



Characteristics of *Thecadactylus rapicauda* Vocalizations in Dominica

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## Abstract

Vocalization recordings from 9 different individuals of *Thecadactylus rapicauda* were taken from primary and secondary forests on the island of Dominica (Lesser Antilles, 15° N, 61°W) using a Marantz PMD660 digital recorder and Azden SGM-1X professional shotgun microphone. The purpose of this study is to compare call characteristics among various individuals of *T.rapicauda*. Little research has been provided on the vocalizations of *T.rapicauda* among the scientific community. In my analysis I compared call frequency, the amount of calls per minute, and the amount of peaks per call.

## Introduction

*Thecadactylus rapicauda*, commonly known as the Turnip-tailed gecko or the Tree gecko, is a relatively large species of gecko found in Dominica. It has been found to flourish throughout the Lesser Antilles islands of the Caribbean and throughout the Amazon Basin, from Yucatan to Bolivia (Bergmann and Russell, 2007). *T.rapicauda* is a nocturnal lizard in the family Gekkonidae, it primarily feeds on insects and spiders in tropical rainforests (Vitt, 1997). This arboreal species is abundant in primary and secondary forests (Vitt, 1997). The Turnip-tailed gecko has cryptic coloration identical to bark and can be found in microhabitats such as tall trees, buildings, on leaves, and on the ground (Vitt, 1997). Individual body temperatures range from 24 to 29 degrees Celsius, and individuals can weigh between 1.3 and 40.3 grams, and grow 41 to 126 mm SVL (Vitt, 1997).

The purpose of this experiment is to record and compare individual Turnip-tailed gecko calls. Vocalization is a means of interspecific and intraspecific communication. It can be used to display dominance, communicate territory area, to attract mates, and to warn others of predation risks. The only study I could find on the vocalizations of *T.rapicauda* was a study done by Arturo Vale in 2002 during a Dominica Texas A&M study abroad trip, comparing the calls of *Eleutherodactylous martinicensis* to the calls of *T.rapicauda*. Little research has been done on *T.rapicauda* calls in the past so I am hoping to provide an analysis that can be used as a basis for research to come.

## Materials and Methods

Vocalization recordings of *Thecadactylus rapicauda* in the field were made in Dominica (Lesser Antilles, 15° N, 61°W) in May and June 2012 over four nonconsecutive nights between 6:48pm and 8:38pm. *Thecadactylus rapicauda* vocalizations were taken from the secondary forest surrounding Archbold Research and Education Center and from the primary forest of Middleham Falls trail. To make the recordings I used Marantz PMD660 digital recorder, Azden SGM-1X professional shotgun microphone, and headphones. To compare individual Turnip-tailed gecko calls I located isolated individuals in the field and attempted to get as close to them as possible before making a recording. To reduce static in the recordings I plugged in headphones to the digital recorder at all times. Once I found an individual's location I turned on both the recorder and the microphone, then I pointed the microphone in the presumed direction of the individual before pressing the record button. All recordings were taken for 30 to 60 second intervals at which time the stop button was pressed to end the recording, but to keep my analysis consistent I edited all recordings to be 30 seconds in length. While recording it was necessary to adjust the record level so that the decibels reached as close to zero as possible without going over. If the decibel level were to go over, the recording would be cut and no sound would be recorded.

To analyze the digital recordings on a computer I plugged a USB cable into the Marantz digital recorder and then into a computer. Then I held down the USB button on the recorder as I turned on the device in order for the Marantz recorder to display USB on the screen and for the files to successfully be transferred to the computer. Once the files were downloaded to the computer I used the RavenPro 1.4 software to analyze my files. Using RavenPro 1.4, I reduced all recordings to 30 seconds in length, then I filtered out all unwanted sound from my files, followed by amplifying the gecko calls to make them easily visible.

## Results

In total 9 individual *Thecadactylus rapicauda* vocalizations were recorded between 6:48pm and 8:38pm.

| Figure # | Date    | Time (pm) | Location                              | Forest    |
|----------|---------|-----------|---------------------------------------|-----------|
| 1        | 5/24/12 | 8:38      | Springfield Station (Star fruit tree) | Secondary |
| 2        | 5/28/12 | 7:48      | Springfield Bee house (mango stairs)  | Secondary |
| 3        | 5/28/12 | 7:50      | Springfield Bee house (mango stairs)  | Secondary |
| 4        | 5/30/12 | 7:48      | Springfield Station (dorm)            | Secondary |
| 5        | 5/30/12 | 8:20      | Springfield Trail to Stream           | Secondary |
| 6        | 5/30/12 | 8:31      | Springfield Station (veranda)         | Secondary |
| 7        | 6/4/12  | 6:48      | Middleham falls trail                 | Primary   |
| 8        | 6/4/12  | 7:54      | Middleham falls trail                 | Primary   |
| 9        | 6/4/12  | 8:06      | Middleham falls trail                 | Primary   |

Table 1: Dates, times, and locations of *Thecadactylus rapicauda* vocalizations.

| Gecko # | calls/minute | peaks/minute |
|---------|--------------|--------------|
| 1       | 44           | 82           |
| 2       | 38           | 68           |
| 3       | 48           | 84           |
| 4       | 42           | 88           |
| 5       | 30           | 42           |
| 6       | 38           | 62           |
| 7       | 30           | 58           |
| 8       | 34           | 68           |
| 9       | 26           | 64           |
| Average | 36.6666667   | 68.4444444   |

Table 2: Average calls and peaks per minute.

| Forest    | calls/minute | peaks/minute |
|-----------|--------------|--------------|
| Primary   | 30           | 63.3333333   |
| Secondary | 40           | 71           |

Table 3: Average calls and peaks per minute in relation to forest types.

Chart 1: Primary and secondary forest *T.rapicauda* call analysis.

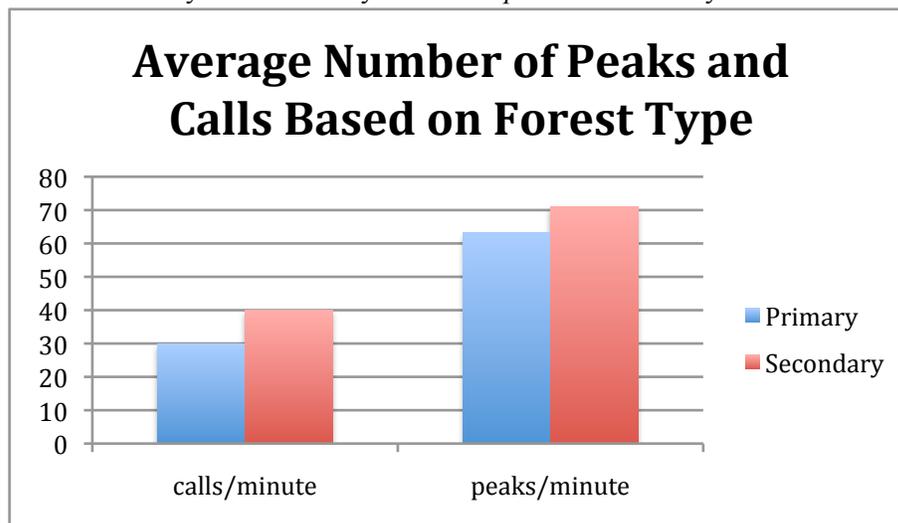


Figure 1: Waveform of *T.rapicauda* vocalization in a secondary rainforest.

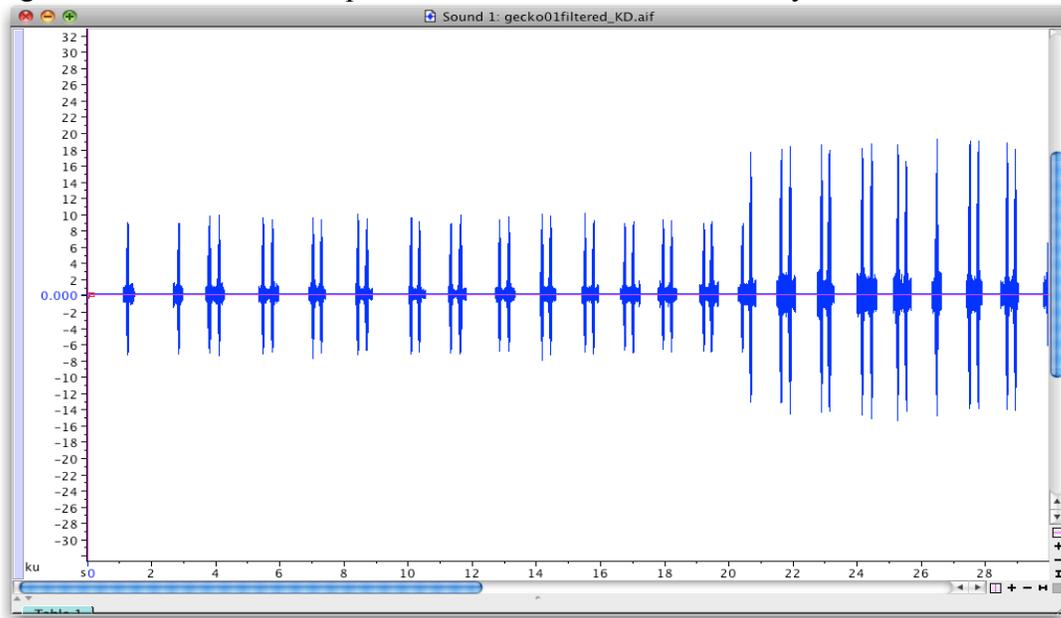


Figure 2: Waveform of *T.rapicauda* vocalization in a secondary rainforest.

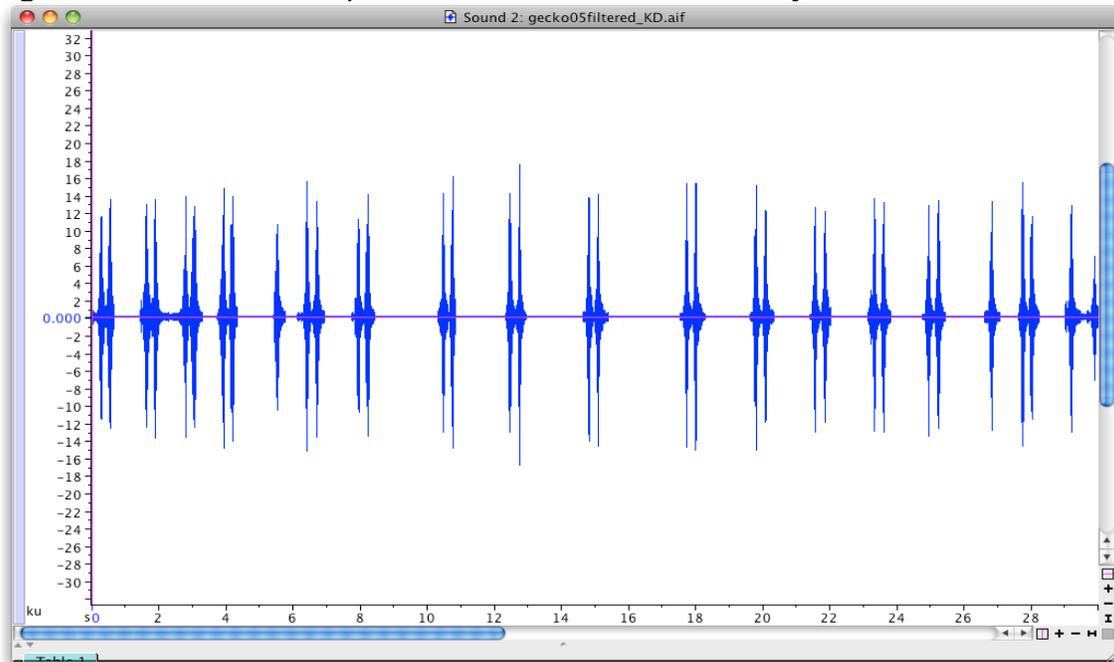


Figure 3: Waveform of *T.rapicauda* vocalization in a secondary rainforest

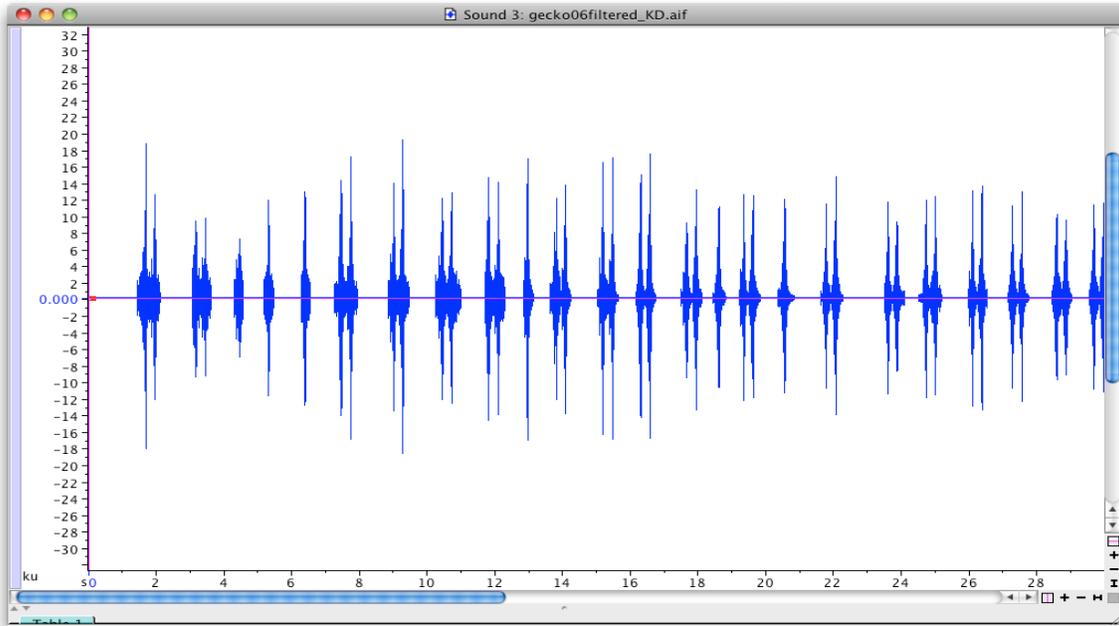


Figure 4: Waveform of *T.rapicauda* vocalization in a secondary rainforest.

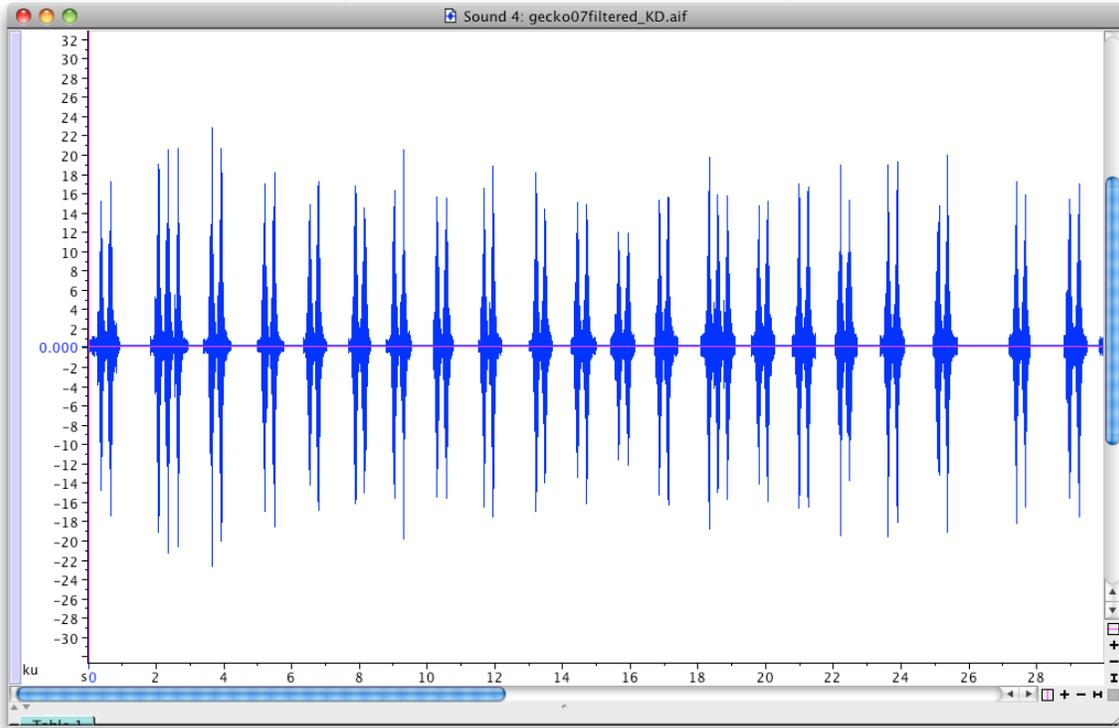


Figure 5: Waveform of *T.rapicauda* vocalization in a secondary rainforest

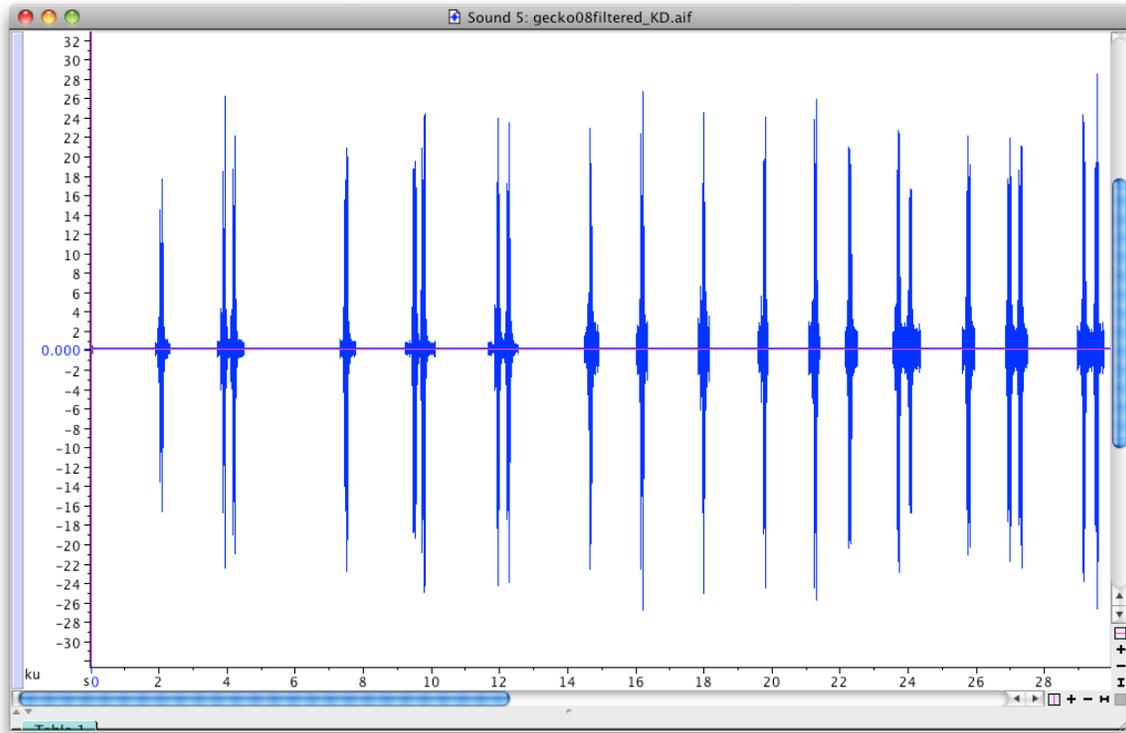


Figure 6: Waveform of *T.rapicauda* vocalization in a secondary rainforest.

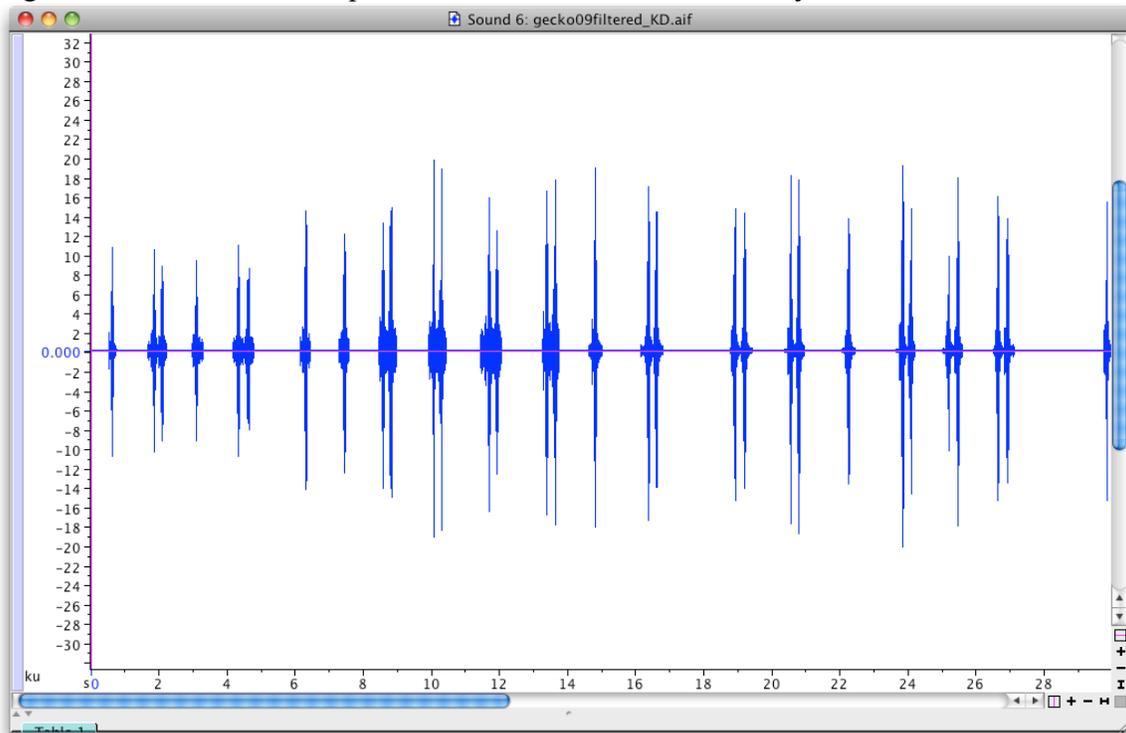


Figure 7: Waveform of *T.rapicauda* vocalization in a primary rainforest.

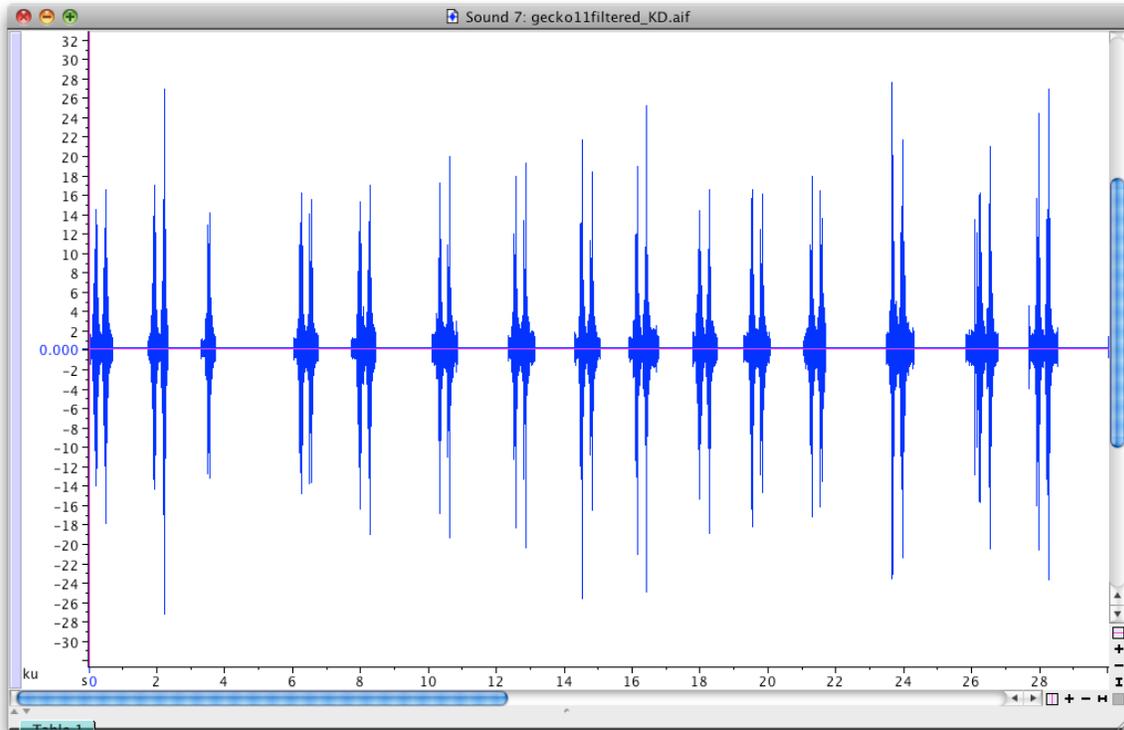


Figure 8: Waveform of *T.rapicauda* vocalization in a primary rainforest.

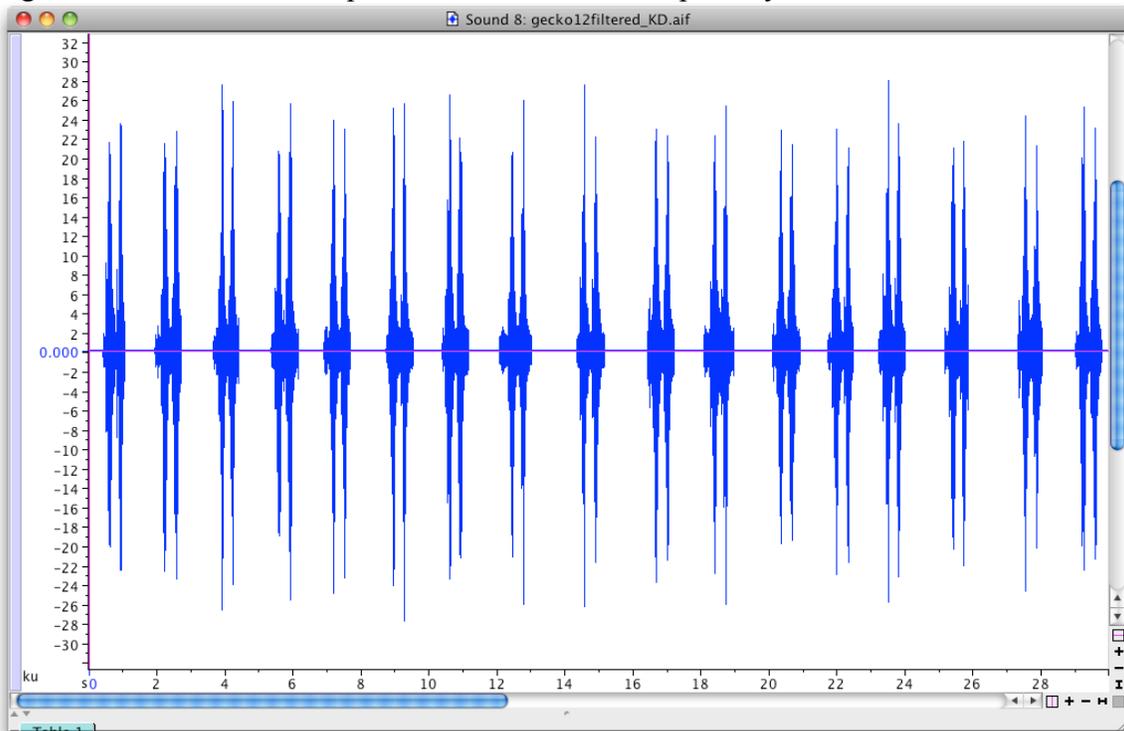


Figure 9: Waveform of *T.rapicauda* vocalization in a primary rainforest.

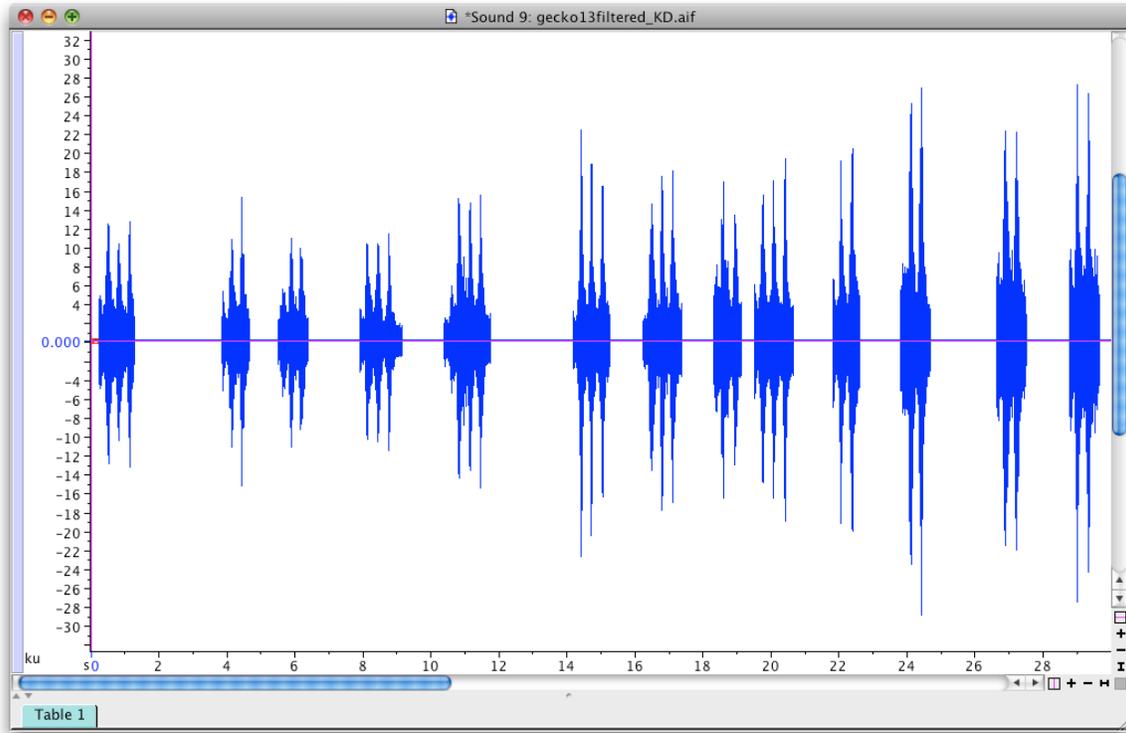
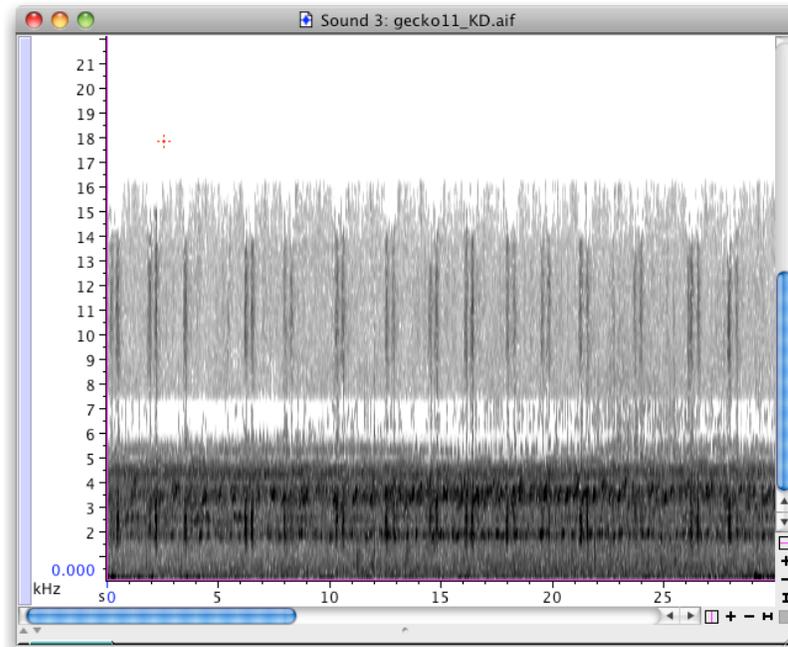


Figure 10: Spectrogram view for vocalization in Figure 7.



## Discussion

Figures 1 through 9 show the amplitude of each individual gecko recorded over time. This allowed me to compare the amount of calls made in each thirty-second interval, in relation to the amount of peaks for each individual gecko call. Figure 10 is a spectrogram view of the calls in Figure 7, which illustrates the *T.rapicauda* vocalization frequency range that was consistent in all the gecko recordings.

Based on the spectrogram view, the frequency of all individual calls spans two frequency ranges, 1.5-3.5 kHz to 8-14 kHz, which is illustrated in Figure 10 by consecutive vertical black lines. The recordings of these calls resembles consecutive chirping sounds sounding much like 'he he'.

The waveform views show that each individual call can have anywhere from 1 to 3 peaks. All individual gecko vocalizations displayed calls with 2 peaks, and would alternate between calls with 1 peak or calls with 3 peaks. None of the gecko vocalizations in this study contained calls with 1 peak, as well as calls with 3 peaks. Among the vocalizations recorded, there was an average of 37 gecko calls per minute and 68 peaks per minute. The amount of calls per unit time was directly correlated to the amount of peaks. In the primary forest there was an average of 30 calls per minute and 63.3 peaks per minute. In the secondary forest there was an average of 40 calls per minute and 63.3 peaks per minute. These findings indicate that in secondary forests, which are fundamentally premature compared to primary forests, geckos may have to call more frequently. This increase in call frequency may be to ensure territory rights or to increase mating potential.

In conclusion, the frequencies among individual gecko call were identical, but the amount and types of calls displayed varied for each individual. I found that the most common type of call contained two peaks. Whether the gecko lived in a primary or secondary forest did not seem to affect the frequency, but it did affect the amount of calls and peaks per unit time.

## Acknowledgements

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## Work Cited

- Bergmann, Philip J., and Russell, Anthony P. "Systematics and Biogeography of the Widespread Neotropical Gekkonid Genus *Thecadactylus* (Squamata), with the Description of a New Cryptic Species." *Zoological Journal of the Linnean Society* 149.3 (2007): 339-70. Web.
- Vitt, Laurie J., and Zani, Peter A. "Ecology of the Nocturnal Lizard *Thecadactylus rapicauda* (Sauria: Gekkonidae) in the Amazon Region." *Herpetologica* 53.2 (1997): pp. 165-179. Web.