# Evidence of post-migratory movements among landbirds wintering on Block Island, Rhode Island 2000-2001

## *Winter movements of landbirds*

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### Abstract

C B C -style counts conducted on Block Island, Rhode Island (B. I.) in November, December, and February (2000-2001) provided evidence of facultative, post-migratory movements among 12 or more species of thicket-dwelling landbirds. As predicted, species that increased in density on B. I. between November and December were composed disproportionately of half-hardy species, for which southern New England is at or near the northern limit of normal winter distributions, and for which stereotyped southbound migration is typically expected to have been completed well before mid-November. In contrast, several true late-fall migrants (the species most likely to continue stereotyped migration November-December) occurred at highest density in November and were essentially absent by February (or even December). Finally, the most numerous winter residents of B. I.'s thickets typically occurred at relatively stable densities in November and December and at somewhat lower densities in February.

These results support the existence of a natural distinction between late migrants and half-hardy wintering species in northeastern North America, mitigate concerns that the early-winter timing of C.B.C.s exposes them to the widespread presence of lingering southbound migrants in northeastern North America, and cast doubt on the popular assumption that the diminution of half-hardy species from mid- to late winter must reflect mortality rather than post-migratory dispersal.

### Introduction

The extent to which migratory landbirds undertake major facultative movements outside of typical migratory periods is poorly known (Gauthreaux 1982), and such movements have seldom been documented (e g , Niles et al. 1969, Terrill and Crawford 1988). These movements, which could result in winter population declines among birds near the northern limits of their winter ranges, might easily be mistaken for mortality and therefore overlooked. For instance, many species accounts in regional ornithological summaries (e.g., Bull 1964, Beardslee and Mitchell 1965, Veit and Petersen 1993, Levine 1998, Walsh et al. 1999) ascribe mid-winter diminution to mortality with little or no supporting evidence—even as they occasionally acknowledge the equally undocumented possibility of facultative withdrawals.

Southern New England is at or close to the northern limits of the normal winter distributions for many species of medium- and long-distance migrants (National Geographic Society 1999). Annual variation in the numbers of such species have long been of interest to ornithologists and birders in the region, and questions regarding their true winter status—particularly the desire to distinguish between post-migratory movements and mortality as agents of winter population changes—were the focus of Mitra and Raithel's (2001) analysis of population trends among landbirds wintering on B. I.

Curiously, that study revealed that mid-winter declines among several "half-hardy" species on B. I. were no greater than those of several more numerous and characteristic wintering species. Furthermore, comparisons with other C.B.C.s across North America revealed unexpectedly high absolute winter densities of several half-hardy landbirds on B I and in other coastal thickets in southern New England (Mitra 2002) One possible explanation for these surprising patterns is that coastal populations of half-hardy species might be augmented under some circumstances by individuals dispersing from the New England interior, long after normal southbound migration has ceased. The present paper represents an effort to derive predictions concerning patterns of post-migratory dispersal from Mitra and Raithel's (2001) results and to test these predictions with data gathered on B. I. during the winter of 2000-2001.

### Methods

C.B.C.-style counts were conducted on Block Island on 13 November 2000, 21 December 2000, and 19 February 2001 (100 observers, cf Acknowledgments). Although all species of birds were counted, the present analysis focuses on a subset of the landbird species—namely, those passerines that characteristically inhabit thickets during the winter (see Table 1). All raw counts were adjusted for effort by dividing them by the total number of party-miles on foot (foot-miles) employed on the count in question (36.5, 29, and 42 foot-miles in November, December, and February, respectively). Standardized densities and population trends from November to December and from December to February were calculated for each species by dividing effort-adjusted densities for November and February by the December density value.

As described in detail in Mitra and Raithel (2001), B. I.'s geographical setting facilitates the study of landbirds' winter population dynamics in several ways. The absence or near-absence of breeding populations for many species enhances detection of individuals arriving via migration or

**Table 1. Winter densities of thicket-dwelling landbirds on Block Island, Rhode Island (2000-2001).**

| Species | Raw Counts | | | Densities (inds./foot-mile) | | | Std. Dens. (prop. December dens.) | | Stat[1] | Traj[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nov | Dec | Feb | Nov | Dec | Feb | Nov | Feb | | |
| Black-capped Chickadee | 106 | 117 | 120 | 2.90 | 4.03 | 2.86 | 0.72 | 0.71 | WR | A |
| Carolina Wren | 173 | 140 | 108 | 4.74 | 4.83 | 2.57 | 0.98 | 0.53 | WR | B |
| Winter Wren | 2 | 4 | 0 | 0.05 | 0.14 | 0.00 | 0.40 | 0.00 | HH | A |
| Marsh Wren | 1 | 2 | 0 | 0.03 | 0.07 | 0.00 | 0.40 | 0.00 | H | A |
| Golden-crowned Kinglet | 35 | 23 | 0 | 0.96 | 0.79 | 0.00 | 1.21 | 0.00 | LMN | B |
| Ruby-crowned Kinglet | 11 | 6 | 1 | 030 | 0.21 | .02 | 1.46 | 0.12 | LMS | D |
| Hermit Thrush | 31 | 80 | 24 | 0.85 | 2.76 | 0.57 | 0.31 | 0.21 | HH | A |
| Gray Catbird | 40 | 38 | 19 | 1.10 | 1.31 | 0.45 | 0.84 | 0.35 | HH | B |
| Northern Mockingbird | 39 | 30 | 28 | 1.07 | 1.03 | 0.67 | 1.03 | 0.64 | WR | B |
| Brown Thrasher | 9 | 4 | 2 | 0.25 | 0.14 | 0.05 | 1.79 | 0.35 | HH | D |
| Orange-crowned Warbler | 0 | 2 | 0 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | HH | A |
| Yellow-rumped Warbler | 726 | 865 | 787 | 19.9 | 29.8 | 18.7 | 0.67 | 0.63 | WR | A |
| Pine Warbler | 6 | 0 | 0 | 0.16 | 0.00 | 0.00 | NA | NA | LM | D |
| Palm Warbler | 32 | 2 | 0 | 0.88 | 0.07 | 0.00 | 12.7 | 0.00 | LM | D |
| Common Yellowthroat | 2 | 3 | 0 | 0.05 | 0.10 | 0.00 | 0.53 | 0.00 | HH | A |
| Yellow-breasted Chat | 1 | 1 | 0 | 0.03 | 0.03 | 0.00 | 0.79 | 0.00 | HH | A |
| Eastern Towhee | 21 | 29 | 8 | 0.58 | 1.00 | 0.19 | 0.58 | 0.19 | HH | A |
| American Tree Sparrow | 4 | 1 | 1 | 0.11 | 0.03 | 0.02 | 3.18 | 0.69 | WR | D |
| Chipping Sparrow | 29 | 0 | 0 | 0.79 | 0.00 | 0.00 | NA | NA | LM | D |
| Field Sparrow | 2 | 1 | 0 | 0.05 | 0.03 | 0.00 | 1.59 | 0.00 | WR | D |
| Fox Sparrow | 4 | 18 | 10 | 0.11 | 0.62 | 0.24 | 0.18 | 0.38 | HH | A |
| Song Sparrow | 434 | 377 | 232 | 11.9 | 13.0 | 5.52 | 0.91 | 0.42 | WR | B |
| Swamp Sparrow | 36 | 15 | 12 | 0.99 | 0.52 | 0.29 | 1.91 | 0.55 | HH | D |
| White-throated Sparrow | 577 | 514 | 361 | 15.8 | 17.7 | 8.60 | 0.89 | 0.48 | WR | B |
| White-crowned Sparrow | 1 | 1 | 0 | 0.03 | 0.03 | 0.00 | 0.79 | 0.00 | HH | A |
| Dark-eyed Junco | 231 | 91 | 39 | 6.33 | 3.14 | 0.93 | 2.02 | 0.30 | LMN | D |
| Northern Cardinal | 57 | 76 | 72 | 1.56 | 2.62 | 1.71 | 0.60 | 0.65 | WR | A |
| Purple Finch | 6 | 0 | 0 | 0.16 | 0.00 | 0.00 | NA | NA | LMN | D |
| House Finch | 56 | 50 | 85 | 1.53 | 1.72 | 2.02 | 0.89 | 1.17 | WR | C |
| American Goldfinch | 32 | 22 | 13 | 0.88 | 0.76 | 0.31 | 1.16 | 0.41 | LMN | B |

[1] Winter status on Block Island; see text for explanation of codes. [2] Population trajectory 2000-2001; see text for explanation of codes.

dispersal. The eight-mile water barrier is large enough to inhibit stochastic density changes arising from local movements, but it is small enough for most species to cross via directed movements. Finally, its location south of the New England mainland, its maritime climate, and its dense thickets rich in fruiting shrubs—e.g., Bayberry (*Myrica pensylvanica*), Chokeberry (*Aronia arbutifolia*), Winterberry (*Ilex verticillata*), and roses (*Rosa* spp.)—appear to present an attractive refuge to species only marginally adapted to the winter environment of the New England interior.

Counts of Carolina Wrens on B. I. provide a useful standard of comparison for other species, as this species is abundant and widespread throughout the island; it is extremely sedentary, so that changes in its density outside of the breeding season are unlikely to reflect any factor other than mortality; and it is known to be relatively intolerant of severe winter weather in the region (Veit and Petersen 1993, R. Ferren in litt.) We used these properties and the species' observed density trajectory during the winter of 2000-2001 (stasis November-December followed by decrease December-February) to conclude that this winter was not particularly severe for the species (had it been so, Carolina Wren density should have decreased November-December).

## Definitions of population trajectories

Changes in density of >25% between successive counts were considered qualitatively meaningful, whereas those <25% were considered to reflect relative stasis. Twenty-four species of thicket-dwelling birds exhibited four qualitative types of trajectories on B. I. over the period November-December-February 2000-2001: increase/decrease (A), stasis/decrease (B), stasis/stasis (C), and decrease/decrease (D). For simplicity, species occurring in moderate numbers (>5 individuals) in November, but completely absent thereafter, were regarded as showing a Type D Trajectory.

## Classification of species by winter status on B. I.

Winter status categories on B. I. were derived in part from those inferred by Mitra and Raithel (2001), and in part to facilitate testing of predictions concerning winter population trajectories. Each species was assigned to one of the following categories: late migrant, normally wintering south of southern New England (LMS); late migrant, normally wintering in southern New England (LMN); half-hardy winter resident likely to have completed southbound migration by mid-November (HH); characteristic winter resident, including sedentary species and migratory species likely to have completed southbound migration by mid-November (WR).

Although Orange-crowned Warbler and Common Yellowthroat were previously identified as likely late migrants/lingerers (Mitra and Raithel 2001), both popular perception and an increasing body of local data (Mitra, unpubl. banding data) support the notion that Orange-crowned Warbler and Common Yellowthroat are half-hardy wintering species rather than late migrants in southern New England. The LMN category is intended to accommodate such winter residents as Golden-crowned Kinglet, American Tree Sparrow, Dark-eyed (Slate-colored) Junco, and American Goldfinch, whose normal southbound migrations in our region continue through November (Veit and Petersen 1993).

## Predictions

Based on a priori considerations, previous results (Mitra and Raithel 2001, Mitra 2002), and the Carolina Wren data, the following predictions were tested:

1) Trajectory A (increase/decrease) reflects arrival of numerous individuals between mid-November and mid-December, either by stereotyped migration or by facultative dispersal. If the former can be excluded, this trajectory is strongly indicative of the latter. We reasoned that even the latest migrants in our area (among the thicket-dwelling species under consideration) were likely to have peaked by 13 November, and that the type A trajectory was more likely a consequence of facultative movements. Therefore, we predicted that, in a mild or normal season, such as 2000-2001, Type A was more likely to characterize half-hardy winter residents (HH) than late migrants (LMS, LMN) or hardier winter residents (WR).

2) Trajectory B (stasis/decrease) is generally equivocal with regard to post-migratory movements. For most species (especially in mild or normal winters, such as 2000-2001), it probably reflects genuine stasis (no significant immigration, emigration, or mortality) November-December, followed by mortality and/or post-migratory withdrawal December-February. Thus we predicted it would characterize B. I.'s most numerous and characteristic winter residents—both migratory and sedentary (WR).

3) Trajectory C (stasis/stasis) is generally equivocal with respect to post-migratory movements, but in mild or normal seasons such as 2000-2001, this trajectory was predicted to characterize B. I.'s hardiest winter residents (WR).

4) Trajectory D (decrease/decrease) is generally equivocal with respect to post-migratory movements. In general, this would appear to be the most likely trajectory for late migrants bound for wintering areas well to the south of B. I. (LMS). Such species might still be present in moderate to large numbers during November but are expected to decrease abruptly thereafter (even to the point of complete absence by December—e.g., Chipping Sparrow). Late migrants wintering farther north (LMN) are also likely to occur in large numbers on B. I. during November (as passage migrants and winter residents). These might be expected to occur in somewhat smaller numbers thereafter, following the departure of passage migrants. Given this, and the fact that virtually all species tend to decline on B. I. from December to February (Mitra and Raithel 2001), LMN species were also predicted to exhibit type D trajectories.

## Results

Perhaps the most striking trend on the B. I. winter counts of 2000-2001 was the abundance of half-hardies during the December C.B.C. (Table 1). Densities of Hermit Thrush, Gray Catbird, and Eastern Towhee were among the highest for all of North American C.B.C.s (Mitra 2002). Among half-hardy species, December densities consistently exceeded their respective November values, implying that many individuals of these species, which by definition generally winter south of southern New England, arrived on B. I. between November and December. Without exception, all species increasing November-December decreased December-February (Type A; see Fig. 1).

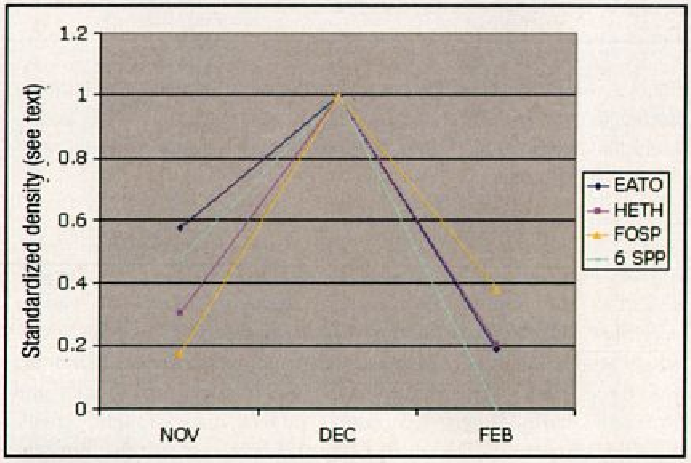


Figure 1. Standardized winter population trends (2000-2001) for nine half-hardy species suspected of undertaking facultative movements to Block Island November-December. The first three species are Eastern Towhee (EATO), Hermit Thrush (HETH), and Fox Sparrow (FOSP). The "6 spp." refers to pooled trends for Winter Wren, Marsh Wren, Orange-crowned Warbler, Common Yellowthroat, Yellow-breasted Chat, and White-crowned Sparrow.

Several of the most numerous and characteristic winter residents of B. I.'s thickets (e.g., Carolina Wren, Northern Mockingbird, Song Sparrow, and White-throated Sparrow) showed stable densities (or perhaps slight increases, in the cases of the two sparrows) from November-December, followed by ca. 50% decreases from December-February (Type B; see Fig. 2). The only species showing a Type C trajectory was, as predicted, a very hardy species: House Finch.

In view of historical patterns of occurrence (Conway 1992) and previous results (Mitra and Raithel 2001), two birds detected 2000-2001 stand out as seasonal vagrants: Yellow-throated Warbler and Baltimore Oriole on the November count. These were not classified by trajectory or winter status. As predicted, really late migrants tended to exhibit type D, rather than type A, trajectories: Ruby-crowned Kinglet, Palm Warbler, Pine Warbler, and Chipping Sparrow (LMS); and American Tree Sparrow, Dark-eyed Junco, and Purple Finch (LMN). Species classified

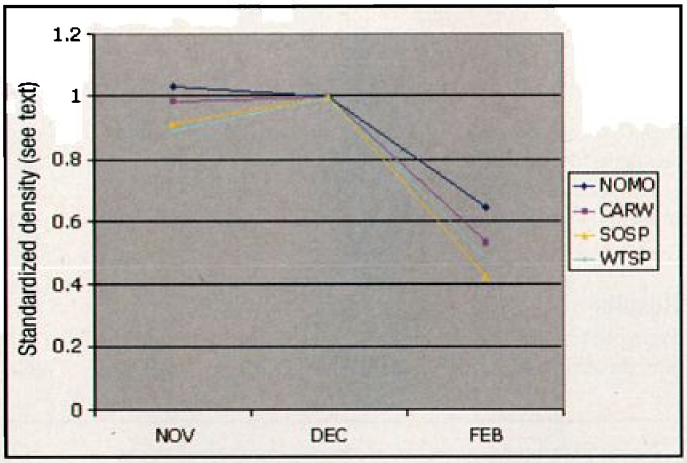


Figure 2. Standardized winter population trends (2000-2001) for Northern Mockingbird (NOMO), Carolina Wren (CARW), Song Sparrow (SOSP), and White-throated Sparrow (WTSP), landbirds regarded as typical winter residents on Block Island.

as LMS were invariably recorded in moderate to large numbers in November and were absent (or nearly so) by February—or even by December. Purple Finch, although regular in mid-winter on the mainland, resembled these species in its occurrence on B. I. Trajectories of the two other species classified as LMN (Golden-crowned Kinglet and American Goldfinch) were technically type B by virtue of slightly smaller declines November-December (21% and 16%, respectively), but otherwise qualitatively resembled the predicted type D trajectories of other late migrants.

## Discussion

In general, results supported predictions very closely. This concordance is especially meaningful given the vagaries of sampling error, the coarseness of our definition of stasis (up to 25% change between counts), and some inevitable arbitrariness in our classification of various species as late migrants, half-hardies, and the like. Systematic detection biases were unlikely to have produced this concordance spuriously because we predicted—and observed—increases for some species and decreases for others on the same days, under the same circumstances of weather, effort, skill, and technique. Although some might question the study's inclusion of certain species (e.g., Marsh Wren, Winter Wren, Orange-crowned Warbler, Common Yellowthroat, Yellow-breasted Chat, and White-crowned Sparrow) whose very small sample sizes were vulnerable to accidents of sampling, collectively such species provided useful qualitative information that would have been lost had they been ignored or obscured had they been pooled together a priori.

Furthermore, trajectories other than A-D were perfectly possible, and the fact that they were not observed during the winter of 2000-2001 deserves mention. For instance, trends such as [increase/increase], [increase/stasis], or [stasis/increase]—none of which characterized any of the species under consideration in 2000-2001—might be more likely during particularly severe winters among hardy species, such as Song and White-throated Sparrows, if these were able to make successive post-migratory movements to escape deteriorating conditions in the New England interior.

In interpreting these results, it is important to draw a distinction between those representing rigorous deductive inference and those representing an extension and refinement of the descriptive explorations of Mitra and Raithel (2001). In the first category, the coincident, large-scale increases observed November-December across a dozen species of thicket-dwelling landbirds—and their predicted correlation with New England half-hardiness—represent real evidence of post-migratory dispersal by these species over a considerable water barrier. With the possible exception of Fox Sparrow, none of these species is expected to be continuing stereotyped migration after 13 November on any kind of scale adequate to produce the increased densities we observed. Likewise, the preponderance of type D trajectories among really late migrants, including the near-absence of category LMS by December, strongly implies that, at least for thicket-dwelling landbirds, birds detected on northeastern North American C.B.C.s are more likely attempting to winter than actually migrating. In the second category, the details of the classification of various species in Table 2—and the degree to which these details matched our predictions—ought not to be interpreted dogmatically but rather should be refined a posteriori to reflect more accurately the local situation on Block Island.

For instance, Gray Catbird could be regarded as an expected winter resident on B. I. on the basis of previously published results—in which case, it would have fallen in line with predictions in 2000-2001. Alternatively, even considered as a half-hardy species, it came close to meeting our criterion for a Type A trajectory (as predicted) but fell just short because its increase from November-December (19%) was not quite large enough. Similarly, the decreases November-December of both Golden-crowned Kinglet and American Goldfinch fell just a few points short of 25% and the predicted type D trajectory.

One surprising result is particularly interesting in view of previous results: Northern Cardinal's increase in density from November-December. This assumedly relatively sedentary species might appear unlikely to move in large numbers across miles of water during late fall/early winter—but such a pattern was precisely what we inferred in

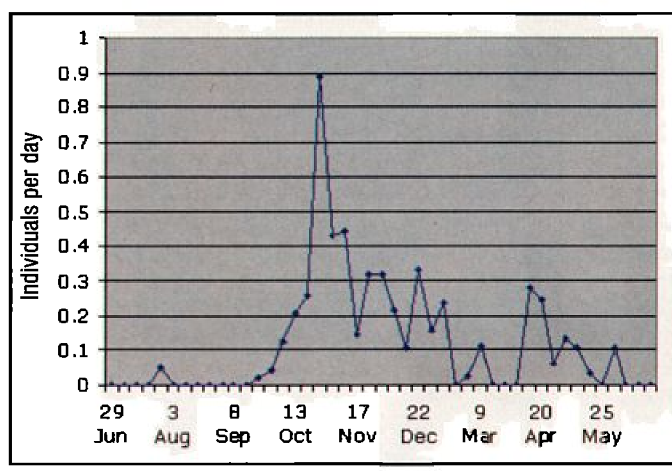


Figure 3. Seasonal occurrence of Northern Cardinals at Napatree Point, Rhode Island, 1982-2001 (weekly means of daily counts).

several previous seasons (Mitra and Raithel 2001), and it was supported again by this year's (2000) data. Furthermore, Raithel's (unpubl.) systematic observations (1982-present) at Napatree Pt. (a barrier beach on the Rhode Island mainland, where Northern Cardinals do not breed) clearly show secondary fall peaks November-January, several weeks after the primary peak of coastal movement around 1 November (Fig. 3). The timing of these secondary peaks varies from year to year, obscuring the mode in the pooled sample, but such modes are evident in most individual years.

The results of the present study underscore several important conclusions concerning the status of landbird species wintering in northeastern

**Table 2. Population trajectories of thicket-dwelling landbirds on Block Island 2000-2001, classified by their winter status there (Mitra and Raithel 2001). Boldfaced type indicates agreement between predicted and observed status categories for each observed trajectory.**

| Species classification | Trajectories, with predicted species compositions in 2000-2001<br>A (incr./decr.)<br>Pred.: HH | B (stas./decr.)<br>Pred.: WR | C (stas./stas.)<br>Pred.: WR | D (decr./decr.)<br>Pred.: LMS, LMN |
|---|---|---|---|---|
| Late migrants wintering south of New England (LMS) | | | | **Ruby-crowned Kinglet**<br>**Palm Warbler**<br>**Pine Warbler**<br>**Chipping Sparrow** |
| Late migrants wintering New England (LMN) | | Golden-crowned Kinglet<br>American Goldfinch | | **American Tree Sparrow**<br>**Dark-eyed Junco**<br>**Purple Finch** |
| Half-hardies (HH) | **Winter Wren**<br>**Marsh Wren**<br>**Hermit Thrush**<br>**Orange-crowned Warbler**<br>**Common Yellowthroat**<br>**Yellow-breasted Chat**<br>**Eastern Towhee**<br>**Fox Sparrow**<br>**White-crowned Sparrow** | Gray Catbird[a] | | Brown Thrasher<br>Swamp Sparrow |
| Winter Residents (WR) | Black-capped Chickdee<br>Yellow-rumped Warbler<br>Northern Cardinal | **Carolina Wren**<br>**Northern Mockingbird**<br>**White-throated Sparrow**<br>**Song Sparrow** | **House Finch** | Field Sparrow |

[a] Species could be regarded as WR on B. I., which would strengthen agreement of results with predictions.

North America. Most importantly, it is clear that the presence of such species as Hermit Thrush, Gray Catbird, Brown Thrasher, and Eastern Towhee on New England C.B.C.s is in no way an indication that the C.B.C.'s early winter timing exposes it to "lingering migrants." Indeed, application of our simple methodology should easily distinguish between actual late migrant species and what might be termed "true" half-hardy wintering species in any given region. This result is important not only because it supports the notion of a natural distinction between these two classes of unusual C.B.C. birds but also because it further mitigates concerns that the C.B.C.'s early timing compromises its value as a barometer of mid-winter bird populations (Peterjohn 2000). Furthermore, the evidence presented here in support of facultative winter movements—of half-hardies in particular, but of other species as well—implies that such movements must be considered a likely alternative to mortality as the cause of mid-late winter population decreases among some landbird species.

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