

Foraging Patterns and Behavior of
Tyrannus dominicensis

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ABSTRACT

This observational experiment was developed to quantify the feeding habits of the Gray Kingbird at the Springfield Plantation on Dominica. Data collection took place over a one week period in a transitional secondary rainforest. Perch substrate, search time, sally angle, sally time and catch success were recorded and analyzed. The results do not indicate that search time is significantly different depending on the time of day for this flycatcher species. Sallies involving a successful prey catch were significantly greater than sallies not involving a catch, and occurred at an angle near or below horizontal to the perch location. Other observations suggest that the Gray Kingbird is a conspicuous species that prefers exposed perches and has some aggressive tendencies.

INTRODUCTION

Tyrannus dominicensis, commonly known as the Gray Kingbird, is classified as follows:

Phylum Chordata

Class Aves

Order Passeriformes

Family Tyrannidae

The adult upperparts are gray while the underparts are mostly white with minimal sexual dimorphism. It has a dark and slightly forked tail, and an orange streak on the crown which is seldom visible. One of this bird's most distinguishing characteristics is a black streak from the base of the bill to the ear coverts, resembling a mask. This tyrant flycatcher has a large black bill with a slightly hooked upper mandible (Evans 95). Insects are their staple diet. The largest of the flycatcher species on Dominica, the Gray Kingbird ranges from 22 to 25cm. The call is a harsh and high-pitched rolling trill that sounds like "pitirre," which led to its local name Pipirit (James 94). It is considered a species of Least Concern, according to the standards of the IUCN Red List, and is a commonly sighted bird on Dominica.



Figure 1. *Tyrannus dominicensis*
(Photo from <http://www.fs.fed.us>)

Data were collected at the Archbold Tropical Research and Education Center (ATREC) on the Springfield Plantation. This field research station is found on the western coast of Dominica in the West Indies. Located in a transitional secondary rainforest, ATREC offers several locations with ideal visibility for observing bird behavior.

MATERIALS

- Local and Regional Field Guides
- Kestrel Weather Meter
- Clipboard

- Pigma Pen
- Steiner 10x26 Binoculars
- 2 Cronus Stopwatches
- Transparent Protractor

METHOD

At the beginning of each data collection period I took three specific weather readings in the location where I was going to observe. Using the Kestrel, I recorded the temperature, humidity, and wind speed. I also noted whether there was any precipitation. By hearing a call, spotting a bird in flight, or scanning vegetation using binoculars, each observation began with locating a Gray Kingbird. To obtain accurate perch and sally times, I would wait until the bird changed its activity. If one was spotted in flight, I began the “Search” timer as soon as it landed in a visible location. If one was spotted while perched, I began the “Search” timer when it moved to a new perch. Search time was always recorded first, and sally time corresponded to the sally immediately following the end of the timed perch. Small hops within the same small area of a tree were ignored, and the search timer was not stopped. If the bird sallied out of sight, both the search and sally time were thrown out. The times were also thrown out if it was unclear whether or not the bird caught any food during its sally. Binoculars proved very useful for identifying a catch. It is important to note that the same bird may have been observed on more than one occasion since no individual identification method was used.

A protractor was used during the first few sally angle observations. From my observation point, I gauged the angles from different tree branches so I would be able to make more accurate estimations later. Each sally angle was estimated based from the angle at which the bird left the perch, not necessarily the angle at which it flew to the next perch. Sally angles from 15° below perch level to 15° above perch level were categorized as 0°. Sally angles from 16° to 45° above perch level were categorized as +30°, and below perch level as -30°. Lastly, sally angles of at least 46° above or below perch level were categorized as +60° or -60°, respectively.

I also recorded any interesting behavior while a bird was perched or in flight, as well as the new perch following the sally. This information provided extra insight to the behavior of the Gray Kingbird, but was not used for any calculations or data analysis.

Data were collected in areas around ATREC with the greatest visibility. A broad veranda with an extensive view of vegetation was the primary observation site, as well as an open driveway area and the top of a deserted building on the Mt. Joy trail.

RESULTS

A total of 37 observations were made over a seven day period. Data were collected during hours of peak activity, either between 6:00 and 9:00am or 4:00 and 7:00pm. Other than precipitation, there was little weather variation within the morning and afternoon observations. Mornings averaged 87.8% humidity and 72.7°F while afternoons averaged 64.5% humidity and 81.3°F. Table 1 displays all of the Gray Kingbird data, as well as the date and time period of the observation. Table 2 includes several categories of simple averages for search and sally time,

including the overall average for all 37 observations. Tables 3-5 include more detailed t tests of three different variables. Figures 2-3 present specific categories of data in a visual format.

Table 1. All foraging data in chronological order. Highlighted observations indicate when a catch was made during the sally.

Bird	Search Time (sec)	Perch Substrate	Sally Time (sec)	Sally Angle (°)	Catch	Time	Date
1	39.34	Royal Palm – Top of Crown	5	-30	N	6:00-7:00	31-May
2	17.75	Royal Palm – Top of Crown	6	30	N	6:00-7:00	31-May
3	41.09	Royal Palm - Inflorescence	4	-30	N	6:00-7:00	31-May
4	47.19	Royal Palm – Top of Crown	6.32	-30	N	16:00-17:00	31-May
5	46.12	Royal Palm – Top of Crown	7.1	0	Y	16:00-17:00	31-May
6	27.38	Royal Palm – Top of Crown	3.37	0	N	16:00-17:00	31-May
7	415.19	Royal Palm – Top of Crown	6.03	-30	N	16:00-17:00	31-May
8	114.19	Royal Palm - Crown	7.53	-30	N	16:00-17:00	31-May
9	30.28	Royal Palm – Top of Crown	9.63	-60	Y	16:00-17:00	31-May
10	341.18	Royal Palm – Crown	2.69	0	N	8:00-9:00	1-Jun
11	25.07	Royal Palm – Top of Crown	7.28	-60	N	8:00-9:00	1-Jun
12	42.22	Royal Palm – Top of Crown	3.18	-30	N	8:00-9:00	1-Jun
13	78.04	Royal Palm – Top of Crown	5.88	-30	Y	17:00-18:00	1-Jun
14	47	Royal Palm - Inflorescence	4.12	-30	N	17:00-18:00	1-Jun
15	76	Royal Palm - Inflorescence	5.72	-60	N	17:00-18:00	1-Jun
16	14.75	Royal Palm - Inflorescence	2.09	60	N	17:00-18:00	1-Jun
17	22.28	Plumeria - Middle Branch	6.03	0	N	6:00-7:00	2-Jun
18	151.53	Royal Palm - Inflorescence	2.62	-30	N	6:00-7:00	2-Jun
19	10.84	Wire	3.25	0	N	6:00-7:00	2-Jun
20	111.59	Royal Palm – Top of Crown	4.06	0	N	6:00-7:00	2-Jun
21	137.04	1.5m Dead Tree – Top Branch	5.54	-30	N	6:00-7:00	2-Jun
22	42.75	Royal Palm – Top of Crown	18.09	-30	Y	6:00-7:00	2-Jun
23	34.31	1.5m Dead Tree – Top Branch	1.57	0	N	6:00-7:00	3-Jun
24	31.59	Plumeria - Middle Branch	7.97	30	N	6:00-7:00	4-Jun
25	143.78	Wire	2.57	0	N	6:00-7:00	4-Jun
26	74.13	Royal Palm – Top of Crown	4.78	0	Y	6:00-7:00	4-Jun
27	93.25	Royal Palm - Inflorescence	4.41	0	N	6:00-7:00	4-Jun
28	53.75	Breadfruit – Near Top Branch	4.56	0	N	6:00-7:00	6-Jun
29	43.43	Royal Palm - Inflorescence	4.47	0	N	6:00-7:00	6-Jun
30	65.16	Royal Palm – Crown	3.82	-30	N	6:00-7:00	6-Jun
31	62.04	Royal Palm – Top of Crown	4.94	-30	N	6:00-7:00	6-Jun
32	18.15	Rose Apple – Top of Crown	2.1	30	N	6:00-7:00	6-Jun
33	137.65	Royal Palm - Inflorescence	2.85	30	N	16:00-17:00	6-Jun

34	25.56	Second Story Railing	1.84	-60	N	16:00-17:00	6-Jun
35	23.88	Wire	4.5	0	Y	16:00-17:00	6-Jun
36	224.19	Royal Palm - Inflorescence	4.19	30	N	16:00-17:00	6-Jun
37	62.16	Royal Palm – Top of Crown	2.32	-60	N	16:00-17:00	6-Jun

Table 2. Average search and sally times calculated for different times and perch substrates. RP indicates Royal Palm. The overall search time had a standard error of 14.3. The overall sally time had a standard error of 0.48.

Foraging Category	N	Search Time (sec)	Sally Time (sec)
6:00-9:00am	22	72.83	4.95
4:00-7:00pm	15	91.31	4.90
Successful Catch	6	49.20	8.33
Perch Substrate - RP	27	88.90	5.72
Overall	37	80.32	4.93

Table 3. T test results for search times in two time of day categories, 6:00-9:00am and 4:00-7:00pm. For this data set, $t=-0.63$ with 35 degrees of freedom and $p=0.53$.

Time of Day	N	Mean Search Time (sec)	Standard Error
6:00-9:00am	22	72.83	15.61
4:00-7:00am	15	91.31	27.27

Table 4. T test results for search times in two perch categories, the highest point of the Royal Palm crown and all other perch substrates. RP indicates Royal Palm. For this data set, $t=-0.022$ with 25 degrees of freedom and $p=0.98$.

Perch Category	N	Mean Search Time (sec)	Standard Error
RP Top of Crown	18	91.21	25.58
All Others	9	92.10	22.45

Table 5. T test results for sally times in two catch success categories. For this data set, $t=3.60$ with 25 degrees of freedom and $p\leq 0.001$. The difference in search time between the two categories was insignificant.

Catch Success	N	Mean Sally Time (sec)	Standard Error
Catch	6	8.33	2.10
No Catch	31	4.27	0.31

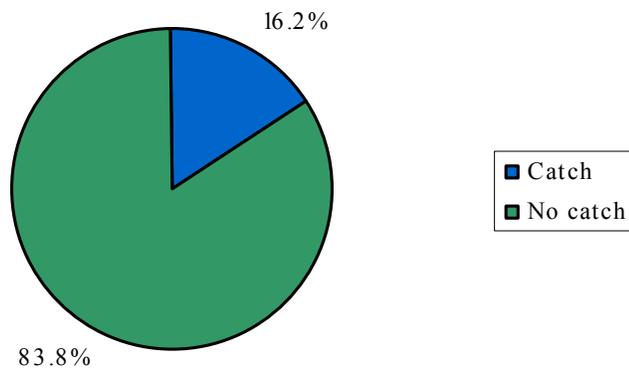


Figure 2. Catch success for all Gray Kingbirds observed.

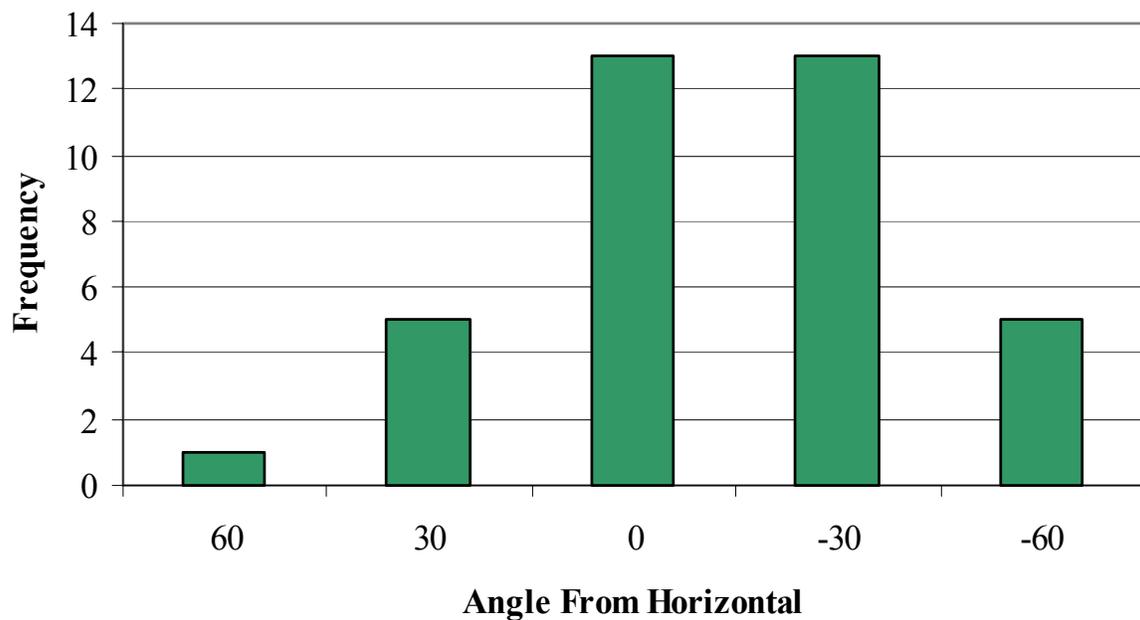


Figure 3. Histogram of estimated sally angles for all Gray Kingbirds observed. Frequency indicates the number of observations.

DISCUSSION

Gray Kingbirds were commonly spotted perched on the many Royal Palms (*Roystonea oleracea*) at Springfield Plantation. These trees provide some of the highest perches in the area and offer

greater visibility for foraging. The easiest locations to observe and time sallies had clear views of the palms and shorter vegetation.

The average search time was not significantly different depending on the time of day. For the six successful catches I observed, the estimated sally angle was 0° or below the perch location. The sally times for those involving a successful catch were significantly greater than those that did not. All catches were made from highly exposed perches, either the top of the crown of a Royal Palm or an electrical wire.

I also witnessed many interesting behaviors of the Gray Kingbird while collecting numerical data. On one occasion at Bee House, I saw two overhead making aggressive passes at a Broad-Winged Hawk (*Buteo platypterus*). There were also several times when I saw Gray Kingbirds displaying territorial behavior toward each other, as well as toward Brown Tremblers (*Cinlocerthia ruficauda*) and Scaly-Breasted Thrasher (*Margarops fuscus*), which are very similar in size to the Gray Kingbird. Rarely did I observe two kingbirds in the same tree, and when I did, it wasn't long before one became territorial.

CONCLUSION

The results of this experiment do not suggest a relationship between search time and time of day. Though less time was spent on average searching for food during the morning hours of activity than in the afternoon, the results were not statistically significant. Further research could be conducted with a larger sample size in order to retest this hypothesis.

Sally times, however, were significantly greater when prey were caught during flight. The implications of this information are unclear. However, we can infer that Gray Kingbirds do not necessarily limit their search area to the immediate surroundings of their perch. They will sally for above average lengths of time in order to catch food. Measuring sally distance during a successful catch would be an interesting elaboration on this study.

My observations confirm the notion that the Gray Kingbird is a conspicuous bird and appears to prefer an exposed perch with a large visibility range. According to the sally angle data, the Gray Kingbird tends to fly horizontal or at an angle below the perch location in order to successfully catch prey. This is likely related to its perch preference. Furthermore, this species is often territorial when foraging and displays aggression toward other Gray Kingbirds as well as toward other species of similar or larger size.

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REFERENCES

BirdLife International 2004. *Tyrannus dominicensis*. In: IUCN 2007. 2007 IUCN Red List of Threatened Species. 5 June 2008 <www.iucnredlist.org>.

Evans, Peter. Birds of the Eastern Caribbean. London: Macmillan, 1990. Pages 94-95.

Gabriel, Vagner de A. and Marco A. Pizo. "Foraging Behavior of Tyrant Flycatchers in Brazil." Revista Brasileira de Zoologia. 22 (4) Dec. 2005: 1072-1077.

James, Arlington, et. al. Dominica's Birds. Dominica: Forestry and Wildlife Division, 2005. Pages 53, 93-95, 109.