

OBSERVING REACTION TIMES IN SPRING PEEPER MATING CALLS AFTER INTERRUPTION OF A THREAT

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ABSTRACT

The purpose of this study was to observe spring peeper [*Pseudacris crucifer*] behavior and record the reaction times to the potential disturbance of the synthesized threats. We used 3 different tests that were designed to disrupt their mating calls on a low acoustic level. We tested using recorded owl calls on a small portable speaker, rustling undergrowth and shrubbery neared an identified subject, and talked loudly, all while recording the effects and whether there was any change. Silence was used as a control. The results of the experiment showed that the rustling test had the highest average time, taken in seconds, for spring peepers to resume their calls after being disturbed.

Key words: Pseudacris crucifer, Spring peeper, Acoustic, Mating call

INTRODUCTION

The Spring peeper [*Pseudacris crucifer*] is a species of amphibian, native to the eastern United States as well as southeastern Canada, northern Florida, Texas and Minnesota. The species tends to reside in “moist, wooded areas, in fields and in grassy lowlands near ponds and wetlands”, according to the National Wildlife Federation. This species has been the focal point of many studies that look at the effects of anthropogenic noise on their ever famous, loud, mating calls, as shown in figure 1. The purpose of this study was to observe the effects of “low-level” acoustic disturbances on Spring peeper mating calls, and if there would be any identifiable change during the interference. In quote from a study looking at the effects of traffic noise on frog pitch, it says, “Acoustic interference from natural sources of noise could lead to the modification of calls through selection for more efficient communication (Littlejohn 1965), and acoustic interference from human-generated noise may act similarly (Katti and Warren 2004, Warren et al. 2006)”. Within acoustic interference, there is a concept called masking which

happens when background noise reduces the active distance of a signal (Brumm and Slabbekoorn 2005). In this study, we hypothesized that Spring peepers would falter or pause in their calling when faced with a disturbance or potential “threat”, then resuming their calls after the “threat” had passed. Because there have been many studies to back the claim that highway systems and traffic or areas close to airports have an acoustic effect on spring peeper calling, the goal of this study was to look at/ mimic threats or disturbances on a smaller level that would be more likely to happen when not directly effected by high frequency acoustic interference. Are the effects of owl calls or rustling bushes or human voices an influence on the mating calls of *Pseudacris crucifer*?



Figure 1: Shows Spring peeper's caught on April 25th, 2020 in Stevensville MD, a display of its white underbelly in the picture to the far left, and a bird's-eye view of the X that marks the back of Spring peepers [*Pseudacris crucifer*].

FIELD SITE

This study was conducted on a 94-acre plot of land owned by Queen Anne's County Department of Parks. The area is in the planning stages of becoming a nature park and an extension of Love Point park, located in Stevensville Maryland. The pond that was used to conduct this study of Spring Peepers is around 100ft in width and about 150ft in length. Three points were selected for data collection and observation, spaced around 50ft apart along the bank of the pond, depicted in figure 2. The vegetation surrounding the pond consisted mainly of a variety of tall grasses, Phragmites, red maple saplings, white pine, and some smaller shrubs and undergrowth. The pond sits with about 50ft of space between it and the tree line of the neighboring field and is open, with no shade from the surrounding forest. The pond contains very little vegetation in the water itself, but has grasses growing in the mud along the banks and around 10ft in.



Figure 1: Shows an aerial image taken from google maps, depicting the study area and the study sites, marked by a red X. The area in blue depicts water and the orange circles mark the 20ft of space between the study site and where information was recorded.

METHODS

Observations and data for this study were gathered in three nights, consecutively, with sampling taking place at the same time each night. We began our sampling periods around 8:20pm EST and ended sampling around 8:40 to 8:46pm, recording air temperature readings and weather, as shown in table 1.

	Time Started	Weather	Air Temp.	Time ended
24-Apr	8:13pm	Breezy/overcast	52°	8:40pm
25-Apr	8:26pm	Light rain/breezy	57°	8:46pm
26-Apr	8:20pm	Light rain/mist	54°	8:48pm

Table 1: This table represents data from April 24-26, 2020, depicting environmental aspects and time as a relative constant for each testing period.

There were four parts in gathering data on the behavior of spring peepers when presented with potential threats and disturbances. Disturbances and threats were determined through the recorded sounds of Great Horned owl calls- a natural predator to the spring peepers, the rustling of nearby growth, and talking at a moderate volume. Each of the four tests were conducted at the three sampling sites. Within each sampling site, a speaker would be placed in a position where it would be within a proximity to a spring peeper; one that could be audibly identified as a test subject. From there, we would stand 20ft from the speaker and play the recorded great horned owl

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calls for 20 seconds, listening for any changes in the calls of the Spring peepers, displayed in table 2.

Table 2: This table represents data from April 24, 2020, showing that there were no changes in Spring peeper calls in response to our first night of running tests.

	Owl Calls	Rustling	Voices	Silence
Site 1	no change	no change	no change	no change
Site 2	no change	no change	no change	no change
Site 3	no change	no change	no change	no change

This process was used as a pattern for all four tests; There would be 20 seconds of testing with a period of one minute to silently write down observations and prepare for the next test. The spacing of 20ft of distance between the test site and the person recording data was continuous throughout all four tests, as well.

After playing the recorded owl calls, one person would note any change 20ft from the speaker, seen in table 3, while another person would move to the site of the speaker and kick and rustle any small trees, grasses, and/or shrubbery.

Table 3: This table represents data from April 25, 2020, showing virtually no change in Spring peeper calls except for an instance in site 3. During the rustling test in site 3, the identified spring peeper ceased calling part-way through the test and we counted 10 seconds for it to begin calling again.

	Owl Calls	Rustling	Voices	Silence
Site 1	no change	no change	no change	no change
Site 2	no change	no change	no change	no change
Site 3	no change	10 seconds	no change	no change

The speaker was a continuity point for the testing, something that we were able to return to for each test. The second to last test was run the same way as the previous two tests with the change being that same person who did the rustling would talk out loud while another person recorded any change, noted in table 4.

Table 4: This table represents data from April 26, 2020, showing much more of a change than the previous two nights. Each time of paused calls

started during the test and began calling again after the test had ended.

	Owl Calls	Rustling	Voices	Silence
Site 1	no change	no change	no change	no change
Site 2	12 sec	20 sec	21 sec	no change
Site 3	no change	20 sec	no change	no change

The control was determined through a period of silence, also 20 seconds, to observe if there was any change. All outside influences were recorded, such as ducks quacking and flapping on the water during testing and loud wood frogs. To find our results, we took the average from each test over the course of the 3 days of testing.

RESULTS

The results of this study show that the rustling test had the most significant effect on the disturbance of Spring peepers, with an average of about 5.55 seconds after disturbance before it began calling again. The second most significant test was when talking was applied to see if it would be a large enough factor to disturb the spring peeper mating call. It averaged approximately 2.33 seconds after the disturbance before calling began again. The use of playing owl recordings only averaged around 1.30 seconds and silence was our control.

Figure 3: This graph shows the average time per



second that it took, in each test, once the identified spring peepers stopped calling during the tests to when they began their calls again.

DISCUSSION

The results show that there was very little change in spring peepers mating calls due to threats of owls, human voices, and rustling. We found that there was little to no change in the calls of the Spring peepers due to low acoustic interference. The effect of playing owl calls from a speaker had little recorded effect across all three days of testing. It might be in our best interest for any future tests to use a louder speaker that reaches further and to potentially change the types of owl calls used. Multiple sources such as the National Wildlife Federation and the Chesapeake Bay Program had listed owls and other raptor birds under the list of predators for spring peepers although there were no specific species listed. Spring peepers are acoustic species, which means that they can change their frequencies (commonly described as pitch) (McGregor, Leonard, Horn, & Thomsen, 2013). In changing the temporal aspects of their calls, like altering the duration of the call or how often its produced, can help to reduce masking by changing the communication to avoid overlap in noise (Nelson, Klinck, Carbaugh-Rutland, Mathis, Morzillo, and Garcia 2016). There were three accounts where the person conducting the tests had walk up to the test site and the identified spring peeper would stop calling, later continuing partway through or after the test had been completed.

On two separate occasions, there could also be room for error due to interference from wildlife. There had been ducks splashing in the pond as well as a loud presence of wood frogs that seemed to drown out the calls of spring peepers on two nights. It can also be noted that on the 24th and 25th of April, we observed 3 water snakes, both nights, that sat in the water close to the shore where the spring peepers were calling. Snakes are a natural predator to spring peepers, so it is possible that their presence also influenced what we were hearing as a natural disturbance. There was an observation that the spring peepers did not stop calling, even when we were quietly wading through the water, looking for samples. We would be standing right over top of one with a flashlight pointed at it and it still would not stop calling.

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