

Variation in Calls of *Eleutherodactylus martinicensis*

Texas A&M University

Study abroad- Dominica

May 20-June 11, 2014

Sarah Veillon

Dr. Lacher and Dr. Woolley

Abstract.

The purpose of this study was to determine if Tink frogs (*Eleutherodactylus martinicensis*) display a difference in call frequencies in natural habitats versus urban habitats. This study was a repeat of one from 2013. They both produced the same results supporting the hypothesis that Tink frogs in urban environments called at higher frequencies than in the natural rainforest environment.

Introduction.

There are four amphibian species found on the tropical Island of Dominica, all Anurans from the family Leptodactylidae. Native to Dominica and endemic to the Lesser Antilles is *Eleutherodactylus martinicensis*, commonly known as a Tink frog. The Tink frog has the appearance of a small tree frog and is tan with a black line under the eye. It is one of the most widely distributed amphibians in the Lesser Antilles because it is ecologically variable. They inhabit a large range of the islands from tropical rainforest to urban areas (Kaiser, 1992).

Anuran vocalizations are used in reproductive behaviors, for the acquisition and defense of territories, and as a means of communication. Research shows that learning is not a factor in vocalization development. The frequency of the call can change when the tension of the vocal cords is altered or the shape and/or position of the arytenoid cartilages is changed. Frogs may change the frequencies of their calls to adapt to the environment around them. A study was done on *Acris crepitans*, the Cricket Frog, in Texas that found statistically significant geographical differences in mean dominant

frequency for 17 populations. The habitat differences explained many of the variations examined in these call frequencies (Gerhardt, 1994).

Tink frog calls that come from a natural rainforest soundscape show a common frequency of around 3500 kHz. A study done by Gaston Casillas (2013) on Tink Frog Vocalizations compared call recordings from frogs in the rainforest to recordings taken from an urban environment. His idea was that the difference in sound ambience generated from the city might affect the nature of frogs calling there. He found similar results as the study done with *Acris crepitans*. Frogs surrounded by a different soundscape had significant variation in frequency. The frogs experiencing more sound pollution vocalized at 500 to 1000 kHz higher than the calls from their undisturbed counterparts. With an increase in sound pollution Tink frogs need their calls to be more unique. Whereas in a forest, they are not competing with as many sounds in the spectrum. Although these results were significant the conclusion was based on little data. The purpose of my study will be to retest the results of Casillas' study. I will use the same locations and methods as he did and compare results.

Materials and Methods.

Recordings were collected over a week in several locations off a trail at the Archbold Tropical Research and Education Center and in three locations in the city of Roseau: roadside by a port, at Fort Young's Hotel artificial waterfall, and from hanging house plants in between two houses. The locations were picked so that the frogs recorded are from different soundscapes. A few calls were obtained from each location. All were recorded at night after 8:30 pm using a Marantz Professional PMD660 digital recorder

and a Shure BG 4.0 directional microphone. The microphone was positioned as closely to the frog as possible and in the direction of the frogs calls then recorded when they went into chorus. The recordings were listened to on the computer and the best samples were opened in Audacity. In Audacity the format is changed to .WAV and exported into Raven Pro 1.4. By using copy and paste keys, a single call is clipped from each sound file and put into a new window which is saved for data use. The new sound clips are put into spectrogram view to be better cleaned up and analyzed. They are clipped at 80 to 90 Db and band filtered between 1000 and 6000 Hertz until the calls are isolated. The call is put in a selection box and a table is pulled down for each graph showing the maximum low and high frequency of the box selected on the graph. The high frequencies are recorded and statistical analyses are ran to compare them.

Results.

The four figures below depict how the sound clips of the calls were done. One from each of the locations used. The window shows the clips in two forms. The top one is waveform view which shows amplitude versus time. The bottom one is in spectrogram view showing the kHz produced by the call versus time. These are followed by a table showing the high frequency numbers which we used in our statistical test. The statistics were done using 8 calls from Roseau and 9 from Springfield. The group statistics showed Roseau had a mean of 4263.7 and Springfield of 3999.5.

The results of the t-test ran for comparison of means showed that variances were equal in both groups, the t-value is 4.057, degrees of freedom is 15, and the p-value is less than 0.001. This means the results were highly significant.

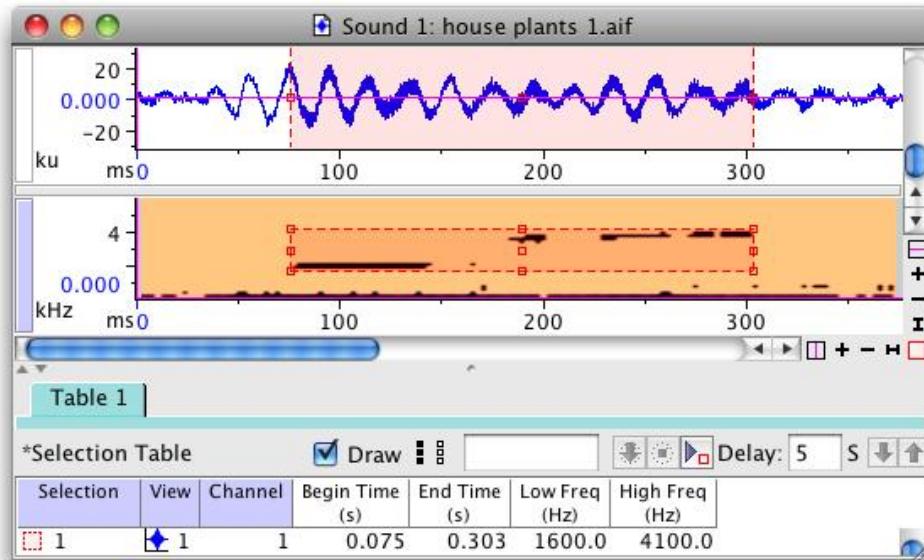


FIGURE 1.

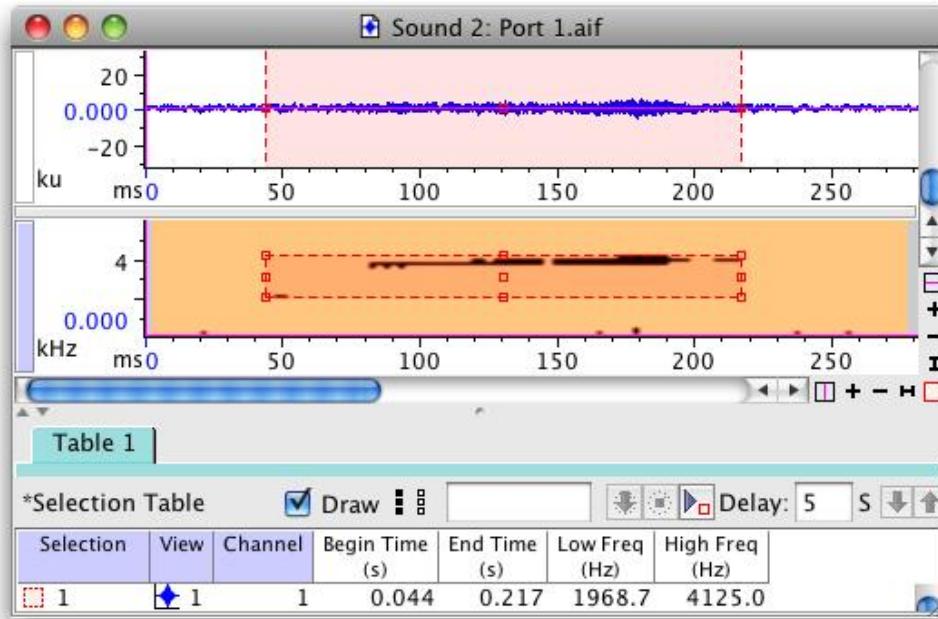


FIGURE 2.

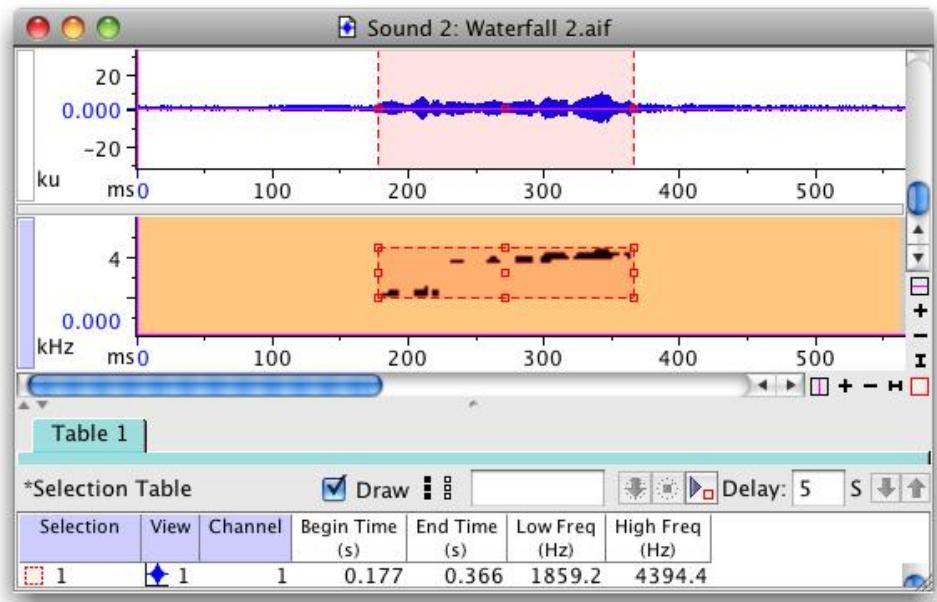


FIGURE 3

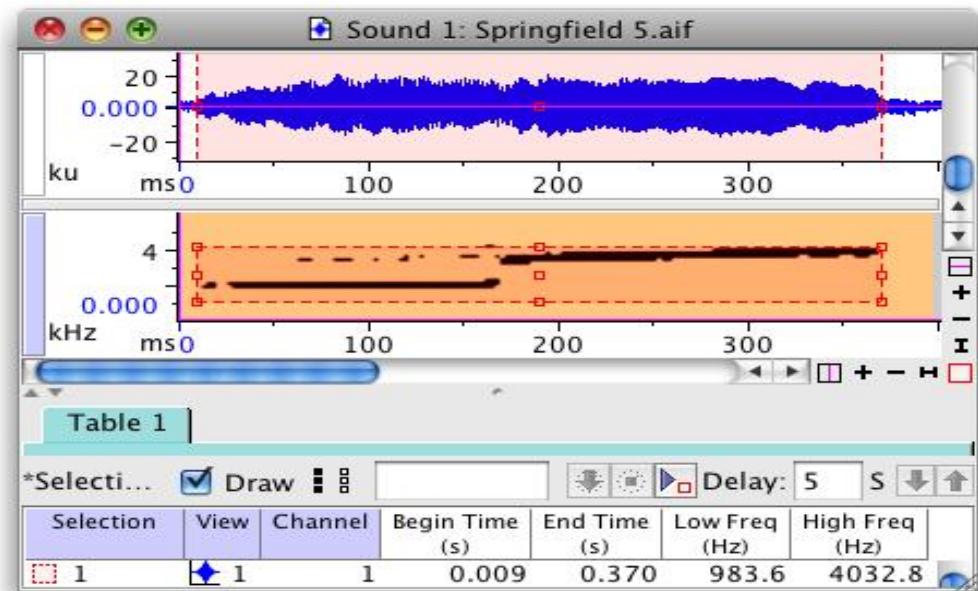


FIGURE 4

Discussion.

The results from my study corroborate the results of Gaston's. The call frequencies from Roseau were significantly higher than at Springfield. The frequency of calls in Roseau were up to 500Hz higher than at Springfield. It is certain that frogs from town have different call frequencies but what is not certain is why. We believed it to be from the louder sound produced in the low frequency spectrum in Roseau but it could possibly be the elevation difference. A study done by Whitney Ward found a significant difference in call frequencies of the Tink frogs on Dominica based on elevation differences. Because Springfield is at a higher elevation than Roseau which is almost sea level, elevation could be a factor. Other studies could be done on this in the future to sort out the reason for these differences. This could be done by comparing call recordings from high, medium, and low elevation cities and also from studying the sounds produced by the city that the frogs are being exposed to.

Work Cited

Gaston Casillas. 2013. Soundscape Ecology of Tink Frogs. Texas A&M Dominica Study abroad. http://dominica.tamu.edu/student%20projects/Dominica%20Projects%20pdf%20copy/Casillas_Gaston_2013.pdf

Gerhardt, Carl H. "Evolution of Vocalization in Frogs." *Annual Review of Ecology and Systematics* 25 (1994): 293-324. Web.

Kaiser, Hinrich. "The Trade-Mediated Introduction of *Eleutherodactylus Martinicensis* (Anura: Leptodactylidae) on St. Barthélémy, French Antilles, and Its Implications for Lesser Antillean Biogeograph." *Journal of Herpetology* 26.3 (1992): 264-273. Web.

Acknowledgements

Being in Dominica had been a great experience that I will never forget. I want to thank Dr. Lacher and Dr. Woolley for allowing me to be here and all the help they gave me with my project. I also want to thank Whitney Ward who helped me get all my recordings. I couldn't do it without them!