

THE 1984 SPRING MIGRATION WATCH

by John Andrews, Lexington

For the past five years, the BIRD OBSERVER Field Studies Committee has sponsored a cooperative data collection project during the spring migration. This article provides a brief summary of the results for 1984. It also presents some results of a computer analysis of data for all five years of the project.

Participants in the Spring Migration Watch (SMW) visit their chosen sites periodically during a period from April 15 to June 6. They follow a fixed route and record the numbers of all designated species present on each visit. The SMW now counts all species on the Massachusetts checklist from Rock Dove to House Sparrow.

Instructions for the SMW specify that all birds detected while traversing the route through the site are to be reported. The actual area that is effectively censused will depend upon the aural and visual acuity of the observer. It also depends upon the maximum distance at which each species can be detected. Because these variables are not controlled, the data must be viewed as providing indices of abundance rather than direct measures of species density. However, such indices are well suited for detecting trends in species abundance or detecting changes in the relative abundance of species. Conversion of the indices to measures of actual area density (such as birds-per-100 acres) is also possible by applying average conversion factors to data combined from many sites and observers.

1984 Results.

In 1984, eight data sets were received from sites in eastern Massachusetts. The sites and the observers were as follows: Provincetown Beech Forest (B. Nikula), Marblehead Neck Wildlife Sanctuary (C. Blaszcak), Mount Auburn Cemetery (F. Bouchard), Pond Meadow Park (R. Campbell), Bowen School in Newton (O. Komar), Webster Conservation Land in Newton (D. Komar), Norton's Woods in Cambridge (P. Stevens), and Bolton Flats (B. Parker).

Warbler abundances were examined by comparing birds-per-hour (BPH) values for 1984 with the values for 1980-83. Differences were considered statistically significant if they had less than one percent probability of occurring by chance. This analysis revealed that two species were low in 1984: Tennessee Warbler (0.322 BPH in 1984 versus 0.744 BPH in previous years) and Black-throated Green Warbler (0.618 versus 0.935). Higher values resulted for Cape May Warbler (0.486 versus 0.097), Black-and-white (2.321 versus 1.766) and Ovenbird (1.066 versus 0.612).

Observers were asked to note if, according to their subjective impressions, any species occurred in distinctly greater or lesser numbers than normal. There was no consistent pattern in their replies. At Mount Auburn, "all warbler species" were up, while at Beech Forest, the numbers of all species were considered low. Of 25 notes that mentioned

individual species, only Yellow-rumped Warbler was mentioned by two observers. They rated Yellow-rumped numbers as being low even though the BPH value for the count as a whole was higher than in previous years. It has been noted in previous years that observers at different sites seldom agree on which species are abnormally abundant in a given year. This may reflect the "patchiness" of bird distributions and the fact that weather patterns can concentrate migrants in different ways from year to year. It also points out the need to examine data from many sites before drawing any conclusions concerning year-to-year fluctuations in migrant density.

The maximum abundance for warblers occurred during the third week of May when 37.1 birds-per-hour were recorded. A strong migration of Magnolia Warbler and American Redstart was noted during the first week of June. The maximum seasonal species count for warblers was 26 species at Mount Auburn Cemetery followed by 24 at Marblehead Neck and Provincetown (Beech Forest).

Data Analysis by Computer.

Without an efficient means of storing and retrieving data, a long-term data collection effort such as the SMW would soon collapse under the accumulated mass of information. For this reason, a computer database has been created for SMW data. The importance of this database to the SMW and other projects of the Field Studies Committee is so great that it is worth some discussion. In a typical year, the SMW data sets involve approximately 160 site visits with up to 65 species reported from each site. Almost ten thousand data entries are then required just to identify the species counts for each site and date. Other data, such as time afield and descriptions of the site habitats must also be entered. As the database grows with each year of the project, hand analysis of the data becomes almost impossible. Fortunately, the personal microcomputers that are becoming increasingly commonplace are quite capable of storing and retrieving such quantities of data. They are also well-suited to volunteer projects since computer work can be done by individuals in their homes and combined later at a central facility.

The SMW database was created by using a word processing program to enter SMW data into text files. This format offered the greatest convenience for data entry and editing. A separate disk file was created for each year of the project. The files contained information on the time afield as well as the species counts. A data file for a complete year (8 data sets and an average of 60 species per site) required approximately 30 kilobytes of storage. Thus, a single floppy diskette with 380 kilobytes capacity can store about 12 years of data.

Programs for reading and analyzing the data were written in the Pascal computer language using the Turbo Pascal compiler by Borland International. This compiler is inexpensive (currently about \$56) and is available for all computers compatible with CP/M or IBM equipment. Each analysis program searches the data files stored on disk and accumulates the bird count data in a table of rows and columns. The type of analysis that results is determined by the manner in which data is

assigned to the rows and columns. For example, if it is decided that the rows will correspond to particular species and the columns to weeks of the year, the resulting table provides an analysis of how the abundance of each species varies from week to week.

As a further control upon the analysis, the user can specify a set of "filter criteria" that will be applied to the stored data before it is accepted for use. The filter criteria specify the sites, site latitudes, site longitudes, years, dates, and species to be used. For example, by a proper setting of the filter criteria, a user could conduct an analysis using only records of Dendroica warblers from outer Cape Cod. If no filtering criteria are specified, then the analysis programs use all available data.

DATA ENTRY IS A TIME-CONSUMING TASK. About an hour of keyboard time is required to enter yearly data for a single site. Additional time is required to prepare the data for entry, resolve questions concerning illegible or questionable entries, and check the data after entry. Thus far, only data for warbler species (Parulidae) have been entered. The Field Studies Committee is seeking volunteers to enter data for all species included in the project.

Timing of the Spring Warbler Migration.

One application of the SMW database is the study of the timing of the spring migration. Figure 1 is a plot of the principal components of the warbler migration resulting from combining SMW data from all five years. The birds-per-hour (BPH) values for each day are derived by summing the total number of individuals seen and dividing this by the total number of hours in the field. The first curve provides BPH values for Yellow-rumped Warbler. This early migrant is by far the most abundant warbler species seen during a spring count. The second curve depicts the BPH values for the principal breeding species: Yellow Warbler, Pine Warbler, and Common Yellowthroat. The third curve depicts the combined BPH values for all other warbler species. This group is composed mostly of migrant individuals.

It can be seen that averaging 5 years of data does not smooth all of the day-to-day irregularities due to weather conditions and random mixes of covered sites. However, several interesting features are evident in this figure. The early migration of the Yellow-rumped Warbler is clearly seen in the general shape of the first BPH curve that peaks between April 25 and May 5. By May 18, the Yellow-rumped migration is essentially complete. The general arrival of the breeding species between May 1 and May 10 is evident in the second curve. BPH values for breeders are fairly stable after this general arrival. The third curve shows that the abundance of migrant warblers increases sharply after May 5 and peaks between May 10 and May 20. There are, however, several late peaks in late May and early June. Because the database contains only a handful of visits in June, the BPH values for this period may be overestimated (due to observers going out only when they believe that weather conditions make a late wave of migrants likely). In the future we hope to stimulate more consistent coverage in early June so that the end of the migration period can be better defined.

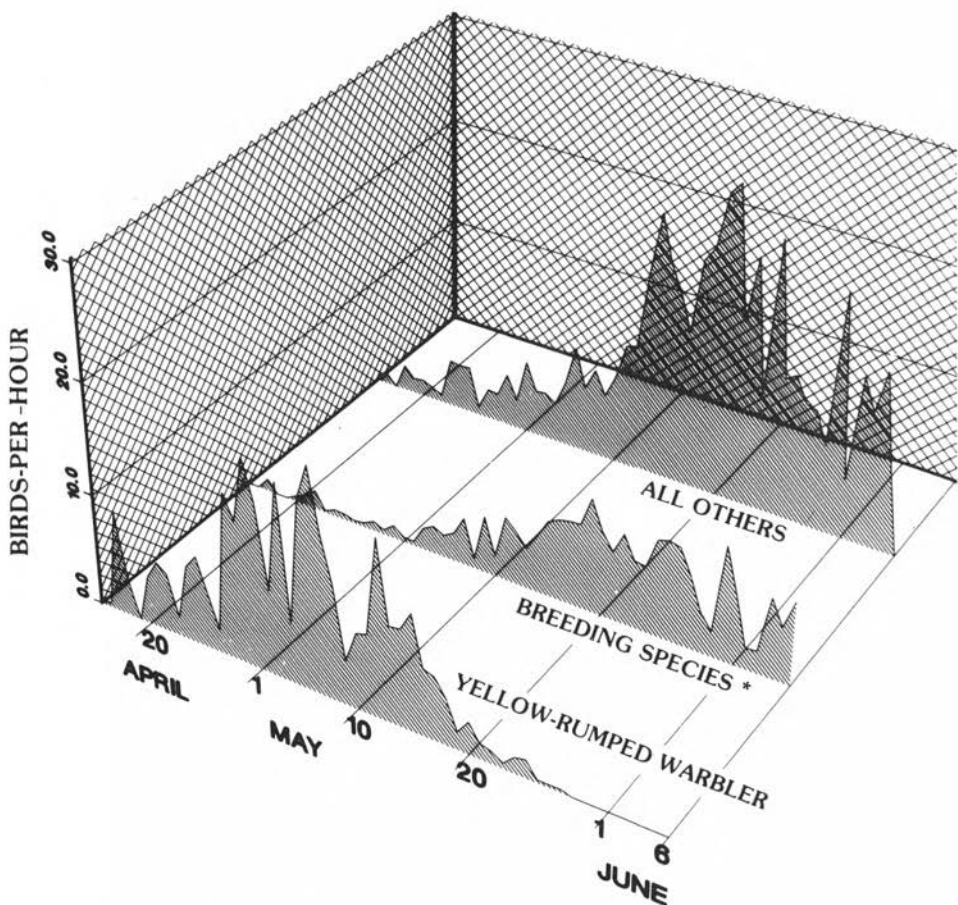


Figure 1. Birds-per-Hour Results for Warbler Species recorded on the Spring Migration Watches, 1980-1984.

*Breeding species: Yellow Warbler, Pine Warbler, and Common Yellowthroat.

Site Analysis of Mount Auburn Cemetery.

An interesting analysis is obtained by computing weekly BPH values for each species at a selected site. Figure 2 is such an analysis for warbler species at Mount Auburn Cemetery in Cambridge. The migration period is divided into weeks with four weeks for each month. The week is assigned a letter code according to the day of the month as follows: A=1 to 7, B=8 to 15, C=16 to 22, D=23 to 31. Thus any day between May 8 and May 15 would be in week 5B. Eight data sets from 1980 to 1984 were combined to produce this graph. These sets contained a total of 5205 individuals recorded during 180 hours afield.

SPECIES	MONTH/WEEK						
	4C	4D	5A	5B	5C	5D	6A
Blue-winged Warbler	-	-	0.525	0.804	0.276	0.354	-
Tennessee Warbler	-	-	0.068	1.311	2.724	1.550	0.750
Orange-crowned Warbler	-	0.056	-	0.105	0.103	0.044	-
Nashville Warbler	-	-	0.434	0.909	0.276	0.177	-
Northern Parula	-	-	1.735	3.164	1.310	0.664	-
Yellow Warbler	-	-	0.616	0.962	1.034	1.196	0.937
Chestnut-sided Warbler	-	-	0.091	0.612	0.414	0.708	0.750
Magnolia Warbler	-	-	0.046	1.189	1.655	0.576	0.750
Cape May Warbler	-	-	0.023	0.490	0.828	0.044	-
Blk-thr. Blue Warbler	-	-	0.274	0.909	0.586	0.044	0.187
Yellow-rumped Warbler	6.113	21.803	17.648	13.479	4.965	1.107	-
Blk-thr. Green Warbler	-	0.113	0.434	2.080	1.931	0.399	0.750
Blackburnian Warbler	-	-	0.046	0.629	0.862	0.266	0.750
Pine Warbler	0.226	0.507	0.046	-	-	-	-
Prairie Warbler	-	-	0.068	0.087	0.034	0.089	-
Palm Warbler	1.585	2.817	1.461	0.070	-	-	-
Bay-breasted Warbler	-	-	-	0.245	1.000	0.443	0.187
Blackpoll Warbler	-	-	-	0.769	2.241	3.188	1.312
Blk-and-white Warbler	-	0.282	3.562	4.108	2.414	1.063	0.562
American Redstart	-	-	0.297	1.469	3.793	3.454	3.187
Worm-eating Warbler	-	-	0.068	-	0.069	0.089	-
Ovenbird	-	-	-	1.381	0.379	0.354	0.187
Northern Waterthrush	-	0.056	0.228	0.315	0.103	0.044	-
Mourning Warbler	-	-	-	-	-	0.089	-
Common Yellowthroat	-	-	0.091	0.927	2.241	1.948	1.125
Hooded Warbler	-	-	0.023	0.087	-	0.044	-
Wilson's Warbler	-	-	-	0.332	0.690	0.443	0.375
Canada Warbler	-	-	-	0.245	1.034	0.531	2.250
COMBINED BPH:	7.92	25.63	27.79	36.68	30.97	18.91	14.06
HOURS AFIELD:	4.42	17.75	43.80	57.20	29.00	22.58	5.33
VISITS:	3	13	29	33	19	15	2
SPECIES/VISIT:	1.7	2.6	5.7	12.2	13.4	9.3	12.0

Figure 2. Weekly Birds-per-Hour Results for Migrant Warblers at Mount Auburn Cemetery, Cambridge (1980-84 SMW). (5205 individual records, 180 total hours afield)

In addition to Mount Auburn Cemetery, site analyses have been produced for Beech Forest (Provincetown), Marblehead Neck Wildlife Sanctuary, and Pond Meadow Park (Braintree). A copy of any of these analyses can be obtained by sending a long self-addressed, stamped envelope to John Andrews (address below).

Conclusion.

The value of the SMW data increases with each year of the project and with each additional site covered. In the coming year, we expect to produce more sophisticated analysis programs and to study site-to-site variations in some detail. Additional volunteers are needed to assist in both data collection and data reduction. BIRD OBSERVER readers who are interested in helping in any way are urged to contact John Andrews (22 Kendall Road, Lexington, MA 02173, Tel. 617-862-6498).

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