Similarities among Tink Frog Calls in Secondary Rainforest of Dominica Island

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Abstract

Frog sounds are used for many important field studies though out the world. In Dominica where the study took place, the sounds can be used to identify one of the four possible species of frogs. The frog being recorded for this project is the Tink Frog (*Eleutherodactylus martinicensis*). In this study the frog sounds were recorded during a certain time to keep the variability in factors that would influence calls at a minimum. The sounds recorded were cleaned up and then compared through Canary 1.2 program to achieve direct correlations among calls and high quality statistical data.

Introduction

The Tink Frog (*Eleutherodactylus martinicensis)* is endemic to Dominica, Martinique, and some of the Lesser Antillean islands. According to Evans, *martinicensis* can grow up to 47mm snout to vent length and is abundant in the rain forest habitats of the island but can be found in coastal dry forest, scrub, and littoral woodland as well. Tink frogs produce calls for various reasons as do most frogs of the world. It is believed Tink frogs utilize their calls for territorial and breeding purposes. Another importance of the calls is to identify the individual calling and differentiate between other species. The information provided form this study can be used as a basis for the identification of the other newly found species of frogs on the island.

Materials

Head Lamp
EC-5 Cardioid Condenser Microphone
Marantz PMD 222 Recorder
Canary 1.2 Sound analyzing program
Plastic Bag (keeping materials Dry)

Study area and Methods

The area of recording took place around the Springfield Research Center off Imperial Rd. about 15 minutes outside Canefield. Springfield is surrounded by secondary rain forest and is relatively close to the Check Hall River. The frogs recorded were usually located in the under story of the forest less than 1 m off the ground sitting on a sheltered area of a plant close to a trail or open area. The method used to locate each individual was to carefully listen and isolate the sound then strategically move in closer. The microphone was usually placed within 1 m of the individual being recorded but normally much closer. When the technique was properly executed it usually resulted in a very close proximity to the subject allowing the microphone to be placed within inches of the calling frog. All recording took place at night after 19:00 either during a rainstorm or after it had recently rained during the day. Due to the fact it was dark, usually cloudy, and in the under story of the rain forest, a headlight had to be used. The headlight was used mainly for two reasons: first was to aid in the navigation through the trails and thicket, and second to provide light in the positive identification of the species recorded. After the calls were recorded each one was transferred into the computer program individually and then analyzed. The calls were recorded in approximately 10-second segments (figure 1-2) and cleaned up. To clean the vocalizations up each segment had a spectrogram produced

for it and all unnecessary background noises were then removed. The product was used to remove a small one-second segment (figure3-5) for specific comparison. Each small one second segment had a spectrogram made for it and were then all compared in an orderly fashion (table 1).

Results

The calls recorded show a very high similarity in appearance and in frequency. In the long segments recorded the time intervals between calls is different but the individual calls themselves remain about the same length, as seen in either figure 1 or 2. The time intervals between each call can be caused by many variables but the most prominent seemed to be the presence of a human or predator. In the short segments (figure 3-5) the similarities and differences can be seen for the individual call. The Waveform of the call shows the amplitude and the spectrogram shows the frequency in kHz. In the waveform window the amplitude can vary because of many different variables such as the distance from the subject or the transfer from the recorder to the computer program but overall they appear very similar. The spectrogram appears to be even more similar because it is showing the change of frequency over a section of time. A close examination shows each of the calls begins at a frequency of 1.8 kHz and stays consistent until the second section, which jumps to around 3.0 kHz and increases to 3.5-3.8 kHz (figure 3-5). In the table all of the spectrograms of the short segments are compared. There are two different comparisons shown in the table. One of the comparisons is between the same individual but different sections of a call and the other comparison is between two different individuals. For example, the comparison between 06066 section and 06067 section are from the same frog at different times during the call, but 06066 section and Tink06061 section are two different frogs. There are a total of five different frogs and the numbers are the following:

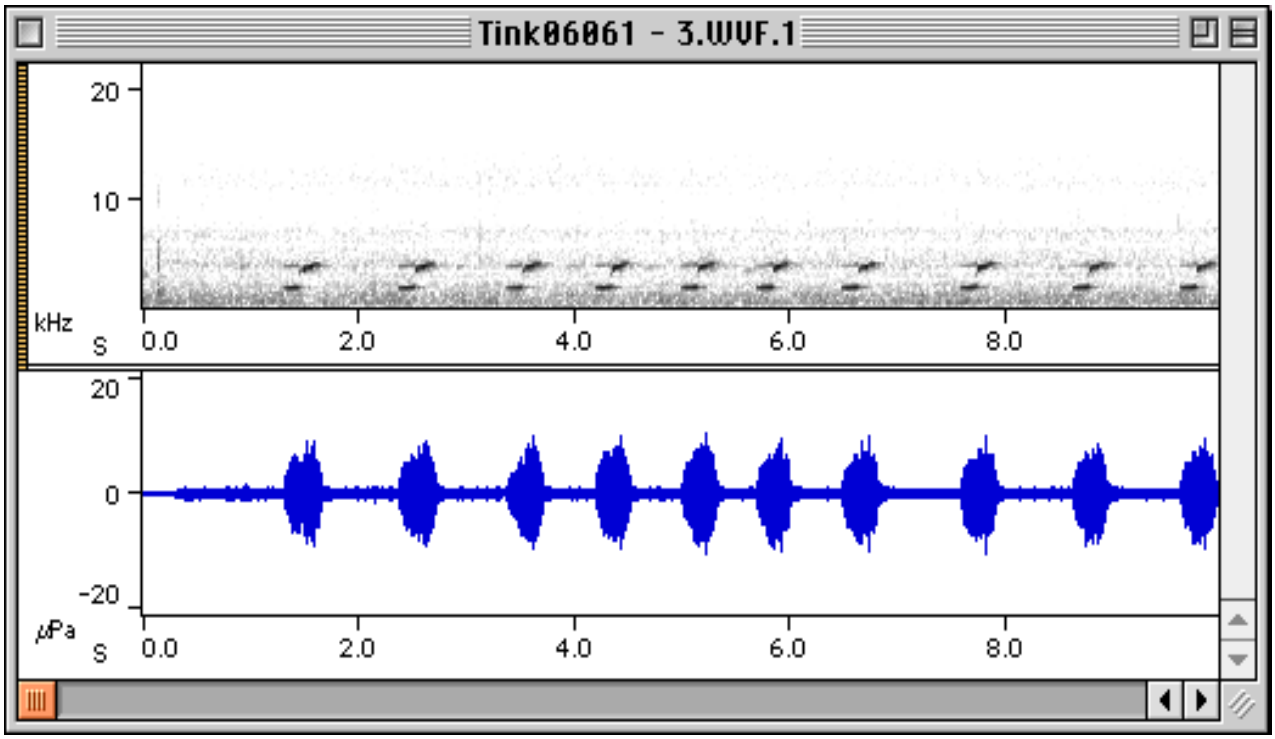
Frog one	Frog two	Frog three	Frog four	Frog five
Tink 06061	Tink 06062	06066	Tink 0607	06073
		06067	06071	06074
			06072	

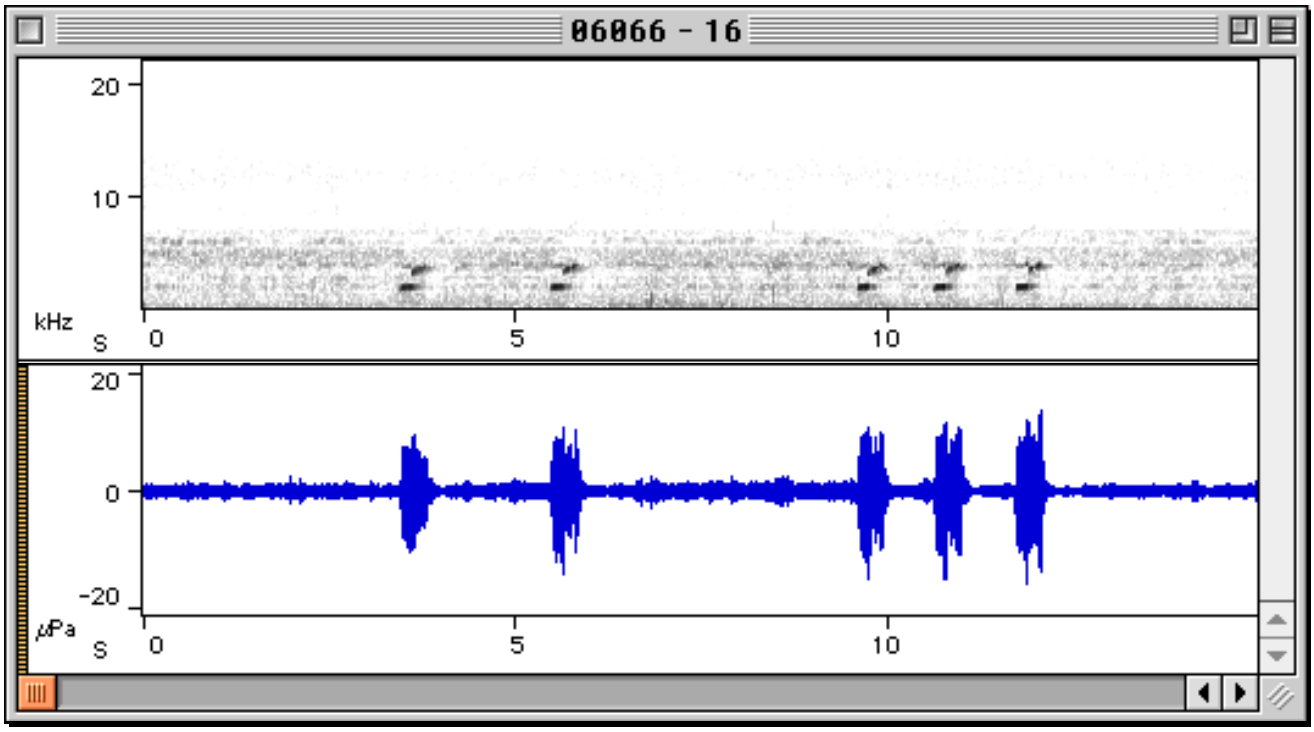
The table shows 1.0 being the highest possible correlation and where it appears is where the comparison is made to itself. The other highest number is 924.677 m, which is 75.323 m away from being 1000.000, or the same as 1.0. The Tink Frog calls are all very similar to each other according to the chart showing the lowest correlation number of 578 (equivalent to 0.578).

The following table and figures include: table 1-correlation of segments from tink frog calls, figure 1-Tink06061 a long segment showing time intervals, figure 2- 06066 long segment of frog call showing time intervals and difference between calls of two different frogs, figure 3-5 showing difference between three calls from different frogs, figure 3-Tink06061 section short section of individual call, figure 4- 06066 section short section of individual call, figure 5- 06072 section short section of individual call.

ARRAY	SPG-06066Section	SPG-06067Section	SPG-06071Section	SPG-06072Section
SPG-06066Section	1.0	914.207 m	807.130 m	817.169 m
SPG-06067Section	914.207 m	1.0	801.988 m	808.247 m
SPG-06071Section	807.130 m	801.988 m	1.0	867.507 m
SPG-06072Section	817.169 m	808.247 m	867.507 m	1.0
SPG-06073Section	832.533 m	834.363 m	739.527 m	733.716 m
SPG-06074Section	815.185 m	814.559 m	731.490 m	721.835 m
SPG-Tink06061section	807.183 m	803.072 m	713.543 m	702.375 m
SPG-Tink06062 Section	663.383 m	653.931 m	663.421 m	680.554 m
SPG-Tink0607Section	750.448 m	739.227 m	836.322 m	817.943 m

SPG-06073Section	SPG-06074Section	SPG-Tink06061section	SPG-Tink06062 Section	SPG-Tink0607Section
832.533 m	815.185 m	807.183 m	663.383 m	750.448 m
834.363 m	814.559 m	803.072 m	653.931 m	739.227 m
739.527 m	731.490 m	713.543 m	663.421 m	836.322 m
733.716 m	721.835 m	702.375 m	680.554 m	817.943 m
1.0	924.677 m	851.297 m	652.375 m	662.043 m
924.677 m	1.0	831.986 m	628.748 m	634.873 m
851.297 m	831.986 m	1.0	578.327 m	664.890 m
652.375 m	628.748 m	578.327 m	1.0	636.661 m
662.043 m	634.873 m	664.890 m	636.661 m	1.0




06066 - 16
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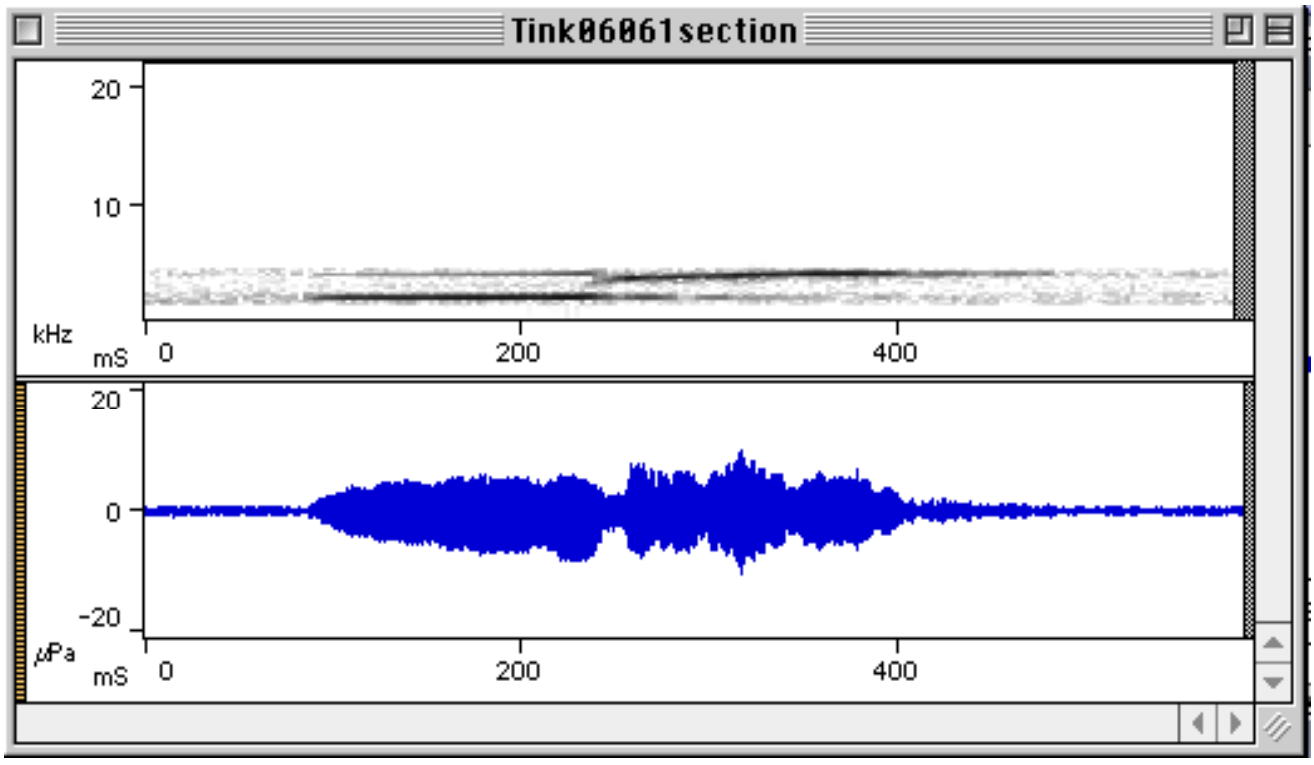
10
kHz
S
0
5
10
20
0
-20
µPa
S
0
5
10


Tink06061section
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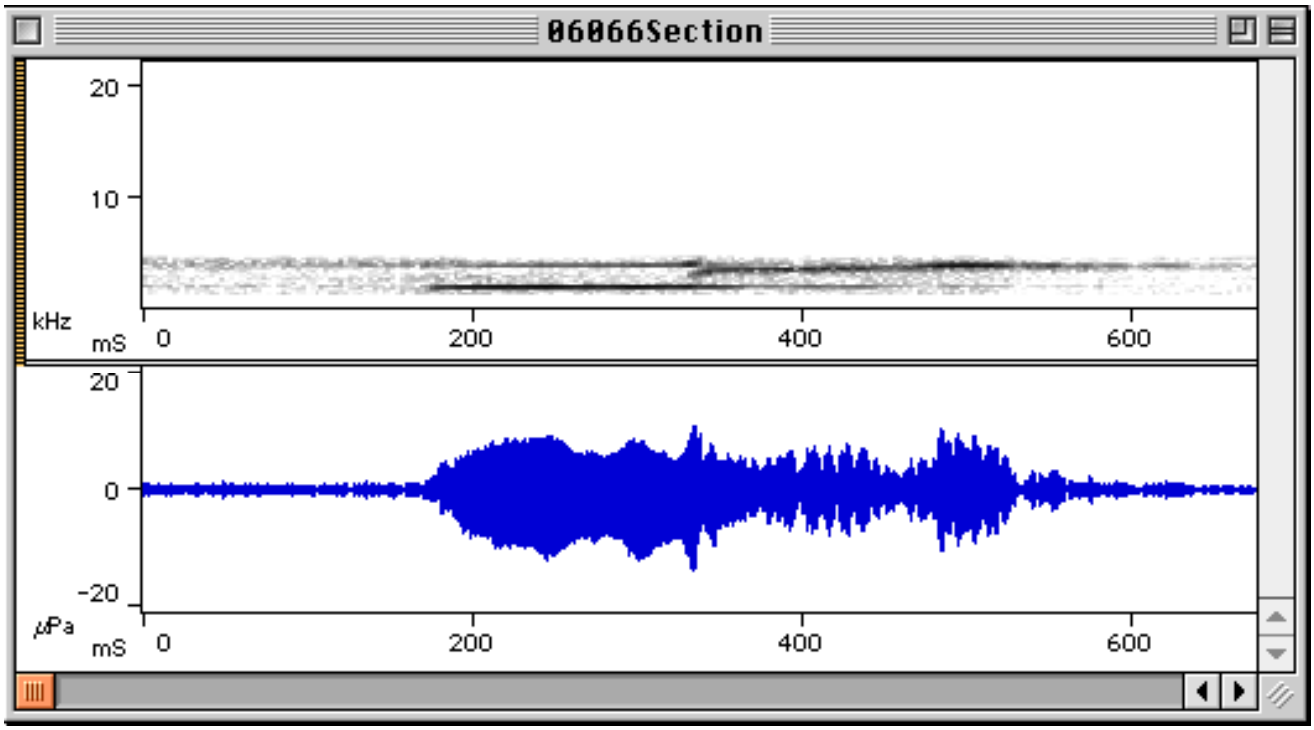
10
kHz
mS
0
200
400
20
0
-20
µPa
mS
0
200
400


06066Section
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kHz
mS
0
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400
600
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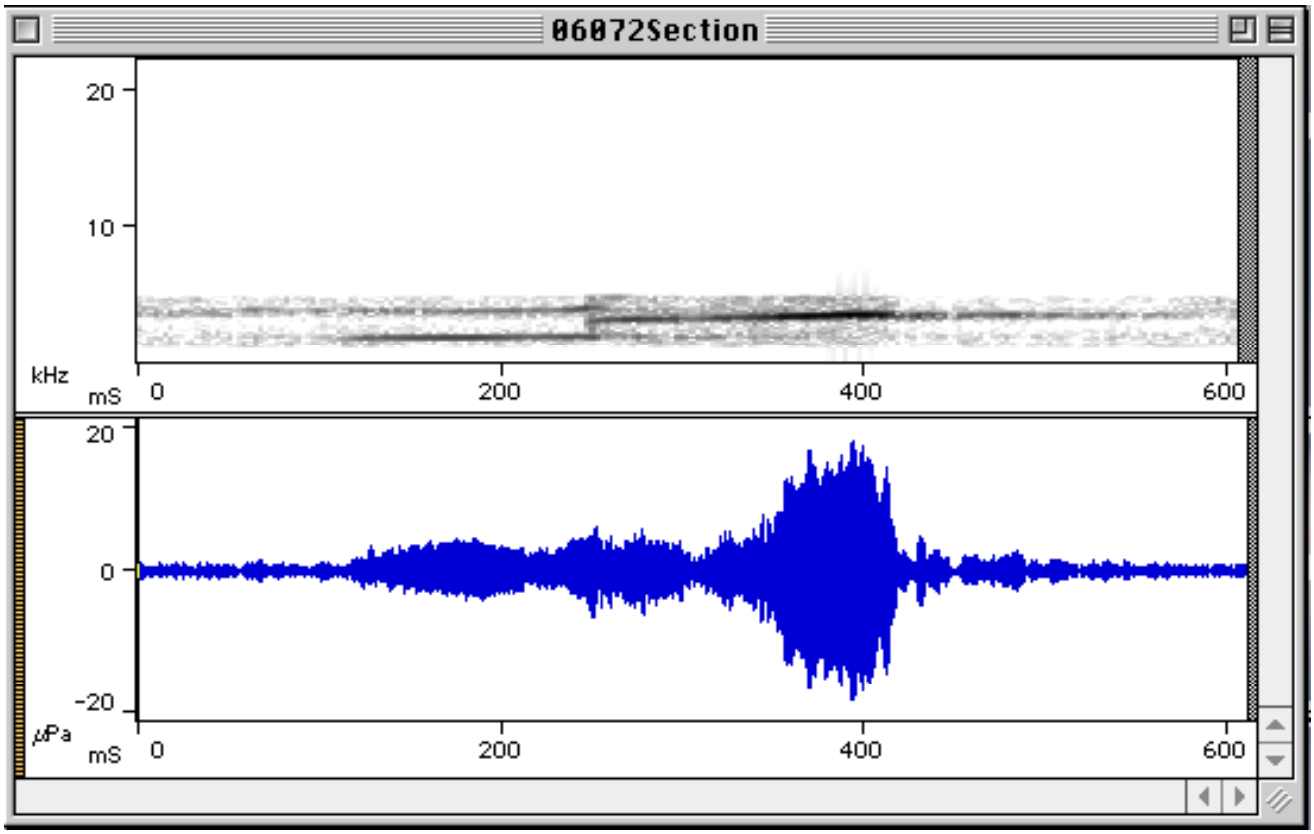
-20
µPa
mS
0
200
400
600


06072Section
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10
kHz
mS
0
200
400
600
20
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-20
µPa
mS
0
200
400
600

Discussion

The information provided by this study can be used as the basis for the continuation of the study on Tink Frogs. The recordings of the calls can be used to either stimulate other frogs to begin calling or to conduct studies to report what each call is used for. During the recording of these calls other calls were observed by Tink Frogs but were unable to be collected during the recording for different reasons. There were at least three calls heard. The first and most common call was the whooping sound, which was recorded. The other two calls heard during the time in the field included a chirping noise and the infamous tinking noise. The tinking noise was only heard once while observing a frog produce the whoop call. The chirping sound was observed after the recordings had already taken place while the transfer of calls were being made from the recorder to the computer. In the background a three to four syllable sound was heard and seemed as though the frogs were communicating. This assumption can not be proven because the frog making the noise could not be located. A study should be conducted on the different types of calls used for Tink frog communication.

Work Cited

Evans, P. G. H., and Jones, A. 1997. Dominica Nature Island of the Caribbean Wildlife Checklist. Ministry of Tourism, Roseau, Dominica.