

SPRING ARRIVAL OF TREE SWALLOW AND EASTERN PHOEBE IN THE ADIRONDACKS

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In the Winter 1987 issue of *The Kingbird*, editor Robert Spahn announced “a more systematic approach to reporting spring and fall arrival and departure dates.” Every year since, tables of arrival and departure dates have been compiled and published in *The Kingbird*. He goes on to say, “No one will know if arrival and departure dates are useful until substantial sets of consistently gathered data are compiled.” And... “there are many questions that can be posed from these data: Is New York State large enough that the direction of migratory movement can be inferred from arrival and departure dates... and are there regular patterns of arrival and departure within a region, and if so with what factors might they be correlated?”

For 12 years (from 1993 to 2004) I kept a meticulous record of dates for many spring biological phenomena including the flowering of coltsfoot, the first appearance of wood frogs in my pond, surfacing of ants from their winter hermitage, appearance of the first butterfly, the last snow, and the spring arrival of the Tree Swallow (*Tachycineta bicolor*) and Eastern Pheobe (*Sayornis phoebe*).

My initial (and naïve) intention was to define the arrival of spring in biological terms, at my location in the Adirondack Mountains. But this coming of spring is an extraordinarily complex phenomenon and can't be accurately defined by any one or even an array of biological events.

So I decided to focus on the arrival dates of the two species of birds, using my data sets as well as the corresponding arrival dates for the same years for each of the ten Regions in NY State. I wanted to see whether these data sets could be fit together seamlessly using Hopkins' Bioclimatic Law (Scott). This principle states that spring advances northward at about one degree latitude (69 miles) in four days, and it advances up mountains at about 100 feet per day (Kudish 1975).

First I compared my sets of data for the two species to see whether there was rank order correlation between them (Table 1). I used sets of ten data points for the comparison (1993-2002). Data for 2004 were incomplete and I treated one data point as an outlier (apparent arrival of Tree Swallow on 16 May, 2003). With $n=10$ and $\alpha=0.05$, the critical value of r_s is 0.648. Since the test statistic $r_s = 0.890$ exceeds the critical value, it appears that there is a positive correlation

between the arrival dates of the Tree Swallow and Eastern Phoebe at my study site (Triola 1992). The site is at an elevation of 990' above sea level in the Town of Elizabethtown, Essex County. This correlation suggests that the arrivals of these two insectivorous species are responding to some of the same factors, which could include weather patterns, temperature, length of day, availability of food, and others.

I chose Regions 7 and 9 to make arrival date comparisons since they represented the extreme ends (north and south) of New York's mainland. Using data from the spring arrival tables published in *The Kingbird* between 1992 and 2005, I determined that the mean arrival date in Region 9 for the Eastern Phoebe was 16 March, and for the Tree Swallow 20 March. For Region 7 by comparison, the mean arrival dates were 29 March for the Eastern Phoebe, and 1 April for the Tree Swallow (Table 2).

Using maps I determined that the distance between the southern end of Region 9, and the southern end of Region 7 is about 234 miles. I made the assumption that birds first appear in the southern end of each Region as they migrate northward in spring. Using the equivalent of one degree latitude equals 69 miles and using Hopkins' Bioclimatic Law, I then determined that there should theoretically be about 13.6 days difference in the appearance of birds between the two Regions. How does the theory compare with the actual? For each species, the observed difference in arrival dates was very close to the predicted difference, deviating by less than one day in each case (Table 2). So the rule of thumb that springs advances one degree of latitude every four days is a good one for these two species.

Next, in order to include my data in the comparisons, I would need to see how well the other part of Hopkins' Bioclimatic Law worked—where spring advances to higher elevations at a rate of 100 feet per day. Applying this law, I calculated that Eastern Phoebe should arrive on 8 April, which corresponds well with the observed mean (8 April) and median (7 April). In the case of Tree Swallow, however, observed arrival at higher elevations (mean = 18 April; median = 16 April) is almost a week later than predicted (11 April).

In conclusion, to answer Robert Spahn's questions cited above, yes, New York State is large enough that the direction of migratory movement can be inferred from observed arrival dates for some species. And further, for some species (e.g., Eastern Phoebe) the rates of migratory movement, both in latitude and elevation, appear to be well predicted by Hopkins' Bioclimatic Law. The question of which specific factor(s) are actually influencing the rates of these migratory movements is another matter altogether.

Table 1. Spring arrival dates 1993-2004 of Tree Swallow and Eastern Phoebe at Hurricane Mountain Road, Elizabethtown, Essex County.

Year	Tree Swallow	E. Phoebe
1993	19 Apr	16 Apr
1994	23 Apr	05 Apr
1995	18 Apr	08 Apr
1996	03 May	19 Apr
1997	16 Apr	03 Apr
1998	16 Apr	11 Apr
1999	15 Apr	31 Mar
2000	15 Apr	02 Apr
2001	15 Apr	19 Apr
2001	15 Apr	19 Apr
2002	13 Apr	31 Mar
2003	16 May	04 Apr
2004		16 Apr
Mean	18 Apr	08 Apr
Median	16 Apr	07 Apr

Table 2. Mean spring arrival dates of Tree Swallow and Eastern Phoebe for Kingbird Regions 7 (Adirondack-Champlain) and 9 (Hudson-Delaware).

	Tree Swallow	Eastern Phoebe
Region 7 (Adirondack-Champlain)	01 Apr	29 Mar
Region 9 (Hudson-Delaware)	20 Mar	16 Mar
Expected Difference (days)	13.6	13.6
Observed Difference (days)	12	13

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