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OBSERVATIONS OF GRAY KINGBIRD (*Tyrannus dominicensis*) HABITS AND BREEDING BEHAVIOR IN ST. JOHNS COUNTY, FLORIDA

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The Gray Kingbird (*Tyrannus dominicensis*) breeds fairly commonly in Florida along both coasts and inland in the southeastern peninsula (Robertson and Woolfenden 1992, Stevenson and Anderson 1994, FWC 2003). Although abundant in the Caribbean and tolerant of humans, its breeding behavior is incompletely described. Smith and Jackson (2002) list "No data" or "No Information" for behaviors such as preening, communicative interactions, sexual behavior, parental behavior, and nest sanitation. They preface their report by noting there are surprisingly few quantitative data on many aspects of its life history and later add "More information needed on all aspects of breeding biology of Gray Kingbirds." The purpose of this paper is to present some supplementary observations.

METHODS

Gray Kingbirds have bred in St. Augustine for many years (Kale et al. 1992; D. Reed, A. Thornton, pers. comm.) despite the species being relatively rare so far north. Gray Kingbirds nest near human habitation, typically in open sites in coastal towns, as was the case for a pair that constructed a nest in St. Augustine, St. Johns County, Florida in May 2012. This nest (29.8992° N, 081.3157° W) was built in a busy city park, located 0.4 km inland from the Matanzas River at St. Augustine Inlet.

Two factors made this breeding pair an ideal observation opportunity: 1) the pair could be separated by individual plumage traits visible when the birds copulated, such as a yellower belly and vent of the male; and 2) the nest was clearly visible at a distance of 10 m. I observed this pair daily, for a cumulative total of 23.8 hours over 1-30 May 2012. The time distribution was as follows: 38% prior to 0800 hrs, 33% 0801-0900 hrs, 15% 0901-1600 hrs, and 14% after 1600 hrs. All data presented below are based on these observations, quantified from minute-by-minute field notes.

RESULTS

Sexual behavior.—I observed several aspects of Gray Kingbird sexual behavior, including an aerial courtship display and copulation. Copulation was observed five times over the 23.8 hours of observation, four of those instances occurring prior to 0800 hours and once at 1534 hours. Copulation continued through production of eggs and

development of nestlings. Prior to incubation both sexes exchanged "p't'tirre" calls and the female moved to a perch within 0.5 m of the nest. The male followed, with wings fluttering, and copulation lasted less than two seconds.

During the incubation phase, the male performed a behavior that led to copulation. Although only the female incubated, twice I observed the male move onto the nest when the female was absent, mimicking an incubation position, sitting high atop the nest while calling and fluttering. His behavior caused the female to return to the nest, while exchanging "p't'tirre" calls. The male would then leave the "incubation" position, join the female near the nest for copulation, after which the female returned to incubate.

Six days before hatch day, the two kingbirds were observed in an aerial interaction. I noticed the pair together tumble downward from ca. 25 m in the air, with feet outstretched, wings fluttering, flashing their yellowish underwings, and vocalizing. This interaction occurred ca. 50 m from the nest. Two days before hatch day, I observed an interaction between the male and a third kingbird while the female was incubating. The male was perched > 20 m away from his usual power line location, when the third kingbird arrived and perched 1.2 m from the male. This was unusually close given that the male and female of the pair typically perched 6-12 m apart on the power line. The male hopped down the wire, closer to the newcomer. The newcomer hopped down the wire, narrowing the distance to the male. The male responded by again hopping down the wire toward the newcomer. The newcomer responded by hopping closer. Both birds were silent and hops did not entail wing displays or head bobbing. When the pair was within centimeters of each other, I heard several loud "p't'tirre" calls from the nest. The female left the nest and flew directly towards the two kingbirds, causing the newcomer to depart.

Feeding behavior.—The pair hunted primarily from a power line (6 m high) running alongside the nest tree or from atop a cluster of blooming cabbage palms (*Sabal palmetto*) about 10 m tall. The sprays of palm flowers attracted large flying insects, particularly bumble bees (*Bombus* sp.). These palms were defended against other aerial insectivores such as Great Crested Flycatchers (*Myiarchus crinitus*) almost as vigorously as the nest tree was defended.

Bees and wasps (Hymenoptera) comprised the majority of the adult kingbird pair's diet. Of the total prey items observed (n = 78), 55% were identifiable as Hymenoptera; of those 50% were identifiable as bumble bees and 10% as red wasps (*Polistes carolina*). Odonates comprised 5% of the observed diet. On an unusually cold early morning (15° C), when few insects were flying, the female caught a small brown lepidopteran. That same morning she also gleaned small unidentified invertebrates

off leaves near the nest, my only observations of these two prey items. On only one occasion each, they dipped the water surface in flight.

Flying insects were caught by sallying from the power lines or palms. Sallies were typically at perch height or higher, with only one flight to the ground observed. The male's foraging sallies most commonly ranged from a few meters to 75 m distant (75%, n = 57), maintaining defense of the nest. Once caught, an insect was brought back to the power line perch. The female foraged nearby at the flowering palms, but more often flew out of sight, more than 100 m from the nest (60%, n = 34), returning to the wire perch either with an insect in her bill or to immediately engage in bill-wiping on the wire.

Large bees, the most common food, were held by the stinger, tossed, and rotated while struck on the wire up to 20 times before being swallowed. The male never offered food to the female, although once, while the female was preening, the male called several times causing the female to notice and capture a very large wasp flying nearby.

Self-maintenance.—I observed both kingbirds engage in extensive preening. The female preened for 10% of the observation time, or 75% of her time off the nest, engaging in frequent and vigorous scratching while preening. Her scratching ceased ten days after the incubation phase. Her preening sessions averaged 5 minutes (n = 34). The male also preened for 10% of the observation time, with an average preening session of 8 minutes (n = 19). If the female was absent, he moved to a perch within 1 m of the nest when preening. I observed the male scratch only once. Anting or dusting was never observed. On one occasion I arrived to find the male completely wet, on a sunny day, suggesting the possibility of recent bathing.

Nest-site selection.—The kingbird nest was constructed in a sparsely-foliaged laurel oak (*Quercus laurifolia*) 10 m tall. The nest was 6 m above ground on an 8 cm-diameter horizontal limb overhanging the edge of a man-made pond, 0.3 m from a three-way branch split, supported by and hidden within a mistletoe (*Phoradendron* sp.) cluster. It was a loose collection of twigs, some with lichen, that appeared to come from the nest tree. The nest was shallow and wide, without a neat outside edge, 30 cm wide by 10 cm high. It was loosely woven and visibly open when viewed from underneath. Although shaded and partially protected by the mistletoe cluster, it was exposed to the north and northeast.

Interspecific interactions.—I observed interactions between the kingbird pair and several other species, some of which were tolerated and others repelled. The male did nearly all the nest defense. I observed the female defend the nest twice: during incubation against a Common Grackle (*Quiscalus quiscula*) in very close proximity to the nest, and on day eight after hatching, while the male was absent, swooping to

repel some Blue Jays (*Cyanocitta cristata*) from the nest tree. The male immediately returned. The male was more tolerant of other avian species when the female was incubating or brooding. The male's defense actions included (in order of intensity) wing flares, swoops with flared wings and tail, chases, and strikes with bill and feet. Most attacks were silent.

Fish Crows (*Corvus ossifragus*) were the least tolerated species; even fly-over crows were promptly, vigorously, and vocally attacked with bill and foot strikes to the back, at times chased for more than 100 m. Cooper's Hawks (*Accipiter cooperii*) and Red-shouldered Hawks (*Buteo lineatus*) were also attacked, unless they were passing overhead or were away from the nest.

Great Crested Flycatchers were not tolerated near the nest or the flowering palms. The kingbird attacks were aggressive, involving the most vocalization of any behavior, wing flashes, and chases until out of sight. The male typically concluded the chase by usurping the intruding flycatcher's perch on top of the nest tree or palms. Blue Jays were tolerated at the far side of the nest tree, but chased if within 3.5 m of the nest. Within that boundary, the male Gray Kingbird conducted silent, relatively mild attacks, sufficient to repel a jay from the immediate vicinity.

Several species were tolerated to within 2-3 m of the nest: Mourning Dove (*Zenaida macroura*), Red-bellied Woodpecker (*Melanerpes carolinus*), Tufted Titmouse (*Baeolophus bicolor*), European Starling (*Sturnus vulgaris*), Northern Cardinal (*Cardinalis cardinalis*), Common Grackle, Boat-tailed Grackle (*Quiscalus major*), and House Sparrow (*Passer domesticus*). A gray squirrel (*Sciurus carolinensis*) was vigorously attacked if it approached within 2 m of the nest.

A Northern Mockingbird (*Mimus polyglottos*) occupied part of the kingbirds' territory, regularly including a series of "p't'tirre" calls in its mimicked repertoire. The mockingbird was tolerated near the kingbird nest, and was allowed to share a regular perch within a few feet of the male kingbird on the power line. Defensive behavior appeared to be divided vertically, with the male kingbird monitoring and defending the nest tree and above the power line, and the mockingbird monitoring and defending the area below the power line, including the ground space below the kingbird nest.

Parental roles during incubation.—With the exception of the male's mimicry of nest sitting, only the female incubated. The female typically faced west, but was observed facing east five times and north once. The female left the nest for 3 to 13 min, with an average absence of 8 min (n = 13), during which time the male perched within 1 m of the nest or on the power line perch closest to the nest. While off the nest, the female typically began by preening and scratching. Then she would either forage locally or fly out of sight, presumably to another foraging area. At night

the male was observed roosting within the nest tree, a few meters from the nest.

The male and female nearly always exchanged calls as they changed positions near the nest. The male called "p't'tirre" several times and flashed his yellowish underwings whenever the female returned. This behavior was effective in initially distracting my attention, at the precise moment when the female would fly in and slip onto the nest. Upon arrival she would immediately sit still for a couple of minutes, later lifting up to inspect and adjust the eggs. The female incubated the eggs for at least 14 days (my observations began post-nest-construction). I believe the eggs hatched on the morning of day 15 (17 May 2012).

Parental care of nestlings.—Only the female was observed brooding the young. Between bouts of brooding she left the nest for between 3 and 20 minutes at a time, with an average absence of 10 minutes (n = 22). Both parents fed the young, in about equal occurrences, although with different contributions. The male provided the majority of the quantity of food, typically bringing a beak full of insects, and feeding for one to two minutes at a time. The female typically carried food for the young in her closed bill; these bits were not large enough to distend her throat. Her feedings lasted only a second or two. The female sometimes returned without feeding the nestlings, settling immediately into brooding position. Both parents removed fecal sacs, again with different behaviors. The male carried sacs to the power line perch to be dropped (Fig. 1). The female ate the sacs at the nest.

Nestling development.—From hatching until day nine, the parents fed the young small clumps of crushed insects, presumably Hymenoptera, which they caught live. On day 10, I observed the first whole insect, an odonate, fed to the young. Thereafter the male fed the nestlings large wads of recently mashed Hymenoptera, while the female continued to feed smaller amounts. Beginning on day six, "p't'tirre" calls were heard from the nest while the adults were absent. On day nine, the red-pink gape of the largest nestling was visible above the nest rim during feeding. On day 11 a chick was visible flapping inside the nest, with buff-colored down on its head and gray-green brown pin feathers on the wings. I believe the nest contained three nestlings, with no evidence of cowbird (*Molothrus*) parasitism.

Tropical Storm Beryl.—On 27 May 2012, day 11 in the chick's development, Tropical Storm Beryl made landfall near St. Augustine with gusts of 122 kph recorded overnight at St. Augustine airport. When I next checked the nest, on the morning of 28 May 2012, I found that it had been destroyed, with only a thin platform of sticks and the finer woven nest lining remaining. The Gray Kingbird pair survived and had begun building a replacement nest 20 m away. The second nest also was built in a dense leaf cluster of a live oak, was 6 m above ground, and

Figure 1. Male Gray Kingbird removing fecal sac from a nestling, St. Augustine, Florida, 27 May 2012. Photograph by Diana Doyle.

overhung a small manmade pond. I was unable to continue watching activities at the new nest.

Acknowledgments

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