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NESTING AND HYBRIDIZATION OF A TROPICAL KINGBIRD (*Tyrannus melancholicus*) AND GRAY KINGBIRD (*T. dominicensis*) IN SARASOTA, FLORIDA

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Abstract.—This paper documents a series of unusual events that occurred in Sarasota, Florida in spring and summer of 2013 centered around a female Tropical Kingbird, a rare bird for the state. After being discovered by local birders in the parking lot of an upscale shopping area, the female was observed as she interacted with Gray Kingbirds, constructed at least two nests, and subsequently fledged four young. Just prior to fledging, a male Tropical Kingbird appeared and kept company with the female, but did not undertake all expected male parental duties. The end result was a successful nesting effort which produced what the authors believe to be Tropical Kingbird x Gray Kingbird hybrid young.

The Tropical Kingbird (*Tyrannus melancholicus*) is a conspicuous, widespread tyrannid ranging from central Mexico to central Argentina (Howell and Webb 1995). A classic "wire bird," it is common along roadsides and in open areas, thriving in gardens, plazas, and other human-modified landscapes. Its U.S. distribution is limited to the Pacific coast (Garrett & Dunn 1981), southeastern

Arizona, the Big Bend and Rio Grande Valley and Lower Coast regions of Texas (Phillips 1994), and southern Florida (Ayers et al. 1980). There are confirmed breeding records only from the Arizona and Texas sites. In Florida, Tropical Kingbird was classified as a Review species by the Florida Ornithological Society's Records Committee (FOSRC) with, as of fall 2013, only 17 prior accepted sight records and no breeding records (Greenlaw et al. 2014). The nearest breeding population is on the Yucatan peninsula of Mexico. Gray Kingbird (*T. dominicensis*) is a fairly common breeding bird along both coasts of Florida, largely absent from the state in winter (Smith and Jackson 2002).

Study Site

Our study area was located in a back parking lot that serves restaurants and other retail businesses located along the north quadrant of St Armands Circle, an upscale shopping area on Lido Key (sometimes referred to as St Armands Key) in Sarasota, Florida (Sarasota County). The parking lot is about two acres in area and dotted with small live oak (*Quercus virginiana)* and green buttonwood (*Conocarpus erectus*) trees. It's frequently busy with automobiles and pedestrians, and holds a fire station, overhead utility wires, and trash dumpsters. Lido Beach and the Gulf of Mexico lie about 0.4 miles west while Sarasota Bay is about 0.1 miles to the east.

Methods

From May through September of 2013, a core group of nine volunteers, including the co-authors, contributed nearly 400 hours to on-site monitoring of the study area. Initial monitoring was rather casual. However, once it became apparent that the subject Tropical Kingbird was actively attempting to nest, it was agreed that organized data collection should be undertaken to document the breeding behavior and perhaps reveal clues as to the identity of a male parent. Formal monitoring of the nest took place throughout the month of June 2013 which encompassed the egg hatching and nestling stages. The protocol entailed standardized data collection sheets, a dedicated group of volunteers, and twice-daily shifts. Observers were required to note behaviors at the end of single minute intervals for thirty minutes. By the end of June, when the young had fledged, the data collection sheets were set aside and informal monitoring resumed. A detailed behavioral analysis of the formal data collected during June is beyond the scope of this paper (and—the possible subject of a future paper), but the exercise was invaluable in ensuring observer coverage during this critical period.

Results

Discovery.—On 3 May 2013 at St Armands Circle, Peipert noted several active kingbirds, one with a yellow belly. In the Sarasota area, Western Kingbird (*T. verticalis*) is the "expected" yellow-bellied kingbird but even it is considered a rare passage migrant. No records for Tropical, Cassin's (*T. vociferans*), nor Couch's Kingbird (*T. couchii*) exist from Sarasota County, although state records exist for the former two. On 4 May 2013, Wilson and Ginaven visited the site and found the bird of interest interacting with two Gray Kingbirds (contra Anderson 2014). The subject bird's tail was notched rather than squared-off, lacked a white edge on the outer feathers, and was grayish-brown rather than blackish; the bill was large; the bright yellow on the underparts rose to the bend of the wing rather than stopping at the upper belly; and the back had a greenish tinge (Fig. 1A). Finally, the subject bird's vocalization was a "twittering trill" (*pip-pip-pip-pip*) readily separating it from the vocalizations of the similarly-plumaged Couch's (single *kip* notes and *breeeer*), Cassin's (*chi-bew*), and Western (*whit* notes in varying cadence) kingbirds (Dunn and Alderfer 2011). This was Sarasota County's first record of Tropical Kingbird and accepted by the Florida Ornithological Society's Records Committee (Catalog

Figure 1. A) Female Tropical Kingbird photograph taken by Claire Herzog at study site on 24 June 2013. Note the sub-ocular mark on the left cheek which allowed for ready identification of the subject bird. B) Photograph of nest and contents taken by Ruth Ellen Peipert on 2 June 2013.

#2013-955) (Pranty 2013, Ahern 2014a). The 17 previous Tropical Kingbird records for the state are concentrated in the southern half of the peninsula, from Miami-Dade to Hillsborough County (a range that includes the study site), with three additional from the panhandle.

Breeding behavior.—On 5 May 2013, Rossheim observed the Tropical Kingbird carrying nesting material into a live oak and photographed the bird sitting on a nest in the same tree. Given this nest-building behavior, it was assumed the Tropical Kingbird was a female (Oniki and Willis 1983). Around mid-month May it was observed that the female Tropical Kingbird seemed to have abandoned the original nest in favor of another just a few meters away in the same tree, on occasion robbing the initial nest for materials to construct the second. Toward the end of May, the bird spent longer periods nest-sitting. At this point, organized data collection was undertaken to better document the breeding behavior and perhaps reveal clues about the identity of the male parent. Formal monitoring of the nest began on 1 June 2013.

Female Tropical Kingbirds are responsible for nest-building and incubation (Oniki and Willis 1983), with the male's duties limited to assisting with the feeding of the young and defense of the nest (Skutch 1960). Indeed, up to and through the incubation period, no male Tropical Kingbird was observed.

Pre-fledge monitoring.—Through the first 10 days of June, the female Tropical Kingbird spent approximately 75% of the time on the nest, strongly suggesting that she was incubating eggs. Departures from the nest were for the purposes of feeding herself (almost exclusively flying insects) and perching for short periods on nearby trees and wires. Mean length of incubation bouts was 18 minutes (N = 9, SD = ± 7). A photograph revealed the presence of four creamy white eggs with brown blotching/spotting (Fig. 1B).

By 10 June 2013, the female's forays off the nest were longer with more time spent chasing off perceived threats, chiefly Fish Crows (*Corvus ossifragus*). On 11 June 2013, observers with good optics were able to catch glimpses of a downy head in the nest. Based on these observations, it is likely that a first egg hatched on or about 10 June 2013, suggesting that the first egg was laid about 23 May 2013 (Oniki and Willis 1983). Observers were soon able to determine that there were four hatchlings in the nest.

Monitoring also revealed the steady presence of nearby Gray Kingbirds. These birds were seen on the parking lot wires, and frequently atop a pink trumpet tree (*Tabebuia heterophylla*) and a Queen's crepe myrtle (*Lagerstromia speciosa*) approximately 120 m to the south-southwest and over a row of buildings. On 11 June 2013 observers confirmed an active Gray Kingbird nest in the latter tree with at least one nestling.

On 22 June 2013, the Tropical Kingbird nestlings were banded (all four, contra Anderson 2014) and bled (just two) by staff from Archbold Biological Station (USGS BBL Permit #07732 issued to Dr. Reed Bowman, expiration 31 January 2016). Since no male parent had yet presented himself, it was hoped that a DNA analysis of the blood would reveal the male parentage of the nestlings.

On 23 June 2013, observers detected the arrival of a second Tropical Kingbird to the nest vicinity (contra Anderson 2014). In attempting to ascertain the sex of the new arrival, observers learned that the "dawn song" (a series of short notes and thin ascending trills *pit-pit-prrrr-pit-prrrr*) is delivered repeatedly just before sunrise and only by male Tropical Kingbirds (Smith 1966). On 29 June 2013 this dawn song was recorded, confirming the second Tropical Kingbird to be a male. Separation of the two kingbirds was facilitated by a dark subocular mark on the left cheek of the female which she bore through the majority of her residency (Fig. 1A).

During the period 10-29 June 2013, the female Tropical Kingbird spent the majority of her time foraging for prey and returning to the nest to feed nestlings. Although the male Tropical Kingbird faithfully remained in the nest vicinity during this period and sometimes assisted the female in chasing off threats (contra Anderson 2014), he tended to follow the female on her rounds and was never observed directly feeding the nestlings. Therefore, the male Tropical Kingbird's role in the breeding effort, if any, remained unclear.

Post-fledge monitoring.—The first nestling fledged on 27 June 2013 when observers noted it flying short distances from branch to branch in the nest tree. The final nestling fledged on 28 June 2013. In the weeks following, the fledglings remained in the natal area, which allowed observers to study details of plumage. A description follows (Fig. 2): Pale underparts with just a faint hint of yellow wash on the belly and slightly deeper yellow on the undertail coverts, gray backs, dark remiges edged in yellow, brown wing coverts edged in light brown, brown rectrices edged in light brown, gray crown, loral and postocular gray smudge, and long dark bills. The only sign of bright yellow was on the underwing coverts and axillaries, a characteristic only visible on a bird in flight. One of the fledglings, the "runt," was notably smaller than its three siblings.

Juvenal plumage for a Tropical Kingbird is similar to definitive alternate plumage (Pyle 1997, Sibley 2014). In terms of obvious field marks, this suggests a greenish back and a bright yellow belly. The appearance of the subject fledglings, specifically the gray back and the lack of a yellow belly, suggested uncertain parentage.

Through the first week of July, the fledglings continued to be fed by the female Tropical Kingbird from perches on the trees and wires about

Figure 2. Photograph of three fledglings begging from their mother, taken by Claire Herzog on 7 July 2013.

the parking lot. The first date that a fledgling was observed sallying and capturing an insect on its own was 8 July 2013. Toward mid-July, observers attentive to the vocalizations of the fledglings detected that they produced a subtly two-part *pe-cheer*' typical of Gray Kingbird rather than the twittering and accelerating *pit-pit-pit-pit* of Tropical (Dunn and Alderfer 2011).

Also beginning in July, a number of Gray Kingbirds (at least two adults and up to three juveniles (Fig. 3A)) began to gather on nearby wires approximately 140 m to the west of the Tropical Kingbird natal area. Interaction amongst these birds and the Tropical Kingbird family was minimal, although the female Tropical Kingbird was noted to drive off Gray Kingbirds whenever one ventured into the natal parking lot. On 9 July 2013, an Eastern Kingbird (*T. tyrannus*) appeared in the natal area, and then periodically over ensuing weeks, and was driven off each time by the female Tropical Kingbird.

All four juveniles continued to be accounted for until 12 July 2013, when only three juveniles were observed. The fourth juvenile was not observed thereafter, and it's not known whether this bird perished or dispersed naturally. On 14 July 2013, the female Tropical Kingbird was observed feeding the remaining juveniles while they also hunted on their own. The last date the female was observed feeding a fledgling was 18 July 2013. On or shortly after this date, observers noted the

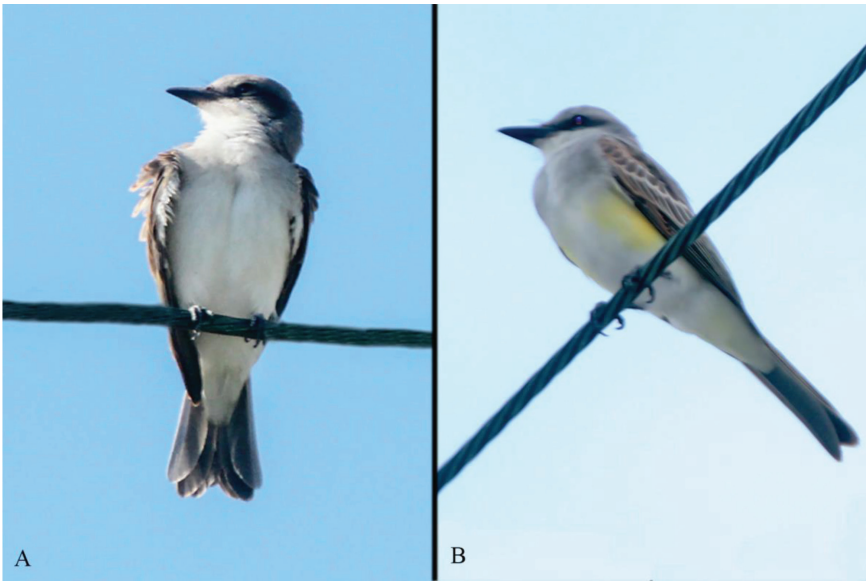

Figure 3. A) Photograph of juvenile Gray Kingbird (left) taken on 11 July 2013 and B) last remaining subject juvenile kingbird (right) on 1 August 2013. Each photograph taken from study area by Rick Greenspun.

female Tropical Kingbird driving off a begging fledgling. The last date that all three remaining fledglings were confirmed was 19 July 2013. Thereafter, only one juvenile remained in the near vicinity. Again, it is not known whether these two birds perished or dispersed naturally. The last remaining juvenile continued to be observed sporadically on the fringes of the natal area. It had been observed being driven off by the female Tropical Kingbird, perhaps explaining its tentative presence.

On 30 July 2013 the lone remaining juvenile was spotted after an absence of several days. At this time observers noted a slight change in appearance where the faint yellow wash on the underparts had intensified locally on each central flank (Fig. 3B). Otherwise, the juvenile had a gray back and pale underparts and continued to strongly resemble a Gray Kingbird. Unfortunately, there were no further opportunities to study plumage details as the last remaining juvenile was last seen on 1 August 2013.

Prior to dispersal of the fledglings, the male Tropical Kingbird remained the female's loyal companion, but was never observed feeding a fledgling and assisted in chasing off threats only when initiated by the female.

In August and September the two adult Tropical Kingbirds remained loyal to the natal parking lot and were reliably found

mornings and evenings, often with little effort, on every visit. Their midday whereabouts were unknown. The two appeared quite compatible and vocalized frequently to each other (contra Anderson 2014). When one landed near the other on a perch there was often an accompanying "wing flutter." The female remained dominant, and continued to chase off perceived threats (Fish Crows, Cooper's Hawk (*Accipiter cooperii*), etc) which entered the parking lot. This continued defense of the natal vicinity led some observers to wonder whether she might contemplate another brood, but no copulations nor nest-building activities were noted.

During evenings in August and September, the parking lot became something of a "kingbird mecca" with high spot counts of 16 Gray Kingbirds and three Eastern Kingbirds joining the two increasingly tolerant Tropical Kingbirds.

Discussion

The Sarasota female Tropical Kingbird represents, as nearly as can be determined, the first confirmed breeding record for the species east of the Mississippi River. The authors also believe that the young represent the first known hybridization anywhere of Tropical Kingbird and Gray Kingbird. There are no known regions where a significant population of Tropical and Gray Kingbird are regularly sympatric during the breeding season. This pairing does not imply strongly that introgression between the two species would occur if they were broadly sympatric, since with greater opportunities for choice of mates individuals may preferentially pair with members of their own species.

The hypothesis that these young are the result of a hybrid pairing between Tropical Kingbird and Gray Kingbird is derived from a number of observations made over five months of covering the study area. Chief amongst these are: 1) opportunity; 2) field marks; and 3) voice. No male Tropical Kingbird was observed in the study area during the time that the female Tropical Kingbird would have conceived, but numerous Gray Kingbirds were observed. The latter are relatively common breeders in the area, and are especially attracted to the ornamental plantings found in the St Armands Circle area. When the female Tropical Kingbird was initially discovered, she was frequently observed chasing Gray Kingbirds. No data exist on the polygynous tendencies of Gray Kingbirds and, although data are again lacking, male Gray Kingbird breeding behavior (e.g. guards the nest while female builds it) seems to closely mirror that of Tropical Kingbird (Smith and Jackson 2002). Our hypothesis would be that the female Tropical Kingbird, through persistence, mated with a male Gray Kingbird which subsequently remained loyal to his own conspecific nest.

The most compelling case for hybridization with Gray Kingbird was noted in the field marks and vocalization of the juveniles. These are summarized in Table 1 (Dunn and Alderfer 2011, Sibley 2014).

After 1 August 2013, the two adult Tropical Kingbirds remained in the study area. Breeding Tropical Kingbirds in Arizona leave the state in winter while those in South Texas tend to be resident (Chesser 1995). Where Tropical Kingbirds are resident, they tend to maintain the pair bond year round (Skutch 1954). Local birders were therefore eager to see if the Tropical Kingbird pair would choose to spend the winter in Sarasota and breed in the spring. However, the male Tropical Kingbird was last seen on 14 September 2013 and the female on 28 September 2013 (Ahern 2014b) (but see Postscript below).

Hybrid records are normally not the purview of the FOSRC, but the committee agreed to review the Tropical Kingbird x Gray Kingbird hybrid submittal at its regular meeting on 2 August 2014. After discussion, the committee reached an informal consensus of "apparent hybridization" (J.S. Greenlaw, pers. communication).

DNA analysis.—It was hoped that a DNA analysis would conclusively establish the identity of the male parent. Blood samples collected by Archbold Biological Station on 22 June 2013 were shipped to two different laboratories (serially rather than coincidently) for analysis. In addition, several other laboratories were contacted. The analytical attempts were prolonged and the unfortunate outcome is that a successful DNA analysis could not be completed. The essential problem is lack of genetic reference materials and information for the putative parent species. Apparently very little DNA work has been done on *Tyrannus*.

Table 1. Summary of significant juvenile kingbird characteristics

Characteristic	Subject juveniles	Pure Gray Kingbird	Pure Tropical Kingbird
Underparts	white with faint hint of yellow wash on belly and undertail coverts*	white with very faint yellow wash on undertail coverts (see Fig. 3A)	bright yellow from lower breast to undertail coverts
Back	gray	gray	greenish
Bill	long tending toward prominent	long and prominent	long
Voice	two-part *pe-cheer*'	two-part *pe-cheer*'	accelerating twittering trill

*the final juvenile to leave the natal area (1 August 2014) displayed, on that date, diminished yellow wash on belly and undertail coverts but localized patches of pale yellow on each central flank (see Fig. 3B)

Postscript

On 23 April 2014, the female Tropical Kingbird was noted to have returned to the natal parking lot in Sarasota. She then commenced to construct and then disassemble six nests in three different oak trees before settling on a seventh nest in an oak about 25 feet away from the 2013 nesting tree. She fledged (on 4 July 2014) three juveniles from a clutch of four eggs. There have been no confirmed reports of a male Tropical Kingbird this time, and indeed the current juveniles appeared to be matches of last year's, i.e. pale underparts with a faint yellow wash on belly and undertail coverts, gray backs, long bills, and vocalizations similar to Gray Kingbird. On 24 July 2014, an experienced observer witnessed a Gray Kingbird land on the wire 12 inches from the female Tropical Kingbird and then, with a wing flutter, proceed to hop up onto her back for a split-second before returning to its original position. The female Tropical Kingbird had no visible reaction. She was last seen on 30 August 2014.

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