

**Differing insect foraging behaviors of three Dominican birds, the Gray Kingbird  
(*Tyrannus dominicensis*), the Scaly-breasted Thrasher (*Margarops fuscus*), and the  
Brown Trembler (*Cinclocerthia ruficauda*)**



*M. Amber Bayles*

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Dr. Lacher and Dr. Heyman

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## **Introduction**

Many bird species utilize similar food resources but their methods of obtaining these foods differ between species. Foraging types are influenced by the type of habitat; Robinson and Holmes (1982) found that the vegetation type limited how fast a bird could search for and catch prey.

The Gray Kingbird (*Tyrannus dominicensis*) is a member of the Tyrannidae, the tyrant flycatcher family (James, Durand, and Jno. Baptiste 2005). It is a large gray Passerine with a large black beak with a hooked tip and like all Tyrannids is skilled at catching insects in flight. Both the Scaly-breasted Thrasher (*Margarops fuscus*) and the Brown Trembler (*Cinclocerthia ruficauda*) are members of family Mimidae (James, Durand, and Jno. Baptiste 2005) and have slightly curved bills. Mimidae is another largely insect-eating bird family. All three bird species are common around the Archbold Tropical Research and Education Center (ATREC) located on the Springfield estate in southwestern Dominica. All three eat arthropods, but they have different foraging habits. Studying these differences gives insight into how species adapt differently to the same environmental variables. Understanding species' foraging behaviors and their differences is also critically important in conservation planning; just because two species utilize similar food sources does not mean they have the same habitat requirements. I studied these behaviors and differences by observing multiple individuals of these three species around the ATREC guesthouse, counting how many times they were observed displaying either active hunting or sit-and-wait hunting and timing how long an individual spent on one perch while foraging. Using the observations and data collected, I compared the feeding strategies of the three species. I expected to find that the Brown Trembler and the

Scaly-breasted Thrasher used more active hunting and less sit-and-wait hunting than the Gray Kingbird.

## **Methods**

I used a pair of 10 x 25 binoculars to identify birds at a distance. To learn the identifying traits of the birds, I referred to *Dominica's Birds* by James, Durand, and Jno. Baptiste. The Gray Kingbird is identified by its large size, gray and white coloring, and large bill with a hooked tip, and black eye mask. The Brown Trembler is identified by its erect tail, brown coloring, faint dark grey eye streak, long and slightly down-curving beak, and distinct trembling behavior. The Scaly-breasted Thrasher is identified by its brown dorsal surface, pale ventral surface with dark "scale" stripes on the breast and belly, and dark pointed beak. The last characteristic is what I used to distinguish the Scaly-breasted Thrasher from the similar appearing Pearly-eyed Thrasher, which looks similar from a distance except for its pale beak. I used my wrist watch, which had a stop-watch function, to time behaviors. Counts and times were written in a small field notebook with a pigma pen and later entered into Excel spreadsheets on a computer.

Observations were made in the morning and evening when temperatures were cooler and the birds were most active. The majority of my observations were from the veranda of the ATREC guesthouse. It offered a clear and wide view of a clearing, densely foliated trees and bushes, and a stand of tall palm trees. I defined active hunting as the behavior of hopping and flapping short distances and searching the nearby surroundings for arthropods. I defined sit-and-wait hunting as the behavior of searching for arthropods from a perch, remaining mostly stationary except for small movements. A bird that flew

to a tree trunk and stuck its beak in a crack would thereby be considered to be showing active hunting while a bird that perched on an exposed branch and flew down to the ground, picked up an insect, and then returned to its perch would be considered to be showing sit-and-wait hunting. Using my wrist watch's stop-watch function, I timed perching time during hunting, defining perching time as the total time spent in one spot when searching for food. For the qualitative/descriptive observations, I observed multiple individuals of each species. When an individual was seen foraging, I noted the time and wrote down their behaviors and surroundings until I lost sight of them.

## **Results**

### *Qualitative/Descriptive Observations*

#### Gray Kingbird

30/5/2010

- 16:20 - dropped to the ground in an open clearing for an insect from perch on an exposed tree branch ~3m from ground
- 16:22 - flew down at ~30° to ground in open clearing and grabbed an insect in beak
- 17:13 - flew to side of palm trunk after a flying insect, turned, and continued flying to a lower tree

1/6/2010

- 17:44 - flew low through veranda, perched and looked around on satellite wire for 1 minute, then flew away

- 17:59 - flapped to ground, pecked at something, then jumped to bench edge and peered at ground

4/6/2010

- 16:26 - flew from perch in tree to the foliage of a sapling about 10 ft away, caught an insect in the air, and flew back to previous perch in tree
- 16:46 - flew from top of palm to open air after an insect, turned around sharply and returned to perch
- 16:47 – perched high in bare tree branch and looked around, spending 1 minute and 52 seconds perching before flying away

Brown Trembler

30/5/2010

- 16:30 - climbed through the foliage of an avocado tree and looked around
- 16:50 - climbed up a tree trunk ~5' off ground, peering at the foliage around itself
- 17:32 - 2 individuals foraging in bare tree branches; 1 moved up to higher branches, the other flew 5-10 ft to a tree with medium density leaves
- 17:41 - foraged in big-leafed plant low to ground, then flew upwards to avocado tree branch
- 17:49 - flew from pillar top in the open to vine on royal palm trunk, hopped around on vine and poked beak into the crack between the vine and the tree

1/6/2010

- 17:40 - hopped from branch to branch in tree looking at leaves, then perched in the top, exposed, for a few seconds
- 17:46 – hopped around on ceiling beam in veranda rafters, searching the ceiling and corners, flew to new perch, looked down, then flew back to previous location and searched corner
- 17:49 - on table, looked up at ceiling, hopped to chair, then to window sill, hopped on 2 more tables, then flew to light bulb close to ceiling and searched the ceiling

4/6/2010

- 6:01 - caught moth on floor in classroom with beak and flicked it sideways against the floor 3 or 4 times
- 16:40 – hopped along tree branch and pecked at broken end of branch
- 17:10 - flew to branch of an epiphyte on palm trunk, peered at the crack between the epiphyte and the trunk, hopped to tip of branch, then hopped to palm trunk

Scaly-breasted Thrasher

30/5/2010

- 16:57 – perched in palm-nuts; dove  $\sim 20^\circ$  from vertical
- 17:36 – hopping in avocado tree under the leaves, attacked falling yellow leaf
- 17:38 - hopped from branch to branch in avocado tree while looking around

1/6/2010

- 17: 52 - flew to pillar top in open, looked around, flew to higher perch

4/6/2010

- 16:54 - foraged in palm flower for 11 seconds
- 17:34 – spent 30 seconds perching before flying into the open air and attempting to catch an insect
- 17:36 – spent 50 seconds perching at the tip of a palm before flying into the open air and attempting to catch an insect
- 15:58 - flew from top of palm to open air attempted to catch an insect, turned around, and returned to perch

### *Quantitative Data*

For my hunting type counts, I made a total of 14 observations of Gray Kingbirds hunting; all but one observation were of sit-and-wait hunting. 52 observations of Tremblers hunting were made, all of them being active hunting. Of the 20 foraging observations I made of Scaly-breasted Thrashers, 12 were of active hunting and 8 were of sit-and-wait hunting. Table 1 shows the proportion of the observations that were active hunting and sit-and-wait hunting.

**Table 1. Proportion of observed hunting type occurrences**

|                                | Active Hunting | Sit-and-wait | Total Counts |
|--------------------------------|----------------|--------------|--------------|
| <b>Gray Kingbird</b>           | 0.07           | 0.93         | 14           |
| <b>Brown Tumbler</b>           | 1.00           | 0.00         | 52           |
| <b>Scaly-breasted Thrasher</b> | 0.60           | 0.40         | 20           |

I timed 20 instances of Gray Kingbirds perching while hunting. Perching time for the Gray Kingbirds was highly variable, as some birds sighted a quarry quickly and some sat for longer times before sighting a prey item. The average perching time during hunting for Gray Kingbirds was 19.9 seconds with a standard deviation of 23.8 seconds

and the median was 15 seconds. 38 instances of perching during hunting were timed for Brown Tremblers. Most of the perching instances were very short, often just a brief pause in a series of hops. The average perching time during foraging for Brown Tremblers was 5.7 seconds with a standard deviation of 6.7 seconds and the median was 4 seconds. 11 Scaly-breasted Thrasher perching times were recorded. The average time was 22.5 seconds with a standard deviation of 18.8 seconds and the median was 18 seconds.

**Table 2. Time (in seconds) spent perching while searching for food**

|                                | AVG         | St. Dev | Total Counts | Median |
|--------------------------------|-------------|---------|--------------|--------|
| <b>Gray Kingbird</b>           | <b>19.9</b> | 23.8    | 20.0         | 15     |
| <b>Trembler</b>                | <b>5.7</b>  | 6.7     | 38.0         | 4      |
| <b>Scaly-breasted Thrasher</b> | <b>22.5</b> | 18.8    | 11.0         | 18     |

The test of homogeneity of variances for the perching time data set showed that the samples are not homogenous at an  $\alpha$  level of 0.05. The ANOVA test for the perching time data set showed that there is a significant difference between at least one of the groups and the others. The Tukey HSD showed that the Brown Trembler data set is significantly different from the other two groups while the Scaly-breasted Thrasher and Gray Kingbird data sets were not statistically different from each other.

### **Tables 3-5. Statistical tests**

#### **Test of Homogeneity of Variances**

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| 5.611            | 2   | 66  | .006 |

## ANOVA

Perch

|                | Sum of Squares | df | Mean Square | F     | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 3964.080       | 2  | 1982.040    | 8.209 | .001 |
| Within Groups  | 15935.080      | 66 | 241.441     |       |      |
| Total          | 19899.159      | 68 |             |       |      |

Perch

|          |   | Subset for alpha = .05 |       |       |
|----------|---|------------------------|-------|-------|
| Species  |   | N                      | 1     | 2     |
| 2        |   | 38                     | 5.66  |       |
| Tukey    | 1 | 20                     |       | 19.90 |
| HSD(a,b) | 3 | 11                     |       | 22.45 |
| Sig.     |   |                        | 1.000 | .875  |

Means for groups in homogeneous subsets are displayed.

a Uses Harmonic Mean Sample Size = 17.940.

b The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

## **Discussion**

My observations and hunting counts point to clear differences between the hunting behaviors of these three birds. While I never observed a Brown Trembler engaging in sit-and-wait hunting, I observed only one instance of a Gray Kingbird engaging in active hunting- when an individual flew to a light and hovered in front of it to search for insects- and my counts of Scaly-breasted Thrasher hunting styles were 60% active hunting and 40% sit-and-wait hunting. Though they both use sit-and-wait hunting, Gray Kingbirds and Scaly-breasted Thrashers show different perch choice. Every time I observed a Scaly-breasted Thrasher hunting from a perch, it was from a very high perch,

usually near the top of a mature royal palm tree, whereas the Gray Kingbirds I observed used a range of perches, from a few feet off the ground to the top of royal palm trees. One thing remained constant, no matter what perch the bird chose: the perch offered a clear, unobstructed view and flight path to either the ground or the air.

Average length of time spent on one perch while hunting was significantly different between the Brown Trembler and both of the other two species; while the Brown Tremblers on average left a perch after 5.7 seconds while hunting, Gray Kingbirds spent on average 19.9 seconds on each perch before chasing an insect and Scaly-breasted Thrashers spent 22.5 seconds on each perch before leaving it. This shows a clear difference between the Brown Trembler and the other two species' hunting styles. The Scaly-breasted Thrasher's average is skewed because of a lack of timed perches during active hunting due to the difficulty of making these observations in the dense foliage preferred by these birds for active hunting.

## **Conclusion**

Based on my observations, the three birds I studied have distinct hunting strategies. The Gray Kingbird is a sit-and-wait insect predator, the Brown Trembler is an active hunter, and the Scaly-breasted Thrasher uses a mix of both sit-and-wait and active hunting. Though they all eat arthropods, they search for and catch them in different ways and in different places. This suggests niche separation and, in the case of the Scaly-breasted Thrasher and the Gray Kingbird, convergent evolution.

The Gray Kingbird uses sit-and-wait hunting almost exclusively. Fitzpatrick (1980) described their genus *Tyrannus* as "aerial hawking specialists," a description I

found fitting for Gray Kingbirds. Their perches have a clear view of either the ground or the surrounding air. These can be bare branches in the top or underside of a tree, a palm frond, rooftops, pillar tops, even chairs. Gray Kingbirds avoid dense foliage, preferring high tree tops or clearings, and they are very agile flyers, often performing complete 180° turns to catch flying insects. From their perch, a Gray Kingbird searches its surroundings by moving its head in all directions, occasionally turning around to see what is behind them. The bird may fly to a different perch if no prey item is seen after about 30 seconds. If an insect is seen flying in the air, the Gray Kingbird flies from its perch into the air, attempts to catch the insect in its beak, and either returns to its previous perch or finds a new one and consumes the insect. If a prey item is seen on the ground, the Gray Kingbird flies from its perch, either glides or flaps to the ground next to the prey, grabs it with its beak, and flies a short distance to a slightly higher perch, returns to its previous perch, or finds a new perch.

The Brown Trembler uses a much more active hunting method. I never observed one catching an insect on the wing. Rather, during a foraging bout, they hop and fly short distances, wings and body quivering upon landing, to search for hiding arthropods. They will hop or fly to a perch and search for nearby arthropods, turning their head in all directions, often peering upwards and sometimes poking their beaks into cracks or corners. While Brown Tremblers seem to prefer searching surfaces close to themselves, an unhidden arthropod will be taken at any distance if it is seen. When foraging in a tree or bush, a Brown Trembler hops along the branches, peering at both the underside and top of leaves. Once they catch an arthropod, they frequently will hold their prey in their beak and flick their head sideways, beating their beak and the prey against the ground.

Their feet and legs are very dexterous, allowing them to cling to tree trunks and narrow ledges or cracks, which they do often. A behavior I found curious was the clutching of chains dangling from the ceiling of the veranda to search for arthropods, which often turned out to be moths, on the ceiling. After finishing searching one small location, a Brown Trembler will fly to another location, where they will repeat the process of hopping and searching.

The Scaly-breasted Thrasher uses both active hunting and sit-and-wait hunting. When engaged in active hunting, they usually search in dense foliage, hopping along branches and tail flicking frequently, peering at the leaves and other plant matter around them. When engaged in sit-and-wait hunting, they can be seen perched atop a tall tree, such as a mature royal palm. They look around, much like a Gray Kingbird, and upon spotting a flying insect will flap away from their perch, attempt to catch the insect in their bill, and either turn and return to their previous perch or find a new perch. Insects are only part of the Scaly-breasted Thrasher's diet; various fruits and seeds are also a part of their diet (James, Durand, and Jno. Baptiste 2005).

As I conducted my project, more questions came to mind. Do these species show peak activity at different times of day? Does the Scaly-breasted Thrasher prefer one hunting method over the other at different times of day? How does the foraging behavior of the Gray Kingbird compare to the feeding behavior of its relative tyrant flycatchers on Dominica? Murphy found in his 1987 study that weather affected the feeding behavior of two species of Tyrannids; my study did not take weather conditions into account, so I wonder now if Gray Kingbirds show similar alterations in feeding behavior in response to weather changes. Another thing I noticed was that at least one individual Gray Kingbird

frequented the same perches and I am curious to know whether all Gray Kingbirds show this behavior and if they visit the same perches at the same times of day.

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