Call Response in *Dendroica petechia*

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Abstract

The island of Dominica possesses many species of birds. One the most prominent species around the Archbold Research Tropical Education Center is *Dendroica petechia,* or the yellow warbler. The focus of this study was to determine the distribution of call responses from *Dendroica petechia* uses of a speaker that played their call and general visual observations. Three locations were selected around ARTEC to conduct the observations. The observations showed that *Dendroica petechia* was more likely to call if the speaker was played prior to their call, and each of the locations showed this trend. It was also observed that the majority of calls were made by males.

Introduction

According to the Encyclopedia of Life website, *Dendroica petechia*, the yellow warbler, is found along many tropical coastlines. It is a highly migratory species that can be found in the southern Lesser Antilles, including the island of Dominica. *Dendroica petechia* is generally a monogamous species that mates during May to early June. Like many other species of bird, it uses vocal calls to communicate with its conspecifics. Males will sing to defend their nesting territories and attract mates. The calls *Dendroica petechia* makes are used to signal territorial boundaries among males and mating calls between both sexes (Beebee, M. 2002). Male yellow warblers possess red markings on top of their head and a brown plumage on their chest (Crary, A. L *et al*. 2012). The purpose of this study was to evaluate whether or not *Dendroica petechia* is more likely to return calls in the presence of calls played on a speaker. If the call frequencies are territorial, then I hypothesize that playback of the speaker will increase calls.

Materials and Methods

The methods of this project consisted of auditory observations of *Dendroica petechia* calls and visual observations of their behavior. In order to maximize the analyzation of these calls, data were measured by playing the yellow warbler's song on a speaker and then recording the number of returned calls via tally marks. The speaker was played every thirty minutes, but the measurements were taken in time increments of fifteen minutes, so that the response to the speaker could be compared to the response without it. The time increments were then divided into two segments. The first segment being the first five minutes following the start of the fifteen minute increment and the second segment being the remaining ten minutes of the fifteen minute increment. There were two fifteen minute segments: one without playing the call on the speaker and one following the playback of the call.

Calls were tallied following auditory recognition of *Dendroica petechia* calls. Initially the calls were compared with a previous recording of a *Dendroica petechia* call. The calls were only counted if it was obviously recognizable when compared to the recording, and if there was any doubt of it being *Dendroica petechia* the call was not recorded. The observations were taken at three different locations within the Archbold Research Tropical Education Center in Dominica, and at different times throughout the day. The three locations included the Bee House, Stream House, and the Veranda. General behavioral observations of *Dendroica petechia* were taken via sight and recorded in a pocket notebook throughout the course of this study.

Results

Statistical analysis of these data suggested that there was a relationship among *Dendroica petechia* response and the presence of calls played by the speaker. A Two-Way Analysis of Variance indicated that call frequency varied by location and the playback method (Table 1). The

table indicated that there was a significant difference between the locations (p-value= 0.001) and that there was a significant difference between the absence and presence of calls played on the speaker (p-value=0.001). Analysis of the relationship between the call response method and location showed that there was no significant difference between the two (p-value= 0.465), indicating that there was no interaction between location and the call response method. Post hoc comparisons using Tukey's test showed that the mean score of the frequency of *Dendroica petechia* calls were highest at the Bee House (M= 7.19), and the Stream House (M=7.19) when compared to the frequency of calls at the Veranda location (M= 4.21), indicating that the mean number of songs per location varied significantly. Another Tukey test indicated that call response varied significantly among the times the speaker was played and the times that it was absent. The first segment of the calls recorded without the speaker had an average of 3.67 and the second segment recorded without the speaker had an average of 5.39. There was only a slight difference among these segments, and the difference between the two segments was not significant (p-value <0.05). The first segment of calls recorded with the speaker was an average of 8.00 and the second segment of calls with the speaker was an average of 8.42. The p-value indicated that there was no significant difference (p-value <0.05) among these two segments and the high frequency of these segments indicated that the playback did provoke more responses of *Dendroica petechia.* These results indicated that there was no significant interaction between the site of the recordings and the method of the speaker being played. It was also noted that at the Veranda location calls were often heard coming from multiple different directions, indicating that there was most likely more than one individual in the area. The Bee House and Stream House consisted of calls coming from usually the same area, indicating it was likely one individual that was returning the calls from the speaker. The graph in Figure 1 shows that the number of calls

was frequently higher with the playback of the speaker. This trend is evident in throughout each location.

During the visual observations of this project it was apparent that males were the main sex that responded to the calls. Males were identified by the red coloration on the top of their head that was very obvious with the use of binoculars. There were many instances in which the males came immediately to the call and returned calls throughout the gap of individual calls on the recording played by the speaker. This behavior was observed many times at the Bee House and Stream House. If a female was observed, she would fly to a branch near the speaker, but there was never an instance that a female was visually seen returning calls to the speaker. When the speaker was played many individuals flew to the same branch near the speaker to return the calls. There were also times in which a pair of yellow warblers would appear to chase other birds from the area. It was observed that these pairs would chase members of their own species and members of other species from the area.

Figure 1. Call Frequency by Playback and the Time of Day

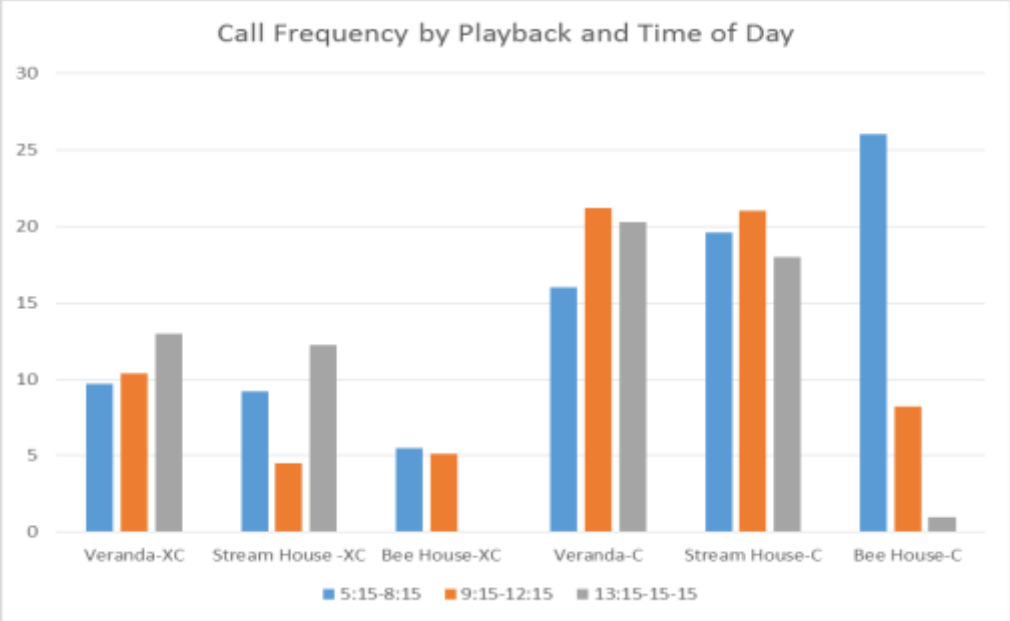

Table 1. Two Way Analysis of Variance by site and Playback Method

2-Way Analysis of Variance					
Factor	Sum of Squares	Df	Mean Square	F	P
Site	342.3	2	171.2	7.51	0.001
Method	544.2	3	181.4	7.96	>0.001
S x P	129.2	6	21.5	0.95	0.465
Error	3007.8	132	22.8		
Total	4023.5	143			

Discussion

The playback of the speaker proved to be a useful tool in provoking a response in *Dendroica petechia* throughout each location of the study. The two locations with the highest

frequency of calls, the Bee house and the Stream House, both exhibited males that would almost immediately appear to return calls throughout the playback of calls on the speaker. It is possible that both of these locations possessed territories that were highly defended by *Dendroica petechia.* It was also evident that these males were comfortable patrolling the area, since they usually landed on many of the same branches and called from these same branches and then retreated to the same tree. The fact that the majority of call responses were done by males in the area is a possible indication that males and females may have different roles in territory defense. The Veranda location consisted of significantly less calls that were returned by the birds, and it was observed that many of the calls appeared to come from different areas. It may be possible that this area was at the edge of many different *Dendroica petechia* territories and therefore this location was not patrolled as often by individuals that were in control of the area.

Although this study was intended to be completed without bias it is possible that some of the observations made were done so with human error. There were many instances in which environmental factors, such as rain or wind, affected the ability to hear. It is also possible that distant warblers returning the call were not heard due to the speaker being played loudly. The calls returned by *Dendroica petechia* could have also been mistaken for another bird and vice versa. Near the stream house there was also an area with constant running water that could have also affected the ability to hear the calls in this area. Each call was indistinguishable from the others with the methods used in this project, so being able to differentiate between individuals was difficult. This could have led to error in this project if one individual was more active than others in the area and caused bias if he was the main individual answering to calls in the area.

In future projects, it is advised that researchers should use techniques, such as mist netting, that would allow them to differentiate between individuals. The use of a high tech

recording device should also be used to evaluate calls, so that calls can be analyzed more accurately. The use of locations with more distance from each other should also be utilized in future projects.

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