TESTING THE EFFICACY OF ACOUSTIC LURES ON WESTERN BAT SPECIES

Tina Greenawalt

Introduction

Arizona has the second highest diversity of bat species in the United States, behind Texas. The availability of various habitat types for many different species make it a prime area for bat research. At least 17 species of bats have been detected in Montezuma Castle and Tuzigoot National Monuments, located in central Arizona. There are likely more bat species present, but detecting them can be challenging. For instance, no single method of surveying for bats is effective for detecting all possible species present. Mist nets and in recent decades, acoustic recording, are often used in combination for surveys but some high flying species are difficult to either capture in nets or detect via acoustic recorders. Acoustic lures (electronic bat calls that are emitted to attract a particular species) have only recently been studied as an effective method of attracting and capturing bats in mist-nets. The method, which has proven effective in several studies, has only been used in Florida and Indiana. In this study, we proposed to test the efficacy of acoustic lures on western bat species in central Arizona.

A recent study in Florida found acoustic lures effective for capturing high-flying endangered Florida bonneted bats (*Eumops floridanus*). Prior to using acoustic lures, only 1 Florida bonneted bat had been captured in a mist net during their surveys. By using the acoustic lures researchers were able to catch 15 Florida bonneted bats (Braun de Torrez et. al. 2017). Another study in Indiana focused acoustic lure research on several different species including *Myotis, Lasiurus, and Eptesicus spp.* These are all species that have been directly affected by White-nose syndrome so their objective was to determine whether acoustic lures were effective for increasing detection rates on these species. Researchers found that the acoustic lures increased capture rates for *Myotis* species, but not for *Eptesicus* and *Lasiurus* (Quackenbush 2016).

Our main objective was to determine whether acoustic lures are an effective method for increasing capture rates in high flying western species such as the spotted bat (*Eumops maculatum*) and the western mastiff bat (*Eumops perotis*). No previous acoustic lure research has occurred in the west and no studies have been done on spotted bats or greater mastiff bats. A secondary objective was to test whether more bats of any species were captured in the nets using the acoustic lure.

Methods

We obtained recordings of spotted bat and western mastiff bat calls from Coconino National Forest staff, who had used an SM3BAT ultrasonic recorder (Wildlife Acoustics, Maynard, MA, USA) in the local area in 2018. We also used recordings from a Pettersson D500x (Pettersson Elektronik AB, Uppsala, Sweden) that recorded spotted bat calls at Tuzigoot National Monument in 2018.

We used a BatLure™ (Apodemus Field Equipment, Mheer, Netherlands) to broadcast the spotted bat and western mastiff bat calls. The acoustic lure was programmed with both the spotted bat (*E. maculatum*) and western mastiff bat (*E. perotis*) calls. Calls were obtained from acoustic recorders in the local area. The lure was programmed to play the call of one species for 3 minutes followed by 3 minutes of silence. This was repeated for an hour and then switched to the other species for an hour and so on for the four hour survey period.

We surveyed 4 sites in central Arizona, all on National Park Service (NPS) and U.S. Forest Service (USFS) lands (Figure 1). NPS locations included Montezuma Castle National Monument in Camp Verde, Montezuma Well in Rimrock and Tuzigoot National Monument in Clarkdale. The USFS site was located at Parson Springs in Sycamore Canyon, near Clarkdale. Each survey consisted of two pairs of a 6 meter triple high mist net and a 9 meter single high mist net in an L pattern. The BatLure™ was used at one set while the second set of nets were placed at least 150 meters away and did not have an acoustic lure (hereafter referred to as control net). The lure was placed on a tripod approximately 1 meter above the ground. A survey was conducted twice at each site with the nets placed in the same locations, but the BatLure™ was switched between the sets of nets for each survey. The nets were typically placed across flowing creeks or within riparian areas. Nets were kept open for a minimum of 4 hours beginning shortly after sunset with the exception of one survey at Montezuma Well where nets were open for just under 4 hours due to net setup taking longer than anticipated. Due to a lack of precipitation throughout the summer, there was no flowing water in Beaver Creek during the second survey at Montezuma Castle. All surveys were conducted on nights with little to no moonlight and no wind in order to lessen the likelihood of bats detecting the mist nets. The eight surveys were conducted between April 2, 2019 and August 27, 2019.

All bats captured were identified to species with the exception of 5 bats that escaped while being removed from either the nets or bags. Bats were sexed and measurements were taken for the ear, tragus, forearm, and thumb. Weight was also taken and bats were checked for reproductive status. Lastly, wing damage was checked on both wings for all bats as this can be an indicator for White-nose syndrome.

Results

No spotted bats or western mastiff bats were captured during any of our surveys. Other bat species were captured in all but one of the surveys. The 9 other species captured included Mexican free-tailed (*Tadarida brasiliensis*), red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), big brown bat (*Eptesicus fuscus*), Arizona myotis (*Myotis occultus*), fringed bat (*Myotis thysanodes*), southwestern myotis (*Myotis auriculus*), cave myotis (*Myotis velifer*), and Yuma myotis (*Myotis yumanensis*). A total of 18 bats were captured in the mist nets with the BatLure™ and 17 bats were captured in the control nets. Six different species were captured in the nets with the BatLure™ and 6 species in the control nets. Fringed bat, southwestern myotis, and cave myotis were caught in the nets with the acoustic lure, but not the control nets while big brown bat, hoary bat, and Arizona myotis were caught in the control nets, but not the acoustic lure nets.

There was no significant difference in number of bats captured in the nets using the BatLure™ versus the control nets (p= 0.90). There was also no significant difference in males (p=0.72) and females (p=0.70) caught in the BatLure™ versus the control nets. We also did not find a significant different in number of Myotis species captured in the BatLure™ net versus the control net (p=0.39).

Discussion

While previous studies have found the use of acoustic lures to be effective at increasing capture rates for certain species, we found the overall capture rates to be roughly the same between the nets with the acoustic lure and the control nets. We also did not catch either of our intended target species, despite being in a habitat where they are known to occur. More Myotis species were caught in the nets using the BatLure™, however, the difference was not significant.

While net location and setup was consistent among the surveys, environmental conditions varied greatly between the two surveys at Montezuma Castle. Flowing water was present at both the acoustic lure and control nets during the first survey. During the second survey, however, there was little to no water at the acoustic lure nets and one to two feet of flowing water at the control nets. During the first survey at this location, 5 bats were caught in the acoustic lure nets while only 1 bat was caught in the control net. For the second survey the BatLure™ was switched to the net setup that was used as the control net in the first survey. During this survey no bats were caught in the acoustic lure net and 6 bats were caught in the control net. While it is impossible to determine how much environmental conditions factored into the results, we can speculate that the absence of water at the acoustic lure nets potentially played a role in the lack of bat captures at this location.

We will continue to test the acoustic lure in future surveys to determine whether it is effective for species other than spotted bat and western mastiff bat. Quackenbush (2016) used a variety of bat calls and found *Myotis* calls increased capture rates for those species. It is worth investigating whether the acoustic lure would increase capture rates for western *Myotis* species, especially since they account for nearly 50% of the species found in our parks.

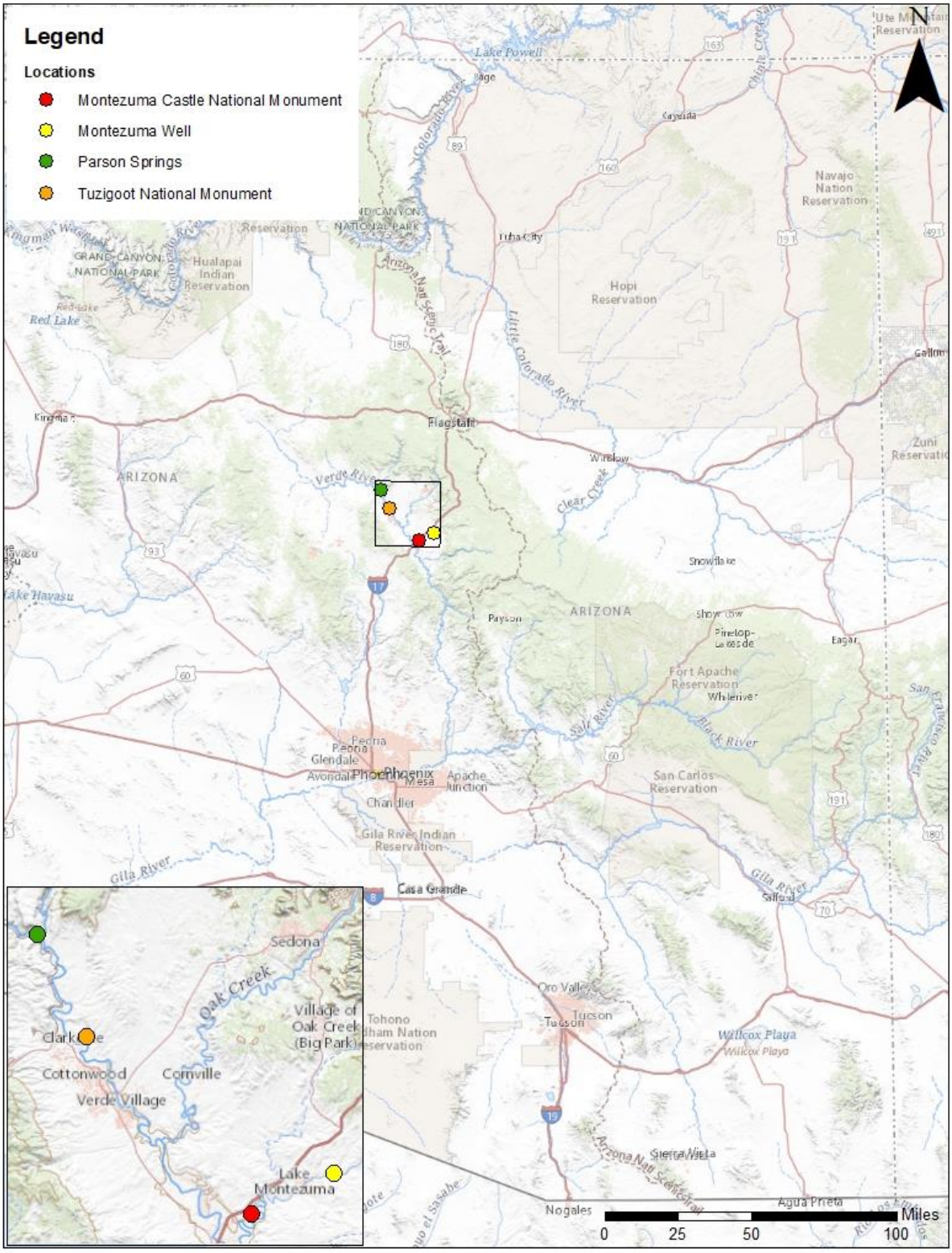

Figure 1: Location of bat surveys

Photo 1: Yuma myotis (*Myotis yumanensis*) captured during a survey

Photo 2: Triple high net setup and habitat at Montezuma Well

Photo 3: Net setup and habitat at Tuzigoot National Monument

Photo 4: Checking for wing damage on a fringed myotis (*Myotis thysanodes*)

Literature

Braun de Torrez, E.C., S. T. Samoray, K. A. Silas, M. A. Wallrichs, M. W. Gumbert, H. K. Ober, R. A. McCleery. 2017. Acoustic lure allows for capture of high-flying, endangered bat. Wildlife Society Bulletin 41(2): 322-328.

Quackenbush, H., L. E. D'Acunto, E. A. Flaherty, P.A. Zollner. 2016. Testing the efficacy of an acoustic lures on bat mist-netting success in North American central hardwood forests. Journal of Mammalogy 97(6):1617-1622.