WINTER POPULATIONS OF THE HOUSE FINCH IN NEW ENGLAND, 1985-1989

by Steve Davis

The House Finch *(Carpodacus mexicanus)* data reported in the 1985-86 through 1988-89 New England Christmas Bird Counts (CBC), published in *American Birds*, were examined to determine over those four years the extent and progress of the spread of this species throughout New England. Preliminary studies to determine the factors that seem to influence the number of House Finches seen on CBCs utilized primarily the 1985-86 and 1986-87 counts.

Factors that influence the number of House Finches seen.

The following categories of data were evaluated using the 1985-86 and 1986-87 count data—count number, the latitude and longitude for each count center, the number of House Finches identified, party hours, and feeder hours. A more extensive evaluation was done using the 1986-87 counts. Additional categories of data were considered—high temperature, low temperature, maximum wind speed, party miles, number of species recorded, and number of individual birds. The variables entered enable other variables to be calculated; for example, knowing the number of House Finches counted and the number of party hours reported made it possible to calculate the variable, House Finches per party hour. Similarly, recording the latitude and longitude for each count center made it possible to calculate an approximate distance from another given point. (One degree of latitude is equal to about 69 miles, and a degree of longitude is equal to the cosine of the latitude times 69 miles.)

There were 91 New England CBCs in the 1985-86 count, 91 in the 1986-87 count, 91 in the 1987-88 counts, and 93 in the 1988-89 count. Eighty-six of the counts were included in all four years. In the preliminary study, correlations were calculated for the number of House Finches reported against the other variables recorded from each count. Correlations, briefly, may range from a perfect positive correlation (+1.00) through no correlation (0.00) to a perfect inverse correlation (-1.00). Generally, values in the 0.25 to 0.50 range, whether positive or negative, are considered moderately strong; those in the 0.50 to 0.80 range are considered very strong. If the correlation is much higher than 0.80, then odds are that the same thing is being measured in two different ways.

Results of these preliminary studies are the following:

1. There were few differences in correlation values between the two years examined (1985-86 and 1986-87).

2. Party hours in both years showed the best correlation with the number of House Finches (0.81 and 0.76).

3. The distance of the count centers from New York City, the presumed

origin of the New England House Finch population (Bock and Lepthien 1976), also correlated well (0.61 and 0.65) with the number of House Finches. In general, more House Finches will be reported if a count is farther south and west, i.e., closer to New York City. The distance variable was calculated from the longitude and latitude data as previously described.

4. The temperature, the wind speed, the high or low temperature of the count day, and the number of other birds reported have little effect on the number of House Finches that are reported.

Bock and Lepthien (1974) have shown that the number of a species reported per party hour is a valid measure of a species' prevalence. Using that concept, it is helpful to look at the correlates of the factors above (latitude, longitude, distance, and feeder hours) with House Finches per party hour (HF/P-h) for the two years (Table 1). The correlations for the additional variables (Table 2) from the 1986-87 counts with HF/P-h are similar to the correlations with House Finch numbers, though of smaller magnitude.

House Finch Population Spread and Growth Rate.

In the 1985-86 count, there were 91 New England CBCs; of these, 73 reported House Finches, and 5 of the counts reported new high counts for the number of House Finches seen. In the 1986-87 count, there were 91 New England CBCs; of these, 77 reported House Finches, and 10 counts had new highs. In 1987-88, 79 of the 91 counts reported House Finches, and 5 had new highs. In 1988-89, 82 of the 93 counts reported House Finches, and 9 had new highs. By the 1988-1989 count, the only non-Maine locations that reported no House Finches were the very northern Errol and Pittsburg, New Hampshire counts and the offshore and very watery Tuckernuck Island and Stellwagen Bank counts in Massachusetts. Only 7 of the 23 Maine CBCs reported no House Finches. Clearly, this is a dispersion that is still progressing.

Even more impressive are the increases in the average number of House Finches seen and the average number of House Finches seen per party hour. These values with their standard deviations appear in Table 3.

Table 1. Correlations with House Finches per Party Hour

	1985-86	1986-87
Latitude	-0.58	-0.47
Longitude	+0.48	+0.39
Distance	-0.62	-0.51
Feeder Hours	+0.10	+0.03

Table 2. Correlations with House Finches per Party Hour, 1986-87

Party Miles	+0.11
Low Temperature	+0.11
High Temperature	+0.22
Top Wind Speed	-0.08
Species Count	+0.25
Total Bird Count	+0.06

In spite of the reversal in trend for the 1987-88 count, the gain over three years is impressive—about fifty percent for both categories. The magnitude of these numbers is even more impressive when compared to Bock and Lepthien's (1976) data for the years 1962 to 1971, when eastern House Finches made the sevenfold leap from about 0.06 finches per party hour in 1962 to about 0.42 in 1971. In the seventeen years since then, House Finches have made a nearly tenfold increase.

In that study Bock and Lepthien calculated the House Finch exponential growth rate which best fits the data from the northeastern CBCs for those years. The best-fit formula is

$$y = 0.04\, e^{0.23\, x}$$

where y is the average number of House Finches seen per party hour, e is the base of the natural logarithms (about 2.718), and x is the number of years. From the graph presented by Bock and Lepthien, it seems that they used 1960 as the initial year for calculation purposes. Also, 0.04 is the y-intercept for the baseline year (1960), and 0.23 is the "instantaneous rate of increase" or exponential growth rate (Bock and Lepthien 1976).

Table 3. CBC House Finch Counts (with standard deviations)

	Average No./CBC	Average No./Party Hour/CBC
1985-86	256 (+/- 301)	2.65 (+/- 2.30)
1986-87	321 (+/- 388)	3.72 (+/- 5.11)
1987-88	304 (+/- 304)	3.30 (+/- 2.53)
1988-89	376 (+/- 389)	4.12 (+/- 3.46)

The growth rate has fallen off since 1971. However, the New England House Finch population has not leveled off, as one might expect a population that is reaching its carrying capacity to do. In fact, if the calculated House Finch per party hour data for the above four years (Table 3) is added to Bock and Lepthien's (1976) data for the 1960s (and it makes little difference whether two or all of their data points are used in the calculation), the resulting best-fit exponential growth curve is

$$y = 0.06\, e^{0.15x}.$$

If the 74 CBCs in the 40-45/65-70 latitude/longitude are used instead of all the New England counts, then the best-fit exponential equation changes slightly to

$$y = 0.05\, e^{0.16x}.$$

Although the New England House Finch population has not maintained the exponential coefficient rate of increase of 0.23 that Bock and Lepthien calculated, it has been able to achieve a growth rate consistent with an exponential growth of 0.15. The fact that this growth rate has occurred for twenty-eight years and does not seem to be decreasing is very impressive. The doubling time for the population in the interval 1962 to 1971 is slightly more than three years, and the doubling time for the population from 1971 to 1989 is about five years.

The scope of this paper does not include the years 1972-1984, and it would also be interesting to examine how consistent the growth has been. Also, it may be that the growth rate in the southwestern New England counts has already leveled off and that the aggregate increase is accounted for by the continued range expansion into more northern and eastern count areas. Smaller latitude-longitude areas of one or two degrees would have to be examined over the intervening years to assess these possibilities.

References

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