Timing of Fall Migration in Six Species of Passerines in Northwestern New Jersey

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ABSTRACT

Migratory passerines were captured to see if there were any significant differences in migratory timing of males versus females or hatching year versus adult individuals in various species of birds during fall migration. Out of the six species of passerines that were caught in large numbers, no significant differences in migratory timing were evident.

INTRODUCTION

There is much literature on spring migratory timing of passerines to their breeding grounds compared to age and sex classes. However, literature on fall migratory timing to wintering grounds is early. The objective of this study is to determine if fall migratory timing of several species of passerines native to New Jersey was related to age or sex.

METHODS

All data were collected at Raccoon Ridge Bird Observatory banding station (41°12'43.62"N, 74°47'59.49"W) in Sandyston, NJ, between the dates of 2 Aug and 11 Nov 2007. The study area consisted of shrubby woodland interspersed with man-made fields and sections of deciduous woods. The area frequently floods and much of the grounds is swampy.

Fifteen 12-m nylon mist nests were used to capture migrating passerines in swamp (four nets), woodland (six nets), and field (five nets) habitats. Mist nests were checked every half hour for at least four hours each banding day, for a total of 35 banding days throughout the season. The birds were removed from the nets via the body-grab method of net extraction and transported 40 m to the banding lab in secured, cloth bags.

Once back at the lab, all birds were banded with an aluminum USGS band. Birds were then aged as either hatching year/juvenile (HY) or after-hatching year/adult (AHY) by wing molt limits and other plumage characteristics and by skull pneumatization when necessary, and sexed (when possible) by plumage coloration and/or wing cord, both in accordance with Pyle (1997). Wing cord measurements were taken of the right wing with a 150 mm wing rule, and the birds were weighed. All data were recorded and the birds were released at the lab site.

Data were plotted in the form of bar graphs, which gave clear visual evidence that the data were not normally distributed, so non-parametric Wilcoxon rank sum tests were performed using IDL software. Calendar dates were converted to ordinal dates for these tests so that they would be a continuous variable, a more precise method for use in statistical analyses. After the mean ordinal dates were calculated, they were converted back into calendar dates for ease of graph interpretation.

RESULTS

Though several dozen species of passerines were captured during this study, only six species were caught in considerable numbers. These included 282 American Goldfinches *(Carduelis tristis),* 76 Gray Catbirds *(Dumetella carolinensis),* 75 White-throated Sparrows *(Zonotrichia albicollis),* 68 Dark-eyed Juncos of the local slate-colored subspecies *(Junco hyemalis hyemalis),* 49 Chipping Sparrows *(Spizella passerina),* and 45 Song Sparrows *(Melospiza melodia).*

The mean date of migration for both age classes of all six species and the standard deviations were calculated; for each species, age was compared to date of capture to check for significant differences in migratory timing (Table 1). Additionally, the mean date of migration for both sex classes of the two species easily sexed, American Goldfinch by plumage and Dark-eyed Junco by plumage and wing cord, and the standard deviations were

Table 1. Mean dates of fall migration of six species of passerines show no correlation to age class in New Jersey, 2007.

Species	Mean Capture Date		Wilcoxon Rank Sum Test	
	HY	AHY		
	Date ±SD (*n*)	Date ±SD (*n*)	*Z* value	*P* value
Gray Catbird	Sep 2±17 (45)	Sep 7±16 (31)	-1.004	0.3153
Chipping Sparrow	Sep 24±21 (35)	Sep 12±25 (14)	1.7152	0.0862
Song Sparrow	Sep 29±23 (21)	Sep 30±23 (24)	-0.1365	0.8915
White-throated Sparrow	Oct 9±8 (40)	Oct 9±8 (35)	-0.0106	0.9915
Slate-colored (Dark-eyed) Junco	Oct 25±11 (13)	Oct 27±11 (55)	-0.5459	0.5852
American Goldfinch	Oct 17±19 (104)	Oct 15±21 (178)	0.5982	0.5497

Table 2. Mean dates of fall migration of two species of passerines show no correlation to sex class in New Jersey, 2007.

Species	Mean Capture Date		Wilcoxon Rank Sum Test	
	M	F		
	Date ±SD (*n*)	Date ±SD (*n*)	*Z* value	*P* value
Slate-colored (Dark-eyed) Junco	Oct 28±10 (40)	Oct 28±10 (20)	-0.1333	0.8940
American Goldfinch	Oct 17±20 (160)	Oct 17±20 (107)	0.0647	0.9484

calculated; sex was then compared to date of capture (Table 2). The *P* value generated by comparing mean date of capture for HY and AHY Chipping Sparrows was marginally significant. None of the results from the other species studied suggest an association between age or sex class and fall migratory timing.

DISCUSSION

At Raccoon Ridge Bird Observatory, it is assumed that such a large number of American Goldfinches was captured because they are an abundant species that migrates in flocks. The considerable number of Gray Catbirds captured is likely due to the dense, shrubby vegetation abundant throughout the grounds of the banding station. Gray Catbirds are known to prefer such habitat; in fact, their abundance increases linearly with shrub density (Lent 1990, cited in Cimprich and Moore 1995).

While American Goldfinches are present in New Jersey throughout the year, the specific individual birds inhabiting the state are different in different seasons (Sibley 2004). Northern populations of goldfinches, such as those in New Jersey, are migratory (Middleton 1978). Thus, goldfinches breeding in New Jersey during the summer migrate further south during autumn while some birds that had been breeding in Canada migrate to New Jersey (Middleton 1978).

Fall migration of the American Goldfinch ranges between mid-October through early December (Middleton 1978). AHY birds winter farther south than HY birds, and females winter farther south than males (Prescott and Middleton 1990). Data from Powdermill Nature Reserve in western Pennsylvania showed that adult goldfinches migrated before immatures (Leberman and Clench 1972).

Gray Catbirds breed in New Jersey but migrate considerably south to Mexico and Central America for the winter, starting in late August (Thobaben et al. 1987). Thus, analyses for migratory timing of this species related to timing of birds leaving New Jersey for their wintering grounds as opposed to arriving in New Jersey for the winter. Male catbirds arrive on breeding grounds a few days prior to females; adults arrive on breeding grounds a few days earlier than second-year birds (Gill 1934). At Powdermill, Gray Catbird adults migrated before immatures (Leberman and Clench 1972).

For the most part, White-throated Sparrows only over-winter in NJ and breed further north, through much of Canada (Sibley 2004). Males arrive on breeding grounds several weeks before females, and adults arrive before SY birds (Falls and Kopachena 1994). Fall migration begins mid-September and ends mid-November (Falls and Kopachena 1994). No significant differences have been reported in the fall migratory timing of White-Throated Sparrows based on age or sex (Leberman and Clench 1972; Falls and Kopachena 1994).

Dark-eyed (Slate-colored) Juncos breed throughout most of Canada and migrate south, throughout most of the United States, for the winter. Thus, they are present in New Jersey as an over-wintering species only (Sibley 2004). Fall migration begins mid-October and concludes by the end of November (Nolan et al. 2002). Adult juncos typically migrate earlier and further south than HY birds (Nolan and Ketterson1990). Females migrate earlier than males in the fall, but males migrate back north earlier in the spring (Chandler and Mulvihill 1990). Migration dates for adult juncos peaked before immatures at Powdermill, though this study found no similar difference in migratory timing based on age class (Leberman and Clench 1972).

Chipping Sparrows breed throughout much of the United States and Canada, and over-winter in Mexico and Central America (Sibley 2004). Chipping Sparrows reach New Jersey breeding grounds in late March (Stone 1965). The birds begin leaving their breeding grounds as early as late July, but migration continues through November (Middleton 1998). In recent decades, there appears to be a trend for Chipping Sparrows that breed in the southern part of their summer range, which includes New Jersey, to over-winter in the same area (Root 1988). Thus, some or many Chipping Sparrows in New Jersey actually may be year-round residents. Though resident and migratory individuals can be differentiated through DNA and stable isotope analysis, such procedures are beyond the scope of this paper (Hobson 1999).

Banding data are sparse in Chipping Sparrows, as very few recoveries of previously banded birds have been reported (Middleton 1998). The little data present establishes rough migratory routes, distances flown, and seasonal ranges. However, age or sex classes related to migratory timing has not been well studied, the latter because HY Chipping Sparrows cannot be sexed reliably by physical characteristics. Since marginally significant results comparing mean date of passage and age class were seen in this study, migratory timing of different age classes of Chipping Sparrows should be studied further to see if this study's results are reproducible.

Song Sparrows are year-round residents of New Jersey, though most populations in eastern North America are migratory (Arcese et al. 2002). Western populations are almost entirely non-migratory (Arcese et al. 2002). Some Song Sparrows that breed in Canada over-winter in New Jersey, while Song Sparrows that breed in New Jersey over-winter in the southern United States and northern Mexico (Davis and Arcese 1999). However, there is increasing evidence that some individuals in eastern populations are year-round residents, and this may be the case for some birds in New Jersey (Aldrich 1984). Again, DNA and stable isotope analysis could serve to differentiate resident and migratory individuals.

Male Song Sparrows arrive on their breeding grounds in the mid-Atlantic during late March and April, a week or two before females (Wingfield 1984). Davis and Arcese (1999) did not find a significant difference between arrival on breeding grounds between SY birds and adults. Song Sparrows in the mid-Atlantic that migrate to wintering grounds in the fall leave in September and October (Arcese et al. 2002). Adult Song Sparrows migrated after immatures at Powdermill (Leberman and Clench 1972).

A lack of significance in comparison between age and fall migratory timing of White-throated Sparrows is consistent with the findings of Falls and Kopachena (1994). Results showing a lack of significance in comparison between sex and fall migratory timing of Slate-colored (Dark-eyed) Juncos are inconsistent with Chandler and Mulvihill (1990), who found that female juncos migrated earlier than males in the fall. Their study site was approximately 500 km west of Raccoon Ridge Bird Observatory, so they were most likely dealing with different populations of juncos, which may time migration differently than populations that over-winter in New Jersey. There is also the possibility

that juncos may have varied their migratory timing somewhat in response to weather or an unknown cue in the interim between that study and last year, when these data were collected.

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