a similar number of insects.

Q. Describe MDC's investment of state funds related to bats.

A. Over the last ten years, MDC has spent almost $1 million on several direct management efforts related to bats. This figure includes but is not limited to: $136,761 to install cave gates (protection devices) and evaluate caves on public land; $220,935 to inventory cave wildlife and plants; $235,929 on estimating occupancy of bats in northern Missouri where wind development was anticipated; and $26,596 estimating occupancy (species presence) and activity of bat communications at different elevations above the ground surface. Since 2007, MDC has spent $187,183 on bat research that included winter ecology, the effects of fire, maternity habitat range and forest management efforts.

Through Memoranda of Understanding, MDC has also spent $116,446 protecting specific bat habitats with partners like The Nature Conservancy and the Missouri Conservation Heritage Foundation. Subject to the

[12] Kurta, A., Bell, G. P., Nagy, K. A., & Kunz, T. H. 1989. Energetics of pregnancy and lactation in freeranging little brown bats (Myotis lucifugus). *Physiological Zoology*, *62*(3), 804-818.

[13] Anthony, E. L., & Kunz, T. H. 1977. Feeding strategies of the little brown bat, Myotis lucifugus, in southern New Hampshire. *Ecology*, *58*(4), 775-786.

Conservation Commission approval annual budget process, MDC plans to conduct the following projects now and into the future:

(a) From Fiscal Year 2018-2021, the MDC anticipates spending $2.7 million on development of a Habitat Conservation Plan for the MDC's land management activities in bat habitats;

(b) MDC will also be implementing the Habitat Conservation Plan (HCP) within that time. Because MDC's HCP is still in development, the cost estimate associated with implementation is not yet available. According to the MDC's HCP consultant, the implementation costs for similarly sized and focused HCP will be approximately $350,000 the first year and $10 million over the 30-year life of the HCP; and

(c) From Fiscal Years 2018 through 2026, the MDC anticipates spending almost $3 million for bat research on summer habitat and physiological responses and population monitoring throughout the state.

IV. PROJECT CONCERNS

Q. Please explain whether bats can be adversely impacted by the proposed solar facilities.

A. The short answer is that we do not know the impacts of large scale solar facilities on Missouri bat species. All three projects are located in counties which have Missouri bat SOCC, including ESA listed species. Rather

than "take" by direct impact (as is the case with wind farms), the "take" with solar projects would likely occur indirectly through the destruction and/or fragmentation of habitat. Additional research is needed to assess the potential impacts of solar development by carefully designing pre-construction and post-construction surveys to better assess the impacts to wildlife within the project areas.

Q. What can be done to minimize potential negative impacts to all protected bat species and state species of concern?

A. Below are my recommendations for protecting Missouri's bat species. These recommendations are specific to the Projects and are a result of the known species and resources within and near the Projects. I have detailed ways to reduce the negative impacts to bats species within each stage of the development process. Specifically, operational monitoring is critical given the unknown effect of solar facilities on Missouri's bat species. The Commission should require Ameren to implement the following recommendations:

(a) Pre-construction Recommendations:

- Conduct a minimum of 1-year full active season (March 15-October 31) pre-construction monitoring for all bats with acoustic monitors;

- Submit a Natural Heritage Review Request (NHRR) to MDC for the project areas. The NHRR will provide any known records of Missouri SOCC and threatened or endangered species on the project area and within a buffered distance from the project sites;
- Site panels at least 1,000 ft from known maternity roost trees and capture locations for federally listed species; and
- Avoid tree removal that would fragment the landscape, and if tree removal is required, follow the United States Fish and Wildlife Service's avoidance dates for Indiana bats.

(b) Construction Phase Recommendations

- Avoid tree removal that would fragment the landscape, and if tree removal is required, follow the United States Fish and Wildlife Service's avoidance dates for Indiana bats;
- No known maternity trees identified by the NHRR should be cleared during construction of project.

(c) Post Construction Operational Monitoring Recommendations

- Conduct acoustic surveys for the entire active season (March 15-October 31) for two years once Projects are in operation to document any changes in bat activity between pre-construction and post construction;

- Conduct carcass searches within the facility through the active season (March 15-October 31) for at least two years once Projects are in operation. Carcass searches can be conducted monthly as the Projects are surrounded by fences which should reduce predation risks; and
- Identify all dead bats found at the Projects and report as described under the Reporting section below.

(d) Reporting Recommendations

- Report all current and future bat species of conservation concern (SOCC) carcasses observed within 48 hours on a form provided by MDC. Verify SOCC annually from the MDC checklist.
- Annually, report mortalities for all bat species by December 31 on the same form to MDC.

Q. Do you know if Ameren plans on taking any of the recommendations listed above from the data request responses received by MDC?

A. Yes, Ameren did document the acreage of tree clearing for all Projects, which will be minimal. Ameren has documented that all necessary tree clearing of potential Indiana bat roost trees will occur during the appropriate off-season (November 1- March 31). However, no Natural Heritage Review Request (NHRR) has been requested and Ameren has not

consulted with MDC or the Service for any of the Projects. Additionally, Ameren has no plans for any post construction mortality monitoring for the Projects.

Q. Why should the PSC consider your concerns and recommendations when there is a separate federal process to address endangered species through the Service?

A. MDC has and will continue to invest millions of dollars in the preservation, management, and protection of Missouri's bat species. MDC strives to be a good steward of taxpayer dollars in protecting the significant investments it has already made in Missouri's bat species, as described herein. The impact to Missouri bat resources from solar energy facilities is unknown; therefore monitoring is needed to better understand how the Projects will affect Missouri's bat resources.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION OF THE STATE OF MISSOURI

In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Permission and Approval and a Certificate of Convenience and Necessity Authorizing it to Construct Solar Generation Facility(ies)	)))))	Case No. EA-2019-0371

AFFIDAVIT OF DR. KATHRYN BULLINER

STATE OF MISSOURI)
) ss
COUNTY OF COLE)

Dr. Kathryn Bulliner being first duly sworn on her oath, states:

1. My name is Dr. Kathryn Bulliner. I work in Kirksville, Missouri, and am employed at the Missouri Department of Conservation as a Resource Scientist.
2. Attached to this affidavit and made a part hereof for all purposes is my Written Rebuttal Testimony (testimony) on behalf of the Missouri Department of Conservation. The testimony consists of 28 pages, which have been prepared in the appropriate format to be introduced into evidence in the case above.
3. I hereby swear and affirm that my answers contained in the attached testimony to the questions promulgated therein are true and correct.

K Bulliner
Dr. Kathryn Bulliner

Sworn to and subscribed before me this 9th day of December, 2019.

Laura M. Stickann
Notary Public

My Commission Expires: 11/24/21

LAURA M. STICKANN
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: November 24, 2021
Commission Number: 13551367