

Texas A&M University

**Male population density of *Eleutherodactylus martinicensis* at
Springfield Plantation**

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Abstract

Eleutherodactylus martinicensis is commonly found at Springfield Plantation Research Center, although an estimate of their population here is unknown. Three different 60m² transects were conducted to gain an estimate of their population density, each at a different elevation and vegetation of different composition. Higher density rates occur at transitional secondary forest while lower density occurs at disturbed, cultivated regions. Population density ranged from 0.172m² to 0.411m².

Introduction

Phylum Chordata

Class Amphibia

Order Anura

Family Leptodactylidae

Genus *Eleutherodactylus*

Species *martinicensis*

Dominica is an Eastern Caribbean island located in the Lesser Antilles that receives approximately 7000 mm of rainfall per year and has a wide variety of vegetation. This vegetation ranges from dry scrub woodland to littoral woodland to rainforest and elfin woodland formations. It is home to three species of frog, *Leptodactylus fallax*, *Eleutherodactylus amplynymph* and *Eleutherodactylus martinicensis*. *E. martinicensis*, commonly known as the Tink frog, is endemic to Dominica, Antigua, Barbuda, Guadeloupe and Martinique. *E. martinicensis* varies greatly in physical characteristics within the species. Dorsal modeling ranges between reddish brown, yellow-brown, dark brown, grey and red on hind limbs as well as the groin. Ventral modeling is pale with numerous dark stippling and the throat is pale with dark spots. Females can reach SVL of 47 mm, while males are smaller. Only males make vocalization calls, and *E. martinicensis* have a distinct vocalization call consisting of a short level note followed by a longer rising note. This is presumably an advertisement call to attract females. Not only do males exhibit this type of calling behavior but a series of rapid clicks can be heard that is thought to indicate to other males their location (Malhotra, Thorpe, 1999). Although *E. martinicensis* can be heard throughout Springfield Plantation Research Center, there is no documentation as to what their population density actually is. By running three different transects on the plantation and listening to male vocalizations I

hope to gain an estimated population density of male *E. martinicensis* at Springfield. While gaining a generalized estimation of male density in the area I can also measure density in relation to vegetation, elevation and humidity.

Materials

- 100 ft measuring tape
- Biodegradable flagging tape
- Kestrel weather meter
- Garmin GPS
- Headlamps
- Two persons

Methods

Before I ran each transect I went to the three different sites; Mt. Joy trail, Bee House and L’etang trail. At each site I recorded the elevation with the Garmin GPS. I also measured out 100ft of trail and marked every 25ft with the biodegradable flags starting at 0ft. Then I recorded the types of vegetation found in each transect. On five different nights one other person and I ran two separate transects, usually between 8:00 and 8:30pm. Before we actually walked the transect I used the Kestrel to document temperature (F°), humidity (%) and dew point (F°). We would then start at the first flag and count calls heard within 1 meter on either side. Total area covered by one transect was 60m². We listened and recorded each weep and tink or if we heard both from the same frog within the 1 meter perimeter. At each 25ft marker we would wait for one or the other to catch up so we wouldn’t disturb any wildlife ahead until we reached the last 100ft flag.

Results

Table 1 shows collected data for each vocalization pertaining to its particular transect as well as total calls and mean density. Figure 1 corresponds to the mean density calculated at a site from least density (0.172m²) to greatest density (0.411m²). Table 2 shows recordings of elevation, temperature, humidity and dew point for each transect carried out. Figure 2 corresponds to vegetation found on each transect and its influence on density. Figure 3 represents density as a function of elevation. Figure 4 corresponds to

fluctuating humidity percentages and how density is impacted as humidity increases or decreases.

Table 1 Indicates estimated number of each vocalization type, total and average number of vocalizations found at each transect as well as calculated mean density for each transect site.

Transect	# Weeps	# Tinks	# Weep & Tink	Total #	Average #	Mean Density (m ²)
Mt. Joy trail 1	20	4	1	25	25	0.411
Mt. Joy trail 2	24	1	4	29		
Mt. Joy trail 3	18	0	2	20		
Bee house 1	13	1	0	14	10	0.172
Bee house 2	9	1	0	10		
Bee house 3	5	2	0	7		
L'etang trail 1	9	2	1	12	19	0.322
L'etang trail 2	20	5	1	26		
L'etang trail 3	16	3	1	20		

Table 2 Indicates elevation, temperature, humidity, and dew point of each transect corresponding to the total number of vocalizations at each transect site.

Transect	Elevation (ft)	Temp. (°F)	Humidity (°F)	Dew point (°F)	Total #
Mt. Joy trail 1	1400	73.1	90%	69.3	25
Mt. Joy trail 2		73.1	90%	69.3	29
Mt. Joy trail 3		70.0	98%	69.7	20
Bee house 1	1300	74.4	69%	64.9	14
Bee house 2		73.3	86%	69.5	10
Bee house 3		71.0	93%	69.0	7
L'etang trail 1	1100	79.1	68%	65.5	12
L'etang trail 2		79.1	68%	65.5	26
L'etang trail 3		74.0	82%	67.6	20

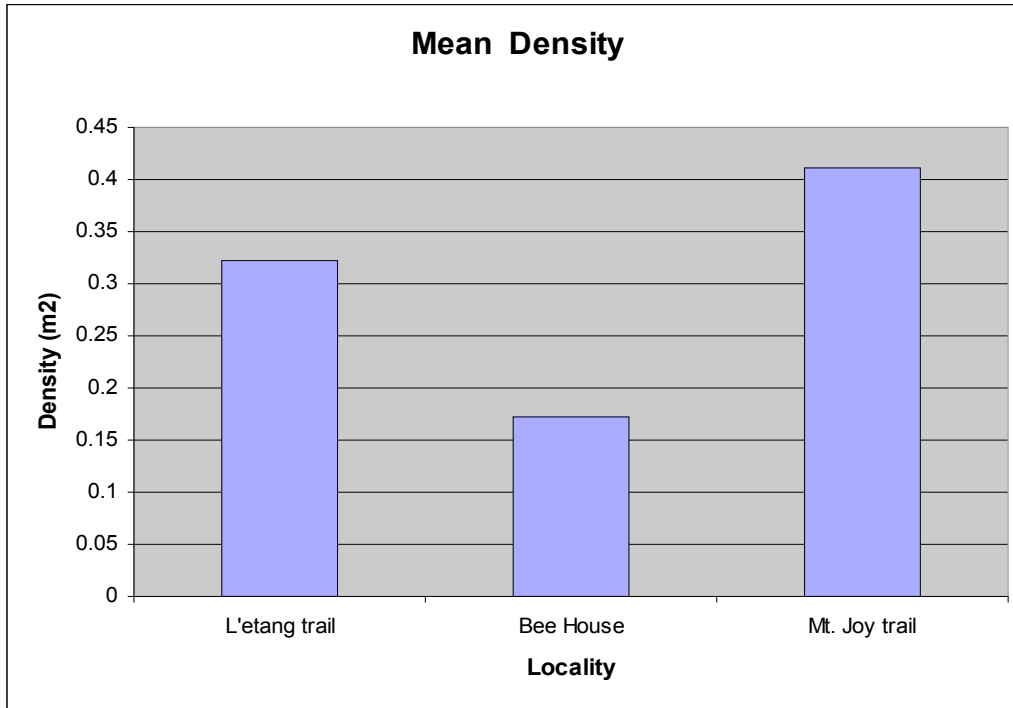


Figure 1 Represents calculated mean density of each 60m² transect at Springfield Plantation.

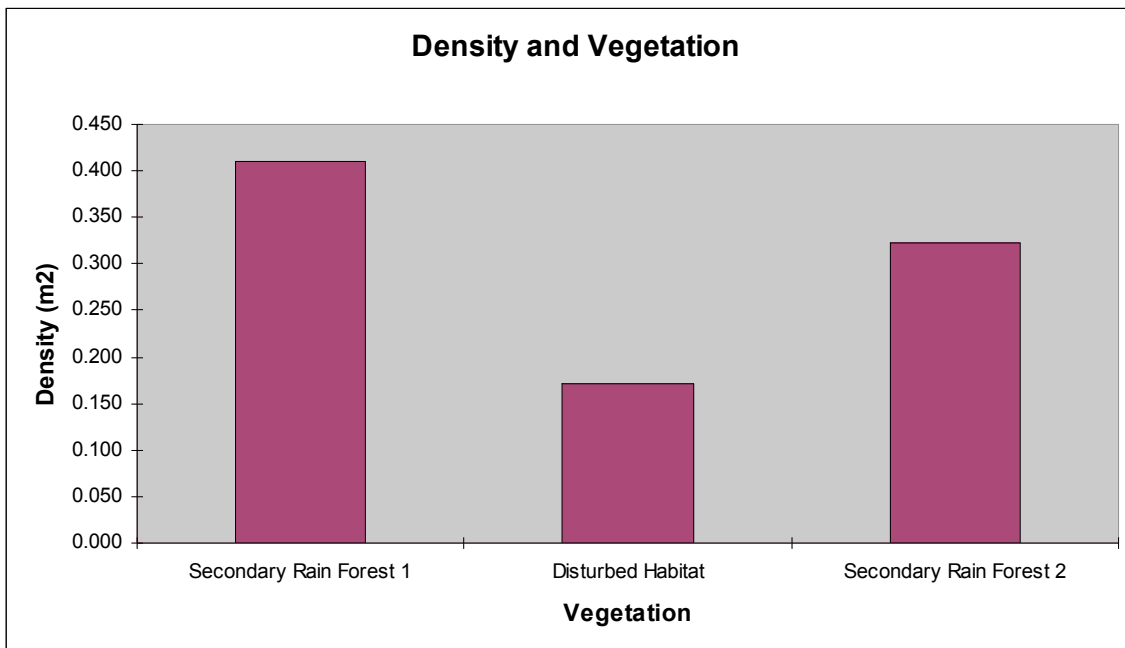


Figure 2 Represents Density as a function of vegetation found at each transect site.

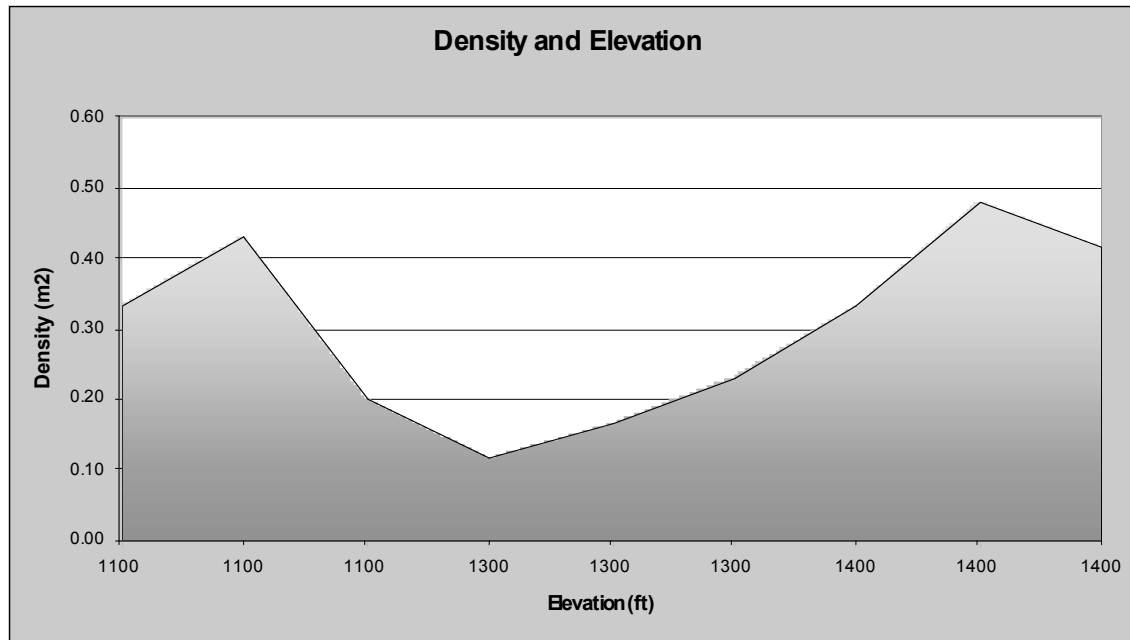


Figure 3 Represents density as a function of elevation. However, 1300-1400ft elevation is disturbed vegetation with accounts for the decrease seen in density.

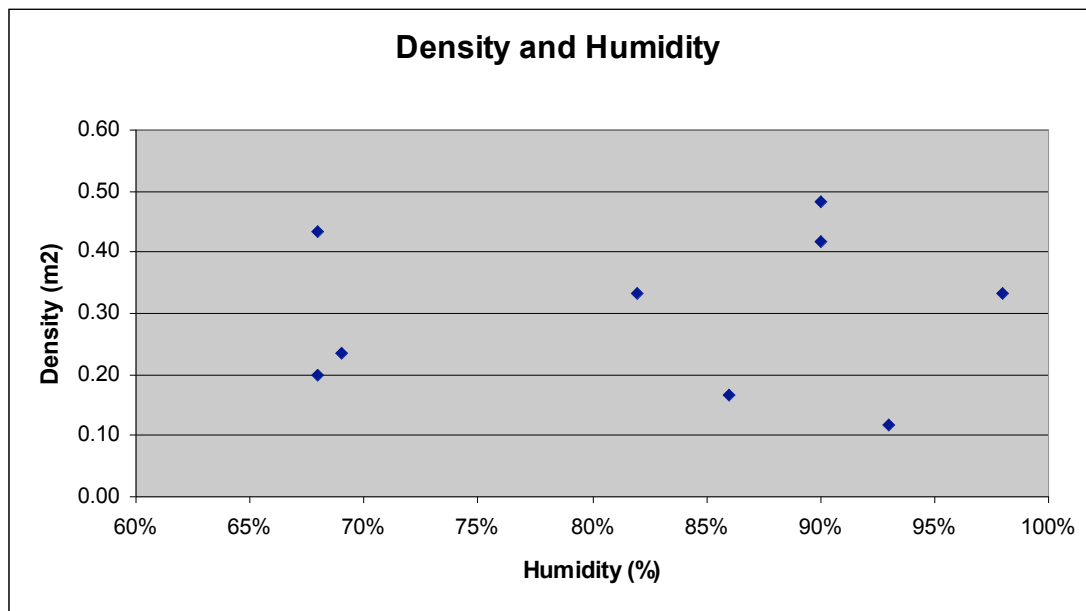


Figure 4 Represents density as a function of humidity, of which there is no significant affect on density.

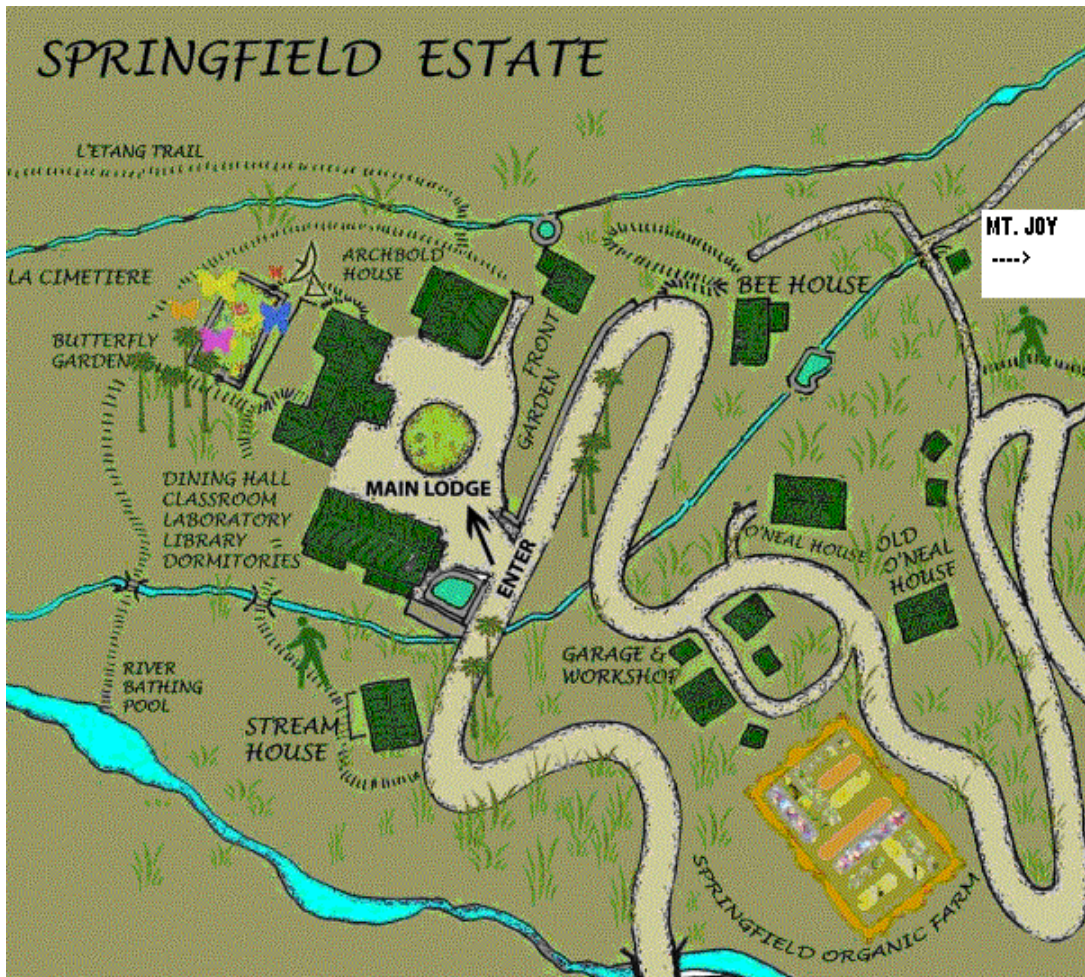
Discussion

I found that the population of *E. martinicensis* is abundant at Springfield Plantation. Bee House had the lowest population density followed by L'etang trail then Mt. Joy trail. Figure 2 shows population density in direct relation to vegetation found in the area. L'etang and Mt. Joy trail are transitional secondary rain forest vegetation. This includes low leaf vegetation consisting of broad leaves with dense ground cover. Bee House on the other hand is disturbed and cultivated land with much of its natural vegetation altered. Of the scarce broad leaved vegetation found in this area, it was found within razor grass that proved to be an unsuitable habitat for *E. martinicensis*. As elevation increased between L'etang trail and Mt. Joy trail, population density seemed to increase as well. Figure 3 represents this increase between these two elevations and indicates that although elevation is higher at Bee House than at L'etang trail, density here is less because of the disturbed habitat. Humidity seemed to have no effect on density as well. As humidity increased there was no corresponding increase in vocalizations. When humidity was between 80% and 100% however, vocalization was at its highest frequency.

Conclusion

E. martinicensis populations are dense at Springfield plantation. Mt. Joy trail proved to have the greatest density rate at $.422\text{m}^2$, followed by L'etang trail at 0.322m^2 , and Bee House at 0.172m^2 . Higher density rates are found where there are low, broad leaved vegetation where as lower density occurs in disturbed, cultivated vegetation. This conclusion is supported by the collected data that density in this disturbed habitat was significantly less than in transitional secondary forest. A water source has little influence on density of *E. martinicensis* which is supported by density recorded in localities stated previously.

Appendix A



Map of Springfield Plantation Research Station and location of each transect

Additional Remarks

Data collected indicates that as elevation increases density increases as well, this due in part because of denser vegetation in the area. For future research I believe it would be beneficial to run transects strictly testing density in relation to elevation of *E. martinicensis* on Dominica. At what elevation do we no longer see *E. martinicensis*?

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