# Environmental Factors Influencing Habitat Selection of *Leptodactylus fallax*

**J.F. Roesner & J.S. Heath**

**Abstract:**

***Leptodactylus fallax* is a large species of nocturnal anuran that is endemic to the island of Dominica. The basic premise of this project was to survey the habitat of *L. fallax* and analyze a suite of variables that could have an effect on habitat selection. We hypothesize that canopy cover, distance to a primary water source, and slope of the soil will affect the habitat selection of *L. fallax*.**

## Introduction

*Leptodactylus fallax*, known natively as the Mountain Chicken or crapaud, is a large anuran endemic to the island of Dominica. As Mountain Chicken is a local culinary favorite, there is a defined hunting season set up for the Mountain Chicken, but due to a decrease in population size it is closed for the season of 2000. Prior research, and local knowledge of *L. fallax*, indicated a strong sense of territoriality within the male of the species. The purpose of this project was to describe known habitats of *L. fallax*. Several environmental conditions and frog characteristics were described during this survey. We measured a suite of environmental variables at sites where frogs where captured, and an adjacent area not containing a frog was chosen and described using the same environmental conditions. We hypothesize that the ideal location for *L. fallax* habitat is one that is close to a primary water supply and has a large amount of canopy cover with a moderate topographic slope (5°-15°).

## Methods

Specimens were usually collected between the hours of 6 p.m. and 11 p.m., as L. fallax calls mostly at night. (On rainy days, however, *L. fallax* would frequently call during daylight hours.) Specimens were collected by hand, or by using a pillowcase. The primary vicinity in which the frogs were captured was the Archbold Tropical Research Center. The ATRC is an area situated in secondary rain forest with scattered agricultural plots. We followed the vocal call of the specimens until visual contact could be made. Upon visual recognition, we captured the specimen and recorded the weight in grams and the snout-vent-length (SVL) in millimeters and identified the sex of the specimen. (Males of the species exhibit a small black spike used to grip the female on its front limbs.) Additionally, *L. fallax* exhibits characteristic markings distal to the frog's eye and on the dorsal side. These characteristics were sketched and recorded for the purpose of future identification. Each frog was also marked with biodegradable flagging tape indicating the order of catch. The number representing order of catch corresponds to the habitat in which the frog was caught. As capture was made at night, the site of capture was flagged in order that the researchers could return during the day to collect environmental data.

Using a Global Positioned Satellite (GPS), exact coordinates and elevation of the habitat were determined. With these coordinates, the researchers could be assured of returning to the same site either during this project or during future studies.
A suite of variables was studied to describe the frog's habitat. The distance to the nearest primary water source was measured in meters. The canopy cover was calculated at "frog height"(frog on ground) and at "human height" (canopy cover calculated at the waist of the researcher). To measure canopy cover, we used a spherical densiometer, which measures forest overstory density. The slope, measured in degrees, was derived using triangulation and angle compliments. A visual description of the site was also recorded. After sampling all of the variables, an area was chosen at random for comparative sampling, ten meters from the frog habitat. In this area, distance to primary water source was again measured in meters. Canopy cover was calculated at "frog height" and "human height." And soil slope was also measured using the same method of triangulation and angle compliments.
We compared sites with frogs ( probability of occurrence=1) to the paired sites without frogs (probability of occurrence=0) for the measured habitat variables using logistic regression. Logistic regression derives the best-fit predictive model for a dichotomous dependent variable, much like multiple regression.

**Data**

| FROG*** | FROG COVER | FROG PRESENT* | HUMAN COVER | SEX ** | SLOPE (°) | SVL (mm) | DIST. TO WATER (M) | WEIGHT (g) |
|---|---|---|---|---|---|---|---|---|
| 1 | 83.36 | 1 | 92.72 | 1 | 24 | 174.4 | 4.84 | 550 |
| 1 | 74 | 0 | 90.64 | 0 | 12 | | 3.56 | |
| 2 | 86.98 | 1 | 90.64 | 1 | 40 | 184.4 | 19.64 | 525 |
| 2 | 64.64 | 0 | 68.8 | 0 | 9.75 | | 29.64 | |
| 3 | 81.28 | 1 | 91.68 | 1 | 19 | 174.7 | 27.5 | 500 |
| 3 | 0 | 0 | 0 | 0 | 4 | | 17.5 | |
| 4 | 73.48 | 1 | 86.48 | 1 | 30 | 145.8 | 33.5 | 398 |
| 4 | 64.64 | 0 | 64.64 | 0 | 6 | | 20 | |
| 5 | 90.64 | 1 | 97.92 | 1 | 2 | 164.2 | 1.74 | 600 |
| 5 | 52.16 | 0 | 58.4 | 0 | 1 | | 10 | |
| 6 | 95.84 | 1 | 91.68 | 1 | 10 | 182.6 | 14 | 600 |
| 6 | 89.6 | 0 | 81.28 | 0 | 15 | | 2.59 | |
| 7 | 85.44 | 1 | 78.16 | 1 | 19 | 162.9 | 50 | 450 |
| 7 | 82.32 | 0 | 74 | 0 | 22 | | 40 | |
| 8 | 86.48 | 1 | 63.6 | 1 | 13 | 158.3 | 0 | 495 |
| 8 | 66.72 | 0 | 81.28 | 0 | 3 | | 10 | |
| 9 | 79.2 | 1 | 72.96 | 1 | 16 | 159.6 | 50 | 505 |
| 9 | 93.76 | 0 | 87.52 | 0 | 22 | | 60 | |
| 10 | 97.92 | 1 | 83.36 | 1 | 28.5 | 161 | 45 | 600 |
| 10 | 81.28 | 0 | 92 | 0 | 28.5 | | 37 | |
| 11 | 100 | 1 | 89.6 | 2 | 6 | 126.8 | 2.78 | 250 |
| 11 | 95.84 | 0 | 75.04 | 0 | 7.5 | | 7.22 | |

*1 indicates a frog found.
** 1 indicates male. 2 indicates female.
*** The first row for each numbered frog indicates the data for the capture site and the second indicates the randomly selected paired site.

## Results

UNWEIGHTED LOGISTIC REGRESSION OF FROG_PRES
PREDICTOR

| VARIABLES | COEFFICIENT | STD ERROR | COEF/SE | P |
|---|---|---|---|---|
| CONSTANT | -9.14791 | 5.65921 | -1.62 | 0.1060 |
| FROGCOVER | 0.07467 | 0.05424 | 1.38 | 0.1686 |
| HUMANCOVER | 0.02827 | 0.05523 | 0.51 | 0.6088 |
| SLOPE | 0.06320 | 0.06928 | 0.91 | 0.3617 |
| TO_WATER | -0.01362 | 0.03192 | -0.43 | 0.6695 |

| | |
|---|---|
| DEVIANCE | 22.94 |
| P-VALUE | 0.1511 |
| DEGREES OF FREEDOM | 17 |

## Discussion

Multiple variables were analyzed in an attempt to predict frog habitat using a logistical regression model. Although the overall model was not significant, areas with greater canopy cover at frog height were found to be more likely to contain a frog, exhibiting a P-value of 0.1686. That finding is not unusual as the frog is dependent on its immediate canopy cover for shelter and shade as well as protection from possible predators (and mountain chicken researchers).

The slope of the soil was significant, which is also understandable as the slope of the soil changes over only a few meters. A variety of soil slopes may be found within the habitat of one frog.

Canopy cover measured at human height was also not significant. This is also understandable as the canopy cover at human height is not an environmental factor that immediately affects the frog.

Distance to water was the least significant of all variables. *Leptodactylus fallax* is not dependent on water so this finding is not surprising.

There are several reasons for error in this study. As always, researcher error must be taken into account. Another reason for error, perhaps the most significant, is the small sample size studied. With only 11 specimens collected, the statistical tests used had little power. A larger sample size will yield not only more data, which will produce more accurate results, but a larger sample size will also give more power to the tests used.

## Conclusion

*Leptodactylus fallax* is a species that is most often found in a habitat with high vegetation cover at ground level. For more accurate results in future studies, a larger sample size should be obtained.

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