

The Change in the Numbers of Wintering Hooded Mergansers (*Lophodytes cucullatus*) in New England

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Introduction

In our environs — greater Providence, RI and Bristol County, Massachusetts — there clearly has been an increase in the number of wintering Hooded Mergansers (*Lophodytes cucullatus*) over the past decade. This study summarizes an investigation into their numbers based on New England Christmas Bird Count (CBC) results (see Hamilton, this issue, for a discussion of CBC data). A comparison was made between the average number of Hooded Mergansers reported on the 1985–1988 New England CBCs and the average number reported from the same CBCs in 1996–1998. A total of 87 counts that had an adequate number of years reported (at least 6 of the 7 years) was used.

The number of Hooded Mergansers counted per party-hour for each count in the above years was calculated. The average count per party-hour for the 1980s and for the 1990s was calculated for each count. Comparisons could then be made between the decades for each count.



Comparisons by latitude-longitude units were also made for the 24 Lat-Long blocks in New England where counts occurred. These blocks are one degree latitude by one degree longitude.

Since there seems to have been a warming trend for the past decade, an analysis was done using the temperatures on the count days. Three measures of temperature were used: high temperature, low temperature, and average temperature for the day. The average temperatures for counts from the 1980s were compared with the average temperatures for the counts from the 1990s. These temperature measures for individual counts were also compared to changes in the numbers of Hooded Mergansers.

Results and Discussion

The number of counts that reported Hooded Mergansers (HMs) out of the total are as follows:

Year	1985	1986	1987	1988	1996	1997	1998
Counts	35/83	34/84	38/87	40/87	57/87	60/87	64/86
Percent	42%	40%	44%	46%	66%	69%	74%

The number of Hooded Mergansers reported per party-hour ranged from a low of 0 on many counts in all the years to a high of 4.34 HMs/Party-Hr on the Buzzards Bay,

MA count in 1998. Interestingly, the second highest individual count was in 1985, also on the Buzzards Bay count (4.30).

The average number of Hooded Mergansers per party-hour per year (HMs/P-Hr) for all included counts, were as follows:

Year	1985	1986	1987	1988	1996	1997	1998
HMs/P-Hr	0.15	0.15	0.21	0.17	0.32	0.36	0.51

The average number of Hooded Mergansers per party-hour per year from the late 1980s was significantly lower than the average from the late 1990s.

The Buzzards Bay count had the highest average for its four counts from the 1980s (2.97 HMs/P-Hr) and also the highest average for the three years in the 1990s (4.04). The New London, CT count was second in both of these averages: 2.20 for the 1980s and 3.38 for the 1990s.

For each count, the average number of Hooded Mergansers counted per party-hour in the 1980s was compared with the average counted from the 1990s. There were 15 counts where none were counted in any of the 7 years. There were 66 counts in which the average count number increased, and there were 6 counts where the average decreased. The counts with a decrease in the number of HMs per party-hour, and the amount by which they decreased, were Athol, MA (- 0.738: 0.87 to 0.13); Old Lyme, CT (-0.18: 0.35 to 0.17)); Hartford, CT (- 0.018: 0.025 to 0.007); Errol/Umbagog, NH (- 0.010: 0.018 to 0.009); Biddeford/Kennebunkport, ME (- 0.006: 0.017 to 0.011); and Storrs, CT (- 0.003: 0.045 to 0.042). Interestingly, three of these counts — Old Lyme, Hartford, and Storrs — are in the same Lat-Long block (41°, 72°).

The greatest increases in count averages from the 1980s to the 1990s occurred in New London, CT (+1.18); Plymouth, MA (+1.13, from 0.75 to 1.88); South Kingstown, RI (+1.13, from 0.26 to 1.39); Worcester, MA (+1.08, from 0.13 to 1.21); and Buzzards Bay (+1.07).

The changes in individual count averages from decade to decade were calculated, and compared to the latitude and longitude of the counts (decimalized). Interestingly, there was no significant correlation between the longitude of the count and the magnitude of the change. There was, however, a significant relationship between the count latitude and the increase in numbers. This suggests that the more southerly counts had larger increases, but that the east-west direction had little effect.

Temperature Changes

There were statistically significant changes in the average temperatures reported for the New England CBCs between the two decades. These changes were similar for all three factors considered: high and low temperatures reported and calculated average temperature. The averages for all counts by years are as follows:

Year	1985	1986	1987	1988	1996	1997	1998
High	27.3	35.7	32.3	26.7	36.0	37.2	35.4
Low	12.0	24.0	18.0	11.8	23.0	24.7	20.1
Average	19.7	29.8	25.2	19.3	29.4	30.9	27.7

When each count's average temperatures for the 1980s is compared with its average temperatures for the 1990s, there are also significant differences. Again, the differences are similar for each temperature measure. The increase in temperature between the decades was 6.1° for average temperature, 5.6° for low temperature, and 5.8° for high temperature. These temperature changes were compared with the count's latitude and longitude values, but there was not a significant relationship for either directional component.

Perhaps more importantly for this study, there is no significant relationship between the measures of temperature changes between the decades and the changes in the average counts of Hooded Mergansers. This is in spite of the observation that for nearly all counts both the average temperature and the average numbers of Hooded Mergansers increased between the two decades.

It is important to note that these temperature data are from the specific count days recorded for each CBC. As such, they may not be representative of true average temperature changes between the decades, if they do exist. The changes in numbers of Hooded Mergansers may be more closely related to the true average temperature changes, or to secondarily related factors such as freshwater or estuary freezing.

Coastal Counts

Another variable recorded for all CBC counts was whether or not the count circle included the ocean coast. This variable may be important in studying numbers of Hooded Mergansers since these birds winter on both salt and fresh water, and in New England winters, the fresh water is often frozen. Of the 87 counts considered, 34 (39 percent) included the coast. When the coastal variable was considered in the changes in Hooded Merganser numbers, it was correlated with higher count numbers and with increases between the decades.

The coastal counts in the 1980s recorded an average of 0.352 HMs/P-Hr compared to an average of 0.057 for the non-coastal counts. For the 1990s the averages were 0.717 and 0.181 for the coastal and non-coastal counts, respectively. Both of these comparisons are statistically significant.

The calculated increase in HMs/P-Hr per count was also significant when considering this variable: the increase for the coastal counts was 0.379 versus 0.128 for the non-coastal. In other words, not only did the coastal counts have higher numbers of Hooded Mergansers in both decades, but they also had larger increases between the decades. (Note: This difference is not just the difference between the averages for the

1980s and those for the 1990s, since it includes the differences for each count, not simply the differences by decade.)

A multiple regression analysis of the changes in numbers of Hooded Mergansers between the decades was done. When longitude, latitude, coastal(ness), and temperature were considered, latitude was the most important correlate of the change, and whether or not the count was coastal was the other important factor. Longitude and temperature were not significantly related to the increase in mergansers. Counts that were farther south and were coastal had the largest increases.

Latitude-Longitude Evaluation

The New England CBCs considered are located in 24 latitude-longitude blocks. Of those 24 blocks, 20 had average increases (from 0.01 to 0.65 HMs/P-Hr) in the numbers of Hooded Mergansers between the decades, two had no change (one of which, the 43°-73° block, is primarily in New York and contained only one Vermont count considered here), and two had (small) decreases (-0.01 in the 44°-68° block with three counts, and -0.04 in the 42°-72° block with six counts). See the accompanying table which demonstrates those changes and the temperature changes by Lat-Long block. Note that no block had an average temperature decrease.

Change in New England Wintering Hooded Mergansers and Change in Average Temperature by Latitude-Longitude Blocks								
	73°	72°	71°	70°	69°	68°	67°	66°
44°	2 0.18 3.4	2 0.0 8.3	2 0.01 2.6	2 0.16 10.8	3 0.01 5.4	3 -0.01 2.3	3 0.17 12.1	1 0.38 7.1
43°	1 0.0 4.3	5 0.05 1.5	3 0.41 4.6	4 0.03 6.5	1 0.50 8.8	1 0.01 1.8		
42°	3 0.06 6.2	6 -0.04 6.3	8 0.24 4.1	5 0.14 7.1			Also	71°
41°	7 0.39 6.7	8 0.39 5.7	5 0.55 0.0	7 0.65 8.1	1 0.21 11.6		45°	1 0.01 7.8
<p>KEY: number of counts change in HM/P-Hr for the counts in that block change in temperature in F° for the counts in that block</p>								

Conclusions

This study demonstrates an increase in the numbers of Hooded Mergansers reported on the New England Christmas Bird Counts over the past decade. Counts that are farther south not only had larger numbers in the 1980s and 1990s on average, but also had larger increases in bird numbers between decades. Not surprisingly, New England CBC areas that include the coast have higher numbers of Hooded Mergansers, and they also had larger increases between decades. The latitude of the count was not shown to be an important factor in the changes in numbers.

An analysis of temperature data demonstrates an increase in the temperatures (high, low, and mean) reported for the count days in the 1990s compared with the 1980s. These temperature changes are not significantly correlated with the increase in the counts of Hooded Mergansers. Whether there actually has been a warming trend over the past decade, or whether some nuance of the CBC dates chosen (e.g., earlier dates) accounts for the temperature increases, is not determined by this study. It might be enlightening to compare actual average temperatures from the two decades as measured by the weather bureau to the changes in the numbers of Hooded Mergansers.

The data analyzed are available from the author on a Statview 512 program for the Macintosh. 🐦

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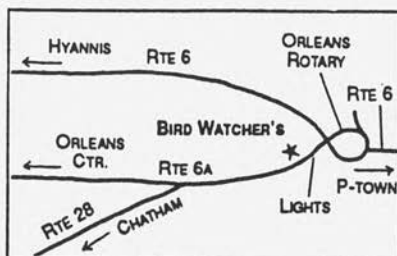
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