

A Look at 200 Years of Migration Arrival Dates

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Residing in the archives of library of the Academy of Natural Sciences in Philadelphia is a diary kept by William Bartram during the later years of his life. This diary encompasses the years 1802 to 1822 and records his observations of nature at “the old Bartram homestead on the Schuylkill in Kingsessing, now a part of the City of Philadelphia, though at the time several miles out in the country” (Stone, 1913). In that book, Bartram faithfully noted the arrival date of 26 “common” species of birds each spring at his home. I place the word common in quotes, for as I write this in 2005, few would argue that a number of Bartram’s “common” birds (Yellow-breasted Chat, Bobolink) can hardly be considered common these days in the Philadelphia metropolitan area. Nevertheless, the records kept by Bartram are a useful reference as “his constant outdoor life and the favorable situation of the gardens offset any lack of ability due to age and make it probable that he recorded the common species as soon as they came about his house” (Stone, 1913).

Almost a full century after Bartram’s death, Witmer Stone endeavored to compare the records kept by Bartram to migration data gathered by DVOG members during the years 1901 to 1912. Stone recognized a fundamental flaw in Bartram’s records; that is, by relying on a single observer at one location, one is unable to distinguish between a:

...very early straggler and in another the beginning of the main flight. Furthermore...average dates of arrival for a number of years will differ materially in the records of equally good observers situated only a few miles apart, owing to the fact that the first migrants of a given species may be present for some days in one neighborhood before any are seen in a nearby locality. For this reason it seems to me that reliable results can only be obtained by combining the records of a number of observers clustered around a given center and selecting as a date for comparison the day upon which the species has reached a majority of the stations (Stone, 1913).

Thus, using data collected by a group of observers situated in and around Philadelphia, Stone was able to arrive at an average “bulk” arrival date. Stone did also include an average first arrival date for comparison purposes, but in comparing those dates to the bulk arrival dates (and utilizing other independent data), he demonstrated “pretty conclusively the futility of figuring closely on comparisons of observations of single individuals or upon ‘first arrival’ records of any sort” (Stone, 1913).

Hence, in performing my analysis of current migration arrival dates, focus was upon when the main or bulk of the migration occurred.

While I did not have the luxury of deploying a team of observers to obtain hard data on arrival dates, we can nevertheless compare Bartram and Stone’s records to those documented in modern source materials, all published since 1998. These publications represent a historical compendium of species distribution and abundance throughout the tri-state region. By expanding the geographic scope of this analysis (as did Stone by moving from the Bartram property to using data secured “in and around Philadelphia.”), we can better account for the marked changes and loss of habitat the Philadelphia metropolitan region has undergone in the last 200 years.

Four of my sources (*Birds of Bucks County, Delaware Valley Birds, Birds of the Lehigh Valley & Vicinity, Birds of Delaware County Pennsylvania*) all utilize bar graphs to represent the abundance of each species throughout the year. In the case of a year-round species, where the graph indicates an increase in abundance, that date was used as the bulk arrival date. In three graphs (Belted Kingfisher twice and Killdeer once), no change in abundance was depicted throughout the year, and thus, no average date was calculated for this source. In attempting to pin a specific date on each species, the spring migration months of each bar graph was broken up into roughly 5-day increments, with the median date being the 15th.

Table 1. Comparison of Arrival Dates over 200 Years

	BARTRAM AVERAGE DATE FIRST ARRIVAL (1802-1821)	STONE AVERAGE DATE “BULK” ARRIVAL (1901-1912)	MODERN LITERATURE AVERAGE DATE “BULK” ARRIVAL
Spotted Sandpiper	April 18	April 27	April 28
Killdeer	Feb. 28	March 11	March 15
Belted Kingfisher	April 3	March 29	April 5
Chimney Swift	May 2	April 23	April 30
Ruby-throated Hummingbird	April 30	May 10	May 5
Eastern Kingbird	May 1	May 5	May 5
Eastern Phoebe	March 14	March 21	April 1
Bobolink	May 10	May 9	May 9
Red-winged Blackbird	Feb. 18	March 9	Feb. 22
Orchard Oriole	April 27	May 6	April 29
Baltimore Oriole	April 30	May 5	May 6
Common Grackle	Feb. 28	Feb. 28	Feb. 27
Eastern Towhee	April 20	April 19	April 13
Indigo Bunting	May 8	May 8	May 5
Scarlet Tanager	May 1	May 6	May 5
Barn Swallow	April 10	April 23	April 30
Red-eyed Vireo	April 28	May 7	April 29
Yellow Warbler	April 23	April 30	April 28
Common Yellowthroat	April 27	April 28	April 29
Yellow-breasted Chat	May 8	May 8	May 7
Ovenbird	April 23	April 30	May 4
American Redstart	April 27	May 4	May 6
Brown Thrasher	April 15	April 23	April 12
Gray Catbird	April 26	April 30	May 3
House Wren	April 20	April 26	April 26
Wood Thrush	April 29	April 30	May 6

In the case of *Birds of New Jersey* and *Birds of Pennsylvania*, verbal time frames were provided. Chimney Swift numbers “build from late April into early May” (Walsh, 1999). Using this description, I calculated the time period to be the last week of April through the first week of May, with the median date being May 1. This was the date assigned for this species and source. Where the written description stated that the “greatest number of migrants is usually recorded from the first to the third week of April” (McWilliams [2000] in the case of the Eastern Phoebe), a date falling mid-way

through the second week (April 10) was used. In the case of *Birds of Delaware*, a combination of bar graph and verbal description is provided for species abundance and migration dates. Both were utilized and compared in arriving at an average bulk arrival date. As in the publications that used bar graphs exclusively, there were a couple of species where the written text provided little useful guidance, particularly so involving the Belted Kingfisher where only *Birds of Pennsylvania* provided a workable date. By using multiple sources, any errors that occurred in extrapolating spe-

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cific dates from the bar graphs or written descriptions would even out when an average date was calculated.

Despite the flaws noted by Stone in using Bartram's first arrival dates, in comparing those dates to dates recorded by DVOC members a hundred years later, he concluded that "we are justified in saying that no appreciable change in the time of arrival of these birds has taken place in the past century" (Stone, 1913). Comparing modern dates to Stone's, can we conclude the same? As the table on page 63 shows, comparing the modern bulk arrival dates of our 26 species with those of Stone, 11 species arrive late, 12 arrive early and 3 have the same arrival date. Those that are late are, on average, late by 4.3 days; those that are early are arriving early by an average of 5.3 days. However, when we examine the data more closely, 3 species' arrival dates deviate from Stone's by more than 10 days, and thus bear examining further.

In the case of the Red-winged Blackbird and Brown Thrasher, these species are recorded as arriving early by 15 and 11 days, respectively. In the case of the Red-winged Blackbird, the deviation may likely be explained by the use of a broader geographic area and diverse habitat, particularly as the source material utilized relied upon encompassed the entire New Jersey and Delaware shorelines, where this species can be found in abundance by mid-February. Additionally, this species is a year-round resident of the Delaware Valley, making the dating of migration more difficult

to pinpoint. It was also interesting to note that the modern bulk arrival date fell almost exactly between Bartram's average first date of arrival and Stone's average first date of arrival (2/28) which he calculated from the DVOC data. We can likely also claim that the use of greater geographic area and diverse habitat in our source material explains why the Brown Thrasher dates deviated so significantly.

As regards the tardiness of the Eastern Phoebe by 10 days, this writer is simply at a loss to explain the anomaly. If some global habitat or climatic change were the root cause, then would we not also expect a similar deviation for the other member of the family *Tyrannidae* listed? Yet, the Eastern Kingbird's arrival date was one of only three that were identical to Stone's. A closer examination and further study is in order before any conclusions can be drawn.

If we eliminate from the analysis the three species discussed above, the 10 species' average late bulk arrival date drops to 3.7 days and the 10 early species' average bulk date deviates from Stone's by only 3.8 days. Furthermore, a total of 11 species are all within a two-day deviation from Stone. Can we conclude that in the last 100 years "no appreciable change in the time of arrival" has occurred? Taking into account the significant habitat and climatic changes that have occurred in the last century, then, yes, it would probably be fair to reach the same general conclusion as did Stone in 1913.

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