

TROPICAL KINGBIRD AT STATEN ISLAND, NEW YORK AND A NORTHEASTWARDS SURGE OF VAGRANTS TO NORTH AMERICA

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Tropical Kingbird (*Tyrannus melancholicus*) is an abundant and widespread Neotropical species with an extended history of vagrancy to temperate North America (Pranty *et al.* 2016). One at Mount Loretto Unique Area, Staten Island, NY (40.503575, -74.218169) on 26 September 2021 was just the second for New York State, less than a year after the first, at Dobbs Ferry, Westchester County, 27-29 October 2020 (Tom Warren, Julien Ansellem, eBird). These New York records follow scores of records from Florida since 1982 and at least 25 from northeastern North America through 2020. Here we provide details for the Staten Island record, describe the broader recent increase in northward occurrence of vagrant Tropical Kingbirds, and address what could be responsible for this change. Specifically, we tested the hypothesis that the occurrence of Tropical Kingbirds in northeastern North America could be predicted by their occurrence in Florida and confirmed that this was so, supporting the notion that vagrancy to northeastern North America is the result of an ongoing process of population growth, exploratory behavior, and colonization.

The Staten Island Bird—About 0700 on 26 September 2021 RRV noted a yellow-bellied kingbird foraging in the shrubby vegetation along the base of the bluff by the old lighthouse at Mount Loretto Unique Area on Staten Island. His first impression was that the bird seemed to have too extensive and bright yellow on the underparts, extending up higher on the throat than on a Western Kingbird. The bird flew three times during the next 15 minutes or so, moving southeastwards along the bluff, and on each of those flights, the bird showed what clearly appeared to be a brownish-olive (and not black) tail that lacked any white at the edges. At this point RRV thought this was likely a Tropical or Couch's Kingbird (*T. couchii*). He sent out email and text messages, and AVC appeared shortly thereafter. RRV lost track of the bird after it flew up from the beach and across the top of the bluff, until both managed to relocate it sitting on a telephone wire that runs from the lighthouse buildings on the top of the bluff north towards Hylan Boulevard. At this point, AVC took photographs that confirmed the bird was either a Tropical or Couch's Kingbird (Ciancimino 2021). Again the bird flew, and when attempting to relocate it, RRV and AVC simultaneously noticed a bird perched at the top of a dead tree on the far west side of the park, which turned out to be the kingbird. At that time, AVC heard a distinct high-pitched twittering call, slower and coarser than that of Eastern Kingbird (*T. tyrannus*),

three of which were also present at Mount Loretto that day and calling, and distinct from the single “peek” call note typical of Couch’s Kingbird. The Tropical Kingbird then called a second time during foraging bouts. We followed the bird as it moved about the Mount Loretto property, concentrating its activity in the trees surrounding Cunningham Pond, at the intersection of Hylan Boulevard and Cunningham Road. During its one-day stay, it was seen and photographed by numerous observers (eBird; photos p. 56 and back cover). On 26 September, the Tropical Kingbird was seen in the company of three Eastern Kingbirds, an Olive-sided Flycatcher (*Contopus cooperi*), a vocalizing Alder Flycatcher (*Empidonax alnorum*) and a Summer Tanager (*Piranga rubra*), all photographed (eBird).

Recent Increase in North America—Tropical and Couch’s Kingbirds are very similar to one another and it is doubtful that juveniles can be distinguished from one another in the field, except by calls (Dickinson and Christidis 2014, Pranty *et al.* 2016, Chesser *et al.* 2021). Tropical Kingbirds utter a twittering call, quite similar to the twittering calls of Eastern Kingbird, whereas Couch’s Kingbirds utter a sharp “pic” or “peek” note quite different from Tropical’s. The occurrence of both Tropical and Couch’s Kingbirds in eastern North America has increased substantially since about 1995. Figure 1 shows the occurrence in the East of Tropical Kingbirds, including individuals that were definitely either Tropical or Couch’s, but not identified to species.

Pranty *et al.* (2016) critically examined 56 records of Tropical/Couch’s Kingbirds from Florida, and concluded that 14 could be conclusively identified as Tropical Kingbird and none as Couch’s Kingbird, although they qualify this by saying they “consider descriptions of two vocalizing individuals to be credible” (as records of Couch’s Kingbird). Tropical Kingbirds have successfully nested in the Sarasota area of southwest Florida, as have Tropical x Gray Kingbird hybrid pairs.

We suspect the reason for the recent increase in records of these kingbirds in North America is increased population growth and consequent range expansion (Veit 2000, Zawadzki *et al.* 2019, Veit *et al.* 2021). To test this idea, we modelled the occurrence of both Tropical and Couch’s Kingbirds (considered together) in northeastern North America (all states and provinces north of North Carolina adjacent to the Atlantic Ocean) as a function of the occurrence of these species in Florida. Our rationale is that the two quantities are both the result of population growth.

METHODS

We calculated the correlation between records of Tropical Kingbird in Florida (Pranty *et al.* 2016), and records in northeastern North America (from eBird, listed in the Appendix), using Spearman rank (R Core Team 2019).

We checked for temporal autocorrelation (R command *pacf*, R Core Team 2019) in both series of records. This revealed temporal autocorrelation at a lag of two years for both series. We then formulated three regression models; we chose

the best model as the one with the lowest Akaike Information Criterion (AIC; Burnham and Anderson 2002). We sought to predict the number of northeastern North America Tropical Kingbirds as the response, using either

- year, or
- year + number of Florida Tropical Kingbirds, or
- number of Florida Tropical Kingbirds

as predictors. We used GAMM (R command *gamm* in package *mgcv*; Wood 2017) models, and incorporated an autocorrelation structure (lag two years) in each model.

RESULTS

The number of Tropical Kingbird records in northeastern North America is significantly related to the number of records in Florida, showing the same upward swings in about 2009 and, especially, 2017 (Spearman’s rho = 0.4128, p = 0.001, Fig. 1).

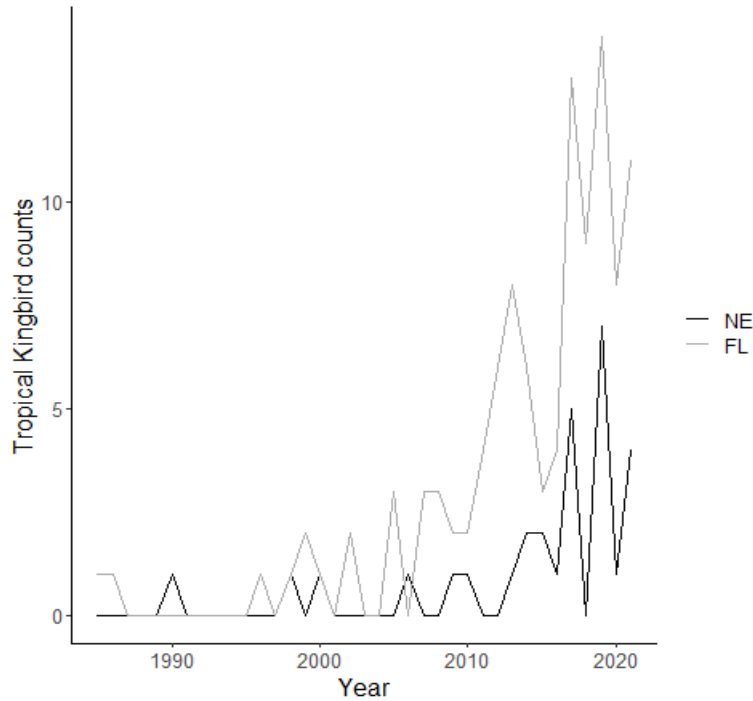


Figure 1. Number of Tropical/Couch’s Kingbird records in Florida (gray; from Pranty *et al.* 2016) and northeastern North America (black; eBird).

The number of Tropical Kingbird records in Florida is significantly temporally autocorrelated at lags one and two years (Fig. 2a). Records from northeastern North America are significantly autocorrelated at two years (Fig. 2b). Because of these results, we incorporated an autocorrelation term with a lag of two in the GAMM models.

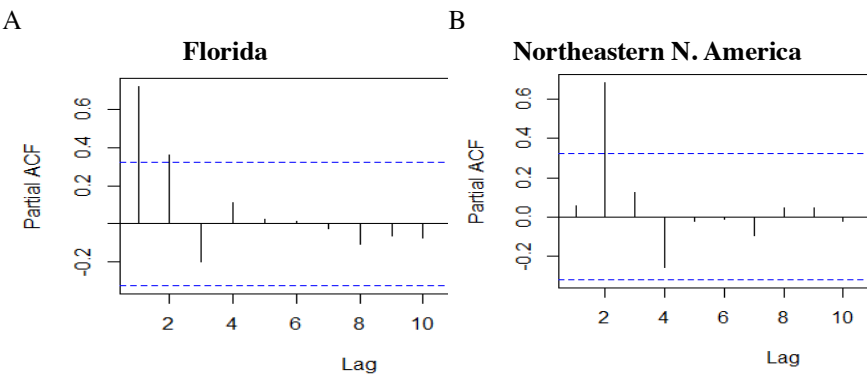


Figure 2. Partial autocorrelations for records from Florida and northeastern North America, showing significant autocorrelation at one and two years, and at two years, respectively.

According to AIC, the best model to predict number of northeastern North American Tropical Kingbirds is that using (only) the number of Florida Tropical Kingbirds (Table 1).

Table 1. Outputs of models predicting Northeastern Tropical Kingbird records.

Predictor(s)	p-values	AIC	Adj R ²
Year	3.3 x 10 ⁻⁵	163	0.45
Year	Year: 0.04	154	0.67
Florida Tropical Kingbirds	FL: 0.16		
Florida Tropical Kingbirds	8 x 10 ⁻⁷	145	0.82

Retaining the model with Florida Tropical Kingbirds yields a predictive model as in Figure 3, indicating that we can expect a roughly exponential increase in numbers of Tropical Kingbirds to northeastern North America going forward.

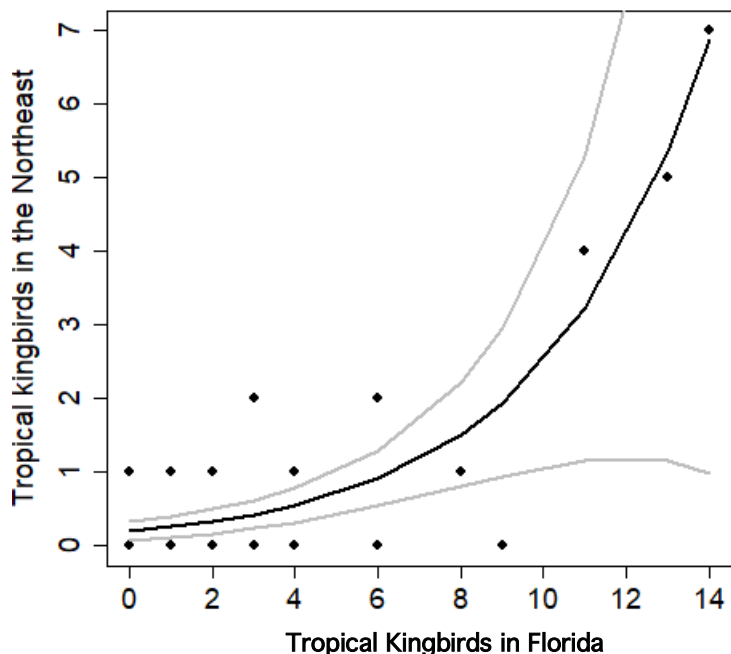


Figure 3: Numbers of Tropical Kingbirds appearing in northeastern North America, as predicted by numbers of Tropical Kingbirds appearing in Florida (from Veit *et al.* 2022, used by permission).

DISCUSSION

We've shown that the best model (among those considered here) is one with the number of Tropical Kingbirds detected in Florida as a predictor of Tropical Kingbirds in the Northeast. One might raise the argument that the single predictor Year and the single predictor FL Tropical Kingbirds had similar levels of significance (10^{-5} and 10^{-7}), so perhaps the strength of the FL Tropical Kingbirds model is merely due to autocorrelation. We reject this line of reasoning because the adjusted R^2 is so much greater (for the FL Tropical Kingbirds model). Further, the FL Tropical Kingbirds data is itself strongly temporally autocorrelated—that is why, in the model containing both Year and FL Tropical Kingbirds as predictors, once Year is accounted for, FL Tropical Kingbirds is no longer significant. Given this, one might be tempted to model northeastern North American vagrant numbers using Year (only) as a predictor, but that would only be useful so long as numbers of Florida Tropical Kingbirds continued to increase as time increases. We contend that the strong association between Florida records and time is what drives the increasing numbers of Tropical Kingbirds to the Northeast. Of course, the increasing number of Tropical Kingbirds in Florida is itself a result of population growth in Central and South America, so the overall

process is a northward progression of vagrancy and colonization from the core of the range.

This is a different scenario from what would be predicted by “drift”, “misorientation”, or “overshooting” (summarized in Howell *et al.* 2014), and more similar to population growth combined with “exploratory behavior” (Baker 1978, Fayet *et al.* 2016, Veit *et al.* 2021). Thus, vagrants are not “lost” or misoriented; the increasing spread of kingbirds through eastern North America represents the intentional searching by these birds for new habitat, driven by the increasing numbers of young birds being produced (Zawadzki *et al.* 2019, Acosta Alamo *et al.* 2022, Veit *et al.* 2022). Not all of the vagrants will be successful finding suitable habitat for nesting, but some already have in Florida, including both hybrid Tropical x Gray and pure Tropical pairs that have successfully fledged young (Pranty *et al.* 2016; eBird). Seeing that these are tropical species moving northwards, it seems likely that the recent increase in population growth is at least partly driven by changing climate.

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Appendix—List of all reported Tropical Kingbirds plus Tropical/Couch’s Kingbirds (but not Couch’s Kingbirds) in states and provinces bordering the Atlantic Ocean, as well as Pennsylvania, to include records at Philadelphia and Conowingo that seem to belong here. Data from eBird; all were reported as Tropical Kingbirds; those listed as Tropical/Couch’s were not heard calling (for consistency with Pranty *et al.* 2016).

Date	Location	Tropical	Tropical/ Couch’s
31 Oct 1915	Scarborough, ME	X	
16 Jun 1984	Anticosti Island, QC		X
11-18 Oct 1990	New Haven, CT	X	
8-17 Jul 1998	Cap Tourmente, QC	X	
11-12 Dec 2000	Hingham, MA	X	
26 Nov 2006-3 Jan 2007	Somerset, MD	X	
13 Oct 2009	Prime Hook, DE	X	
31 Oct-2 Nov 2010	Falmouth, MA	X	
20 Jun 2013	Philadelphia, PA	X	
1 Aug 2014	Manicouagan, QC		X
6 Oct 2015	Montreal, QC		X
18 Oct 2015	Northumberland, NB		X
17-23 Nov 2016	Conowingo, PA	X	
10 Jun 2017	New Castle, DE		X
8 Jul-5 Aug 2017	Barabois, QC		X
24 Oct 2017	Yarmouth, NS	X	
4 Nov 2017	Gloucester, NB	X	
9 Nov 2017	Westmorland, NB		X
14 Jun-4 Jul 2019	Plymouth, MA	X	
15 Jul 2019	Assateague, MD		X
19-26 Oct 2019	Belmont, MA	X	
28 Oct 2019	East Machias, ME		X
28 Oct-3 Nov 2019	Cambridge, NB	X	
2 Nov 2019	Shelburne, NS		X
2 Nov 2019	Cape Henlopen, DE	X	
20 Oct 2020	Westchester, NY	X	
15 May 2021	Provincetown, MA	X	
26 Sept 2021	Staten Island, NY	X	
5 Dec 2021	Rockport, MA	X	



Left: Gray Kingbird, Fire Island Lighthouse, *Suffolk*, 13 Oct 2021, © Eileen Schwinn.

Right: Tropical Kingbird, Mount Loretto Unique Area, *Richmond*, 26 Sep 2021, © Anthony Ciacimino. See article pp. 2-8.



Left: Gray Kingbird, Great Kills Park, *Richmond*, 30 Nov 2021, © Steve and Josette Bonamo.

Right: Tropical Kingbird, Mount Loretto Unique Area, *Richmond*, 26 Sep 2021, © Seth Wollney. See article pp. 2-8.

