

Possible Causes of Reduction in Bat Captures on the Springfield Estate

by

Pamela Newton

6/7/99

INTRODUCTION

There are twelve species of bats on the West Indian island of Dominica. In the past, many of these species have been captured by scientists and students through the use of mist nets of various sizes. Mist netting in the vicinity of the Springfield Estate and Mt. Joy has yielded hundreds of bats in the past (Genoways et al., 1999.) Expectations, therefore, were extremely high when this project began. Unfortunately, the number of bats captured fell very short of these expectations, and it is now the intention of this project to explain why the number of bats captured has been so greatly reduced compared to past years. Three possibilities discussed within this report are changes in vegetation at the Springfield Estate, the ability of insectivorous bats to detect the nets and weather and light conditions.

METHODS

In attempting to capture bats, mist nets were set up at various locations on the Springfield Estate. All nets were six meters long and four shelves high, except for net E, which was nine meters long and four shelves high. Net A was initially set up south of the Guesthouse next to a single mango tree in a large, open area parallel to a road leading down into the farm patch (see diagram.) This land has been cultivated within the last two years, and besides the single mango tree, its only vegetation is a few farm vegetables and some grasses. Very little of the original vegetation is present, except in the outlying areas, which contain mango and breadfruit trees. Net B was set up a few meters north of net A in a small clearing in a wooded portion of the outlying area of the farm patch. This area consists mostly of mango and breadfruit trees, as well as coconut palms. Nets C and D were not used for bats. Net E was initially set up parallel to and west of net A, to provide greater coverage of the flyway leading through the farm patch and into the forest. It was later rotated 90 degrees, perpendicular to net A, creating an L-shaped vector of coverage of this flyway. After limited success, we moved net A and set up net H at the southwest corner of the veranda at the Guesthouse, directly off the covered dining area. This location was chosen because of the large amount of insect activity attracted by the fluorescent lighting and because of the bats observed flying through the veranda feeding on the insects.

With the original intention of providing some systematic accounts of the species captured, measurements were taken of forearm length, notch to tip ear length, hindfoot length and weight. These measurements were in millimeters and grams, respectively. Bats captured were marked with white shoe polish so they could be identified upon recapture. After all measurements were taken and the bats were marked, they were released.

RESULTS

A total of 20 hours of netting was done, yielding only four bats of two species. On May 24, no bats were captured from 2030 to 2230. On May 25, one male *Sturnira lilium* was captured at 2050. This bat's wing was injured in an attempt to disentangle itself. Therefore, it was not processed. On May 27, one male *Sturnira lilium* was captured at 2100. It weighed 10 g and had forearm length of 45mm and ear length of 10 mm. No bats were captured on May 26 or from May 28-31. During this time, however, insectivorous bats were observed foraging while flying high above the nets. This activity occurred mostly before moonrise, and it slowed down a great deal after the moon rose, especially on clear nights when the moon was full. This activity occurred from 1830 to 1930, every night that it was clear. On June 1, after setting up nets on the veranda, a *Pteronotus davyi* was captured at 2145 in net A. It weighed 10 g and had forearm, ear and hindfoot lengths of 50mm, 14mm and 10mm, respectively. At this location, high activity was observed under the roof of the veranda from 2145 to 2215. It should be noted, however, that this activity varied in intensity from night to night. No bats were captured on June 2. However, on June 3, a *Pteronotus davyi* was captured at 2000 after a brief rain shower. This bat weighed 10g and had forearm, ear and hindfoot lengths of 55mm, 16mm and 10mm, respectively. No bats were caught on June 4, the last night of netting.

DISCUSSION

The above results are in extreme opposition to past results of other students, as well as researchers.

Only four bats of two species were captured, compared to hundreds of bats of several species captured in the past (Genoways et al., 1999.) One possible explanation of this is the dramatic change in vegetation around the Springfield Estate within the last two years. The open area now being cultivated was once full of fruiting trees, such as mango, breadfruit, citrus, fig and banana. The clearing of the land for farming would naturally account for a lower number of fruit-eating bats being captured. Indeed, both fruit-eating bats caught were in the vicinity of fruiting trees.

The two insectivorous bats that were captured were probably attracted to the insects flying about the fluorescent lighting of the veranda. However, it was surprising that no more were caught. This led to speculation about the ability of insectivorous bats to better detect the mist nets, as well as the possibility of weather and light conditions creating variations in the intensity of insect activity. Insectivorous bats have much more finely honed and precise echolocation capabilities than other bats (Wilson, 1997.) Once engaged, echolocation proceeds automatically and very quickly. In comparison, fruit bats must survey an area for suitably ripened fruiting trees and store these in memory (Wilson, 1997.) They use echolocation for finding fruit in general, but for detecting and discriminating suitable ripeness of fruit, olfactory and chemical signals are used (Wilson, 1997.) This makes it considerably more difficult for them to forage than for the insect-eaters to forage. Considering the extremely sensitive and finely tuned echolocation capabilities of insectivorous bats, it could be concluded that they were somehow capable of detecting the nets. Indeed, the behavior of some of the bats under the veranda would indicate this ability. Some bats would fly within millimeters of touching the net, then quickly dart up and over the net, avoiding being captured. This happened several times at the veranda location.

Another contributing factor could be weather conditions. While observing bats flying high over the nets in the open area of the farm patch each night at dusk, more intense activity was noticed when the moon was bright and full. On nights when no bats were captured at the veranda location, it was noted that there had been gusty winds and a drop in air pressure, effectively driving away insects that would have otherwise attracted bats to the nets. These changes preceded rain showers and were perhaps detected by the insects, as well as the bats.

In conclusion, changes in vegetation, weather and light conditions, as well as echolocation ability were observed as possible contributors to the low number of captures in comparison to past years. All three of these factors should be taken into consideration in future attempts at mist netting for bats on the Springfield Estate. Furthermore, in future bat studies, it would be far more productive to have several people involved in the project so that several different netting locations can be set up and compared. I believe this project could have been much more productive had there been more students participating and more and varied netting locations had been utilized.

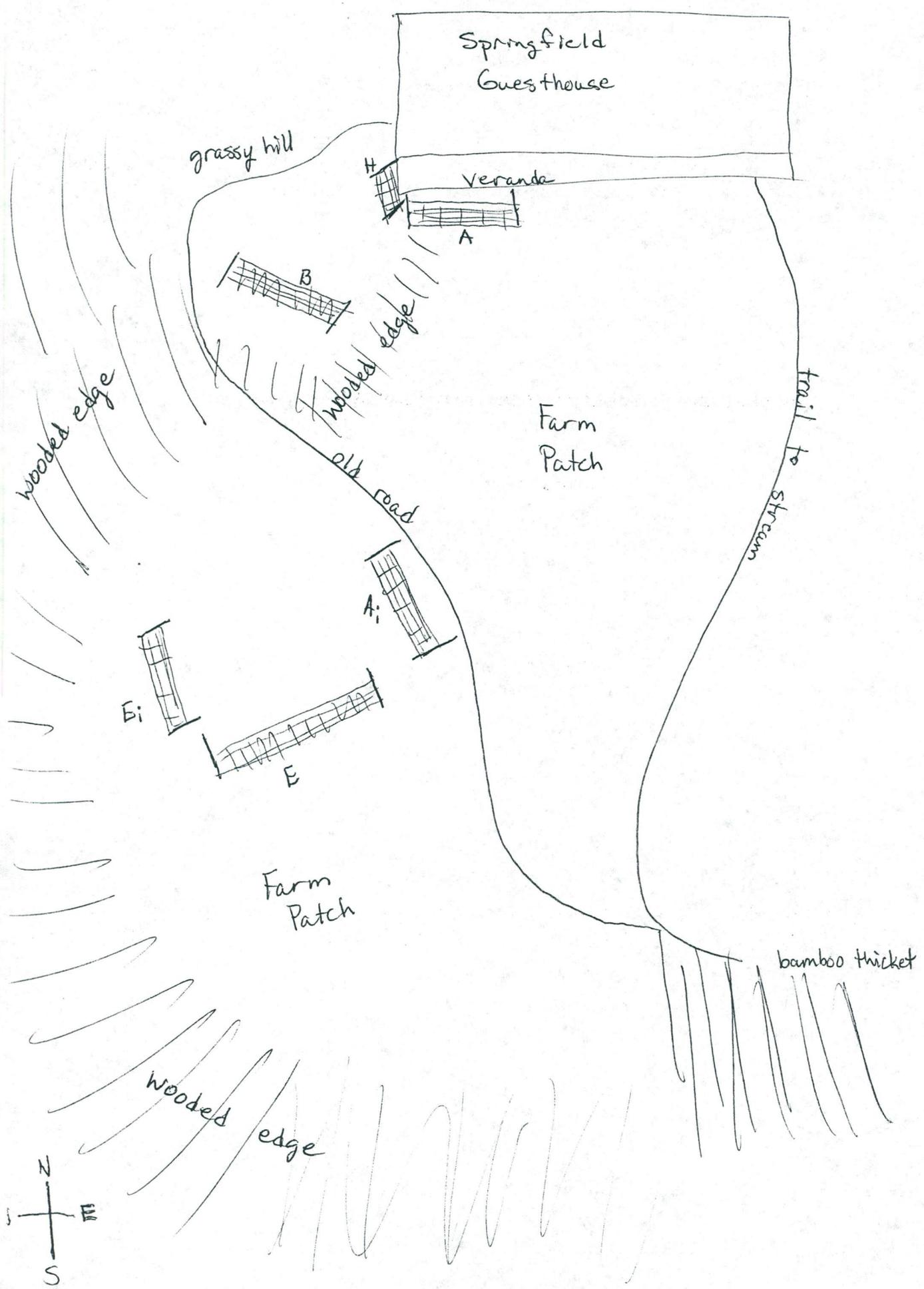
ACKNOWLEDGEMENTS

I would like to gratefully acknowledge Shannon Waterhouse, Keith Arnold and Duane Schlitter for their patience, optimism and assistance with this project.

LITERATURE CITED

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Springfield
Guesthouse

grassy hill

Veranda

H

A

B

A_i

E_i

E

Farm
Patch

old road

trail to stream

Farm
Patch

bamboo thicket

wooded edge

