THE 1985 SPRING MIGRATION WATCH

by John W. Andrews, Lexington

For the past six years, *Bird Observer* has sponsored an annual Spring Migration Watch (SMW), in which data on bird species abundance are collected by volunteer observers at various eastern Massachusetts sites during the spring migration. This article provides a brief summary of 1985 results and an analysis of the accumulated SMW database.

The data collection methodology for the SMW has been described in previous articles (*Bird Observer* 13:72, April 1985). Briefly, volunteer observers visit their chosen sites periodically during a period from mid-April to early June. They follow a fixed route on each visit, recording the numbers of all bird species that follow Rock Dove on the Massachusetts checklist. Daily totals are entered into a microcomputer computer database and analyzed using several software packages specially written for the SMW.

The data sets submitted for the 1985 SMW included 229 site visits, 308 hours in the field, and 30,402 individual birds (see Table 1).

Table 1. Summary of 1985 SMW Data.

SITE	OBSERVER	NUMBER VISITS	TOTAL HOURS	NUMBER SPECIES	TOTAL COUNT
Willard's Woods Lexington	J.Andrews	17	16.3	68	1123
Mt. Auburn Cemetery Cambridge	R.Stymeist	26	44.9	93	6260
Beech Forest Provincetown	B.Nikula	22	18.1	79	3112
Pond Meadow Park Braintree	R.Campbell	25	33.1	79	4441
Bridgewater - Lakeville	K.Holmes	22	42.5	87	2454
Met. State Hospital Waltham	L.Taylor	28	35.4	85	4546
Cutler Pond Needham	D.Case	22	37.1	57	1631
Bowen School Newton	O.Komar	15	17.3	68	1206
Bolton Flats Bolton	B.Parker	14	14.3	59	2398
Marblehead Neck Wildlife Sanctuary	C.Blasczak	10	9.7	76	763
Edmand's Park Newton	T.Estis	13	25.1	53	924
Mystic Reservoir Medford	C.Jackson	15	14.2	41	1544

1985 Results.

Analyzing the timing of the migration is complicated by the fact that the different sites vary greatly in the average abundance of migrants. Mount Auburn Cemetery averaged 43 migrants per hour, while the Lexington site averaged less than 7 migrants per hour. Thus, the combined number of migrants reported on a given day is not a reliable indicator of the strength of the migration, since this number is greatly affected by the mix of sites covered. In order to provide a better index to the actual strength of the migration, an analysis program was written that normalizes the count at each site by the average site count for the season. A normalized value of 1.00 corresponds to an average count; a normalized value of 1.50 would correspond to a count that was 50 percent above the site average. The normalized counts at each covered site are then averaged to produce an overall migration rating for the date. Figure 1 is a chart of this migration index for the 1985 SMW. In order to avoid confusion between migrant and breeding populations, only those species that do not normally breed in Massachusetts were used to produce this chart.

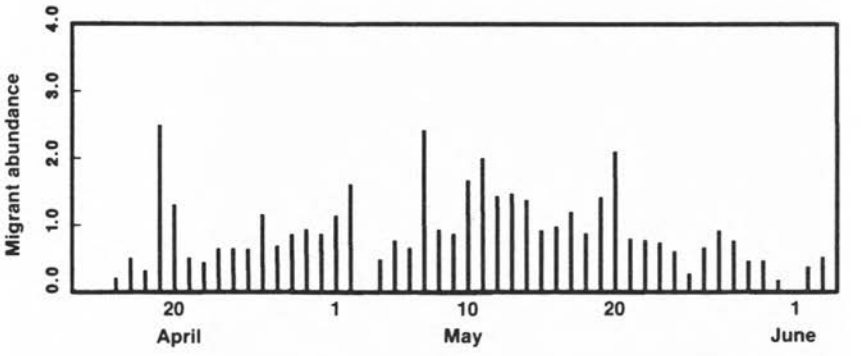

Figure 1. Daily variation in observed migrant abundance for 1985 SMW (1.0 = average count).

In terms of overall numbers of migrants, 1985 was below normal. Warblers averaged 23.9 birds per hour (BPH) compared with a six-year average of 27.9 BPH. The major movement of Yellow-rumped Warblers began on April 19 and continued through about May 12. Summer residents arrived in force on May 6 and had reached full strength by about May 12. The apparent peak of the general warbler migration was May 20. Other dates of strong migration were May 7, 10, 11, 17, and 20. A major movement of flycatchers was noted on June 2.

Yearly BPH Variations.

Table 2 provides BPH values for the month of May for each year of the count. 1985 produced high relative abundances for Tennessee Warbler, Black-throated Blue Warbler, and Ovenbird. Low counts were noted for Magnolia Warbler, Northern Waterthrush, Wilson's Warbler, and Canada Warbler.

Table 2. Warbler Abundances (BPH), May 1980-1985.

WARBLER SPECIES	1980	1981	1982	1983	1984	1985	1980-85 COMBINED
Blue-winged*	0.074	0.671	0.082	0.085	0.058	0.096	0.1596
Golden-winged	0.000	0.000	0.000	0.000	0.000	0.005	0.0012
Orange-crowned	0.000	0.000	0.009	0.072	0.008	0.000	0.0151
Tennessee	1.131	0.514	0.663	0.804	0.422	0.840	0.7632
Nashville	0.315	0.235	0.481	0.418	0.232	0.344	0.3391
Northern Parula	1.428	0.697	1.916	1.948	2.243	1.574	1.6336
Yellow-throated	0.000	0.000	0.000	0.020	0.000	0.000	0.0035
Yellow*	3.368	0.557	4.005	2.314	2.127	2.206	2.4433
Chestnut-sided	0.321	0.166	0.309	0.405	0.472	0.213	0.3099
Magnolia	1.261	0.819	1.435	2.085	1.507	0.703	1.2770
Cape May	0.130	0.139	0.154	0.033	0.339	0.127	0.1456
Black-throated Blue	0.284	0.183	0.500	0.275	0.422	0.385	0.3391
Cerulean	0.000	0.000	0.009	0.007	0.008	0.000	0.0035
Yellow-rumped	3.999	5.183	10.136	9.059	12.674	6.058	7.5409
Black-throated Green	1.428	0.514	0.817	1.026	0.811	0.663	0.8925
Blackburnian	0.408	0.166	0.545	0.529	0.364	0.349	0.3950
Pine*	0.012	0.000	0.345	0.392	0.422	0.294	0.2435
Prairie*	0.056	0.035	0.218	0.157	0.132	0.091	0.1107
Palm	0.049	0.218	0.945	0.856	1.026	1.088	0.7073
Bay-breasted	0.494	0.070	0.300	0.458	0.290	0.369	0.3484
Blackpoll	1.199	0.610	1.371	0.954	1.175	0.789	1.0009
Black-and-white	1.601	1.333	2.525	2.268	3.046	1.705	2.0297
American Redstart	2.281	1.429	2.080	2.516	2.310	1.331	1.9680
Worm-eating	0.000	0.000	0.000	0.033	0.017	0.015	0.0117
Ovenbird	0.723	0.645	0.845	0.725	1.093	0.977	0.8389
Northern Waterthrush	0.346	0.166	0.209	0.314	0.281	0.127	0.2389
Louisiana Waterthrush	0.000	0.000	0.000	0.000	0.000	0.020	0.0047
Kentucky	0.000	0.000	0.009	0.007	0.000	0.010	0.0047
Mourning	0.006	0.009	0.045	0.065	0.066	0.035	0.0373
Common Yellowthroat*	3.492	1.786	4.033	3.556	2.550	2.910	3.0772
Hooded	0.000	0.000	0.009	0.052	0.017	0.000	0.0128
Wilson's	0.414	0.340	0.300	0.320	0.464	0.177	0.3251
Canada	0.698	0.636	0.845	0.758	0.621	0.349	0.6280
Yellow-breasted Chat	0.000	0.044	0.009	0.000	0.000	0.000	0.0070
Number of Individuals	4129	1970	3870	4974	4252	4713	23908
Time in hours	161.8	114.8	110.1	153.0	120.8	197.6	858.3
BPH	25.52	17.16	35.15	32.51	35.20	23.85	27.86

*Breeding populations may significantly affect count of these species.

Since detection of population trends is a major goal of the SMW, the extent to which species abundances vary from year to year is of fundamental interest. The more stable the abundances, the easier it is to detect population trends. Casual inspection of Table 2 reveals a significant amount of year-to-year variation in the reported BPH values. There are many factors contributing to this variation. In some years, noticeably 1981, the overall count is much lower than in others. This overall variation is probably due primarily to weather factors rather than differences in the actual population sizes. For breeding species, some of the variation in numbers is due to differences in the breeding populations present at the covered sites; e.g., the high count of Blue-winged Warbler in 1981 was due to the inclusion of a site that had several breeding pairs.

In order to characterize the magnitude of the variations, a special statistical analysis technique was applied to the data. This analysis began by selecting only those species for which the observed population in Massachusetts consists almost entirely of migrants. This eliminated species whose counts varied due to breeding populations at covered sites. Then, all species with combined abundances of less than 0.1 BPH were combined into an "other species" category. This eliminated much of the spurious variation due solely to the randomness of the counting process itself for rarer species. At this point, the statistics of the logarithm of each BPH were computed. A logarithmic analysis is justified by experience that shows that BPH differences from year to year tend to be multiplicative rather than additive. (It is more suitable to model the counts as varying from the norm by a given multiplicative factor than as varying from the norm by a given arithmetic difference.)

Figure 2 is a histogram of the extent to which the log BPH varies for the sixteen species subjected to analysis over the six years of the study. It can be seen that although BPH variations by factors up to 1.5 often occur, variations of more than a factor of 2 are quite unusual. The standard deviation of the log BPH value is 0.1769 (corresponding to a BPH factor of 1.50).

The observed variation can be further reduced by employing *relative abundances* rather than raw BPH values. This is equivalent to applying a correction for the overall yearly BPH value to each column of Table 2. The standard deviation of the log abundance then reduces somewhat to 0.1473 (corresponding to a factor of 1.40). Thus, relative abundance is somewhat more stable than the raw BPH, although it fails to radically reduce the observed variations.

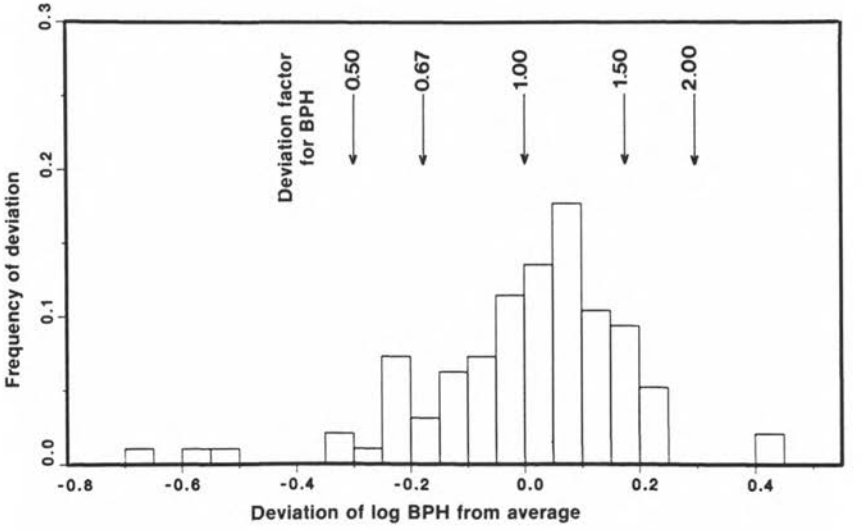

Figure 2. Histogram of deviations of the log BPH from the average log BPH for 16 warbler species over 6 years.

The SMW Database.

The SMW database now contains 51 data sets representing 22 different sites in eastern Massachusetts. These data are readily accessed for analysis using several data analysis programs developed specifically for the SMW. Yearly data entry remains a formidable task, and data analysis for nonwarbler species has been delayed by a backlog of unentered data. The Bird Observer Field Studies Committee continues to seek volunteers to aid with database maintenance. Please contact John Andrews, 22 Kendall Road, Lexington, MA 02173; telephone 862-6498.

JOHN ANDREWS is a research engineer at a Massachusetts Institute of Technology laboratory. He was the founding chairman of the Bird Observer Field Studies Committee and has regularly contributed articles to this publication. His ornithological interests include habitat utilization, population dynamics, and bird behavior. He is active in the Sierra Club and is an adviser to the Lexington Conservation Commission on land management issues.