

Avian Spring Arrival Differences in East-central Illinois, 1903-1922 and 1965-1987

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ABSTRACT

Median spring arrival dates for 74 avian species migrating through east-central Illinois were recorded around Urbana, Champaign County, 1903-1922, and near Charleston, Coles County, 1965-1987. Only 11% had an expected lag of 2-3 days later in their median arrivals in Urbana than 74 km farther south in Charleston; arrivals of individual species varied by 12 days earlier to 30 days later in Urbana than decades later in Charleston. Changes in climate or in population size over time may have contributed to marked differences for some of these species as well as for several others where yearly observations were rare at one site or the other. For a few nesting species availability of key bottomland forest habitat in Coles County but not in Champaign County could explain their infrequent records or late arrivals in Urbana.

INTRODUCTION

Phenology, the study of recurring seasonal events in the life cycles of plants and animals, enables one to compare the timing of such events in different geographic locations or over different time intervals. In Wisconsin between 1935 and 1945, Aldo Leopold compiled a phenological calendar of yearly biological activities recorded around Madison and farther northwest on the family farm near Baraboo. Among 325 annual events were spring arrival dates for 39 species of migrant birds (Leopold and Jones 1947). Years later, Nina Leopold Bradley published an analytical comparison of her father's 1936-1947 spring records on their farm with her own 1976-1998 observations at that same site. Included were 74 series of recurring events including arrival dates for 18 bird species (Bradley et al. 1999).

My objective was to compare spring arrival dates in 1965-1987, for birds recorded near Charleston in Coles County with those reported during 1903-1922 by Smith (1930) near Urbana in Champaign County, 74 km north of Charleston. Included are plausible explanations for species having marked arrival differences.

METHODS

Frank Smith, with help from “competent and interested observers,” kept daily field notes of birds seen near the University of Illinois, Urbana campus during spring seasons of 1903 to 1922. He published data on 221 species including median arrival dates for those seen regularly during the 20-year span (Smith 1930).

I also recorded almost daily notes on migratory activity near Charleston in Coles County plus notes from other capable observers during 1965-1987 with arrival records of select species extending until 2005. As did Smith, I calculated median dates of first arrivals to minimize the skewing effects of occasional extreme records or clusters of dates that affect means and modes. In my tabular comparisons of species at the two sites I only listed regular migrants recorded in at least 70% of the total years sampled (14 of 20 in Urbana and 16 of 23 in Charleston). Omitted are those that occasionally overwinter making first arrivals uncertain. Waterbirds, marsh and shorebirds were excluded because Smith regarded these as less adequately studied, causing doubt about their actual arrivals. Without annual arrival dates in Smith’s paper, I elected not to include correlation or regression analyses for my own data. I did include statistics from an earlier paper on the variability in yearly spring arrivals of certain species in Coles County. Scientific names appear in the Appendix to reduce clutter in text and tables that follow.

RESULTS

The median arrival dates of the 74 migrant pairs in this report include 17 recorded in Urbana during February-March (Table 1), 25 in April (Table 2) and 32 in May (Table 3). The species lists are in taxonomic order rather than by chronological dates to facilitate easy comparison of related groups. The earliest arriving species are all short-distance migrants wintering mostly in the United States that periodically are confronted by harsh survival conditions as winter weather lingers or recurs (Table 1). The mean difference for this initial group was 0.8 days earlier in Urbana. There were, however, considerable arrival differences for some species between sites over the half century. Of the 17 species, 10 were recorded earliest near Urbana including most sparrows but decades later blackbird members were conspicuously early around Charleston.

Among the 25 migrant species that usually arrived in Urbana in April (Table 2), all winter mainly outside the U.S. but seven (Turkey Vulture, House Wren, Blue-gray Gnatcatcher, Gray Catbird, Yellow-rumped Warbler, Palm Warbler, and Common Yellowthroat). During April the group mean difference was 3.4 days earlier in Charleston; omitting Turkey Vulture dates, the mean was 2.2 days earlier for the other 24 species. Sixteen species occurred earlier in Charleston but three of the four thrushes appeared first in Urbana (as did the Hermit Thrush in March).

During May, the peak landbird migration period in Illinois (Table 3), all 32 species except the Lincoln’s Sparrow are long-distance migrants wintering mostly in the tropics. The mean arrival date was 3.2 days earlier in Charleston for this group. The four vireos averaged more than a week earlier in Charleston and the Northern Parula, a warbler, nearly 3 weeks earlier. Only nine species averaged earlier median arrival dates at Urbana early in the century and usually by only 1-2 days.

Several species that lacked adequate yearly records for inclusion in the tables are of particular interest. Early in the past century seven species were found nearly every spring near Urbana but more than 40 years later they were recorded at Charleston in less than half the 23 years: Olive-sided Flycatcher, Yellow-bellied Flycatcher (5 years), Bewick's Wren (8 years and none after 1984), Winter Wren, Loggerhead Shrike, Black-throated Blue Warbler (3 years) and Pine Warbler. By contrast, the White-eyed Vireo, Cerulean Warbler and Yellow-throated Warbler were found in at least 20 of 23 springs around Charleston, the Worm-eating Warbler has occurred locally in 33 of the past 40 years and the Louisiana Waterthrush yearly since 1975 through 2005 in my records. From 1903-1922 at Urbana, none of these latter five species were seen in more than 6 of 20 years with the Cerulean Warbler found only once and the Yellow-throated Warbler not listed.

DISCUSSION

Median arrival date differences between Urbana, 1903-1922 and Charleston, 1965-1987 might have resulted from the latitudinal distance separating the two sites, changes in climate, changes in population size, or habitat differences limiting the presence of some species. Each of these possibilities will be considered with supporting evidence from other studies.

In the northern hemisphere most phenological events follow the warming sun and longer days northward in spring; thus migrants would be expected to arrive somewhat later in Urbana, 74 km north of Charleston. To compare the timing of such events at distant locations, Hopkins (1918) proposed his Bioclimatic Law, a rule-of-thumb formula to measure the average spring delay in days as one travels northward, eastward and upward in elevation. If his latitudinal component is valid, in a typical year migrating birds should arrive in Urbana 2.7 days after reaching Charleston.

Using Hopkins' rule, Leopold and Jones (1947) calculated dates for biological activities at their two Wisconsin sites to be 1.5 days later at the more northerly farm. They actually observed average flowering dates to be 2.6 days later in April and 3.6 days later in May. Their bird arrival data were excluded because of weekday gaps in farm records near Baraboo.

When median migrant arrival dates near Baraboo were compared with Charleston for similar years (Hunt and Cope 1996), Hopkins' rule predicted a delay of 16.1 days. In fact, February-March arrivals in Baraboo averaged 25.5 days later than Charleston, April migrants were 8.3 days later and May birds were 6.2 days later. Thus, the rule is a poor predictor for highly mobile birds that can traverse 68-80 km in 2-3 hours and as shown above, speed up their transit as the season progresses. At best the rule might account for 8 of 74 species with 2 to 3-day average delays between Charleston and Urbana but most species fell outside this range.

In Wisconsin, Temple and Cary (1987) reported considerable differences in year-to-year migration peaks among the earliest arrivals; nearly all were short-distance migrants responding to regional temperatures. Later arriving, long-distance travelers wintering in

the tropics that depend more on photoperiod for timing displayed less variation between years.

Among 91 spring migrants reported by Hunt and Cope (1996), the ten species with the least annual variability in their arrivals in eastern Illinois and eastern Indiana had median dates between April 14 and May 7. All but two were long-distance migrants. From my Coles County 1965-1987 records in their table 4, each species is listed below by increasing variability with its sample years – mean arrival dates – standard errors – range of arrival days: Chimney Swift – 22 – 4/15 – 0.57 – 10; Rose-breasted Grosbeak – 22 – 4/28 – 0.67 – 13; Magnolia Warbler – 22 – 5/07 – 0.73 – 15; Least Flycatcher – 20 – 5/02 – 0.75 – 12; Cape May Warbler – 19 – 5/05 – 0.78 – 12; Eastern Wood-Pewee – 21 – 5/04 – 0.79 – 17; Baltimore Oriole – 22 – 4/26 – 0.81 – 14; Common Yellowthroat – 22 – 4/23 – 0.83 – 14; Great Crested Flycatcher – 22 – 4/29 – 0.89 – 17; Gray Catbird – 22 – 4/26 – 0.95 – 17. At the other extreme, my unpublished species with the greatest yearly variability near Charleston was the Turkey Vulture, an early, short-distance migrant: 21 – 3/01 – 2.82 – 44. Without yearly records in the Smith (1930) report, I can only assume the variability of spring arrivals in Urbana for these same species was comparable.

Because a delay of 2.7 days predicted by Hopkins (1918) for the latitudinal difference between Charleston and Urbana failed to explain arrival differences for most species, the two sites could be treated as one and comparisons made of two recording intervals separated by several decades similar to the following study. To test the hypothesis that global warming has been altering biological responses, Nina Leopold Bradley compared her annual observations on the Leopold farm during 1976-1998 with those of her father in 1936-1947 (Bradley et al. 1999). With the emphasis on phenological changes over six decades, they plotted statistically significant regressions of lake ice melt through the years with a rise in March temperatures, earlier spring flowering dates and migrant arrivals. Of 18 bird species they compared, eight were significantly earlier, six were marginally earlier and four did not respond to temperature change.

Of the five species in the current study that Bradley et al. (1999) classified as significant responders to spring temperature increases in Wisconsin, median arrivals of Whip-poor-will, House Wren, Rose-breasted Grosbeak, and Red-winged Blackbird in east-central Illinois averaged 7.5 days earlier in the more recent time span; Brown-headed Cowbird arrivals were identical for both study periods. Among other migrants, all four vireos averaged 7.8 days earlier in the 1965-1987 period and 12 of 22 warblers averaged 1.8 days earlier but median arrivals by four of five thrushes were 3.8 days later. These differences indicate not all travel schedules are determined by identical sets of stimuli.

Unfortunately, long-term average winter-spring temperatures for east-central Illinois are difficult to obtain although Chagnon (1990) reported a yearly warming trend statewide 1890-1940 followed by a cooling trend through 1985. The lack of yearly arrival dates by Smith (1930) also precluded the use of regression analyses for the sequence of Illinois data sets, the basis for the Bradley et al. (1999) conclusions.

Also to be considered is the influence of population size on variation in arrival times and the frequency of years during which individuals are likely to be seen. Both Smith (1930) and Leopold and Jones (1947) made the point that large populations are more readily

detected than smaller numbers, resulting in earlier and more frequently recorded arrivals. Consider the Turkey Vulture median arrivals (Table 2) – 30 days earlier in 1965-1987 (Charleston) than in 1903-1922 (Urbana) and on average 41 days earlier in 1988-2005 than previously in Urbana. This dramatic change might suggest a long sequence of milder weather shifting their winter range northward but it could also result from a growing population where some migrants leave the winter roosts earlier. Bohlen (1989) cited a report that Turkey Vulture populations had increased between 1909 and 1958 in central Illinois, a trend that may have continued. For Barn Swallows to average 15 days sooner than early in the century (Table 2) may have a similar explanation. Graber et al. (1972) describe “striking population changes through the years in Illinois,” citing a three-fold increase of the central Illinois nesting population from 1907-1909 to 1957-1958.

Long-term Midwest declines of other species probably account for infrequent sightings during 1965-1987. Bewick’s Wrens were seen in all 20 years of Smith’s study but were found in only 8 of 23 years in Charleston with the last in 1986. Bohlen (1989) stated the decline has been so drastic the species rarely nests in Illinois and is on the state endangered species list. Early in the past century Smith also found Loggerhead Shrikes yearly near Urbana but recently around Charleston there are only 19 spring shrike records in the 40 years since 1965. According to Graber et al. (1973), “most of the population in northern and central Illinois has disappeared since 1965.”

Black-throated Blue Warblers also occurred annually in Urbana but are rarely seen near Charleston – only three springs during 1965-1987 and only three more times through 2005. Graber et al. (1983) said this species had “probably experienced a serious population decline in the past century.” They also believe there has been a lesser decline of Pine Warblers migrating through central Illinois. This latter species has been observed in only 6 of 23 spring migrations in Charleston. Separate monographs by these same authors on flycatchers and vireos make no mention of population changes that might explain why Olive-sided and Yellow-bellied Flycatchers were once common in Urbana but recently scarce near Charleston nor why White-eyed Vireo records are numerous here but infrequent during Smith’s (1930) Urbana study.

Still other species with differing spring migration histories were probably affected more by the geologic history and landforms of the two study areas than by the distance or decades separating them. The Wisconsin glacial advance scoured Champaign County around Urbana creating a rather flat, prairie landscape that lacked extensive forests and waterways. That same glacier stopped abruptly in Coles County leaving a terminal moraine that was penetrated by the Embarras River with its watershed of steep ravines and mature bottomland hardwoods (V.P. Gutowski, pers. com.). Much of this riverine forest still exists because of timber harvesting difficulties and it is here the Cerulean, Yellow-throated, and Worm-eating Warblers, Louisiana Waterthrushes and Northern Parulas arrive early in spring and linger into summer. In Urbana transient Northern Parulas didn’t arrive until 20 days later and the other four were rarely or never reported by Smith. Recently, for the Illinois Breeding Bird Atlas (Kleen et al. 2004), several of these species were found nesting in Coles County but were scarcely represented in Champaign County surveys.

One should not be surprised by avian spring migration calendars that vary from area to area or from time to time but only with more detailed information can one hope to explain differences exhibited by individual species.

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Table 1. February-March median arrival dates in Urbana, 1903-1922, and Charleston, 1965-1987, with years (n) and days difference.

Species	1903-22 (20)	1965-87 (23)	Difference
Killdeer	3-01 (20)	2-21 (21)	-8
Yellow-bellied Sapsucker	3-26 (20)	3-29 (21)	+3
Eastern Phoebe	3-17 (18)	3-22 (22)	+5
Ruby-crowned Kinglet	3-28 (20)	4-07 (22)	+10
Eastern Bluebird	2-23 (17)	2-24 (22)	+1
Hermit Thrush	3-31 (18)	4-08 (21)	+8
Brown Thrasher	3-27 (19)	3-25 (22)	-2
Eastern Towhee	3-11 (20)	3-14 (22)	+3
Chipping Sparrow	3-23 (20)	4-04 (20)	+12
Field Sparrow	3-22 (20)	3-17 (22)	-5
Vesper Sparrow	3-28 (19)	4-03 (20)	+6
Fox Sparrow	3-01 (20)	3-11 (21)	+10
Swamp Sparrow	3-19 (20)	3-22 (20)	+3
Red-winged Blackbird	3-06 (19)	2-20 (22)	-14
Eastern Meadowlark	2-26 (20)	2-13 (17)	-13
Rusty Blackbird	3-08 (19)	3-02 (16)	-6
Brown-headed Cowbird	3-11 (19)	3-11 (21)	0

Table 2. April median arrival dates in Urbana, 1903-1922, and Charleston, 1965-1987, with years (n) and days difference.

Species	1903-22 (20)	1965-87 (23)	Difference
Turkey Vulture	4-01 (16)	3-02 (21)	-30
Broad-winged Hawk	4-28 (16)	4-17 (17)	-11
Whip-poor-will	4-24 (19)	4-17 (21)	-7
Chimney Swift	4-20 (18)	4-14 (22)	-6
Least Flycatcher	4-30 (16)	5-02 (20)	+2
Eastern Kingbird	4-27 (20)	4-26 (22)	-1
Purple Martin	4-09 (18)	3-31 (22)	-9
Bank Swallow	4-20 (16)	4-26 (18)	+6
Barn Swallow	4-25 (16)	4-10 (20)	-15
House Wren	4-21 (20)	4-15 (22)	-6
Blue-gray Gnatcatcher	4-14 (20)	4-12 (22)	-2
Veery	4-29 (18)	5-05 (19)	+6
Gray-cheeked Thrush	4-29 (19)	5-03 (22)	+4
Swainson's Thrush	4-25 (20)	5-01 (22)	+6
Wood Thrush	4-30 (20)	4-25 (21)	-5
Gray Catbird	4-26 (16)	4-26 (22)	0
Yellow-rumped Warbler	4-09 (20)	4-06 (22)	-3
Black-throated Green Warbler	4-27 (20)	4-29 (22)	+2
Palm Warbler	4-22 (20)	4-22 (22)	0
Black-and-white Warbler	4-24 (20)	4-29 (22)	+5
Northern Waterthrush	4-30 (20)	4-23 (21)	-7
Common Yellowthroat	4-29 (20)	4-24 (22)	-5
Scarlet Tanager	4-30 (20)	4-27 (22)	-3
Rose-breasted Grosbeak	4-30 (20)	4-27 (22)	-3
Baltimore Oriole	4-29 (18)	4-26 (22)	-3

Table 3. May median arrival dates in Urbana, 1903-1922, and Charleston, 1965-1987, with years (n) and days difference.

Species	1903-22 (20)	1965-87 (23)	Difference
Black-billed Cuckoo	5-13 (20)	5-06 (19)	-7
Yellow-billed Cuckoo	5-05 (18)	5-07 (21)	+2
Common Nighthawk	5-07 (20)	4-28 (20)	-9
Ruby-throated Hummingbird	5-09 (20)	5-03 (21)	-6
Eastern Wood-Pewee	5-02 (14)	5-04 (21)	+2
Acadian Flycatcher	5-12 (19)	5-08 (20)	-4
Great Crested Flycatcher	5-01 (20)	4-29 (22)	-2
Yellow-throated Vireo	5-04 (19)	4-26 (20)	-8
Warbling Vireo	5-04 (16)	4-25 (22)	-9
Philadelphia Vireo	5-12 (19)	5-07 (17)	-5
Red-eyed Vireo	5-06 (20)	4-27 (19)	-9
Golden-winged Warbler	5-06 (16)	5-05 (21)	-1
Nashville Warbler	5-01 (20)	4-27 (22)	-4
Northern Parula	5-09 (15)	4-19 (21)	-20
Yellow Warbler	5-02 (20)	4-26 (21)	-6
Chestnut-sided Warbler	5-04 (20)	5-06 (22)	+2
Magnolia Warbler	5-02 (20)	5-07 (22)	+5
Cape May Warbler	5-05 (19)	5-05 (19)	0
Blackburnian Warbler	5-03 (20)	5-04 (22)	+1
Bay-breasted Warbler	5-08 (20)	5-09 (22)	+1
Blackpoll Warbler	5-09 (20)	5-04 (21)	-5
American Redstart	5-02 (20)	5-03 (22)	+1
Prothonotary Warbler	5-02 (14)	4-25 (19)	-7
Ovenbird	5-02 (20)	4-28 (21)	-4
Wilson's Warbler	5-11 (19)	5-10 (19)	-1
Canada Warbler	5-07 (14)	5-14 (21)	+7
Yellow-breasted Chat	5-04 (17)	5-03 (22)	-1
Lincoln's Sparrow	5-03 (19)	5-01 (20)	-2
Indigo Bunting	5-03 (20)	4-27 (22)	-6
Dickcissel	5-03 (20)	5-05 (21)	+2
Bobolink	5-04 (16)	5-03 (20)	-1
Orchard Oriole	5-04 (19)	4-26 (22)	-8

APPENDIX

Scientific names standardized by the American Ornithologists' Union (1998).

Turkey Vulture – <i>Cathartes aura</i>	Chestnut-sided Warbler – <i>Dendroica pensylvanica</i>
Broad-winged Hawk – <i>Buteo platypterus</i>	Magnolia Warbler – <i>Dendroica magnolia</i>
Killdeer – <i>Charadrius vociferus</i>	Cape May Warbler – <i>Dendroica tigrina</i>
Black-billed Cuckoo – <i>Coccyzus erythrophthalmus</i>	Black-throated Blue Warbler – <i>Dendroica caerulescens</i>
Yellow-billed Cuckoo – <i>Coccyzus americanus</i>	Yellow-rumped Warbler – <i>Dendroica coronata</i>
Common Nighthawk – <i>Chordeiles minor</i>	Black-throated Green Warbler – <i>Dendroica virens</i>
Whip-poor-will – <i>Caprimulgus vociferus</i>	Blackburnian Warbler – <i>Dendroica fusca</i>
Chimney Swift – <i>Chaetura pelagica</i>	Yellow-throated Warbler – <i>Dendroica dominica</i>
Ruby-throated Hummingbird – <i>Archilochus colubris</i>	Pine Warbler – <i>Dendroica pinus</i>
Yellow-bellied Sapsucker – <i>Sphyrapicus varius</i>	Palm Warbler – <i>Dendroica palmarum</i>
Olive-sided Flycatcher – <i>Contopus cooperi</i>	Bay-breasted Warbler – <i>Dendroica castanea</i>
Eastern Wood-Pewee – <i>Contopus virens</i>	Blackpoll Warbler – <i>Dendroica striata</i>
Yellow-bellied Flycatcher – <i>Empidonax flaviventris</i>	Cerulean Warbler – <i>Dendroica cerulea</i>
Acadian Flycatcher – <i>Empidonax virescens</i>	Black-and-white Warbler – <i>Mniotilta varia</i>
Least Flycatcher – <i>Empidonax minimus</i>	American Redstart – <i>Setophaga ruticilla</i>
Eastern Phoebe – <i>Sayornis phoebe</i>	Prothonotary Warbler – <i>Protonotaria citrea</i>
Great Crested Flycatcher – <i>Myiarchus crinitus</i>	Worm-eating Warbler – <i>Helmitheros vermivora</i>
Eastern Kingbird – <i>Tyrannus tyrannus</i>	Ovenbird – <i>Seiurus aurocapillus</i>
Loggerhead Shrike – <i>Lanius ludovicianus</i>	Northern Waterthrush – <i>Seiurus noveboracensis</i>
White-eyed Vireo – <i>Vireo griseus</i>	Louisiana Waterthrush – <i>Seiurus motacilla</i>
Yellow-throated Vireo – <i>Vireo flavifrons</i>	Common Yellowthroat – <i>Geothlypis trichas</i>
Warbling Vireo – <i>Vireo gilvus</i>	Wilson's Warbler – <i>Wilsonia pusilla</i>
Philadelphia Vireo – <i>Vireo philadelphicus</i>	Canada Warbler – <i>Wilsonia canadensis</i>
Red-eyed Vireo – <i>Vireo olivaceus</i>	Yellow-breasted Chat – <i>Icteria virens</i>
Purple Martin – <i>Progne subis</i>	Scarlet Tanager – <i>Piranga olivacea</i>
Bank Swallow – <i>Riparia riparia</i>	Eastern Towhee – <i>Pipilo erythrophthalmus</i>
Barn Swallow – <i>Hirundo rustica</i>	Chipping Sparrow – <i>Spizella passerina</i>
Bewick's Wren – <i>Thryomanes bewickii</i>	Field Sparrow – <i>Spizella pusilla</i>
House Wren – <i>Troglodytes aedon</i>	Vesper Sparrow – <i>Pooecetes gramineus</i>
Winter Wren – <i>Troglodytes troglodytes</i>	Fox Sparrow – <i>Passerella iliaca</i>
Ruby-crowned Kinglet – <i>Regulus calendula</i>	Lincoln's Sparrow – <i>Melospiza lincolni</i>
Blue-gray Gnatcatcher – <i>Poliopitila caerulea</i>	Swamp Sparrow – <i>Melospiza georgiana</i>
Eastern Bluebird – <i>Sialia sialis</i>	Rose-breasted Grosbeak – <i>Pheucticus ludovicianus</i>
Veery – <i>Catharus fuscescens</i>	Indigo Bunting – <i>Passerina cyanea</i>
Gray-cheeked Thrush – <i>Catharus minimus</i>	Dickcissel – <i>Spiza americana</i>
Swainson's Thrush – <i>Catharus ustulatus</i>	Bobolink – <i>Dolichonyx oryzivorus</i>
Hermit Thrush – <i>Catharus guttatus</i>	Red-winged Blackbird – <i>Agelaius phoeniceus</i>
Wood Thrush – <i>Hylocichla mustelina</i>	Eastern Meadowlark – <i>Sturnella magna</i>
Gray Catbird – <i>Dumetella carolinensis</i>	Rusty Blackbird – <i>Euphagus carolinus</i>
Brown Thrasher – <i>Toxostoma rufum</i>	Brown-headed Cowbird – <i>Molothrus ater</i>
Golden-winged Warbler – <i>Vermivora chrysoptera</i>	Orchard Oriole – <i>Icterus spurius</i>
Nashville Warbler – <i>Vermivora ruficapilla</i>	Baltimore Oriole – <i>Icterus galbula</i>
Northern Parula – <i>Parula Americana</i>	
Yellow Warbler – <i>Dendroica petechia</i>	