

# *The Contribution of Christmas Bird Counts to Knowledge of the Winter Distribution of Migratory Warblers in the Neotropics*

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INFORMATION CONCERNING MIGRATORY WOOD WARBLERS HAS been summarized for all 301 neotropical terrestrial Christmas Bird Counts. Rates of occurrence by broad regions and by count area are presented for the 45 warbler species claimed. Coefficients of fluctuation and a regression have been computed to seek for trends for each instance in which a species occurs regularly at a site. The Yellow-rumped Warbler is the most irregular species, and island sites show less stability than mainland sites. Hooded, MacGillivray's, and Nashville warblers seem to be increasing, while American Redstarts show a negative trend. The greatest numbers of species and species/count were recorded at Catemaco, emphasizing the importance of the Atlantic slope of Middle America for migrant warblers. Individual species accounts indicate many patterns and apparent range extensions.

Although the broad outlines of winter distributions of migratory wood warbler species have been described (i.e., by Ridgway 1902; Hellmayr 1935; Eisenmann 1955; Lowery and Monroe 1968; Gochfeld 1980; American Ornithologists' Union 1983; and mapped by Rappole et al. 1983), there are

large gaps in our knowledge of precise range boundaries and, within ranges, of patterns of abundance and fluctuation. In this paper we examine the records from all land-based, neotropical Christmas Bird Counts (hereafter CBCs) to determine where and in what numbers each migrant warbler species has been reported, trends in abundance over time or space, and the relationship of these reports to ranges described in the literature and discernible from museum specimens.

Between 1972, the first year in which *American Birds* began regularly publishing results of CBCs conducted south of the United States, and 1985, 304 counts have been held at 56 neotropical sites. Elimination of three counts at three almost entirely pelagic sites leaves 100 counts at 18 sites in Mexico, 83 at 15 sites in Central America, 97 at 17 sites in the Caribbean region (including Bermuda), and 21 at three sites in South America including Trinidad (Table 1, Fig. 1).

Data for the 45 migrant warbler species that have been reported in these counts are summarized by region in Table 2 and by count or group of counts in Table 3. The following

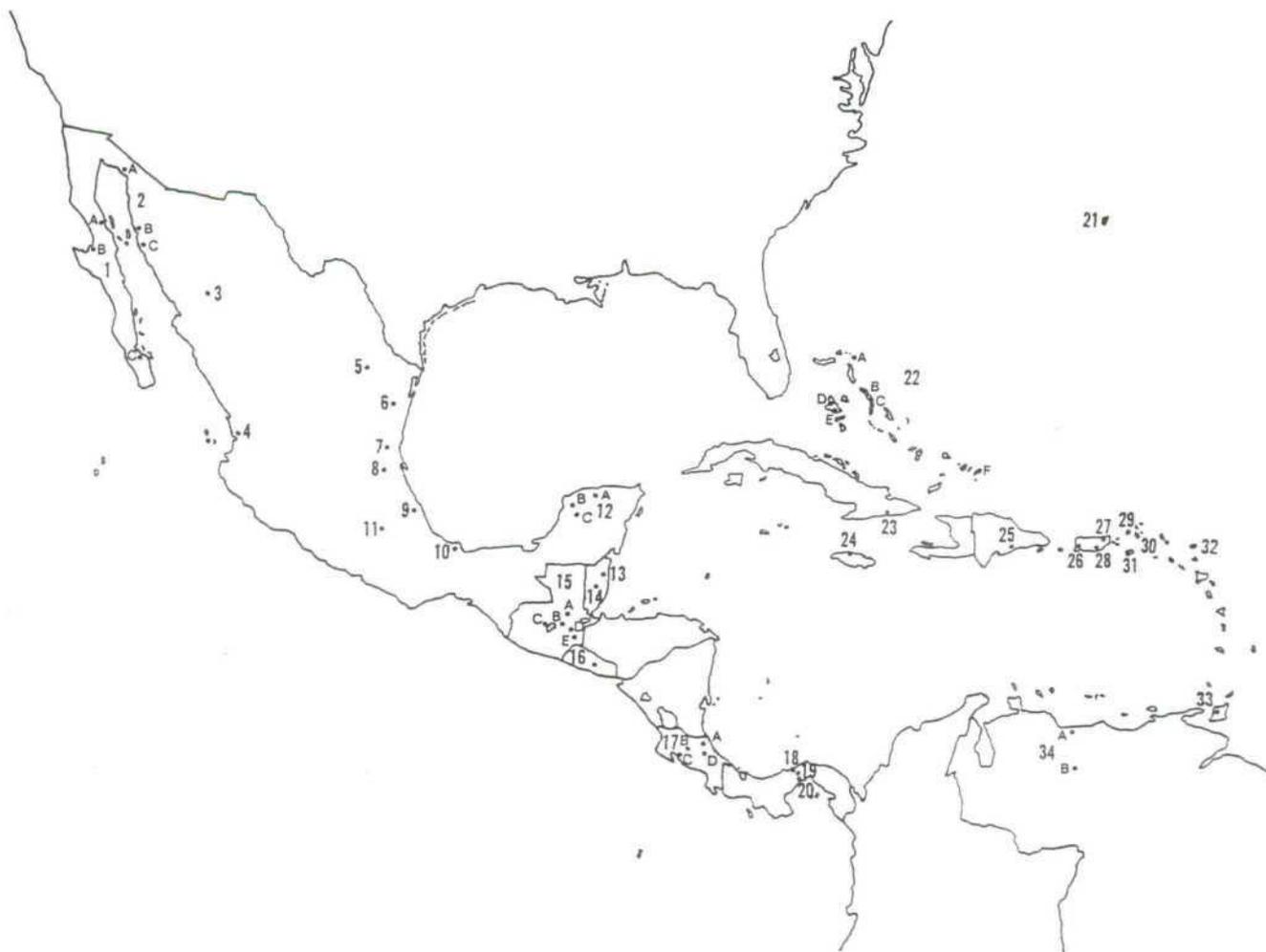


Figure 1. Location of neotropical Christmas Bird Counts (Numbers correspond to those in Table 1).

text includes an analysis of trends over time at those sites where a species has been relatively common, some notes as to peculiar phenomena at various CBC sites, and concludes with an evaluation of the unusual findings for each species.

### TRENDS

We have attempted to evaluate two components of change over time in all situations in which a species was recorded in a count area in five or more years. A coefficient of fluctuation was used to evaluate the variation in abundance of a species at a site from year to year. Regression analysis was used to detect trends, either increases or decreases, in abundance over time. Non-biological factors, such as variability or trends in observer competence, could contribute to these measures, but broad patterns that emerge may realistically reflect local or general biological events. This analysis was completed before the 1985 count results were available.

The coefficient of fluctuation, a statistic devised to com-

pare variances among sets of numbers whose means differ from each other, was used to compare the regularity of occurrence of birds at sites independent of the absolute numbers recorded. Originally described by Whittaker (1975) and used recently by Holmes *et al.* (1986), it is less sensitive to differences in means than are coefficients of variation, although it is certainly not entirely unresponsive to these differences. A major problem with the statistic is that, due to the use of geometric means, a zero in a data set (such as a year in which a species was not reported at a site under analysis) makes it impossible to calculate. Whittaker (1975) claimed that this was an ecological phenomenon, but Holmes *et al.* (1986) recognized that the problem was arithmetic in nature, and substituted a dummy constant equalling his smallest observed positive value for each of the zeroes in his data set (R.T. Holmes pers. comm.). We have used the same procedure but have discovered that the quantity of the inserted value can have a major impact on the coefficient of fluctuation. Within this data set, we have substituted 0.01 birds/party-hour for every zero; thus there is internal consistency, and coef-

**Table 1. Location of neotropical Christmas Bird Count sites and number of counts/site (Note that, in some cases, sites within a political unit are listed as a single number; these have been combined for some further analyses)**

Site	Long	Lat	Number of Counts
Mexico			
Western			
1a. Bahia de Los Angeles	113°38'N	29°00'W	1
1b. Guerrero Negro	114°00'N	27°57'W	1
1c. La Paz	110°15'N	24°15'W	1
2a. Puerto Penasco	113°31'N	31°21'W	6
2b. Bahia Kino	111°54'N	28°50'W	3
2c. San Carlos	110°49'N	27°55'W	1
3. Alamos	108°54'N	27°00'W	9
4. San Blas	105°19'N	21°34'W	12
Eastern			
5. Mesa de las Tablas	100°29'N	25°15'W	7
6. Rio Corona	98°56'N	23°56'W	8
7. Gomez Farias	99°13'N	23°09'W	8
8. El Naranjo	99°24'N	22°30'W	14
9. Teziutlan	97°19'N	19°53'W	6
10. Catemaco	95°08'N	18°30'W	9
11. Mexico City	99°11'N	19°14'W	2
12a. Telchac Puerto	89°25'N	21°19'W	2
12b. Uxmal	89°45'N	20°27'W	7
12c. Sayil-Labna	89°35'N	20°15'W	3
Central America			
Belize			
13. Belize City	88°24'N	17°36'W	14
14. Belmopan	88°43'N	17°11'W	11
Guatemala			
15a. San Andres Semetabaj	91°08'N	14°45'W	1
15b. Cerro de Oro	91°10'N	14°40'W	5
15c. Santiago Atitlan	91°14'N	14°38'W	1
15d. Yepocapa	90°57'N	14°30'W	1
15e. Lago de Amatitlan	90°35'N	14°25'W	1
El Salvador			
16. San Salvador	89°17'N	13°44'W	3
Costa Rica			
17a. Lower Zona Protectora	84°08'N	10°22'W	1
17b. Grecia	84°19'N	10°04'W	2
17c. Nandayure	85°15'N	10°00'W	1
17d. Turrialba	83°41'N	9°54'W	3
Panama			
18. Canal Area—Atlantic	79°57'N	9°18'W	13
19. Canal Area—Central	79°47'N	9°08'W	13
20. Canal Area—Pacific	79°35'N	9°00'W	13
Caribbean Region			
21. Bermuda	64°45'N	32°18'W	11
22a. Green Turtle Cay, Abaco	77°23'N	26°44'W	1
22b. Gregory Town, Eleuthera	76°29'N	25°21'W	1
22c. Governor's Harbor, Eleu.	76°15'N	25°13'W	4
22d. San Andros, Andros	77°58'N	24°55'W	1
22e. Staniard Creek, Andros	77°55'N	24°53'W	2
22f. Grand Turk	71°08'N	21°27'W	1
23. Guantanamo Bay, Cuba	75°09'N	19°58'W	4
24. Trelawney, Jamaica	77°37'N	18°23'W	1
25. Santo Domingo, Dom. Rep.	70°15'N	18°21'W	10
26. Cabo Rojo, Puerto Rico	67°07'N	18°01'W	14
27. San Juan Bay, Puerto Rico	66°04'N	18°26'W	6
28. Cayey, Puerto Rico	66°04'N	18°08'W	6
29. St. Thomas, U.S.V.I.	64°56'N	18°21'W	10
30. St. John, U.S.V.I.	64°42'N	18°21'W	9
31. St. Croix, U.S.V.I.	64°47'N	17°43'W	14
32. Barbuda	61°48'N	17°38'W	2
South America			
33. Trinidad	61°22'N	10°38'W	10
34a. Rancho Grande, Venezuela	67°41'N	10°25'W	10
34b. Hato Masaguaral, Venez.	67°34'N	8°34'W	1

**Table 2. Migrant warblers reported in Christmas Bird Counts with the mean number of individuals observed/100 party-hours in five neotropical regions**

Species	West Mexico	East Mexico	Cent. Amer.	South Amer.	Carib.
Blue-winged Warbler	—	0.91	1.31	—	0.23
Golden-winged Warbler	0.06	—	0.74	0.24	0.03
Tennessee Warbler	0.20	0.56	22.71	2.20	—
Orange-crowned Warbler	82.69	74.23	0.05	—	0.08
Nashville Warbler	98.64	19.97	0.08	—	0.06
Virginia's Warbler	—	0.08	—	—	—
Lucy's Warbler	11.93	—	—	—	—
Northern Parula	0.06	3.45	1.02	—	52.36
Yellow Warbler	40.67	10.88	13.04	5.60	0.03
Chestnut-sided Warbler	0.17	0.10	32.43	0.08	0.03
Magnolia Warbler	0.41	21.46	16.15	—	1.41
Cape May Warbler	—	0.13	0.07	—	20.95
Black-throated Blue Warbler	0.06	0.05	0.08	—	5.71
Yellow-rumped Warbler	82.63	146.99	4.41	—	22.45
Black-throated Gray Warbler	67.33	0.58	—	—	—
Townsend's Warbler	3.44	16.72	4.02	—	0.03
Hermit Warbler	0.17	3.93	0.02	—	—
Black-throated Green Warbler	0.17	80.25	1.94	0.62	1.05
Golden-cheeked Warbler	0.03	—	—	—	—
Blackburnian Warbler	—	0.10	0.46	1.32	0.14
Yellow-throated Warbler	—	2.82	0.72	—	2.46
Grace's Warbler	—	0.03	—	—	—
Pine Warbler	—	0.13	—	—	0.06
Kirtland's Warbler	—	—	—	—	0.03
Prairie Warbler	—	—	0.02	—	13.54
Palm Warbler	—	0.41	0.28	—	37.57
Bay-breasted Warbler	—	0.15	41.64	0.54	—
Blackpoll Warbler	—	—	—	0.86	0.51
Cerulean Warbler	—	—	0.18	2.65	—
Black-and-white Warbler	14.20	41.04	8.76	2.81	19.79
American Redstart	60.64	7.91	13.37	19.30	57.31
Prothonotary Warbler	—	0.08	7.79	0.62	2.04
Worm-eating Warbler	0.87	0.99	0.74	—	7.57
Swainson's Warbler	—	0.03	0.03	—	0.14
Ovenbird	0.99	1.39	0.63	—	30.28
Northern Waterthrush	19.03	2.80	15.20	12.92	121.66
Louisiana Waterthrush	1.28	4.26	0.64	—	4.41
Kentucky Warbler	3.72	2.42	1.37	—	0.65
Connecticut Warbler	—	—	—	—	0.06
Mourning Warbler	—	0.10	0.92	—	0.06
MacGillivray's Warbler	87.05	0.46	0.14	—	—
Common Yellowthroat	20.36	48.93	8.77	—	32.50
Hooded Warbler	9.99	6.30	2.75	—	4.47
Wilson's Warbler	168.17	189.73	3.93	—	0.14
Canada Warbler	—	0.05	0.44	0.08	0.06
Yellow-breasted Chat	9.54	3.90	0.64	—	0.06

ficients can be compared among species and among sites. One should avoid the temptation, however, to compare coefficients of fluctuation among studies that use different dummy constants or that feature large differences in means.

Coefficients of fluctuation values for species at individual sites ranged from 1.2 to 14.4. Overall mean coefficients for species that occur regularly at five or more sites (Table 4) highlight the strikingly high rate of fluctuation of the Yellow-rumped Warbler (Latin names for all species are given in the species accounts). This supports and broadens the geographical base of the contention of Terrill and Ohmart (1984), based upon observations in Arizona and Sonora, that this is a highly facultative migrant. The Northern Waterthrush is the least and the Wilson's Warbler the most regular of the other, less erratic, species (Table 4).

Mean coefficients of fluctuation of all Caribbean region sites (3.22) were significantly higher (t-test,  $P < .001$ ) than the mean for all mainland sites (2.42). Trinidad was not included in this analysis, as it is an island with strong continental affinity. The small size or remoteness of some islands is not entirely responsible for this difference, as the value for Bermuda (2.3) is the lowest for all island sites. We can only speculate as to a biological explanation for the apparent relative instability on islands.

To search for long-term population trends, 247 separate tests of regression of birds/party-hour per year were run, one for each case in which a species was recorded at a site five or more times. Of these, 46, or 17.9 percent, revealed slopes, either positive (indicating an increase over time) or negative, that were statistically significant (meaning that

Table 3. Migrant warblers recorded/party-hour on neotropical Christmas Bird Counts (1972-1985)

COUNT	Blue-winged	Golden-winged	Tennessee	Orange-crowned	Nashville	Virginia	Lucy's	Northern Parula	Yellow	Chestnut-sided	Magnolia	Cape May
1	—	—	—	0.06	0.28	—	—	—	0.06	—	—	—
2	—	—	P	0.41	—	—	—	—	P	—	—	—
3	—	—	—	2.24	0.11	—	0.07	—	—	—	—	—
4	—	P	P	0.69	1.47	—	0.11	P	0.64	P	P	—
5	—	—	—	0.04	—	—	—	—	—	—	—	—
6	—	—	—	3.70	0.46	—	—	0.01	P	—	—	—
7	p	—	P	0.45	0.07	—	—	P	—	P	—	—
8	p	—	0.01	1.23	0.43	P	—	0.01	0.01	P	P	P
9	0.02	—	0.01	0.21	0.12	—	—	P	0.02	P	0.09	—
10	0.01	—	0.02	0.04	0.04	—	—	0.09	0.38	P	0.70	P
11	—	—	—	—	1.07	—	—	—	0.02	—	—	—
12	p	—	P	0.01	—	—	—	0.18	0.07	—	0.24	—
13	0.04	—	0.03	P	P	—	—	0.05	0.29	P	0.84	P
14	0.07	P	0.05	P	—	—	—	0.06	0.16	P	0.87	—
15	—	—	0.78	—	P	—	—	—	—	—	—	—
16	—	—	0.67	—	—	—	—	—	0.11	—	—	—
17	—	0.03	0.68	—	—	—	—	—	0.20	0.18	0.03	—
18	0.01	0.01	0.26	—	—	—	—	—	0.10	0.47	0.02	P
19	0.01	0.01	0.17	—	—	—	—	—	0.11	0.45	0.01	P
20	0.01	0.01	0.42	—	—	—	—	—	0.21	0.48	0.01	—
21	0.01	—	0.01	P	P	—	—	0.24	P	—	0.06	0.32
22	P	—	—	—	—	—	—	0.38	—	—	0.07	0.81
23	—	—	—	—	—	—	—	0.72	—	—	—	1.81
24	—	—	—	—	—	—	—	0.31	—	—	—	—
25	—	—	—	—	—	—	—	0.06	—	—	P	0.51
26	—	—	—	—	—	—	—	0.81	—	—	P	0.11
27	—	—	—	—	—	—	—	0.06	—	—	—	—
28	—	—	—	—	—	—	—	0.14	—	—	—	—
29	P	—	—	—	—	—	—	1.50	—	—	P	0.11
30	P	P	—	—	—	—	—	1.97	—	P	0.03	0.09
31	—	—	—	—	—	—	—	0.55	—	—	—	0.06
32	—	—	—	—	—	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—	—	0.23	—	—	—
34	—	P	0.06	—	—	—	—	—	0.03	P	—	—

COUNT	Black-throated Blue	Yellow-rumped	Black-throated Gray	Townsend's	Hermit	Black-throated Green	Golden-cheeked	Black-burnian	Yellow-throated	Grace's	Pine	Kirtland's
1	—	1.42	—	—	—	—	—	—	—	—	—	—
2	—	0.87	P	0.02	—	—	—	—	—	—	—	—
3	—	2.62	1.09	0.10	P	—	—	—	—	—	—	—
4	P	0.37	0.74	0.02	P	P	—	—	—	—	—	—
5	—	0.82	—	0.16	0.06	—	—	—	—	—	—	—
6	—	3.00	0.01	P	—	1.14	—	—	0.07	—	—	—
7	—	0.30	P	0.19	0.05	0.57	P	P	0.03	—	P	—
8	—	2.39	0.01	0.26	0.03	1.33	—	—	0.01	P	—	—
9	—	0.63	P	0.40	0.17	0.78	—	—	0.02	—	—	—
10	P	0.84	P	P	—	0.44	—	P	0.04	—	—	—
11	—	2.90	0.08	0.39	—	—	—	—	—	—	—	—
12	—	0.19	—	—	—	0.14	—	—	0.13	—	—	—
13	P	0.25	—	—	—	0.06	—	P	0.04	—	—	—
14	P	0.14	—	—	—	0.12	—	P	0.03	—	—	—
15	—	P	—	1.18	P	—	—	P	—	—	—	—
16	—	—	—	0.82	—	P	—	—	—	—	—	—
17	—	—	—	—	—	0.07	—	—	—	—	—	—
18	P	0.03	—	—	—	P	—	P	—	—	—	—
19	—	P	—	—	—	—	—	P	—	—	—	—
20	—	P	—	—	—	P	—	P	P	—	—	—
21	0.03	1.73	—	—	—	0.07	—	—	0.02	—	P	—
22	0.21	0.14	—	—	—	0.09	—	—	0.38	—	—	P
23	0.42	P	—	—	—	—	—	—	0.06	—	—	—
24	0.22	—	—	—	—	—	—	—	—	—	—	—
25	0.11	P	—	—	—	P	—	—	0.02	—	—	—
26	0.02	0.10	—	—	—	—	—	—	0.03	—	—	—
27	—	—	—	—	—	—	—	—	—	—	—	—

Table 3. Continued

COUNT	Black-throated Blue	Yellow-rumped	Black-throated Gray	Townsend's	Hermit	Black-throated Green	Golden-cheeked	Black-burnian	Yellow-throated	Grace's	Pine	Kirtland's
28	0.15	—	—	—	—	P	—	0.02	—	—	—	—
29	0.02	0.16	—	—	—	—	—	—	0.06	—	—	—
30	P	0.02	—	—	—	P	—	P	P	—	—	—
31	0.11	0.06	—	—	—	—	—	—	0.01	—	—	—
32	—	—	—	—	—	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—	P	—	—	—	—
34	—	—	—	—	—	0.02	—	0.03	—	—	—	—

COUNT	Prairie	Palm	Bay-breasted	Black-poll	Cerulean	Black-& White	American Redstart	Prothonotary	Worm-eating	Swainson's
1	—	—	—	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—	—	—	—
3	—	—	—	—	—	—	—	—	—	—
4	—	—	—	—	—	0.21	1.00	—	0.01	—
5	—	—	—	—	—	—	—	—	—	—
6	—	—	P	—	—	1.02	—	—	—	—
7	—	—	—	—	—	0.24	—	—	—	—
8	—	P	P	—	—	0.61	P	P	P	—
9	—	—	P	—	—	0.32	0.01	—	—	—
10	—	0.01	—	—	—	0.29	0.27	P	0.03	P
11	—	—	—	—	—	0.18	—	—	—	—
12	—	0.05	—	—	—	0.10	0.08	—	—	—
13	—	P	P	—	P	0.25	0.62	0.02	P	P
14	—	—	P	—	—	0.30	0.81	0.01	0.03	—
15	—	—	—	—	—	0.05	—	—	—	—
16	—	—	—	—	—	0.23	0.10	—	—	—
17	—	—	—	—	—	0.08	P	—	—	—
18	P	P	0.62	—	P	0.04	0.03	0.19	0.01	—
19	—	—	0.56	—	P	0.03	0.01	0.04	P	—
20	—	P	0.66	—	P	0.06	0.02	0.09	P	—
21	0.05	0.97	—	—	—	0.41	0.94	P	0.07	P
22	1.29	5.87	—	—	—	0.35	0.58	—	0.03	—
23	0.48	1.79	—	0.04	—	0.34	0.18	—	—	—
24	0.09	—	—	0.04	—	0.45	0.09	—	0.09	—
25	0.02	0.04	—	0.01	—	0.04	0.18	—	—	—
26	0.22	0.18	—	P	—	0.05	0.19	0.01	—	—
27	P	—	—	—	—	0.03	—	P	—	—
28	0.01	—	—	P	—	0.11	0.05	—	—	—
29	0.25	0.09	—	—	—	0.56	0.14	0.02	0.02	—
30	0.19	0.02	—	—	—	0.71	0.45	P	0.17	—
31	0.04	0.04	—	—	—	0.19	0.18	0.05	—	—
32	—	—	—	—	—	—	—	0.02	—	—
33	—	—	—	P	—	—	0.10	P	—	—
34	—	—	0.01	0.02	0.06	0.07	0.46	0.01	—	—

the probability that the slope exists due to random events is less than ten percent). In most species, either population sizes are not changing or this method of census and analysis is not sensitive enough to detect change. Reasonably convincing patterns of change emerged in four species. Of the six sites where they regularly occur, Hooded Warblers showed a significant positive increase in four regressions (at San Blas, Catemaco, Belmopan, and St. John). To search for a combined trend over all sites in which the species was regularly encountered, data were transformed and a single regression recalculated. The slope for the combined Hooded Warbler data is positive and significant ( $P = 0.0009$ ,  $R^2 = 0.17$ ). Breeding Bird Surveys from 1965 to 1979 show an increase in Hooded Warbler populations in the eastern United States (Robbins *et al.* 1986), and CBCs could be de-

tecting the same apparent phenomenon. It should be noted, however, that there are many trends in Breeding Bird Surveys not shown by Christmas Bird Count data, so that the Hooded correlation could be merely fortuitous.

As an example of a contradiction between Breeding Bird Surveys and CBCs, Robbins *et al.* (1986) showed an increase in American Redstarts in the East while there appear to be consistent declines in Christmas Bird Count regressions. Of the 16 sites where the species is regular, the regression slope is negative in 11 cases, in two cases significantly so. A regression of American Redstart data sets from all sites at which they occurred regularly over the period from 1974 to 1984 produced a combined slightly negative ( $-0.06$ ) but significant ( $P = 0.0487$ ,  $R^2 = 0.03$ ) slope. The American Redstart is the only species indicated by Christmas Bird

Table 3. Continued

COUNT	Oven-bird	Northern W'thrust	Louisiana W'thrust	Kentucky	Connecticut	Mourning	MacGillivray's	Common Yellow-throat	Hooded	Wilson's	Canada	Yellow-breasted Chat
1	—	—	—	—	—	—	—	P	—	—	—	—
2	—	—	—	—	—	—	—	0.03	—	P	—	—
3	—	—	P	—	—	—	0.40	0.06	—	0.63	—	—
4	0.02	0.29	0.02	0.06	—	—	1.17	0.29	0.02	2.44	—	0.16
5	—	—	—	—	—	—	—	—	—	—	—	—
6	—	0.01	0.02	—	—	P	—	0.43	—	1.15	—	P
7	P	0.02	0.08	P	—	—	P	0.07	P	1.45	—	0.02
8	0.01	P	0.06	—	—	—	0.01	1.16	—	3.29	P	0.02
9	0.02	0.03	0.02	P	—	—	P	0.03	P	2.39	—	0.06
10	0.04	0.06	0.03	0.09	—	P	P	0.26	0.24	1.40	P	0.10
11	—	0.02	—	—	—	—	0.15	0.48	—	0.25	—	—
12	—	0.04	—	—	—	—	—	0.13	P	—	—	—
13	0.02	0.15	P	P	—	P	—	0.46	0.14	P	—	0.05
14	0.03	0.09	0.01	0.01	—	P	—	0.37	0.15	0.09	P	0.03
15	—	—	—	—	—	—	0.03	—	—	0.58	—	—
16	0.02	—	—	—	—	—	0.02	0.08	—	0.62	—	—
17	P	0.02	P	0.02	—	0.02	—	—	—	0.12	—	—
18	P	0.17	0.01	0.02	—	0.01	P	0.02	P	P	P	—
19	—	0.06	0.01	0.02	—	0.01	—	P	—	P	P	—
20	—	0.12	0.01	0.01	—	0.01	—	P	—	P	P	—
21	0.60	0.59	—	P	—	—	—	0.70	0.08	P	—	P
22	0.52	0.82	0.04	—	—	—	—	1.44	P	P	P	—
23	0.05	0.06	—	—	—	—	—	0.06	—	—	—	—
24	0.22	0.04	—	—	—	—	—	0.76	—	—	—	—
25	0.11	P	0.02	—	—	—	—	0.11	—	—	—	—
26	P	1.19	0.02	P	P	P	—	0.04	P	—	—	—
27	—	0.75	0.09	—	—	—	—	0.04	—	—	—	—
28	—	—	0.11	—	—	—	—	—	—	—	—	—
29	0.03	1.91	0.02	0.02	—	—	—	0.05	0.04	—	—	—
30	0.28	0.67	0.01	0.01	—	—	—	—	0.08	—	—	—
31	—	0.72	P	—	—	—	—	0.03	—	—	—	—
32	—	—	—	—	—	—	—	—	—	—	—	—
33	—	0.31	—	—	—	—	—	—	—	—	—	—
34	—	0.14	—	—	—	—	—	—	—	—	P	—

<sup>P</sup> Species present but relative density less than 0.01/party-hour and/or only recorded once

Counts to be undergoing a significant overall downward population trend. Slight negative trends can also be seen in data for the Yellow-rumped, Chestnut-sided, and Cape May warblers.

MacGillivray's Warblers increased significantly at the two western Mexico sites where they occur regularly (the only two amenable to analysis). This species also has a high coefficient of fluctuation (3.6), due presumably to this steady increase over time. With data from only two count areas, however, it is more difficult to disregard the possibility that observers became more adept at locating and identifying these birds.

The last species for which a major pattern can be detected is the Nashville Warbler, which shows a significant positive slope in four of the seven sites where it regularly occurs (Alamos, San Blas, El Naranjo and Teziutlan). The combined Nashville Warbler data set also shows a positive slope (0.14) at a highly significant level ( $P = 0.0003$ ,  $R^2 = 0.35$ ); in contrast, Breeding Bird Surveys reveal a downward trend (Robbins *et al.* 1986).

#### SITES

The Catemaco CBC boasts the highest total number of species reported and the highest mean number of warbler species per count (Table 5). Indeed, the entire southern

Gulf slope of Mexico appears from CBC data to be a critical stronghold for wintering warblers. These high numbers persist into Belize, falling off in the drier areas of Yucatan counts. Farther south, although the total number of species observed in Panama counts is high, the low mean number/count and the mean number of individuals/party-hour suggest that warblers are more irregular and less abundant.

A total of 28 species has been reported from Bermuda CBCs, and each year the number of species and individuals observed is high (Table 5). That such an isolated and small set of islands would attract such large numbers of winter migrants is an unanticipated result of this analysis. It is unfortunate that counts in the Bahamas have been held so sporadically in view of the extremely high mean numbers of individuals per party-hour reported. The Bahamas may prove to be critical not only for the rare Kirtland's Warbler (Radabaugh 1974) but also for common species such as the Palm Warbler. The mean of 6.65 Palm Warblers/party-hour in the combined Bahama counts, the highest total in Table 5, indicates that this may be the most abundant warbler at any single count site.

The San Blas count site has been mentioned repeatedly in this paper because of reports of primarily eastern warblers otherwise unusual or unknown from the west coast of Mexico. Furthermore, there are far more positive slopes in the regression lines of individual species at San Blas (nine) than at any other site. This indicates either an in-

crease in winter warbler populations in general on this portion of the Mexican west coast or a continually increasing observer awareness of these birds.

Nine species reported on St. John have never been reported in the 14 counts held on nearby St. Croix. The five most common of these on St. John (Ovenbird, at 0.29 birds/party-hour; Worm-eating Warbler, at 0.19; Black-throated Blue Warbler, 0.10; Hooded Warbler, 0.08 and Magnolia Warbler, 0.04) have also been recorded on St. Thomas counts.

### SPECIES ACCOUNTS

The great majority of the reports in Table 3 are from within known general ranges of the birds. We have examined about 1300 pertinent literature references and over 46,000 specimen records from 32 museum collections for the following analysis. Those CBC reports that point out peculiarities in distribution or appear to be extralimital are evaluated here within the context of this relatively complete data set.

Two disclaimers are necessary. First is the obvious possibility that some of these birds have been misidentified. Instead of evaluating the veracity of each individual report, we have accepted those published in *American Birds* at face value. We feel that it is important to scrutinize unusual records carefully. By pointing out which records have been unusual in the following text, we hope to stimulate such scrutiny. The second disclaimer involves the dates at which the counts have been held. It is possible that many unusual records, particularly those from areas north of typical winter range, are of late migrants rather than of winter residents. We present these data relative to pre-existing records for certain areas for certain dates, and make no claims as to precisely what an alleged bird was doing when it was identified.

Blue-winged Warbler (*Vermivora pinus*). CBCs indicate that the Blue-winged Warbler is fairly widespread in winter, but nowhere common (Table 3). If a peak exists, it is in Belize, where the bird is at least regular in occurrence, if not abundant. Based upon a summary of Bahama records (Paulson 1966), the 1978 Governor's Harbor count report from Eleuthera is the first for that island. Reports of single birds in two counts on St. John and in one count on St. Thomas are the first from the Virgin Islands. A scattering of Bermuda reports would also represent a range extension.

Golden-winged Warbler (*Vermivora chrysoptera*). Only Panama CBCs report this species regularly (Table 3). The sole report from western Mexico prior to the individual claimed in the 1974 San Blas count was a tentative sight record from Colima (Schaldach 1969). A 1985 St. John CBC report followed the statement by Raffaele (1983) that there are no certain records from the Virgin Islands.

Tennessee Warbler (*Vermivora peregrina*). This species is reported regularly as one of the most common warblers in Panama (Table 3). It has also been reported frequently in low numbers from the Mexican Gulf Coast, where it has been considered a transient moving to and from the northern limits of its wintering range in Oaxaca (Binford 1968), Chiapas (Alvarez del Toro 1980), and Tabasco (Berrett 1962). Reports in five Catemaco counts, in three Teziutlan counts, in nine of 13 counts at El Naranjo, and twice at Gomez Farias suggest that this species winters regularly but rarely north into Tamaulipas. Two reports from San Blas and one from San Carlos would be the first winter records from northwestern Mexico; the two previous records are of October birds, one from Baja California (San Diego Natural History Museum 13965, noted by Huey 1931) and the other from south of Nogales, Sonora (Delaware Natural History Museum [DNHM] 32528). Reports from three Bermuda counts would be the first winter records

**Table 4. Overall mean coefficient of fluctuation (CF) and number of sites in which recorded for species occurring five or more times at five or more sites.**

Species	Coefficient of Fluctuation	Number of Sites
Yellow-rumped Warbler	4.3	15
Northern Waterthrush	3.2	15
Tennessee Warbler	3.1	7
Northern Parula	3.1	11
Cape May Warbler	3.0	6
Yellow-throated Warbler	2.9	5
Nashville Warbler	2.6	7
Orange-crowned Warbler	2.6	7
Townsend's Warbler	2.6	6
American Redstart	2.4	16
Kentucky Warbler	2.3	5
Common Yellowthroat	2.2	10
Black-throated Green Warbler	2.2	9
Hooded Warbler	2.1	6
Black and white Warbler	2.1	19
Magnolia Warbler	2.1	8
Yellow Warbler	2.0	9
Wilson's Warbler	1.8	9

for those islands. Previous records consist of two late September specimens (American Museum of Natural History [AMNH] 789081 and 789082) and one report of an individual in March (Bradlee et al. 1931).

Orange-crowned Warbler (*Vermivora celata*). This is a common species in both eastern and western Mexico (Table 3). At the southern edge of its range, the only Belize record prior to the CBC observations (one at Belmopan and one bird in each of two counts at Belize City) were two individuals banded in March 1961 (Russell 1964). The reports on three Bermuda counts would add to the one specimen record (AMNH 789083) from those islands of which we are aware.

Nashville Warbler (*Vermivora ruficapilla*). High numbers for the last four years at San Blas have resulted in a very high overall value for western Mexico (Table 3). Grinnell (1928) termed this bird "a transient, chiefly or altogether within the northern fourth of [Baja California]". The 16 individuals reported in the single La Paz count (1974) would represent a large number of birds a great distance from where they are otherwise known to winter. The Nashville Warbler is also common in northeastern Mexico but less so in the more southern counts. The Belize City report would be the only record for that country in addition to the two February 1958 sightings at Gallon Jug (of a single bird?) mentioned by Russell (1964). Two 1985 Bermuda birds are the first records since an individual was taken after a gale in September 1907 (Bradlee et al. 1931).

Virginia's Warbler (*Vermivora virginiae*). One Virginia's Warbler has been reported in each of three El Naranjo counts (Table 3). This count circle is well northeast of the State of Guanajuato, the site of the otherwise northeasternmost winter records (Bent 1953).

Colima Warbler (*Vermivora crissalis*). This and Bachman's Warbler are the only two warbler species that have bred in the United States that have not been claimed on any neotropical Christmas Bird Counts. Counts have not been held in deep southwest Mexico, the normal wintering

range of the Colima (and Virginia's) Warbler (as summarized by Miller *et al.* 1957).

Lucy's Warbler (*Vermivora luciae*). This species appears commonly only on the Alamos and San Blas CBCs (Table 3). Although there are no reports in the literature from Nayarit prior to these from San Blas, there is one specimen (DNHM 26250). In general, there has been little work reported from Nayarit.

Northern Parula (*Parula americana*). CBC results point out the dramatic differences between Caribbean sites, where the Northern Parula is abundant, and the mainland part of its range, where it is regular, but nowhere particularly common, on the Gulf slope of Mexico and in Belize (Table 3). Although there are specimens from scattered localities in western Mexico, the 1979 San Blas report would be the first Northern Parula record for Nayarit. A Tropical Parula (*P. pitiaiyumi*) reported from St. Thomas in 1976, a record that would represent the first Caribbean record north of Trinidad, was probably a Northern Parula, a species not otherwise reported on that count, and has been treated as such in our analysis.

Yellow Warbler (*Dendroica petechia*). This species is a special problem because both migrant and resident populations reside within a number of count circles. Where they are not differentiated in reports as being either "Yellow" or "Mangrove" warblers, birds from inland counts are considered to be migrants, all island reports (save for Bermuda and Trinidad, where there are no resident subspecies) have been treated as residents, and most ambiguous situations have been discarded from further consideration. Among the localities reporting high Yellow Warbler numbers (Table 3), Catemaco probably represents a true peak in migrants, although the subspecies *oraria* is a rare resident in parts of that count circle. The Belize City data could possibly have been eliminated, as the large numbers reported there potentially represent an unknown mixture of migrants and resident *D. p. bryanti* individuals. Residents were recorded separately in San Blas and in most Panama Pacific and Atlantic counts.

Chestnut-sided Warbler (*Dendroica pensylvanica*). The Chestnut-sided is one of the most abundant warblers in Panama counts (Table 3). Berrett (1962) and a few specimen records indicate that the species winters sparingly as far north as Tabasco. More northerly CBC reports from eastern Mexico (one each at Catemaco, Teziutlan, El Naranjo and Gomez Farias) suggest that the species may rarely winter substantially farther north. Reports of Chestnut-sided Warblers in six of the 11 San Blas counts and two previous Nayarit specimens (DNHM 26276 from November and Moore Laboratory of Zoology, Occidental College [Moore] 28245 from March) indicate that the species is a regular straggler to western Mexico.

Magnolia Warbler (*Dendroica magnolia*). CBC results indicate a peak in Magnolia Warbler abundance from Catemaco south to Belize (Table 3). Reports from four San Blas CBCs document the sporadic occurrence of this species on the west coast of Mexico. San Blas is south of one specimen locality in Sonora (Alamos, Museum of Comparative Zoology, Harvard University 221296, referred to by van Rossem 1934) and north of the other known locality in Jalisco (Boca de Tomate, DNHM 19288 and 19289). This is one of several species for which regular count reports from Bermuda add to a previously meager set of records, in this case a single May 1878 specimen (Bradlee *et al.* 1931).

Cape May Warbler (*Dendroica tigrina*). Most Cape May Warblers winter in the Caribbean. On the mainland, Cape Mays have been reported twice on Catemaco CBCs and once each at Belize City, Panama Atlantic, and Panama Central (Table 3). These reports can be added to a summary of the infrequent observations of this species in Central America (Mason 1976) and records from Veracruz (Andrle

1966, plus an October specimen, Bell Museum of Natural History, University of Minnesota [Bell] 30079, from near Catemaco).

Black-throated Blue Warbler (*Dendroica caerulescens*). This is another primarily Caribbean species that is occasionally reported on the mainland (Table 3). Three reports on Belize counts are additions to a few previous Belize records noted by Russell (1964), and two reports from Panama supplement the one sight record noted by Wetmore *et al.* (1984). Two Catemaco CBC reports are from an area from which at least two specimens (Bell 27925 and 30098) have been taken.

Yellow-rumped Warbler (*Dendroica coronata*). Yellow-rumped Warblers have been treated as a single taxon, even though Myrtle and Audubon types have been differentiated from each other on many counts. These birds are abundant on mainland counts, dwindling somewhat to the south, and although widespread, are considerably less common on Caribbean CBCs (Table 3).

Black-throated Gray Warbler (*Dendroica nigrescens*). This species is most common in western Mexico, as shown by high numbers reported from Alamos and San Blas (Table 3). The 1978 report from far to the east at Catemaco is the first since Andrle (1966) noted that one specimen was collected in the poorly known highlands of that region.

Townsend's Warbler (*Dendroica townsendi*). Townsend's tend to winter in mountainous pine or oak woodlands, a habitat type rarely sampled in CBCs. Three birds reported in the 1973 Catemaco count (Table 3) would be the first record for the Sierra de los Tuxtlas, the highlands of which are, again, very poorly known ornithologically. The Townsend's reported on Bermuda in 1976 would constitute a range extension, as that bird has not been recorded from that island, nor, for that matter, from any of the West Indies.

Hermit Warbler (*Dendroica occidentalis*). In 1975, one Hermit Warbler was recorded on the San Blas count (Table 3). Although there are no literature references to this species in Nayarit, reflecting, as much as anything, a lack of work in that state, there are at least three specimens in existence (DNHM 32838 and 32839 and Moore 54650).

Black-throated Green Warbler (*Dendroica virens*). CBC data indicate that the core of this species' range is, like that of the Magnolia Warbler, along the Gulf Coast of Mexico (Table 3). Two San Blas reports add to two previous winter specimens from Nayarit (DNHM 19300 and 26307). In the Caribbean, Black-throated Greens are rare everywhere except on Cuba. Two birds reported from the 1983 Cayey, Puerto Rico, count add to just two previous records for that island (Molinare 1980). The Santo Domingo bird claimed in 1979 would be the first record for the Dominican Republic and only the second from Hispaniola, the first being a specimen from Haiti (National Museum of Natural History [USNM] 317313). There has since been a specimen collected on Isla Beata off the southern Dominican coast (Bond 1982). Four West Indian sites reported their first Black-throated Greens in 1985. Two birds on St. John are the only records for that island since the individual noted by Robertson (1962). A bird at Governor's Harbor is the first since the specimen noted by Van Tyne and Mayfield (1952). Reports of one bird at San Andros and seven at Staniard Creek are the first records for Andros Island since a November sight record reported by Bond (1969).

Golden-cheeked Warbler (*Dendroica chrysoparia*). The bird reported in the 1976 Gomez Farias count (Table 3) would be the only midwinter Mexican report other than the two recently published Chiapas sightings 1100 kilometers to the south (Braun *et al.* 1986).

Blackburnian Warbler (*Dendroica fusca*). This species has been noted in one Gomez Farias and three Catemaco counts, twice each at Belize City and Belmopan, and once in Guatemala (Table 3). This suggests that some individuals

Table 5. Number of migrant warblers recorded at each count site, mean number of species/count (SE), and mean number of individuals/party-hour/count (SE)

Site	Counts	Total Species	$\bar{X}$ Number of Species (SE)	$\bar{X}$ Number of Individuals (SE)
Mexico				
Western				
1a. Bahia de Los Angeles	1	1	1 —	1 —
1b. Guerrero Negro	1	4	4 —	1 —
1c. La Paz	1	4	4 —	4 —
2a. Puerto Penasco	6	5	2.0 (0.68)	1.5 (0.80)
2b. Bahía Kino	3	3	2.0 (1.00)	0.8 (0.40)
2c. San Carlos	1	4	4 —	1 —
3. Alamos	9	11	7.6 (0.53)	7.3 (1.34)
4. San Blas	12	27	16.8 (0.83)	9.8 (2.04)
Eastern				
5. Mesa de las Tablas	7	4	3.0 (0.38)	1.1 (0.38)
6. Rio Corona	8	17	10.5 (0.68)	11.0 (1.87)
7. Gomez Farias	8	25	13.1 (0.48)	3.6 (0.54)
8. El Naranjo	14	31	16.5 (0.97)	11.4 (1.28)
9. Teziutlan	6	26	15.7 (1.50)	7.6 (2.60)
10. Catemaco	9	32	21.7 (0.88)	5.4 (0.58)
11. Mexico City	2	12	10.0 (0.99)	8.1 (3.11)
12a. Telchac Puerto	2	7	5.5 (0.50)	1.3 (0.28)
12b. Uxmal	7	13	7.3 (0.75)	1.5 (0.22)
12c. Sayil-Labna	3	10	5.7 (2.42)	2.2 (1.15)
Central America				
Belize				
13. Belize City	14	31	15.4 (0.50)	3.4 (0.26)
14. Belmopan	11	28	17.3 (0.43)	3.5 (0.32)
Guatemala				
15a. San Andres Semetebaj	1	3	3 —	6 —
15b. Cerro de Oro	5	10	4.6 (0.98)	2.0 (0.27)
15c. Santiago Atitlan	1	2	2 —	5 —
15d. Yepocapa	1	3	3 —	1 —
15e. Lago de Amatitlan	1	4	4 —	1 —
El Salvador				
16. San Salvador	3	9	6.3 (0.88)	2.6 (0.68)
Costa Rica				
17a. Lower Zona Protectora	1	12	12 —	1 —
17b. Grecia	2	13	11.0 (0.99)	4.2 (2.97)
17c. Nandayure	1	3	3 —	1 —
17d. Turrialba	3	6	3.7 (0.33)	0.2 (0.05)
Panama				
18. Canal Area—Atlantic	13	29	14.9 (0.81)	2.0 (0.25)
19. Canal Area—Central	13	22	11.2 (0.83)	1.4 (0.15)
20. Canal Area—Pacific	13	24	13.6 (0.89)	2.2 (0.23)
Caribbean Region				
21. Bermuda	11	28	15.9 (0.37)	6.9 (0.71)
22a. Green Turtle Cay, Abaco	1	11	11 —	23 —
22b. Gregory Town, Eleuthera	1	13	13 —	32 —
22c. Governor's Harbor, El.	4	17	14.5 (1.30)	11.3 (1.55)
22d. San Andros	1	8	8 —	12 —
22e. Staniard Creek, Andros	2	16	13.5 (1.48)	12.4 (2.05)
22f. Grand Turk	1	14	14 —	6 —
23. Guantanamo Bay, Cuba	4	13	9.2 (1.11)	5.8 (1.69)
24. Trelawney, Jamaica	1	10	10 —	2 —
25. Santo Domingo, Dom. Rep.	10	16	9.3 (0.50)	1.4 (0.16)
26. Cabo Rojo, Puerto Rico	14	20	10.0 (0.58)	3.1 (0.58)
27. San Juan Bay, P.R.	6	8	2.8 (0.65)	1.0 (0.31)
28. Cayey, P.R.	6	10	5.8 (0.65)	0.7 (0.08)
29. St. Thomas, U.S.V.I.	10	19	9.5 (1.05)	5.1 (0.83)
30. St. John, U.S.V.I.	9	23	12.3 (1.49)	4.8 (0.87)
31. St. Croix, U.S.V.I.	14	12	6.4 (0.43)	2.2 (0.32)
32. Barbuda	2	1	0.5 (0.50)	a a
South America				
33. Trinidad	10	7	3.3 (0.21)	0.7 (0.07)
34a. Rancho Grande, Venez.	10	14	6.8 (0.84)	0.9 (0.16)
34b. Hato Masaguaral, Venez.	1	2	2 —	1 —

a—value less than 0.01



of this species linger north of their wintering range in areas where they are normally uncommon transients. We know of no midwinter Blackburnian specimens, however, from anywhere north of Costa Rica nor of any literature reference other than a comment that it "may winter occasionally" in Veracruz (Loetscher 1955).

Yellow-throated Warbler (*Dendroica dominica*). Because *D. d. flavescens* breeds on Abaco (Bond 1930), individuals reported in the Green Turtle Clay count have been treated as residents, although some or all may have been migrants. Birds reported from counts from other Bahaman islands are treated as migrants (Table 3). CBCs indicate that this species is regular, but nowhere common, on the Atlantic side of Middle America from Rio Corona to Belize and in various locales in the West Indies.

Grace's Warbler (*Dendroica graciae*). Based upon the range described by Webster (1961), the Grace's Warbler noted in one count at El Naranjo is treated as a migrant (Table 3), but the two noted in 1972 at Belize City are considered residents and not included in our totals.

Pine Warbler (*Dendroica pinus*). Pine Warblers breed on the United States mainland, in the Bahamas, (where found on several counts and treated as residents), and on Hispaniola (in interior highlands, according to Wetmore and Swales 1931, not near the Santo Domingo count circle). Their occurrence on other neotropical counts should be considered unusual. The only Mexican records prior to the 1972 report of five Pine Warblers at Gomez Farias (Table 3) are two February specimens from near the Tamaulipas coast (USNM 183394 from Matamoros and Royal Ontario Museum 61197 from Altamira). The 1983 and 1985 Bermuda reports are not unique: Reid (1884) and Bradley *et al.* (1931) reported sporadic occurrences of this species on these islands, usually of small flocks and usually in the fall.

Kirtland's Warbler (*Dendroica kirtlandii*). The bird reported from Governor's Harbor, Eleuthera in 1985 (Table 3) is the first CBC notice of this species.

Prairie Warbler (*Dendroica discolor*). This is another species confirmed by CBCs to be almost exclusively Caribbean in distribution (Table 3). The Prairie claimed in one Atlantic Panama count is unusual, but other single vagrants have been sighted in unusual places on the mainland in Panama (Wetmore *et al.* 1984), Costa Rica (Stiles and Smith 1980), Nicaragua (Howell 1972), El Salvador (Dickey and van Rossem 1938), in the Pacific Ocean off the Guatemala coast (Willis 1961), and even far out of the Pacific on Cocos Island (Slud 1967).

Palm Warbler (*Dendroica palmarum*). This typically Caribbean species is not unusual on the mainland, where claimed on 14 CBCs (Table 3). Although there are a few Mexican reports in the literature other than from the Yucatan Peninsula, the species is apparently not unusual in winter in the Catemaco area, where it is fairly regular on CBCs.

Bay-breasted Warbler (*Dendroica castanea*). This is another Central American species, chiefly Panamanian on the basis of CBCs (Table 3), recorded on occasion in counts in eastern Mexico (once each at Rio Corona and Teziutlan, twice at El Naranjo). We know of no other records from this area outside migration periods. Two Belize reports (one from each count) are the first since one winter record from 1887 (Russell 1964).

Blackpoll Warbler (*Dendroica striata*). This species winters in South America and migrates through the West Indies. Persistent and widespread reports from Caribbean CBC's (nine times in five count areas, Table 3) suggest that some individuals either migrate south very late or overwinter in these areas. Previous December records include a December 9 specimen from Grenada (Peabody Museum of Natural History, Yale University 34003), a December 9 date cited for Cuba (Garrido and Garcia Montana 1975),

two December claims for southwestern Puerto Rico (McCandless 1962), and a December 30 sighting on St. Martin (Hoogerwerf 1977), a report that Bond (1980) found unacceptable. It bears repetition here that some of these birds, notably Blackpoll Warblers in fall, are liable to be misidentified.

Cerulean Warbler (*Dendroica cerulea*). The Cerulean Warbler winters in South America and passes through Central America as a transient (Wetmore *et al.* 1984; Slud 1964; Monroe 1968; Russell 1964). The appearance of the species seven times on Panama counts and twice at Belize City (Table 3) suggests that some individuals may linger farther north.

Black-and-white Warbler (*Mniotilta varia*). The Black-and-white Warbler has been reported from more counts (227) and from more sites (36) than any other migrant warbler in the Neotropics (Table 3). The 1985 Trinidad report is the first for that count, adding to seven sight records listed for the island by French (1980). The American Redstart (*Setophaga ruticilla*) is the third most commonly reported species in this survey (Table 3).

Prothonotary Warbler (*Protonotaria citrea*). The Prothonotary is most abundant at counts held in the heart of its winter range in Panama (Table 3). Sporadic reports in the Caribbean support claims that some individuals do winter in that region (Schwartz and Klinikowski 1963). Prior to the 1982 Christmas Bird Count report, Bermuda records consisted of one specimen from 1874 and another from 1903 (Bradley *et al.* 1931). A December 31 specimen (Bell 30069) from the Catemaco area is the northernmost winter mainland record prior to one CBC report from that area and two from El Naranjo counts.

Worm-eating Warbler (*Helminthos vermivorus*). CBCs indicate that the Worm-eating Warbler, a species that appears to occur in low density over a wide winter range, is much more common in West Indies count areas than on the mainland (Table 3). It is particularly regular on Bermuda, where Bradley *et al.* (1931) called it an accidental visitor, and on St. John in the Virgin Islands.

Swainson's Warbler (*Limnithlypis swainsoni*). The winter range of Swainson's Warblers (summarized by Meanley 1971) is so poorly known that it is worth recounting all CBC records (as summarized in Table 3). One individual was recorded in one Catemaco count (1975) and in each of two Bermuda counts (1975 and 1981), and two individuals were noted in the 1972 Belize City count. The Bermuda reports are the first that we are aware of from those islands.

Ovenbird (*Seiurus aurocapillus*). The Ovenbird is uncommon in Panama, where single birds have been recorded in only three of 39 counts (Table 3). Wetmore *et al.* (1984) indicated that it is fairly common in western Panama, where it apparently reaches the southern limit of its normal range.

Northern Waterthrush (*Seiurus noveboracensis*). Sightings on 196 counts at 33 sites makes this the second most ubiquitous species in these counts. It is by far the most commonly reported species in the Caribbean region (Table 3).

Connecticut Warbler (*Oporornis agilis*). This rare species, which winters in South America, is at best an extremely uncommon transient on Puerto Rico, from where it was reported in the 1974 CBC (Table 3). Raffaele (1983) noted only a specimen from nearby Mona Island and a few sight records from Puerto Rico, all during migration, and Rolle (1961) suggested consigning the species to the hypothetical list for the island.

Mourning Warbler (*Oporornis philadelphia*). It is possible to misidentify some Mourning Warblers as Connecticut on the basis of eye-ring characters (Lanyon and Bull 1967). However, Mournings, also reported on one Puerto Rico count (Cabo Rojo in 1977, Table 3), are only slightly more

likely to be there in midwinter. Danforth (1937) reported a December 29 sighting "in dense lowland thicket" on nearby Vieques Island, and Todd (1925) noted a specimen from Puerto Rico taken in late March. Nonetheless (and apparently in spite of Todd's reported specimen), Rolle also (1961) suggested putting this species on the Puerto Rican hypothetical list. On the mainland, the northern extreme of the Mourning's winter range lies somewhere between Costa Rica, where the species is fairly common (Carriker 1910, Slud 1964) and Honduras, where an uncommon migrant (Monroe 1968). Reports from Belize (one once at each count), Catemaco (1974), and especially Rio Corona (three individuals in 1978) are all of potentially lingering individuals well north of normal wintering grounds.

MacGillivray's Warbler (*Oporornis tolmiei*). As with the Connecticut, reports of MacGillivray's Warbler in areas where the Mourning is more likely, such as in the 1976 Panama Atlantic count (Table 3), must be treated cautiously. Wetmore et al. (1984) indicated that MacGillivray's occurs in Chiriqui in western Panama, but that records for the Canal Zone are all old, made before mensural differences between it and the Mourning were known. Thus, the status of the species that far east, where reported once on an Atlantic Canal Zone count, is uncertain.

Common Yellowthroat (*Geothlypis trichas*). This species is regular to common in most counts held in the Caribbean, Mexico, and Belize (Table 3). The report of 803 individuals in the 1977 El Naranjo count is the highest number for a warbler species in any one count, and is even more surprising considering that no Common Yellowthroats were reported in the 1985 count. Reports in 14 of the 36 Canal Zone counts establish it as a fairly regular winter bird somewhat east of the western Panamanian provinces of Chiriqui and Bocas del Toro, the easternmost areas in which Wetmore et al. (1984) reported it as occurring every year.

Hooded Warbler (*Wilsonia citrina*). The most surprising result for the Hooded is the regularity with which it shows up on Bermuda and St. John (Table 3). Raffaele (1983) calls the bird a decidedly uncommon winter visitor to the Virgin Islands, and yet an average of four individuals were noted every year in the St. John count. Reid (1884) noted one 1847 Bermuda record, and Bradlee et al. (1931) were able to add no others, terming the species an accidental visitor. There is no suggestion in the literature that it should be so common as to appear on ten of 11 counts, with a maximum report of 22 individuals in 1981 (0.41 per party-hour).

Wilson's Warbler (*Wilsonia pusilla*). The mean of 192.6 Wilson's Warblers per 100 party-hours in eastern Mexico is the highest for any species in any of the five regions (Table 2). The individual in the 1974 Green Turtle Cay count (Table 3) is the first report of which we are aware for the Abaco Island group. The Bermuda report would be the first for those islands.

Canada Warbler (*Wilsonia canadensis*). Once again, two eastern Mexico reports, one each from Catemaco and El Naranjo, are from areas through which the bird commonly passes in migration, but from which there are no winter records (Table 3). The Staniard Creek report (1984) is the only record for Andros Island, following a specimen record from New Providence (Bond 1961; confirmed in Bond 1962), a sight record from the Exumas (Bond 1968), and a banding report from Grand Bahama (Bond 1980).

Yellow-breasted Chat (*Icteria virens*). Chats are not particularly common at any count site (Table 3). The report from Bermuda in 1976 and a November specimen (AMNH 789100) are the only records of which we are aware for those islands.

Note that although many northern breeders surely move south in the winter, all Red-faced Warblers (*Cardellina rubrifrons*), Painted Redstarts (*Myioborus pictus*) and Olive

Warblers (*Peucedramus taeniatus*) reported in CBCs have been treated as residents rather than as migrants.

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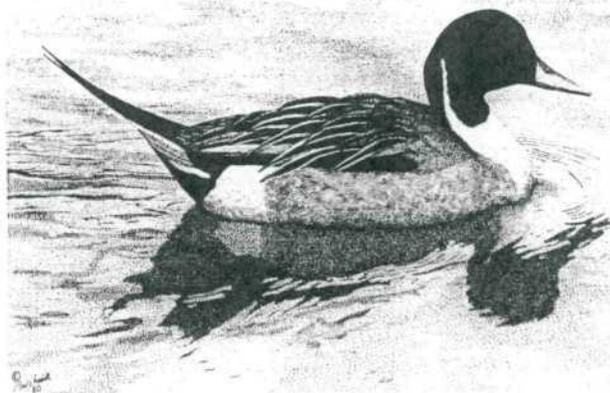


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