

Unexpected Centers of Winter Landbird Density During the 101st CBC

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Introduction

What do Dismal Swamp, VA, Belleplain, NJ, and Block Island, RI have in common? Their CBC circles hosted the greatest densities (individuals/party-hour) of Hermit Thrushes (*Catharus guttatus*) in North America during the 101st Christmas Bird Count. Examination of the BirdSource database revealed that these three counts also ranked highly among all CBCs for several other eastern North American landbird species, including Gray Catbird (*Dumetella carolinensis*), Yellow-rumped (Myrtle) Warbler (*Dendroica c. coronata*), and White-throated Sparrow (*Zonotrichia albicollis*). Furthermore, several other count circles were conspicuous among the leaders for multiple species (e.g., Lake Village, AR and Tensas River N.W.R., LA). Given that all of the species named above are relatively widespread, and that 1,880 CBCs were conducted across the USA and Canada, it seemed noteworthy that a few count circles could produce the highest densities for multiple species.

Previous research has already demonstrated that Hermit Thrushes, Gray Catbirds, and several other species whose primary winter distributions lie well to the south of New England are capable of overwintering on Block Island with success comparable to that of the most numerous species wintering there (Mitra and Raithe 2001). With that knowledge in mind, it struck me as significant that preliminary results from the 101st CBC seemed to imply that some of these species were present at unexpectedly high *absolute* winter densities there as well. These observations motivated the present study, in which I have attempted to identify general patterns in the distributions of landbirds wintering in the thickets of southeastern North America.

In general, one might expect that the highest densities of the most abundant and widespread species should be concentrated in the southernmost states, with some bias toward the Atlantic and Gulf coasts. Nevertheless, some exceptions leap to mind. For instance, it has become obvious in recent years that a number of Neotropical migrants whose “normal” winter distributions lie wholly south of the United States are encountered regularly on North American CBCs. Astonishingly, several of these CBC novelties (e.g., Yellow-breasted Chat [*Icteria virens*], Baltimore Oriole [*Icterus galbula*], and Dickcissel [*Spiza americana*]) are no more likely to be encountered in South Florida — or anywhere else in the southern USA — than in the coastal thickets of New England and the Canadian Maritimes.

To what extent are these well-known examples really exceptional? Is it possible that similar eccentric trends characterize populations of other, more numerous species wintering in eastern North American thickets? Here I describe an index that can be used to compare the densities of a set of selected species across all CBC circles. Using this index, which objectively quantifies differences among count circles, I have

attempted to identify composite centers of abundance for ten species wintering in eastern North American thickets, to interpret the spatial distribution of these hot spots, and to assess patterns of co-occurrence among species across southeastern North America.

Methods

The analysis was based on ten thicket-dwelling landbird species with extensive winter distributions in southeastern North America: Carolina Wren (*Thryothorus ludovicianus*), Hermit Thrush, Gray Catbird, Northern Mockingbird (*Mimus polyglottos*), Myrtle Warbler, Eastern Towhee (*Pipilo erythrophthalmus*), Song Sparrow (*Melospiza melodia*), Swamp Sparrow (*M. georgiana*), White-throated Sparrow, and Northern Cardinal (*Cardinalis cardinalis*). For each species, I extracted from BirdSource the top 100 CBC densities for the 101st count period, and then compiled a matrix of count circles versus species, with density ranks as the cell values. A total of 492 CBCs appeared on at least one top-100 list. Wherever one of these CBCs ranked below the top-100 for a particular species, it was assigned a dummy rank of 101st. Thus I was able to compute an average rank for each CBC across the ten focal species.

Thus computed, the average ranks tended to be higher for counts with high ranks (e.g., 1-20) for a few species than for counts with lower ranks (e.g., 80-100) for many species—an unintended and undesirable consequence of choosing 101 as the dummy value. Substituting larger dummy ranks (e.g., 200 or 500, instead of 101) tended to relieve this bias, but left open the question of which arbitrary value to select. I settled on a more objective method of addressing the bias associated with the original raw averages—namely dividing each count's average rank by the square root of the number of species for which that count ranked in the top 100 (Figure 1). The resulting weighted index produced results very similar to those generated by the use of very large dummy ranks.

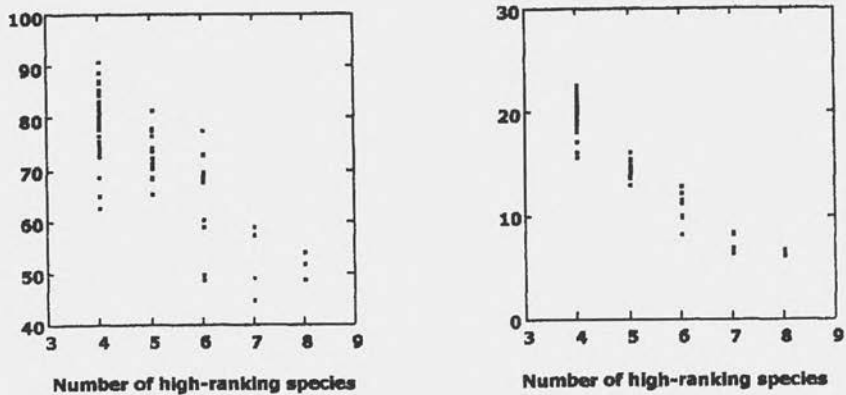


Figure 1. Unweighted average rank (left) and the weighted index (right) in relation to number of high-ranking focal species, across CBCs featuring at least four high-ranking species. Use of the weighted index tended to reduce instances in which counts featuring a few very high-ranking species outranked counts featuring many moderately high-ranking species (see text).

Table 1. Count circles with the highest density indices for ten species of birds wintering in eastern North American thickets, 101st CBC, Dec 2000-Jan 2001. Number of top-50 CBCs for each state in parentheses following the state's highest-ranking CBC.

	CBC Circle	Index¹	Avrank²	Spp³
1	Block Island, RI (2)	17.0	44.9	7
2	Lacassine N.W.R. - Thornwell, LA (5)	17.3	48.9	8
3	Wayne County, NC (6)	18.4	52.0	8
4	Lake Village, AR (5)	18.6	49.2	7
5	Crowley, LA	19.2	54.2	8
6	Dismal Swamp, VA (3)	20.0	48.9	6
7	Tensas River, N.W.R.	20.3	49.8	6
8	Chincoteague N.W.R., VA	21.7	57.4	7
9	Cape Charles, VA	22.4	59.2	7
10	Moon Lake (Lula), MS (4)	24.1	59.1	6
11	Southern Dorchester County, MD (2)	24.7	60.6	6
12	Macon, GA (3)	27.6	67.7	6
13	Southport-Bald Head-Oak Islands, NC	27.9	68.3	6
14	Tallahassee, FL (4)	28.2	69.1	6
15	Lafayette, LA	28.3	69.3	6
16	Mountain Home, AR	28.5	69.7	6
17	Buffalo National River (east), AR	29.3	65.6	5
18	McClellanville, SC (2)	29.9	73.2	6
19	Pee Dee N.W.R., NC	30.6	68.4	5
20	Wapanocca N.W.R., AR	30.7	68.7	5
21	Big Lake N.W.R., AR	31.5	62.9	4
22	Savannah River Site, SC	31.6	70.6	5
23	Columbia, TN (5)	31.8	71.0	5
24	Newport County-Westport, RI	31.8	77.9	6
25	Mingo N.W.R., MO (1)	31.9	71.3	5
26	Hiwassee, TN	32.0	71.5	5
27	Chapel Hill, NC	32.4	72.5	5
28	Tuckermuck Island, MA (1)	32.6	65.2	4
29	Memphis, TN	33.0	73.9	5
30	Eagle Lake, MS	33.3	74.4	5
31	Fayette County, TN	33.4	74.6	5
32	Lake Blackshear, GA	34.4	77.0	5
33	Horseshoe Lake, IL (2)	34.5	69.0	4
34	Arkabutia Lake, MS	34.8	77.9	5
35	Jackson County, IL (2)	34.9	78.0	5
36	Tenaha-Timpson, TX (2)	35.0	78.2	5
37	Piedmont N.W.R.-Rum Creek W.M.A., GA	36.5	73.0	4
38	Nashville, TN	36.5	81.7	5
39	Lake Placid, FL	36.8	73.5	4
40	Cedar Key, FL	36.8	73.6	4
41	Crisfield, MD	37.1	74.1	4
42	Ocracoke Island, NC	37.3	74.5	4
43	Raleigh, NC	37.4	74.7	4
44	Apalachicola Bay-St. Vincent N.W.R., FL	37.6	75.2	4
45	Brazos Bend, TX	37.7	75.3	4
46	Eufaula N.W.R., AL (1)	37.9	75.8	4
47	Southern Hancock County, MS	38.4	76.8	4
48	Reserve-Bonnet Carre Spillway, LA	39.0	78.0	4
49	Belleplain, NJ (1)	39.2	78.3	4
50	McDowell County, WV (1)	39.4	78.8	4

¹Index computed as Avrank divided by square root of Spp

²Avrank computed as the average of the count's ranks for the ten focal species (all ranks below 100 treated as 101; see text)

³Spp computed as the number of the ten focal species for which the reported density (birds per party-hour) ranked among the top 100 of all CBCs

The selection of species obviously had critical implications for the results. I deliberately excluded several mobile, flocking species (e.g., American Robin [*Turdus migratorius*] and Cedar Waxwing [*Bombycilla cedrorum*]) and several species very rare in winter north of NJ (e.g., Ruby-crowned Kinglet [*Regulus calendula*] and Common Yellowthroat [*Geothlypis trichas*]). I also excluded Fox Sparrow (*Passerella iliaca*) because this species appears in the BirdSource Database under a bewildering array of partially overlapping taxonomic groupings. Many other species were excluded on the basis of their preference for relatively open (or conversely, relatively wooded) habitats in portions of their winter ranges (e.g., Palm Warbler [*Dendroica palmarum*], Chipping Sparrow [*Spizella passerina*], Slate-colored Junco [*Junco h. hyemalis*]). Several other species might easily have been included, notably Brown Thrasher (*Toxostoma rufum*), Winter Wren (*Troglodytes troglodytes*), and Orange-crowned Warbler (*Vermivora celata*). It should be noted that adding extra species imposes a computational burden, because each additional species adds not only its own values to the matrix, but requires inclusion of all the CBCs unique to its top-100 list. In light of these considerations, I argue that the ten species chosen provided the best compromise between convenience and rigor.

Results

A total of 492 CBCs produced a high-ranking density (among the top 100 overall) for at least one of the ten species considered. Of these CBCs, 34 produced high-ranking densities for five or more species, and 255 produced such a density for just a single species. All of the 34 CBCs with high-ranking densities for five or more species, as well as the 39 CBCs with the highest unweighted average ranks, were among the 50 CBCs with the highest overall indexes (Table 1). The highest index was that of Block Island, RI (17.0), followed by Lacassine NWR-Thornwell, LA (17.3) and Wayne County, NC (18.4). The most striking feature of the highest-ranking CBCs is their geographic dispersion. Rather than clustering in the extreme southeastern USA or the lower Mississippi River Valley (MRV), the 50 highest-ranking circles were distributed among 18 states, extending as far north in the Mississippi and Ohio River valleys as Horseshoe Lake, IL, and McDowell Co., WV, and as far north on the Atlantic Ocean coast as Newport County-Westport, RI/MA, and Tuckernuck Island, MA — in other words, around much of the low-elevation periphery of the eastern USA (Table 1).

The ten species analyzed were all widespread, appearing on 335 (Gray Catbird) to 1464 (Song Sparrow) of 1880 CBCs conducted in the USA and Canada (Table 2). As might be expected, their absolute densities (over each species' top 100 CBCs) varied a great deal: 0.6 individuals per party-hour for Gray Catbird to 21.0 for Myrtle Warbler. The ten species also varied strikingly in their geographical associations with one another. For instance, among the top 100 Northern Cardinal CBC densities, 45 were recorded on counts lacking top 100 densities for any of the nine other species. This was largely a consequence of Northern Cardinal's unusual (among the species considered here) center of abundance around the southern Great Lakes and upper MRV (i.e., around the states of IA, WI, IL, IN, and OH). Similarly, Song Sparrow was the only high-ranking focal species on 39 of its 100 counts. In this case, the lack of

Table 2. Summary of CBC data for ten species of birds wintering in eastern North American thickets, 2000-2001

Species	CBCs reporting species	Approximate focus of CBCs with highest densities	Average density ¹	CBCs where ²
Carolina Wren	823	None	1.7	17
Hermit Thrush	862	None	0.9	28
Gray Catbird	335	Florida	0.6	28
Northern Mockingbird	981	Texas/Lower MRV	2.5	36
Myrtle Warbler	810	Coastal, MA-LA	21.0	12
Eastern Towhee	564	None	1.1	15
Song Sparrow	1464	MRV ³	6.9	39
Swamp Sparrow	738	MRV	3.0	7
White-throated Sparrow	1063	None	10.9	28
Northern Cardinal	1190	S. Great Lakes-MRV	9.7	45

¹Average density (birds per party-hour) across each species' top 100 CBCs

²Number of CBCs for which this was the only top-100 ranking species

³Also Pacific coast, BC-CA

association with other species was a direct consequence of this species' abundance in other parts of North America — notably along the Pacific coast, from BC to CA. In contrast, all but seven of the top 100 Swamp Sparrow densities were recorded on counts featuring high densities for at least one other focal species, as were all but twelve of Myrtle Warbler's top 100 densities. These latter two species were obviously concentrated in regions featuring generally high densities of the other thicket-dwelling species — the lower MRV for Swamp Sparrow, and coastal thickets (albeit from MA to LA) for Myrtle Warbler. Overlap between pairs of species averaged 22.9 shared counts across the 45 pairwise comparisons and varied from just three counts shared between Gray Catbird and Northern Cardinal to 55 counts shared between Gray Catbird and Myrtle Warbler (Table 3).

Table 3. Number of CBCs in which both members of a pair of species appeared at high density (among the top 100 CBCs for each species) on the 101st CBC. See text for full species names.

	HETH	GRCA	NOMO	MYWA	EATO	SWSP	SOSP	WTSP	NOCA
CARW	35	11	22	18	40	34	22	38	26
HETH		16	14	24	27	40	24	31	18
GRCA			16	55	21	38	8	9	3
NOMO				18	18	16	6	15	25
MYWA					29	43	14	13	5
EATO						33	22	21	12
SWSP							38	29	18
SOSP								27	14
WTSP									26

Yellow-breasted Chats provided evidence that seasonal vagrancy does not always decrease in frequency as one moves away from a distributional center. This species, which typically winters deep in the Neotropics, exhibited a North American (USA and Canada) CBC locus in southern New England — appearing on eight counts in MA and three in RI. Indeed, more than half (23/40) of all USA and Canadian CBCs reporting Yellow-breasted Chats 2000-2001 were in the Northeast, between New Jersey and Newfoundland (Table 4).

Table 4. North American CBCs (USA and Canada) Reporting Yellow-breasted Chat during the 101st CBC, by state or province.

State or Province	CBCs with YBCH	Total CBCs (100th CBC)
Newfoundland	1	10
Nova Scotia	2	14
Maine	2	23
Massachusetts	8	32
Rhode Island	3	3
New York	3	67
New Jersey	4	27
Delaware	2	6
Maryland	1	23
Virginia	3	39
North Carolina	3	42
South Carolina	1	16
Florida	3	60
Alabama	1	11
Texas	2	86
California	1	112
All CBCs (USA and Canada)	40	1880

Discussion

The densities of thicket-dwelling landbirds might vary among CBC circles as a consequence of many factors: climate, food availability, habitat integrity, and nuances of count methodology. In view of these, Block Island might seem an unlikely focus of southeastern North American winter bird populations. After all, it is relatively far north (41° 14' N), exposed to winter storms, small (ca. 10 square miles), and experiencing rapid residential development. Range maps published in several popular North American field guides (Peterson 1980, National Geographic Society 1999, Sibley 2000) depict Block Island near or beyond the northern winter limits of six of the species considered here (Carolina Wren, Hermit Thrush, Gray Catbird, Myrtle Warbler, Eastern Towhee, and Swamp Sparrow), and they place the island well to the north of the centers of the winter distributions for the remaining four species (Northern Mockingbird, Song Sparrow, White-throated Sparrow, and Northern Cardinal).

Even so, its thickets yielded high-ranking densities for five of the six species ostensibly wintering entirely or almost entirely to its south, and for two of the other four species: Carolina Wren (1st), Hermit Thrush (3rd), Song Sparrow (12th), White-throated Sparrow (15th), Gray Catbird (17th), Myrtle Warbler (22nd), and Eastern Towhee (76th). Furthermore, the Block Island CBC's Yellow-breasted Chat was detected with just 37.5 party-hours of effort, producing a density value exceeded in the USA and Canada only by two Cape Cod CBCs.

The possibility exists that the high densities recorded on Block Island and other highly ranked CBCs might have been methodological artifacts. Individual results must certainly be affected by variation in weather conditions on count day, and by variation among individual participants, compilers, and editors in the techniques and priority accorded to the admittedly mundane species in question. It is almost certainly true that a combination of favorable conditions on count day, local concentrations of feeders,


use of screech-owl tapes, and other factors unrelated to broad-scale density helped to raise the landbird indexes of some of the count circles listed in Table 1. Nevertheless, the high-ranking counts collectively produced a well-defined — although unexpected — pattern, and it is difficult to conceive how this pattern, in a dataset comprising almost 2000 counts conducted throughout an entire continent over a three week period, could be wholly spurious.

A more general source of concern involves that chronic obstacle to CBC comparability — variation among CBCs in the overall amount of effort employed. The Block Island and Tuckernuck Island CBCs — and several other highly ranked counts, such as Wayne County, NC, Lake Village, AR, and Moon Lake-Lula, MS — employed relatively small numbers of observers. My own personal experience on the Block Island CBC involved covering a large amount of productive habitat relatively rapidly, thereby accumulating relatively high counts per unit time. Observers on CBCs with greater numbers of participants might have tended to work smaller areas at greater leisure, resulting in depressed counts per unit time. This sort of bias is the unavoidable trade-off that arises when CBC tallies are adjusted by dividing them by party-hours, and it undoubtedly influenced many of the results reported herein. Even so, most of the highest index values were produced by CBCs with >20 observers and >80 party-hours (e.g., Lacassine N.W.R.-Thornwell, LA, Crowley, LA, Dismal Swamp, VA, Chincoteague N.W.R., VA, Cape Charles, VA, and Southern Dorchester County, MD). Indeed, the most northerly of the top 50 CBCs was Newport County-Westport, RI/MA (ranked 24th overall) — a popular count which received 86.5 party-hours last year. Thus the overall pattern of geographic dispersion observed among the full set of CBCs was equally evident among counts featuring intense coverage. Thus it seems reasonable to conclude that the effort-corrected data employed herein represent the best single approach to the actual densities in question.

If one accepts these caveats, then one conclusion is inescapable: the Yellow-breasted Chat is not unique. The most interesting aspect of the present study is that neither the extralimital chat nor the core wintering species conform to the expectation that winter density should diminish in a regular manner as one moves farther from a distributional center. Even widespread North American winter species echo the chat's eccentric pattern by wintering at relatively high densities at sites distant from the geographical centers of their winter ranges. Collectively, the ten species considered here underscore this pattern: rather than clustering in one or two central areas, CBCs recording unusually high composite densities were distributed around much of the periphery of the ten species' collective winter range.

With respect to Block Island, it is worth noting that several of the species considered here (Carolina Wren, Northern Mockingbird, and Northern Cardinal) were virtually or entirely absent prior to the 1960s. Carolina Wren's rapid proliferation on Block Island, from its first CBC appearance in 1975 to its present abundance, is a striking demonstration of the mutability of the distribution of bird populations. This same process is currently unfolding on Nantucket Island where Carolina Wren was a boldfaced (i.e., very unusual) CBC species as recently as 1990. Similar, incipient expansions might be underway for Fish Crow (*Corvus ossifragus*, which has recently

colonized Block Island, appears to be rapidly increasing there, but has yet to be recorded on Nantucket), and Tufted Titmouse (*Baeolophus bicolor*, which has been recorded twice in recent years on Block Island).

Thus it appears that continent-scale range maps are not adequate to convey the details of many species' winter distributions. This may seem obvious, but the degree to which the centers of abundance reported here departed from expectations was striking and unexpected. Perhaps more significantly, these patterns imply that an overreliance on spatially central population centers in the course of conservation planning could potentially compromise major population foci far from such centers. Indeed, who could have foretold twenty-five years ago that southeastern New England's thickets would feature several of North America's densest concentrations of winter landbirds, or that Block Island would come to host the planet's highest density of Carolina Wrens? 

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