

Pittsburg State University

Pittsburg State University Digital Commons

Posters

Research Colloquium 2019

4-1-2019

Habitat Ecology, Species Presence, and Public Perception of Three Declining Bat Species in Southeastern Missouri

Amy Hammesfahr
Pittsburg State University

Christine Rega-Brodsky
Pittsburg State University

Kathryn Womack-Bulliner
Missouri Department of Conservation

Follow this and additional works at: https://digitalcommons.pittstate.edu/posters_2019



Part of the [Biodiversity Commons](#), and the [Population Biology Commons](#)

Recommended Citation

Hammesfahr, Amy; Rega-Brodsky, Christine; and Womack-Bulliner, Kathryn, "Habitat Ecology, Species Presence, and Public Perception of Three Declining Bat Species in Southeastern Missouri" (2019).

Posters. 23.

https://digitalcommons.pittstate.edu/posters_2019/23

This Article is brought to you for free and open access by the Research Colloquium 2019 at Pittsburg State University Digital Commons. It has been accepted for inclusion in Posters by an authorized administrator of Pittsburg State University Digital Commons. For more information, please contact mmccune@pittstate.edu, jmauk@pittstate.edu.



Habitat Ecology, Species Presence, and Public Perception of Three Declining Bat Species in Southeastern Missouri

Amy Hammesfahr¹, Dr. Christine Rega-Brodsky¹, and Dr. Kathryn Womack-Bulliner²

¹Department of Biology, Pittsburg State University, Pittsburg, KS 66762, ²Missouri Department of Conservation, Kirksville, MO 63501



Introduction

Bats Benefit Humans

- Bats provide many ecosystem services for humans such as pollination and insect control.
- In an agricultural study in Illinois, bats helped reduce pest larvae densities and mycotoxin in corn. This effort is estimated to save \$1 billion U.S. dollars of insect-related control for corn crops (Maine and Boyles 2015).

Bats are Threatened

- Bat populations are threatened from habitat loss, habitat fragmentation, and disease. For many species in decline, not much is known about their habitat needs.
- The greatest threat bats face in North America is white-nose syndrome (WNS). Since its introduction in 2006, WNS has caused over 6 million bat mortalities. WNS is a deadly fungal disease that causes bats to awake frequently during hibernation. WNS has been documented in Missouri since 2012.

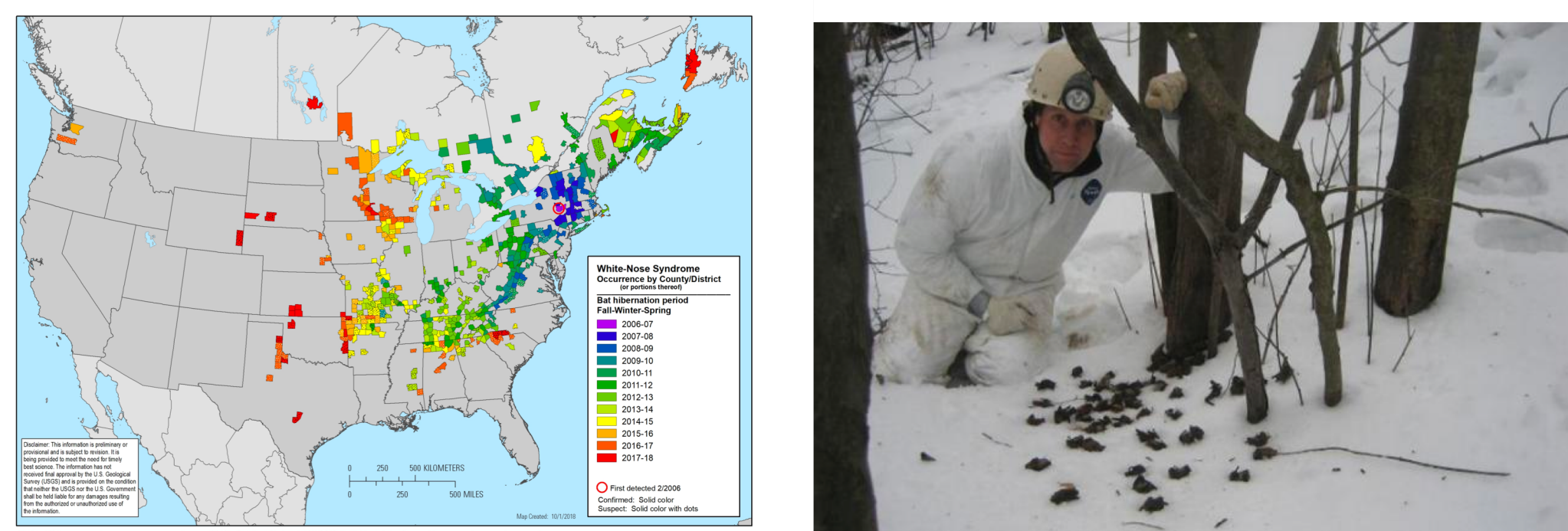


Figure 1. Map illustrating WNS spread since it was first found in 2006 (left), and photograph (right) of WNS-related mortality.

Our Three Target Species in Missouri are Impacted by WNS

- Northern long-eared bat (*Myotis septentrionalis*) was the first species to be federally listed as threatened due to WNS. During a survey of 183 caves in Missouri in 2014-2015, 2,281 bats were found. When the same caves were surveyed in 2015-2017, only 2 individuals were found (Colatskie 2017).
- The little brown bat (*Myotis lucifugus*) has declined 86.7% in Missouri (Colatskie 2017).
- Populations of Missouri's tricolored bat (*Perimyotis subflavus*) have declined by 53.8% (Colatskie 2017).



Figure 2. Our three target species: *Myotis lucifugus* (left), *Myotis septentrionalis* (top right), and *Perimyotis subflavus* (bottom right).

Research Objectives

Objective 1: Radio-tag the three target species to determine the forest characteristics associated with the selection of diurnal maternity roosts. We will estimate the maternity population within selected roosts.

Objective 2: Assess how acoustic lures impact *P. subflavus* capture rates in mist nets, and how lures change the species' acoustic activity.

Objective 3: Evaluate the general perception of bats among Missouri residents via in-person human dimensions survey, to assess their understanding of bat ecology, WNS, and enjoyment of Missouri Department Conservation (MDC) land and educational products.

Methods

Objective 1

- Mist net surveys will occur in the counties of Shannon, Carter, and Reynolds within Missouri Department of Conservation (MDC) Conservation Areas.
- Females and any juveniles of the target species will be radio-tagged and tracked to their diurnal maternity roosts.
- A variety of forest characteristics will be measured at the roost trees, to identify the forest characteristics important to our target species. This effort will contribute to better forestry practices that support remaining populations.



Figure 3. A radio-transmitter being applied to *M. septentrionalis* (left) and an individual measuring DBH on a tree (right).

Objective 2

- We will measure the effectiveness of an acoustic lure by evaluating capture rates and acoustic activity.
- We will document the presence of the target species across the three counties by using acoustic detectors.
- For our acoustic analysis, we will manually vet every recording and only consider analyzing files with >2 calls. We will only ID files to species if the echolocation is in the 'search phase.'

Table 1. Description of species codes used in acoustic analysis.

Acoustic Code Used	Species or Description
EPTFUS	<i>Eptesicus fuscus</i>
EPTFUS/LASNOC	<i>Eptesicus fuscus/Lasiurus noctivagans</i> overlap.
LASBOR	<i>Lasiurus borealis</i>
LASNOC	<i>Lasiurus noctivagans</i>
LASCIN	<i>Lasiurus cinereus</i>
LOWF	Too few calls to confirm species to LASCIN/LASNOC
MYOGRIS	<i>Myotis grisescens</i>
NYCHUM	<i>Nycticeius humeralis</i>
PERSUB	<i>Perimyotis subflavus</i>
40 kHz Myotis	A Myotis call but in approach or feeding buzz phases; call may be too poor in quality to ID. Species often overlap and may originate from <i>Myotis lucifugus</i> , <i>Myotis septentrionalis</i> , <i>Myotis sodalis</i> , or <i>Myotis grisescens</i> .
40 kHz Unknown bat	This group's species ID often overlaps, and feeding buzz and approach calls may further distort calls. Calls may originate from PERSUB, LASBOR, or NYCHUM
Unknown bat	Unclear if the call belongs to a Myotis spp or 40 kHz bat; call has poor quality; or is in a feeding buzz or search phase calls.

Objective 3

- We will distribute a human dimensions survey to Missouri residents living around the study area. Our survey will assess perceptions of bat natural history, WNS, and MDC land use and enjoyment.

Preliminary Results

2018 MDC Conservation Areas Bat Surveys

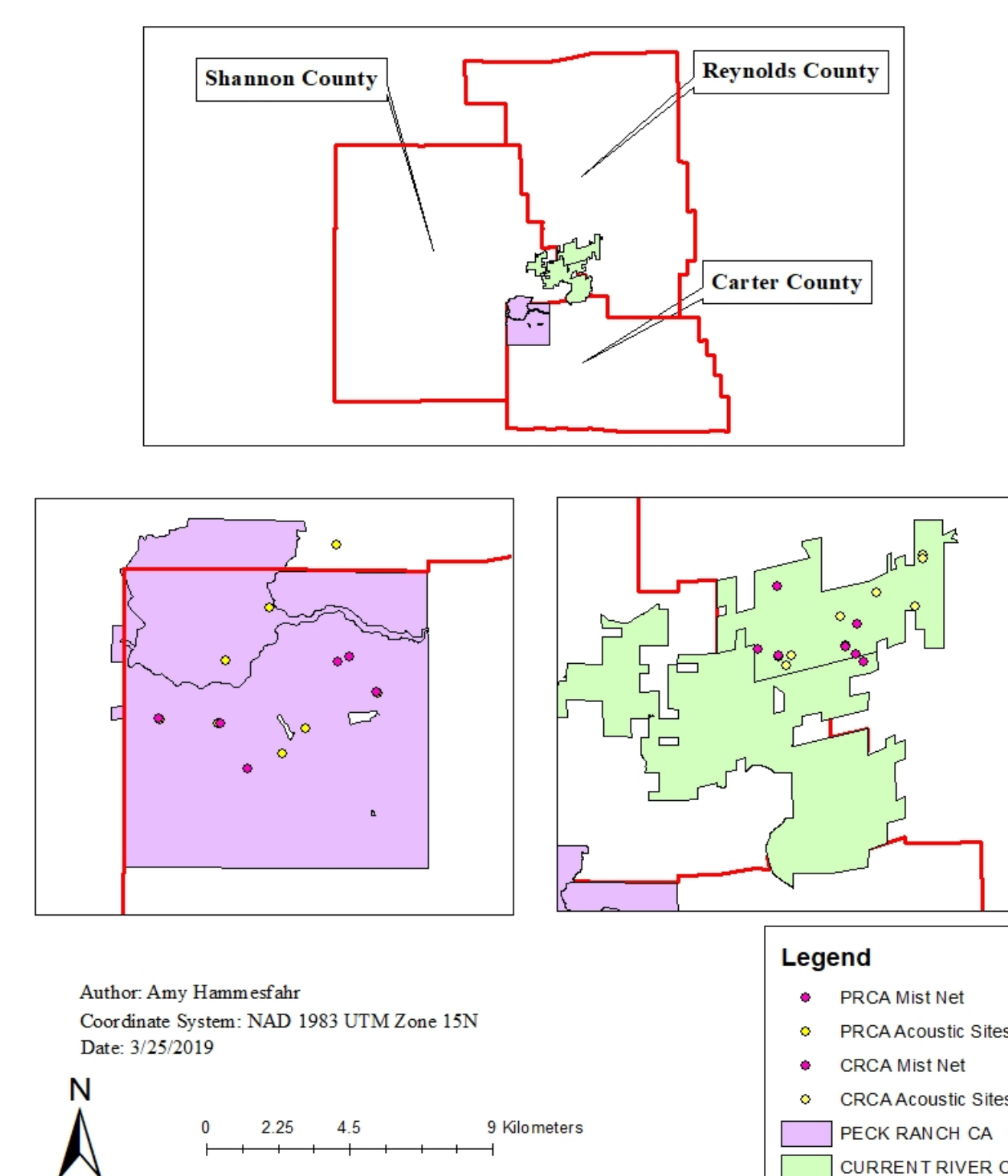


Figure 4. Map of research areas used in 2018. Each mist net site included an acoustic detector.



Figure 5. *L. seminolus* captured in 2018.

- No target species were captured during our pilot research season in 2018, however this may be due to limited resources.
- We remain optimistic for our surveys in 2019-2020 because the study will be more comprehensive and our equipment has been upgraded.

Preliminary Results (continued)

- We captured 149 bats over 23 nights through mist netting.

Table 2. 2018 bat captures in both Peck Ranch and Current River.

	Peck Ranch	Current River	Total
ADULT			
Female			
<i>Lasiurus borealis</i> (LASBOR)	13	10	23
<i>Myotis grisescens</i> (MYOGRIS)	1	0	1
Male			
<i>Lasiurus borealis</i> (LASBOR)	19	7	26
<i>Lasiurus cinereus</i> (LASCIN)	6	1	7
<i>Lasiurus seminolus</i> (LASSEM)	0	1	1
<i>Myotis grisescens</i> (MYOGRIS)	3	2	5
<i>Myotis sodalis</i> (MYOSOD)	1	0	1
<i>Nycticeius humeralis</i> (NYCHUM)	10	3	13
JUVENILE			
Female			
<i>Lasiurus borealis</i> (LASBOR)	2	6	8
<i>Lasiurus borealis</i> (LASBOR)	2	6	8
Male			
<i>Eptesicus fuscus</i> (EPTFUS)	0	1	1
<i>Lasiurus borealis</i> (LASBOR)	9	7	16
<i>Nycticeius humeralis</i> (NYCHUM)	2	1	3
Unknown-Escaped Net			
	10	6	16
Total	89	60	149



Figure 6. Mist nets set up over a pond.

- We deployed acoustic detectors at 13 sites at Peck Ranch Conservation Area (PRCA) and 14 sites at Current River Conservation Area (CRCA).
- We recorded 688 acoustic files at PRCA and 1511 acoustic files at CRCA.
- Portions of the data collected below (Fig. 7) were unable to be properly identified due to limitations in recording quality and species overlap.

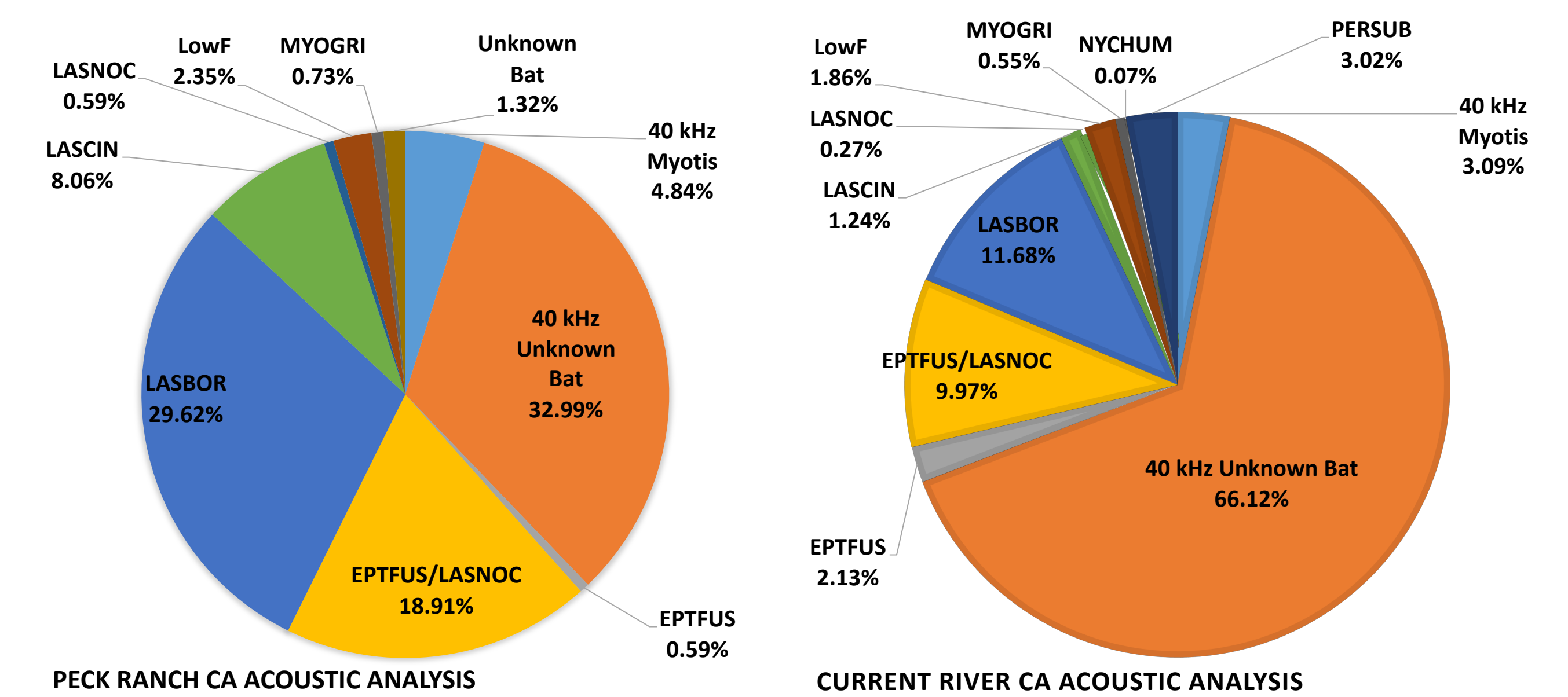


Figure 7. The percentage of acoustic calls recorded at PRCA and CRCA.

- Our acoustic results suggest that *P. subflavus* inhabited CRCA. We plan to follow up these results with mist net surveys at the site during 2019-2020. The most frequently captured and recorded species in our survey areas was *L. borealis*.

Acknowledgements & References

- A proportion of this project was supported by a grant/cooperative agreement from the U.S. Department of Interior, Fish and Wildlife Service, and White Nose Syndrome Response Team in the amount of \$3,791.00
- Financial support for our internship positions and thesis came from generous anonymous donors and the Graduate Student Advisory Council.
- Additional support came from Janet Tyburec, Dr. Andrew George, Michael Barnes, and Jena Staggs.
- The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Government.

References

- COLATSKIE, S. 2017. Missouri Bat Hibernacula Survey Results from 2011-2017, Following White-nose Syndrome Arrival. Missouri Department of Conservation, Technical Brief.
- MAINE, J. J., AND J. G. BOYLES. 2015. Bats Initiate Vital Agroecological Interactions in Corn. Proceedings of the National Academy of Sciences 112:12438-12443.