

# Transient spring warblers in the Maryland Piedmont: the explosive nature of migration

*David S. Lee*

**A**LTHOUGH NUMEROUS PUBLICATIONS, *e.g.*, state bird books, provide information on seasonal distribution of parulid warblers in particular geographic areas, the patterns presented are mostly generalized and attempt to compile and illustrate only the extremes of species' known periods of occurrence. Spring migration data, summarized and pooled from a number of years, typically including aberrant records, and derived from numerous habitats and localities, tend to mask the explosive nature of warbler migration. Other authors have commented on problems of interpretation of migration patterns. DeBenedictis (1968 *Aud. Field Notes* 22(1): 4-8) and Smith and McCrimmon (1979 *Am. Birds* 33(5):749-751) noted the limited usefulness of first arrivals in assessing migratory patterns. Richardson (1978 *Oikos* 30(2):224-272) commented that first arrivals "... constitute a small (and in many ways atypical) fraction of the total passage and usually represent the interruption of movement begun elsewhere rather than migration in progress." The inherent problems of late migrants cause similar interpretative difficulties. The published regional reports of warbler movements tend to emphasize the unusual and the rare, making it difficult to assess normal mi-

gration activity of specific nocturnal migrants with anything more sophisticated than viscera logic. Nevertheless, the abrupt appearance of spring migrants is well known by most field workers, and this study is simply an attempt to document a well-known, but previously unquantified phenomenon.

In the springs of 1972 through 1974, I conducted systematic daily censuses of warbler activity on a 130-yard transect within the city limits of Towson, Baltimore County, Maryland. Data from this study indicate brief but intense periods of migration in marked contrast to the protracted local patterns suggested by other publications. One type of data base is not superior to the other, but illustrates differences in their respective interpretive roles.

Censuses taken 5 or 6 days/week (5.2 $\times$ ), began in mid-April and continued through May 24, 1974. Less intensive but similar censuses were conducted in the spring of 1972 and 1973. The value of these earlier studies was to train volunteer observers and develop local censusing techniques that minimized duplication of tallies. Results are based on a total of 77.5 field hours in 1974,

and are similar to those acquired from 100 combined hours in 1972 and 1973. Counts were made while walking the length of the transect or by watching from established stations. Tallies from any single 30-minute count period were recorded as the number of birds observed. A 30-minute pause was included allowing birds to pass through the study area, thus reducing duplication of sightings between counts. Three-seven (5.54 $\times$ ) count days/week were conducted each hour from 0800 through 1500. Several students from a field biology course at Towson High School assisted with the census. Only visual encounters are represented in the data, although it should be pointed out that warbler vocal activity became increasingly important in locating individuals toward the end of each annual study period as birds became less numerous and vegetation more dense. Meteorological data is from the nearest major weather station, Baltimore-Washington International Airport (*ca* 30 miles distant).

The study site, located within the city limits of a rather urbanized Piedmont city directly abutting Baltimore City, consisted of a narrow strip immediately adjacent to a 130-yard section of a highly polluted, partly channelized stream (an unnamed branch of Herring

Run) American Sycamore (*Platanus occidentalis*); Red Maples (*Acer rubrum*); Box Elder (*A. negundo*); Black Locust (*Robinia pseudoacacia*); assorted ornamental shrubs, and Japanese Hon-eyesuckle (*Lonicera japonica*), comprised the dominant vegetation bordering the stream. A residential neighborhood of suburban yards, school athletic fields, and community playgrounds containing many relatively mature trees, completely surrounded the site. No warbler species regularly overwinter in the area and few nest there, so all observations (except for those of the Louisiana Waterthrush, *Seiurus motacilla*) are believed to be of migrants.

Typically the birds moved upstream (SE to NNW) as they foraged. Individuals that were followed moved completely through the area in an hour or less, with time/distance movements ac-

celerating after 0930. Counts were made while observers moved downstream, thus eliminating most chances for duplicating counts. Only individuals of species not encountered during the downstream tally were scored on the observers' return. After the season advanced and leafy vegetation became more dense, counts often were made from a single station in a group of Black Locust trees through which most of the birds moved. The late leafing of the Black Locust made counts of individuals possible. Transect tallies also were conducted at these times to compare for possible sampling bias but none was found. At the extreme upstream end of the transect the stream becomes channelized and is surrounded by little woody vegetation other than occasional willows (*Salix* sp.). At this point the birds dispersed in various other direc-

tions, and no longer funnelled along the stream.

During the 1974 observations, 1549 individual sightings were tallied for 26 species of Parulidae. Counts for 1972 and 1973 were similar, although the data base was less comprehensive. Migration phenology of the nine most common species are presented in Figure 1. Sightings of other species were too infrequent for meaningful discussion, or for some species (*i.e.*, Blackpoll Warbler, Louisiana Waterthrush), a significant portion of their spring migration period occurred before or after the 28-field-day observation period. This group included Worm-eating Warbler (*Helmitheros vermivorus*) (2); Blue-winged Warbler (*Vermivora pinus*) (12); Tennessee Warbler (*V. peregrina*) (3); Nashville Warbler (*V. ruficapilla*) (6); Northern Parula (*Parula americana*) (10); Cape May

**Table 1. 1974 daily tallies and periods of coverage of spring migrating warblers, Towson, Maryland. Meteorological data from weather station at Baltimore-Washington International Airport.**

Date	# of 30-min. periods covered	# of individual warblers	# of birds/30-min. pd.	# of species	24-hr. temperature range (°F)	Precipitation	Barometer (sealevel)
April 17	4	1	.25	1		Not recorded	
18	4	3	.75	1		Not recorded	
19	0	—	—	—		Not recorded	
20	0	—	—	—		Not recorded	
21	0	—	—	—		Not recorded	
22	7	2	.28	1		Not recorded	
23	7	2	.28	1		Not recorded	
24	7	1	.14	1		Not recorded	
25	7	4	.57	2		Not recorded	
26	7	3	.43	2		Not recorded	
27	4	0	.00	0		Not recorded	
28	0	—	—	—	52-80	0.00	30.30
29	6	29	4.83	9	61-91	0.00	30.12
30	7	113	16.14	12	58-88	0.00	30.01
May 1	7	198	28.28	15	67-78	0.00	29.93
2	7	163	23.28	15	45-59	0.05	30.28
3	7	159	22.71	13	46-70	0.37	29.81
4	2	22	11.00	9	48-67	0.00	30.03
5	0	—	—	—	41-55	0.01	31.15
6	7	100	14.28	11	43-66	0.13	29.80
7	7	92	13.14	12	37-58	0.00	29.99
8	6	36	6.00	15	37-64	0.00	30.16
9	4	59	14.75	9	56-65	0.33	30.00
10	7	229	32.71	19	57-74	trace	29.90
11	0	—	—	—	51-69	0.00	30.09
12	0	—	—	—	53-70	0.97	29.74
13	3	16	5.33	6	50-66	0.00	29.69
14	6	48	8.33	10	44-82	0.00	30.08
15	5	28	5.60	7	61-86	0.00	29.97
16	7	65	9.28	15	65-84	0.02	30.11
17	4	55	13.75	16	65-90	0.00	30.02
18	0	—	—	—	57-75	0.29	30.14
19	0	—	—	—	58-68	0.00	30.16
20	4	28	7.00	10		Not recorded	
21	5	63	12.60	13		Not recorded	
22	3	15	5.00	3		Not recorded	
23	0	—	—	—		Not recorded	
24	4	15	3.75	8			
Totals	155	1,549	9.99	26	—	—	—

Warbler (*Dendroica tigrina*) (1); Black-burnian Warbler (*D. fusca*) (5); Bay-breasted Warbler (*D. castanea*) (3); Blackpoll Warbler (*D. striata*) (29); Palm Warbler (*D. palmarum*) (2); Ovenbird (*Seiurus aurocapillus*) (2); Louisiana Waterthrush (*S. motacilla*) (9); Connecticut Warbler (*Oporornis agilis*) (2); Yellow-breasted Chat (*Icteria virens*) (2); Hooded Warbler (*Wilsonia citrina*) (1); Wilson's Warbler (*W. pusilla*) (6); and Canada Warbler (*W. canadensis*) (9). An additional 188 individuals included in the totals in Table 1 were not positively identified to species.

Figure 1 and Table 1 present information on periods of occurrence. Local weather (Table 1) did not appear to be a major factor in intensity of observed movement. The bulk of migration through the study area occurred in rather concise calendar periods. Attempts to analyze warbler migration periods from data pooled from several years generally indicated an extended period of movement for any given species. This apparently is a result of birds' response to normal variations in annual weather conditions. For example, Stewart and Robbins (1958 North American Fauna No. 62: 286) considered the normal period of spring migration for the Yellow-rumped Warbler (*Dendroica coronata*), throughout Maryland, to extend from March 10–20 to May 15–25, with the peak movement between April 15 and May 15. In this study 75% (328) of the 438 observations were made in a 7-day period (May 1–8). Although the 1974 survey terminated prior to the conclusion of the Yellow-rumped Warbler migration, an average of only 1.5 of these birds/day was tallied during the last three days. Many of the other species showed a similar, although perhaps less dramatic, explosive occurrence. Average total daily observations of migrating warblers are presented in Table 1.

Species known to winter regularly on the Maryland Coastal Plain (e.g., Common Yellowthroat (*Geothlypis trichas*) and Yellow-rumped Warbler) were not necessarily the first to appear in numbers, nor were neotropical migrants necessarily the last. Most species reached peak abundance during the same time period. Over 80% of the total number of observed birds was tallied in a 15-day period between April 30 and May 14. Several authors have pointed out that during spring migration certain species, such as the Black-and-white

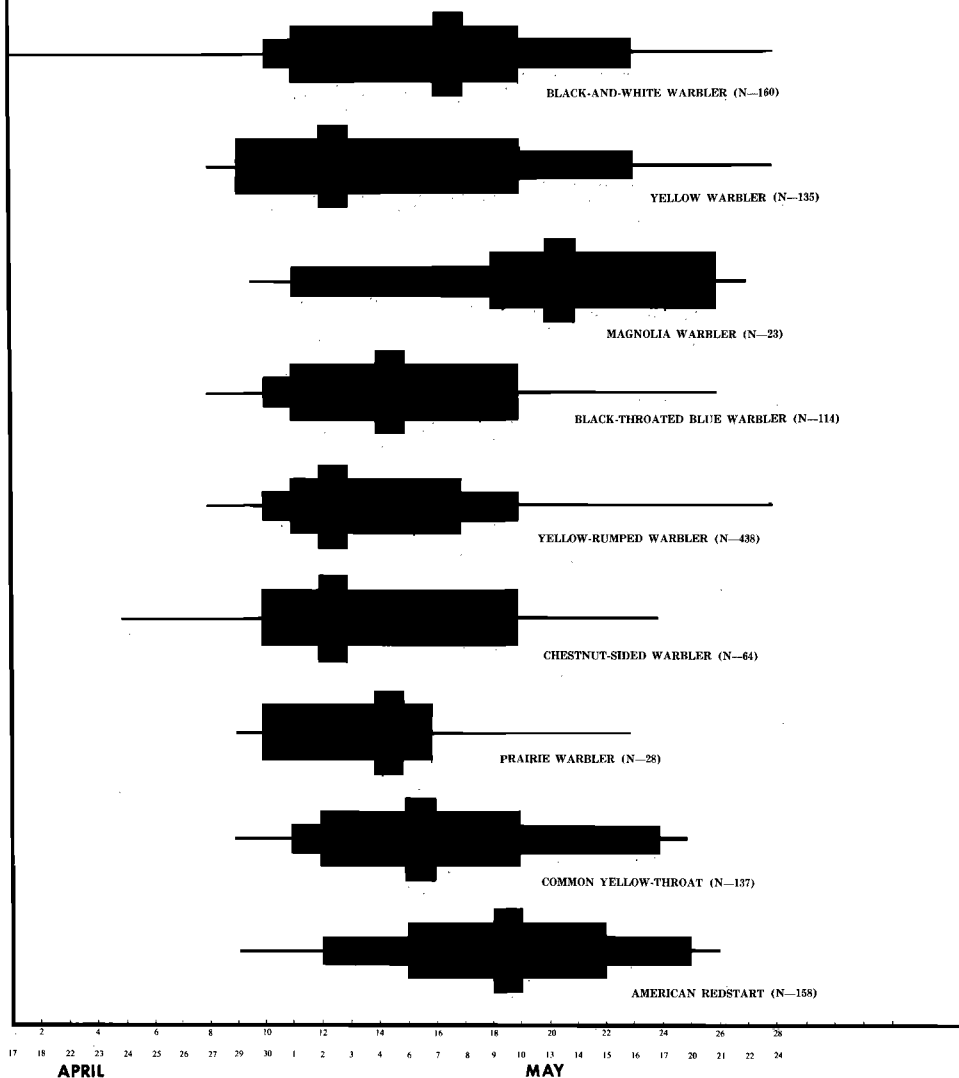


Figure 1. 1974 spring warbler migration at Towson, Maryland, expressed in inter-quartile and inter-octile ranges. Thin line represents observed range of activity. Heavy line progressing from left to right represent  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , and  $\frac{7}{8}$  of total cumulative recorded species activity. For example, by the 18th day  $\frac{1}{4}$  of all American Redstarts had been observed.

Warbler, arrive earlier than others. Although this was also true in this study, most of the individual Black-and-white Warblers arrived during the same peak periods as the other species. In general, the warblers arrived with leafing of hardwoods, although several species did not appear in numbers until mid-May when foliage was well developed. Although this study was flawed by variables in daily coverage (lack of counts on some days, potential duplication of observations, and conclusion of the survey before the migration period totally ended), it does demonstrate the explosive nature of spring warbler migration at a given locality. It also illustrates the "wave-like" nature of migration within

the abbreviated migration period (Table 1). It should be pointed out that although the migration was still in progress at the end of this study, 38% of the 121 birds counted on the last four days were Blackpoll Warblers, late migrants that do not appear in numbers until most other warblers have completed migration.

It is interesting to speculate on the possible significance of explosive migration of multiple warbler species. Although this may temporarily tax food resources at a particular locality, the birds stratify themselves and thus partly eliminate interspecific foraging competition. Data on height of birds above ground level were taken on all sightings,

but the results duplicate those of Parnell (1969 *Auk* 86(3):505-521) and are not presented here. Furthermore, the correlation of intensity of warbler migration with the synchronous opening of new leaves and the first emergence of many insect species is certainly not coincidental. Lack of heavy foliage also may enable birds not familiar with the locality to see concentrations of insects that are unable to disperse through the undeveloped canopy and subcanopy. Mass movements of birds also might subject fewer individuals to predation because a resident predator's take would likely be less in a short period of time than it would be if the migration period were more protracted. Additionally, food and territorial demands in breeding and wintering areas should also favor

narrowing periods of arrival and departure.

It is also of interest to comment on the intensity of migration at this particular station. Using an average figure of 20 birds/hour of actual observation time, an estimated 10,640 warblers moved through this small study area during the day (based on 14 hours daylight) between April 17 and May 24. Unfortunately, I know of no comparable studies which would indicate whether this represents typical movement across a broad area and that these relatively high tallies and estimates are simply a result of field effort, or if this location is, for reasons unknown, particularly favorable for transient warblers. The species composition and abundance was similar for all three years, and I assume

is a good representation of spring warbler activity in the area. How this information compares in species composition and fluctuation of nocturnal spring warbler movement over the same area is unknown.

I thank numerous students at Towson High School (1972-1974) for assisting with the tallies. Zenas M. Sykes helped with the statistical treatment for Figure 1. John E. Cooper, Eloise Potter, Chandler S. Robbins and the late Charles Blake reviewed earlier drafts of this note. Their comments and criticisms are appreciated.

—North Carolina State Museum,  
P.O. Box 27647, Raleigh, North  
Carolina 27611



*Dickcissels (Spiza americana)*. Illustration/James Lish.