

CALLING SITE AND BODY SIZE EVALUATION OF *LEPTODACTYLUS FALLAX*

By

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Abstract

Leptodactylus fallax is a tropical Anuran found on the island of Dominica in the West Indies. Males of this species use distinctive vocal calls to advertise territory, dominance, and to attract females (Pough, 1998). Larger males use their advertisement calls to intimidate smaller males and exclude them from favorable calling sites (Pough, 1998). Males were captured, weighed, measured, and marked to determine body size. Call sites were then assigned a quality rating. Although the sample size was small, the data suggests that a correlation exists between body size and call site quality.

Objective

The purpose of this experiment was to determine if a relationship exists between the size of advertising males and the relative quality of their individual calling sites. Habitat descriptions, individual specimen data, and Global Positioning Systems (GPS) data were used to accomplish this objective. GPS is the use of military satellite technology to pinpoint a location on the surface of the earth. A three-way communication must be established between four satellites, a base station, and the rover unit in order to achieve an acceptable accuracy. The four satellites give an x, y, and z value for each point taken. The base station is a computer system set at a known location. The base station for this study was located in St. Croix, Virgin Islands. Studies have shown that Anurans can identify individuals based simply on their calls (Pough, 1998). Anurans use their advertisement calls to establish territory, dominance, and to attract females (Pough,

and close proximity to other advertising males. After characterization of the habitats a GPS point was taken in order to observe the elevation and the spatial relationships between the ten *L. fallax* calling sites. Unfortunately, unforeseen computer problems prevented the processing of GPS data. In the future, GPS data points will be entered into a GIS program in order to create maps for comprehensive data analysis.

Results

The specimens were ranked in order of increasing size (See appendix: Figure 1) and assigned a site quality rating ranging from good (3) to average (2) to bad (1). The following results were obtained from the specimens. Specimen number one had an SVL of 120 mm, a weight of 400 g, and the second digit on the right hind foot was clipped for identification purposes. The specimen was located on a steep embankment beneath the Stream House at Springfield Plantation. The site overlooked a small stream and the specimen's call could easily be broadcasted over a large area. A large dasheen plant provided cover and the specimen was perched on a small rock beneath the leaves of the Dasheen plant. This site received a quality rating of 3 due to its good vegetative cover, proximity to a water source, and distance from other advertising males. Specimen number two had an SVL of 136 mm, a weight of 428 g, and the second digit on the left hind foot was clipped. The specimen was located approximately 30 to 40 meters away from the Springfield Plantation Guest House. The site was located a short distance away from a frequently used trail. One large tree and several small bushes and grasses provided moderately dense vegetative cover and dense leaf litter covered the ground. The site was overlooking a small valley with a stream running through it. This site received a quality rating of 2 due to the proximity to a frequently used trail and the close

habitat for other specimens. This site received a quality rating of 1 due to the atypical habitat, unsuitable man-made water source, and dense vegetative cover that greatly masked call broadcasting. Specimen number six had an SVL of 154 mm, a weight of 508 g, and the fifth digit on the left hind foot was clipped. This specimen was located on the trail to Mount Joy near the Bee House. The site was located on a steep embankment overlooking a valley with a stream running through it. The vegetative cover consisted mainly of sawgrass, bamboo, and ferns. This site received a quality rating of 3 due to the sparse vegetative cover that allowed the call to be broadcast over a large area. The isolation from other advertising males was also important in the quality rating of the site. Specimen number seven had an SVL of 154 mm, a weight of 520 g, and the third digit on the left hind foot was clipped. This specimen was located directly beneath the balcony of the professor's quarters at the Springfield Plantation Guest House. The area was covered by thick, herbaceous vegetation, shrubs, ferns, and vines. The site was relatively close to a valley with a stream running through it, although runoff from the Springfield Plantation kitchen created a secondary, man-made water source. This site received a quality rating of 2 due to the low vegetative cover that facilitated call broadcasting and the close proximity of potential predators (i.e. humans and canines). Specimen number eight had an SVL of 172 mm, a weight of 548 g, and the first digit on the right hind foot was clipped. This specimen was located approximately 50 to 55 meters from the Springfield Plantation Guest House along a trail. The site overlooked a small valley with a stream running through it and the vegetative cover was favorable for call broadcasting. The vegetative cover consisted of one large breadfruit tree, sawgrass, dasheen, and various types of small bushes. This site received a quality rating of 2 due to favorable call

quality rating of 1 or 2. Specimens six through ten occupy calling sites with a quality rating of 2 or 3. In the small specimen group (one through five), number one and number four show no correlation with the hypothesis due to the fact that they are small males that occupy calling sites with a quality rating of 3. In the large specimen group (six through ten), all show a correlation with the hypothesis due to the fact that they are larger males that occupy calling sites with a quality rating of 2 or 3. Of the ten specimens sampled, eight agreed with the hypothesis. This suggests that a correlation between body size and calling site quality exists in *L. fallax* males.

Had the GPS data been properly processed and analyzed, the calling sites of the ten specimens could have been characterized in terms of elevation, spatial relations between competing males, and vegetation. Using this information, a description of a typical *L. fallax* calling site could be created to aid in future research. The sample size used in this experiment was too small to show that a definitive correlation between body size and calling site quality exists among *L. fallax* males, but a larger data set should show that this correlation does exist. Future research should focus on using GPS data to comprehensively analyze the spatial patterns of calling sites, defining the feeding behavior of this species, and determining the effects of cultivation on the typical habitat of *L. fallax*.

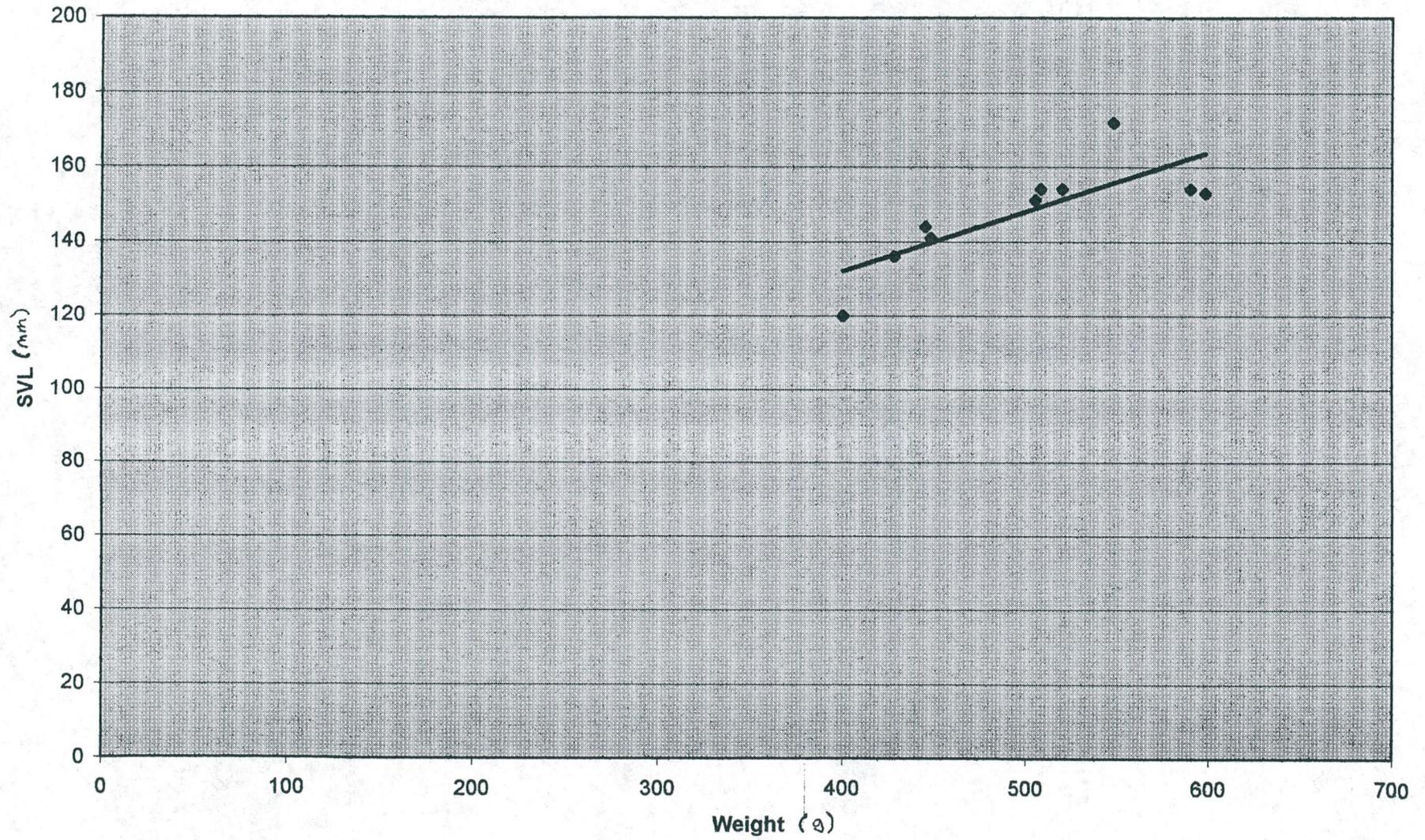
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References

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Figure 1. Size Rank Determinant



Appendix

Table 1.

Toe Clipped	SVL	Weight	Size Rank	Site Rank
2 nd digit on right	120mm	400g	1	3
2 nd digit on left	136mm	428g	2	2
4 th digit on right	144mm	445g	3	1
1 st digit on left	141mm	448g	4	3
1 st & 2 nd digit on right	151mm	505g	5	1
5 th digit on left	154mm	508g	6	3
3 rd digit on left	154mm	520g	7	2
1 st digit on right	172mm	548g	8	2
1 st & 2 nd digit on left	154mm	590g	9	3
3 rd digit on right	153mm	598g	10	3

would like to thank Mark Moore for exposing us to a unique brand of humor the likes of
which we have never seen before and hopefully will never see again.

broadcasting conditions and the close proximity to the other advertising males. Specimen number nine had an SVL of 154 mm, a weight of 590 g, and the first two digits on the left hind foot was clipped. This specimen was located approximately six meters away from the stairs leading to the Stream House at Springfield Plantation. The site was located on the side of a steep embankment overlooking a small stream. Bamboo trees, ferns, shrubs, bushes, and vines provided vegetative cover. The elevation and cover facilitated enhanced call broadcasting over a large area. This site received a quality rating of 3 due to the range of call broadcasting and the isolation from other advertising males.

Specimen number ten had an SVL of 153 mm, a weight of 598 g, and the third digit on the right hind foot was clipped. This specimen was located on the fringes of a bamboo forest bordering a cultivated area of Springfield Plantation. The site overlooked a small, seasonal stream and was covered by bamboo trees, ferns, shrubs, and short herbaceous vegetation. The site facilitated call broadcasting over a large area. This site received a quality rating of 3 due to the range of call broadcasting, close proximity to a water source, and isolation from other advertising males.

Unforeseen computer problems prevented analysis of the GPS data obtained in this experiment. The GPS data would have been used to determine the spatial characteristics of each specimen's calling site. This information would have provided a means to characterize typical calling sites for *L. fallax* males.

Discussion

Based on the hypothesis that larger males use advertisement calls to exclude smaller males from favorable calling sites, the data should show a correlation between body size and calling site quality. Specimens one through five should occupy calling sites with a

proximity to other advertising males. Specimen number three had an SVL of 144 mm, a weight of 445 g, and the fourth digit on the right hind foot was clipped. The specimen was located approximately 10 meters from the Springfield Plantation Guest House on the fringes of a cultivated area. The specimen was perched on a small pile of rocks underneath a juvenile bamboo tree. The site overlooked a valley with a small stream running through it. This site received a quality rating of 1 due to the close proximity to a cultivated area and the close proximity to other advertising males. Specimen number four had an SVL of 141 mm, a weight of 448 g, and the first digit on the left hind foot was clipped. The specimen was located overlooking a small stream running through the forested area above the Springfield Plantation Guest House. The site was covered by dense bamboo and banana trees, and the ground was covered by dense leaf litter. The sites elevation allowed the specimens call to be broadcast over a large area. This site received a quality rating of 3 due to the large call broadcasting area, the moderately dense vegetative cover and the isolation from other advertising males. Specimen number five had an SVL of 151 mm, a weight of 505 g, and the first two on the right hind foot were clipped. This specimen was located approximately 2 kilometers away from the Springfield Plantation Guest House in a forested area along the road. The specimen had assumed a perch overlooking a man-made water source. A pipe was leaking a steady flow of water and this served as the water source that all *L. fallax* males gravitate towards when searching for calling sites (Pough, 1998). The site was covered in dense leaf litter, surrounded by various ferns, bamboo trees, banana trees, and several different types of brushes and grasses. The dense vegetation greatly masked the specimen's call, and although no other advertising males could be heard the area did not appear to be suitable

1998). Based on this information, larger *Leptodactylus fallax* males should have more favorable calling sites than smaller males due to their ability to intimidate smaller males using their advertisement calls. Ten *L. fallax* specimens were captured, weighed, measured, and marked. Then, the surrounding area was described and GPS points were taken in order to determine the spatial relationships among the ten *L. fallax* specimens.

Methods

All data was obtained using the following methods. The specimens were located by following the mating calls until visual contact was established with the advertising male. The specimens were then captured by hand. Each specimen was weighed, measured, and marked. Weights were measured in grams, Snout-Vent-Length (SVL) was measured in millimeters, and the specimens were marked using toe clipping. The innermost digit on each hind foot was defined as 1 and each digit was numbered in increasing order towards the outermost digit, defined as 5. The specimens were then released to their original calling sites and the site was marked by placing a red tag on the nearby vegetation. Each calling site was then described in terms of vegetation, proximity to a water source, and proximity to other *L. fallax* individuals. These three factors were used to qualify each calling site as good (3), average (2), and bad (1). A good (3) site was defined as a site containing vegetation that would not obstruct call broadcasting, close proximity to a water source, and distance from other advertising males. An average (2) site was defined as a site containing moderate amounts of vegetation that may slightly obstruct call broadcasting, relatively close proximity to a water source, and relatively close proximity to other broadcasting males. A bad (1) site was defined as a site containing dense vegetation that would obstruct call broadcasting, not in close proximity to a water source,