THE NEWPORT-WESTPORT CHRISTMAS BIRD COUNT

by Steve Davis

Inspired by Jim Berry's analysis of the Newburyport, Massachusetts, Christmas Bird Count (CBC) (Berry 1992), I undertook a similar selective analysis of the CBC data from the Newport (RI)-Westport (MA) count. The analysis was simplified immeasurably by the careful record of data that has been kept through the years initially by Severyn Dana and more recently by Dave Emerson. To make the data more accessible to statistical analysis, I transferred it to a StatView 512 statistical software program for the Macintosh (contact the author for a copy of the data on a 3.5" disk MAC-format).

The Newport-Westport CBC has been conducted annually since 1949. This analysis includes the 1993 count, for a total of forty-five counts. The highest species count occurred in 1953 with 130, although 1971, 1983, and 1984 were close with 127, 129, and 128 species, respectively. (The species totals in this article conform to what are considered species according to the 1973 AOU list.) The low year was 1949 (most likely affected by the newness of the count and relatively small number of observers), with 92 species, and 1960 was a close second with 93 species. The average number of species identified is 115 (with a standard deviation of 8.7). The average number of species identified per count by decade is 117.2 for 1950-1959, 107 for 1960-1969, 118.5 for 1970-1979, and 119 for 1980-1989. So far, the 1990s have averaged 117.5. The highest count for total number of individual birds was in 1984 with 87,666, and the lowest was in 1949 with 9,171. The average number of total birds is about 31,666 (standard deviation of 13,900).

The species counts for each year are not entirely consistent because five of the "species" became "forms" in the 1973 AOU listing: Ipswich Sparrow, Blue Goose, Common Teal, Bullock's Oriole, and Oregon Junco. Nevertheless, by today's AOU species list, the Newport-Westport CBC has identified 214 different species and seven forms (the five above plus a Blue x Snow Goose hybrid and an Acadian Sharp-tailed Sparrow). A murre and three other unidentified alcids also have been reported.

Fifty of the species have been seen on every count (Table 1). Another twenty-four species have been missed on five or fewer counts. These latter species are listed below, with the number in parentheses representing the number of years missed:

> Pied-billed Grebe (5); Mute Swan (1); Green-winged Teal (1) American Wigeon (1); Canvasback (4); Common Eider (1); Hooded Merganser (2); Ring-necked Duck (5); Ring-necked Pheasant (1, 1993); American Coot (3); Sanderling (1); Common Snipe (3); Great

TABLE 1. SPECIES SEEN IN ALL NEWPORT-WESTPORT CBCs

Numbers are the lowest count for the species.

Red-throated Loon	1	Great Black-backed Gull	72
Common Loon	26	Rock Dove	304
Horned Grebe	20	Mourning Dove	2
Great Cormorant	50	Belted Kingfisher	1
Great Blue Heron	5	Downy Woodpecker	9
Canada Goose	99	Common Flicker (no Red-shafted)	15
American Black Duck	191	Horned Lark	45
Mallard	8	American Crow	114
Northern Pintail	1	Blue Jay	26
Greater Scaup	126	Black-capped Chickadee	128
Black Scoter	9	White-breasted Nuthatch	20
Surf Scoter	15	American Robin	2
White-winged Scoter	51	European Starling	1358
Common Goldeneye	317	Yellow-rumped Warbler	25
Bufflehead	82	American Tree Sparrow	43
Common Merganser	6	Field Sparrow	6
Red-breasted Merganser	124	Savannah Sparrow	5
Northern Harrier	1	Song Sparrow	48
Red-tailed Hawk	2	Swamp Sparrow	4
American Kestrel	11	White-throated Sparrow	56
Purple Sandpiper	3	Dark-eyed Junco	13
Dunlin	9	Eastern Meadowlark	4
Bonaparte's Gull	11	Brown-headed Cowbird	2
Ring-billed Gull	33	American Goldfinch	10
Herring Gull	1050	House Sparrow	210

Horned Owl (1); Hairy Woodpecker (3, 1991 and 1992); Brown Creeper (1); Carolina Wren (1); Golden-crowned Kinglet (1); Hermit Thrush (4); Gray Catbird (1); Northern Mockingbird (3); Rufous-sided Towhee (1); Purple Finch (4); Snow Bunting (1); Red-winged Blackbird (1).

The Common Eider, Ruddy Duck (Figure 1), and American Coot have had large fluctuations in their numbers from year to year. Thus, of the 214 species identified, seventy-four are usually seen. This is similar to the forty species that Jim Berry identified for Newburyport. At least two factors contribute to the higher number of usually seen species on the Newport-Westport count: the greater total number of species (214 versus 192) and the fewer count years (45 versus 56) which makes misses less likely. The number of party hours may also be a factor in the number of species usually seen, but I do not have the data for Newburyport. Thirty-seven of the forty Newburyport species are also on the Newport-Westport "reliable" list. The three that are not on the Newport-Westport list (with the number of years that they have been recorded for Newport-Westport) are Oldsquaw (34/45), Rough-legged Hawk (29/45), and Ruffed Grouse (15/45). The very common birds, then, are quite consistent between the two counts. On the other extreme, twenty-seven species have been identified only once on the Newport-Westport count, and fourteen species have been identified on two counts (Table 2). For these two categories (once or twice seen), the only species on both the Newburyport list and the Newport-Westport list are Arctic Loon (one Newburyport count; two Newport-Westport counts), Common Moorhen (one and one), and Osprey (two and one).

Trends

Although trends are difficult to quantify, a quick perusal of the data for each species suggests that about twenty-two species have had increasing count totals:

Great Cormorant, Mute Swan, Brant, Canada Goose, Mallard, Gadwall, Canvasback, Harlequin Duck, Common Merganser, Sanderling, Ring-billed Gull, Tufted Titmouse, Carolina Wren, American Robin, Northern Mockingbird, Cedar Waxwing, European Starling, Red-winged Blackbird, Common Grackle, Northern Cardinal, White-crowned Sparrow, House Finch.

Of these twenty-two species, eleven are included in Jim Berry's list of increasing trends for Newburyport. Counts for Brown Thrasher have generally been five or fewer birds throughout the 1949-1993 period, except during 1960-1970, when six counts had greater than 10 birds, with a maximum count of 39 Brown Thrashers in 1970.

In the Newburyport counts the American Black Ducks have declined as the

TABLE 2. SPECIES SEEN IN ONE OR TWO CBCs

Unusual totals are in parentheses.

One Count	Two Counts
Magnificent Frigatebird	Arctic Loon
Yellow-crowned Night Heron	Pacific Loon
Fulvous Whistling-Duck (30)	Least Bittern
Tundra Swan (14)	Turkey Vulture
Golden Eagle	Osprey
Black Rail	Semipalmated Plover
King Rail	Spotted Sandpiper
Common Moorhen	Red Knot
Sandhill Crane	Least Sandpiper
Spotted Sandpiper	Blue-Gray Gnatcatcher
Semipalmated Sandpiper	Wilson's Warbler
Little Stint	Clay-colored Sparrow
White-rumped Sandpiper	Yellow-headed Blackbird
Red-necked Phalarope (7)	Hoary Redpoll
Lesser Black-backed Gull	
Common Tern	
Ash-throated Flycatcher	
Boreal Chickadee	
White-eyed Vireo	
Cape May Warbler	
Prairie Warbler	
Ovenbird	
Northern Waterthrush	
Rose-breasted Grosbeak	
Pine Grosbeak (14)	
Lincoln's Sparrow	
Harris's Sparrow	

Mallards have increased. It is not as clear an inverse relationship for Newport-Westport, where the black ducks seem to be holding their own or even increasing slightly (Figure 2), as the Mallards have increased in number.

The Lesser Scaup numbers initially decreased but more recently have increased (Figure 3). The maximum count for Eastern Bluebird was 33 birds in 1953, with a subsequent decline to zero birds in 1960. Since 1960 only 6 counts have recorded Eastern Bluebirds, with the 1991 and 1992 counts recording 3 and 4 birds, respectively.

The Ring-necked Pheasant, Evening Grosbeak, and Common Grackle numbers initially rose but recently have fallen off. The Ring-necked Pheasant pattern is probably the most characteristic and symmetric of these (Figure 4). Several other species have recently had tenuous increases: these include Northern Gannet (Figure 5), Ring-necked Duck, Hooded Merganser, Sharp-shinned Hawk, Red-bellied Woodpecker, Red-winged Blackbird, and Eastern Bluebird.

Several other species had counts that declined in the 1950s, but have been relatively stable since the early 1960s. These species are Horned Grebe (Figure 6), Surf Scoter, American Wigeon, and Red-shouldered Hawk.

Eight species have clearly had a decreasing trend: Redhead, Northern Bobwhite, Hairy Woodpecker, Fox Sparrow, Eastern Meadowlark, Purple Finch, Red-shouldered Hawk, and Loggerhead Shrike. Only Red-shouldered Hawk among this list occurs also on Jim Berry's Newburyport list of declining species. Interestingly, the Purple Finch has declined, but, judging by the CBC totals, it was not very common even before the House Finch invasion in the 1970s. Counts from the mid-1950s to the late 1960s were generally about 10 to 20 birds, with three counts in this time period between 40 and 60 birds. Then, from the late 1960s to the mid-1970s, Purple Finch counts were generally between 40 and 100 birds. Since the mid-1970s, counts have been less than 40 birds, and the last 9 counts have had either no Purple Finches or only 1 or 2 birds.

There are several species whose scatterplots suggest that either they have winter irruptions, in which some winters large numbers of them are driven into our region, or they are "flockers" (i.e., usually present in flocks), which are either seen or not seen during the CBC. Common Redpolls are an example of the former (46 birds in 1968; more than two-thirds of the counts had no Common Redpolls), and Cedar Waxwings the latter. Other species that seem to fit this pattern are Vesper Sparrow, Pine Siskin, Pine Grosbeak, and Red and White-winged crossbills, the latter three of which are known irrupter species.

Graphing and analyzing the data from CBCs can also suggest areas where research is needed. The graph of the counts for Redheads (Figure 7) suggests that in 1957-1958 a population crash occurred: did the birds simply go somewhere else? was it a response to overpopulation? was it a DDT effect from

FIGURE 1. RUDDY DUCKS PER PARTY HOUR

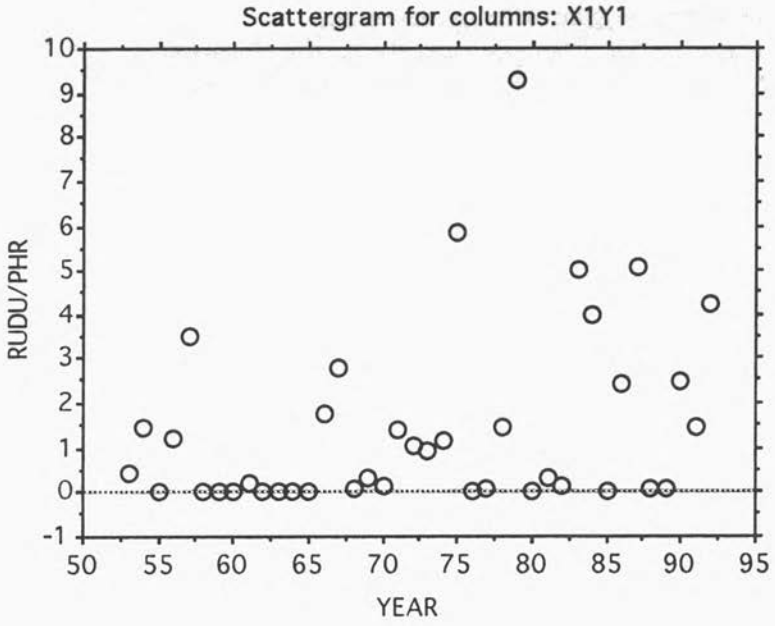
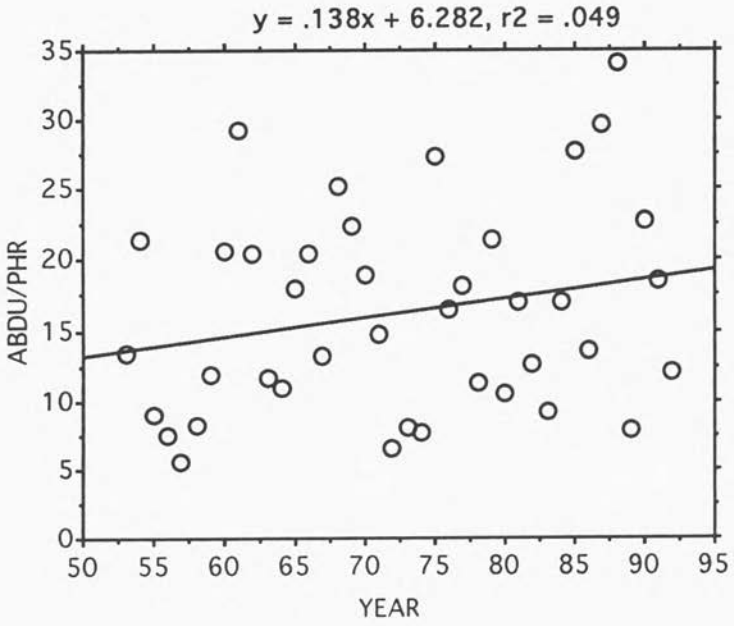


FIGURE 2. AMERICAN BLACK DUCKS PER PARTY HOUR



which the Redheads have not yet recovered? is this pattern for Redheads similar on other counts?

Other Graph Information

When comparing year-to-year CBC data, it is more accurate to use the raw totals divided by the party hours (Bock and Lepthien 1974; Kricher 1981). Because party hours may vary greatly, this adjustment helps to standardize comparisons between years and between different CBC areas. I also performed statistical analyses on the data. I derived Pearson's r correlation coefficients, which describe the relationship between two variables, and determined whether the relationship was significant (significance level 0.05). Negative correlation coefficients indicate that one variable increases while the other decreases. Positive correlation coefficients indicate that both variables either increase or decrease together. To achieve a significance level of $p < 0.05$ for a sample size of 45 (years) with 43 degrees of freedom requires a correlation of <-0.294 or $>+0.294$; $p<0.01$ requires a correlation of <-0.380 or $>+0.380$.

The adjustment for party hours does not appear to be crucial for the Newport-Westport data. The average number of party hours from 1949-1993 has been 90, with a range of 68 to 123. When party hours were plotted for each year, there is a small, but statistically insignificant, decrease in party hours during the 45-year period.

Some believe that because winter can be very harsh on birds and hence reduce bird numbers either by death or emigration, CBCs that are conducted earlier in the count period have a better chance of recording more total birds and, presumably, more species. When the total number of birds counted and the number of species identified are graphed against the day of the count (all of these counts have been done in December; the counts were standardized by party hours), the data seem to provide some support for the theory (Figures 8 and 9). The statistics suggest that about 2160 fewer birds are seen and 0.8 fewer species are identified for every day later that the count occurs. The statistically significant correlations are -0.36 ($p<0.05$) and -0.62 ($p<0.01$), respectively, which suggest that these are moderately strong associations (Crow et al. 1960). It would be interesting to confirm these patterns in other count areas, to study the effect of latitude on this phenomenon, or to assess whether the slopes of the regression lines change for those counts that occur in January.

The correlations between the species totals and the numbers of birds versus party hours are also informative. I found no correlation between party hours and species total. The regression line begins at 115 species, has a slope of 0.001, and ends at 115 species. Such a lack of correlation is expected given the relatively little variation in party hours and number of species in the Newport-Westport count. Nonetheless, standardizing for party hours is important when comparing counts between CBC areas. The scatterplot of party hours and total birds also shows an insignificant relationship between the two variables.

FIGURE 3. LESSER SCAUP PER PARTY HOUR

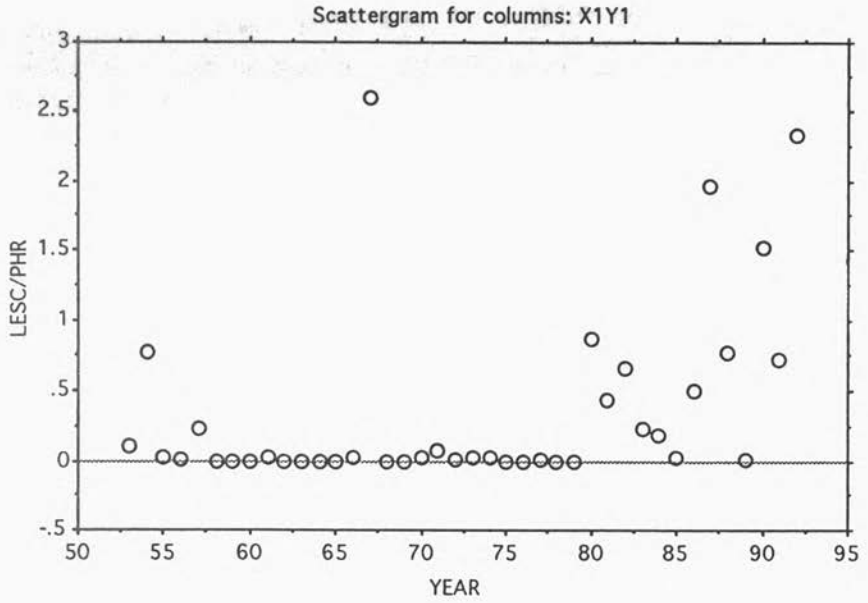


FIGURE 4. RINGED-NECKED PHEASANTS PER PARTY HOUR

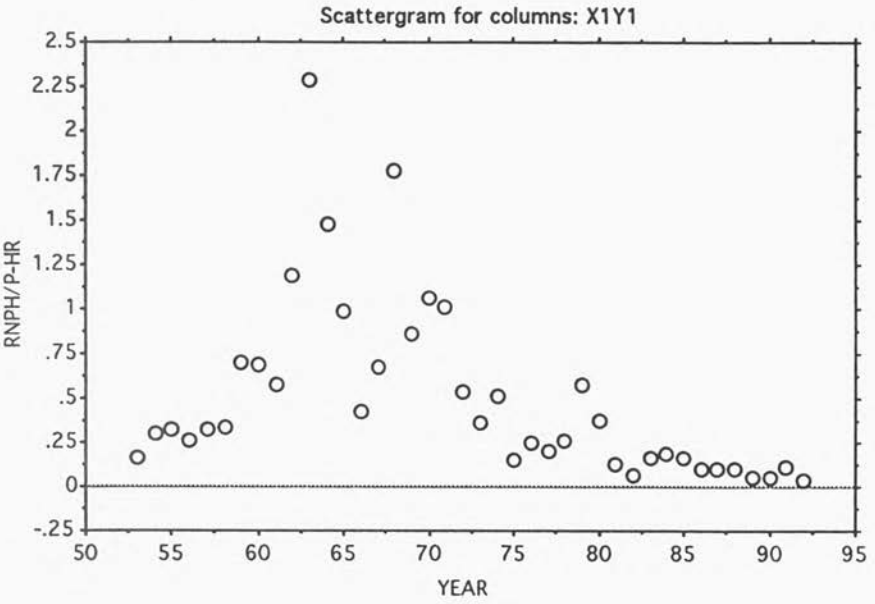


FIGURE 5. NORTHERN GANNETS PER PARTY HOUR

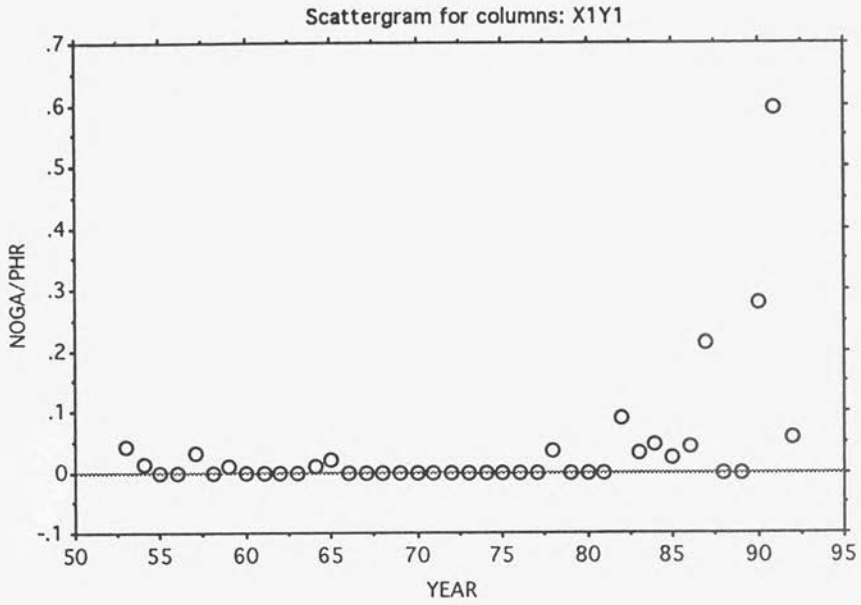


FIGURE 6. HORNED GREBES PER PARTY HOUR

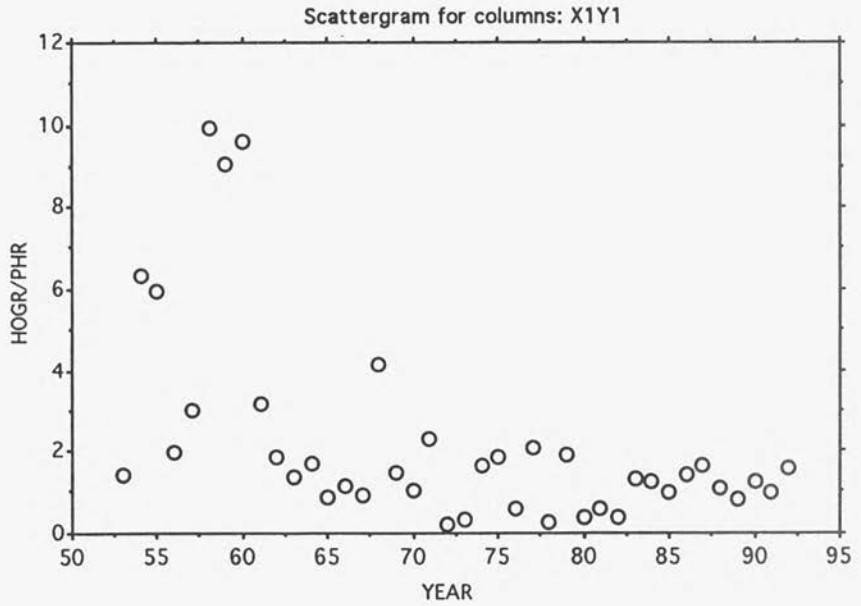


FIGURE 7. REDHEADS PER PARTY HOUR

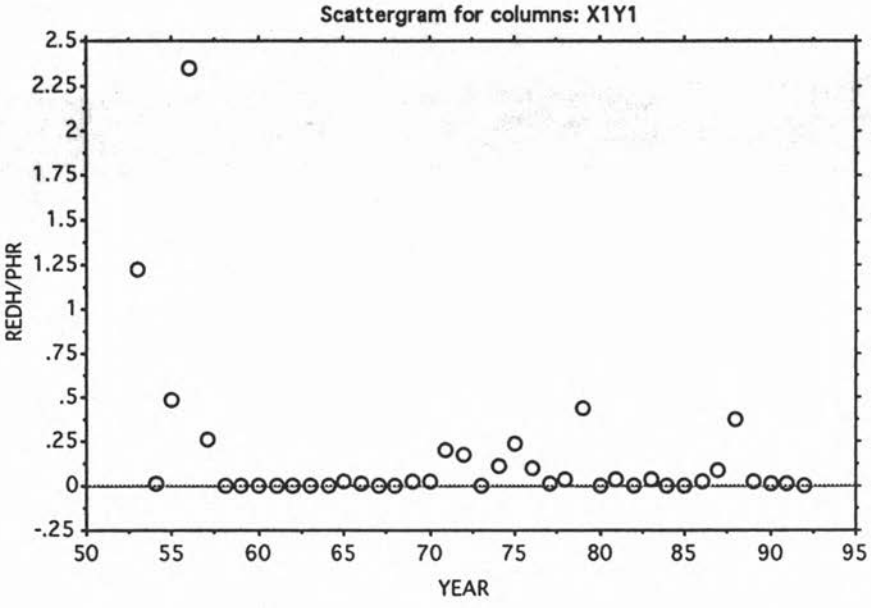


FIGURE 8. SPECIES PER PARTY HOUR BY DECEMBER DATE OF COUNT

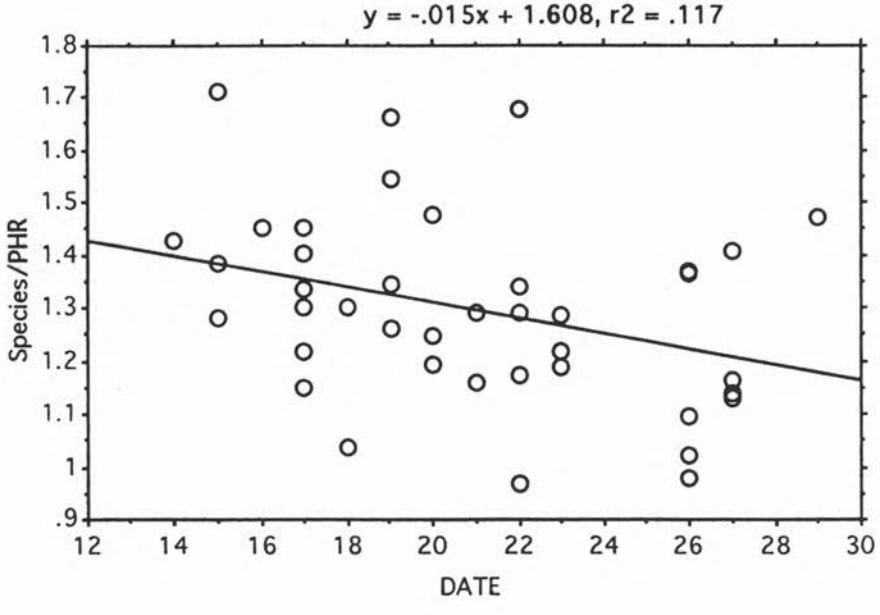


FIGURE 9. TOTAL BIRDS PER PARTY HOUR BY DECEMBER DATE OF COUNT

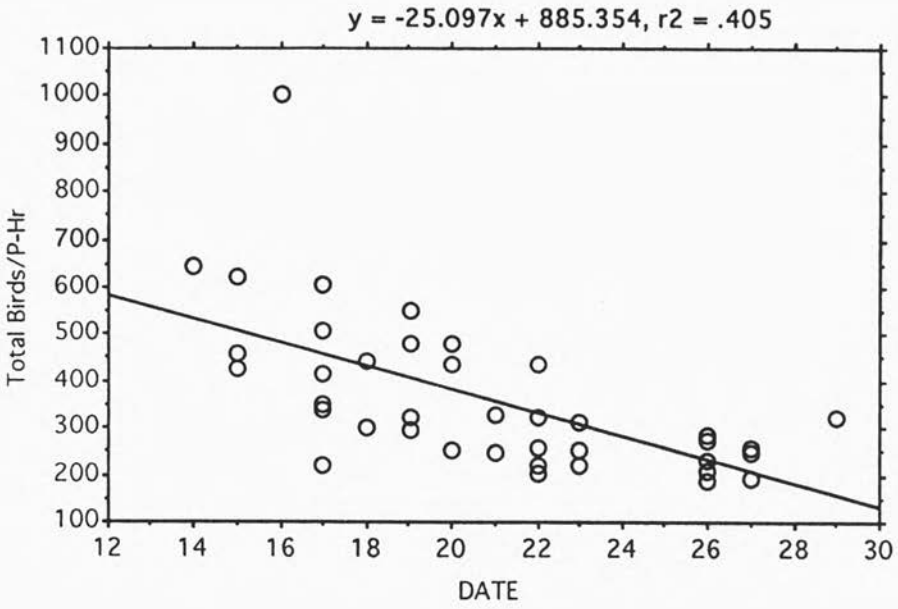
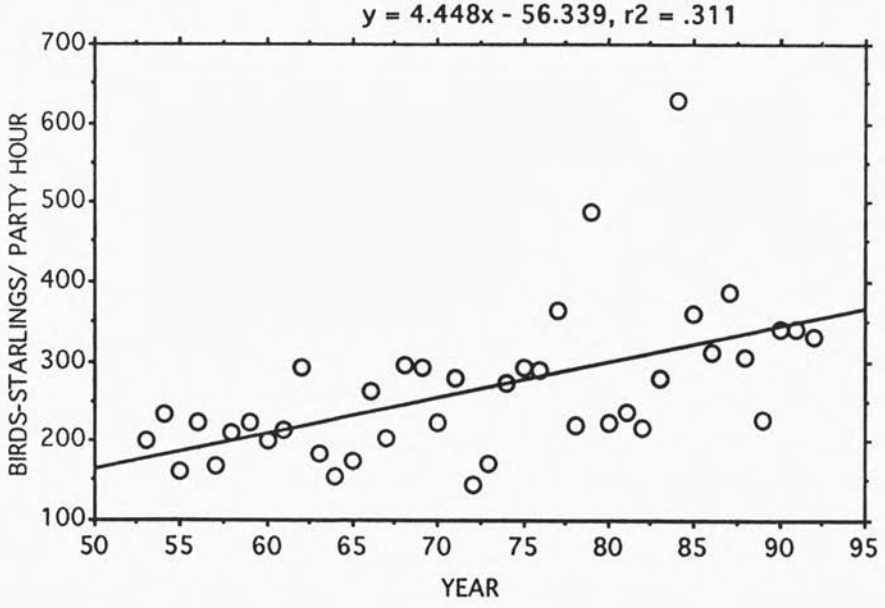


FIGURE 10. TOTAL BIRDS MINUS STARLINGS PER PARTY HOUR BY YEAR



Starlings and Total Numbers

I also examined the influence of the number of European Starlings on the total individual bird count (Figure 10). The total number of birds counted on the Newport-Westport CBC has increased steadily during the 45-year period reviewed in this article. There is a strong and statistically significant relationship between the total number of starlings and the total number of birds on a count. When starlings are subtracted from the total count, however, we still see an increasing and statistically significant ($p<0.05$) trend in the total number of birds (counts are standardized by party hours). Are there really more birds? Are we seeing a higher percentage of the birds in our circles? Are our estimates getting more generous?

When I plotted party hours against the total number of birds counted, minus the starlings, I found a statistically insignificant relationship between the two variables, suggesting that the variation in the number of party hours in our CBC area did not significantly affect the count of total number of individual birds.

Conclusions

This article summarizes trends of species seen during the 1949-1993 period of Newport-Westport CBCs. Although the number of party hours is important to standardize count totals for comparison between years and between count areas, party hours did not generally influence trends seen within the Newport-Westport counts, perhaps because the number of party hours did not vary much throughout the period.

I agree completely with Jim Berry about how *American Birds* (now *National Audubon Society Field Notes*) reports the CBCs: the tabular format is much more convenient in making comparisons between counts, in seeing where a particular species occurs, and in making comparisons from year to year.

References

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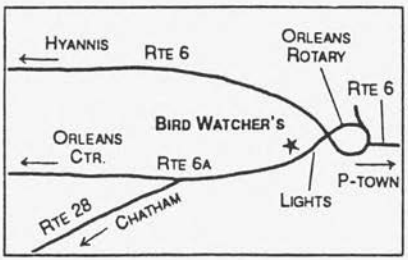

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