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(Eastern)

Fall Migration of Twelve Species of Wood Warblers through Coastal Virginia

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Based on four fall seasons of mist-netting, Hall (1981) reported on the migration of 12 species of wood warblers through the mountains of West Virginia. Curves were constructed showing total numbers of birds captured in 5-day intervals during the fall migration, with data from four fall seasons (1973, 1974, 1976, and 1977) pooled. My purpose in writing this paper is to compare patterns of fall migration among the 12 species of wood warblers reported on by Hall from his inland mountain station with patterns for the same species at the coastal station at Kiptopeke Beach in eastern Virginia. The data used were gathered during the 7 years 1974-1980.

Methods

As I am comparing my data with data published by Hall (1981) I am, in general, following Hall's lead in the procedure for presenting the data. Thus, I am pooling data in the same 5-day intervals used by Hall. In gathering the data I am using, mist nets were operated at the Kiptopeke station from 31 August through 3 November 1974, from 30 August through 26 October 1975, from 4 September through 31 October 1976, from 22 August through 6

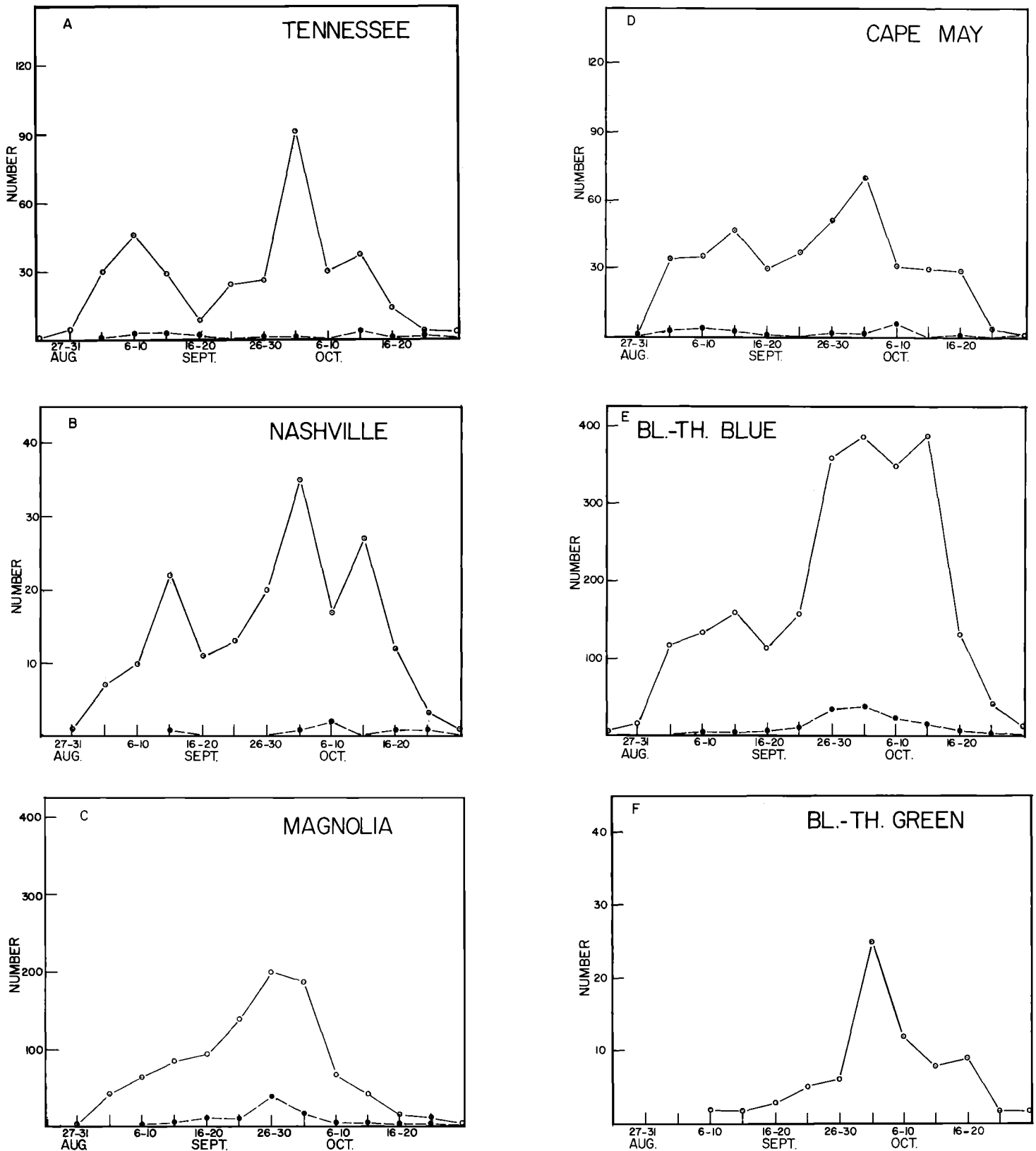
November 1977, from 28 August through 28 October 1978, from 30 August through 28 October 1979, and from 29 August through 26 October 1980, for a total of 141,531 mist-net hours. The resulting graphs furnish the basis for comparison of seasonal trends in numbers of birds captured at the two stations. Because of the difficulty of standardizing capture effort in different situations, comparisons are made of numbers of warblers captured at the two stations only when the difference clearly was not merely a result of difference in capture effort.

Birds were aged according to the degree of pneumatization of their skulls.

Results and discussion

In Figures 1 and 2 curves are shown indicating numbers captured in 5-day periods of hatching-year (HY) and after-hatching-year (AHY) wood warblers of 12 species migrating through the Kiptopeke station in eastern Virginia. A comparison of these curves with curves for the same species presented by Hall (1981) for his inland station in West Virginia reveals both differences and similarities.

Figure 1. Numbers of birds captured in coastal Virginia plotted against dates. Solid = HY, and dashed line = AHY birds.



Only relatively small numbers of AHY birds were captured at the coastal station, and a situation was thus provided showing HY birds starting migration there earlier than AHY birds among Tennessee, Nashville, Magnolia, Black-throated Blue, Blackburnian, Chestnut-sided, Bay-breasted, and Wilson's warblers. Cape May and Blackpoll warblers and American Redstarts were the only species with HY and AHY birds starting their migrations through the coastal station in the same 5-day periods.

In addition to HY birds starting their migrations through the coastal station earlier than AHY birds, peaks of migration for different species were reached earlier at the inland than at the coastal station. The following are among the examples available: the peak number of Tennessee Warblers was captured at the inland station during 21-25 September and at the coastal station during 1-5 October; the peak number of Magnolia Warblers was captured at the inland station during 11-15 September and at the coastal station during 26-30 September; the peak number of Black-throated Green Warblers was captured at the inland station during 21-25 September and at the coastal station during 1-5 October; the peak number of Bay-breasted Warblers was captured at the inland station during 21-25 September and at the coastal station during 26-30 September.

Paralleling the tendency for earlier starting of migration and earlier peaks in numbers at the inland station rather than at the coastal station was an earlier decline in numbers captured at the inland station. Thus, the number of Black-throated Blue Warblers captured at the inland station had fallen to a very low level by 6-10 October; whereas, the peak number was captured at the coastal station during 11-15 October. Also, the number of Blackpoll Warblers captured at the inland station had fallen to a very low level by 11-15 October when the peak number was captured at the coastal station. The difference in timing of migrations through the inland and coastal stations seems to indicate that distinct populations migrate through the two stations, instead of species migrating as range-wide populations.

Although migrations were generally earlier at the inland station, close similarity was shown in shapes of some curves from the two stations. Captures of Nashville Warblers at both stations produced curves with three minor peaks. Similar curves were shown also by captures of Black-throated Green Warblers. The wood warbler populations at the two stations thus showed signs of their responding to some of the same influences although they seemed to migrate through the two stations as independent populations. At least one influence promoting similarity can be assumed to be weather, since the birds migrate in association with weather patterns and weather patterns in the United States normally move eastward.

A major difference shown by the data from the two stations was the lower proportion of AHY relative to HY birds captured at the coastal station compared with the inland station. At the coastal station the birds captured were 3.2 to 9.3 (average 5.6) % AHY birds; (Table 1) at the inland station they were 23.1 to 48.8 (average 32.7) % AHY birds (Hall 1981). This difference, known as "coastal effect" (Ralph 1978), has been noted by various authors (Robbins et al. 1959, Ralph 1971, Stewart et al. 1974).

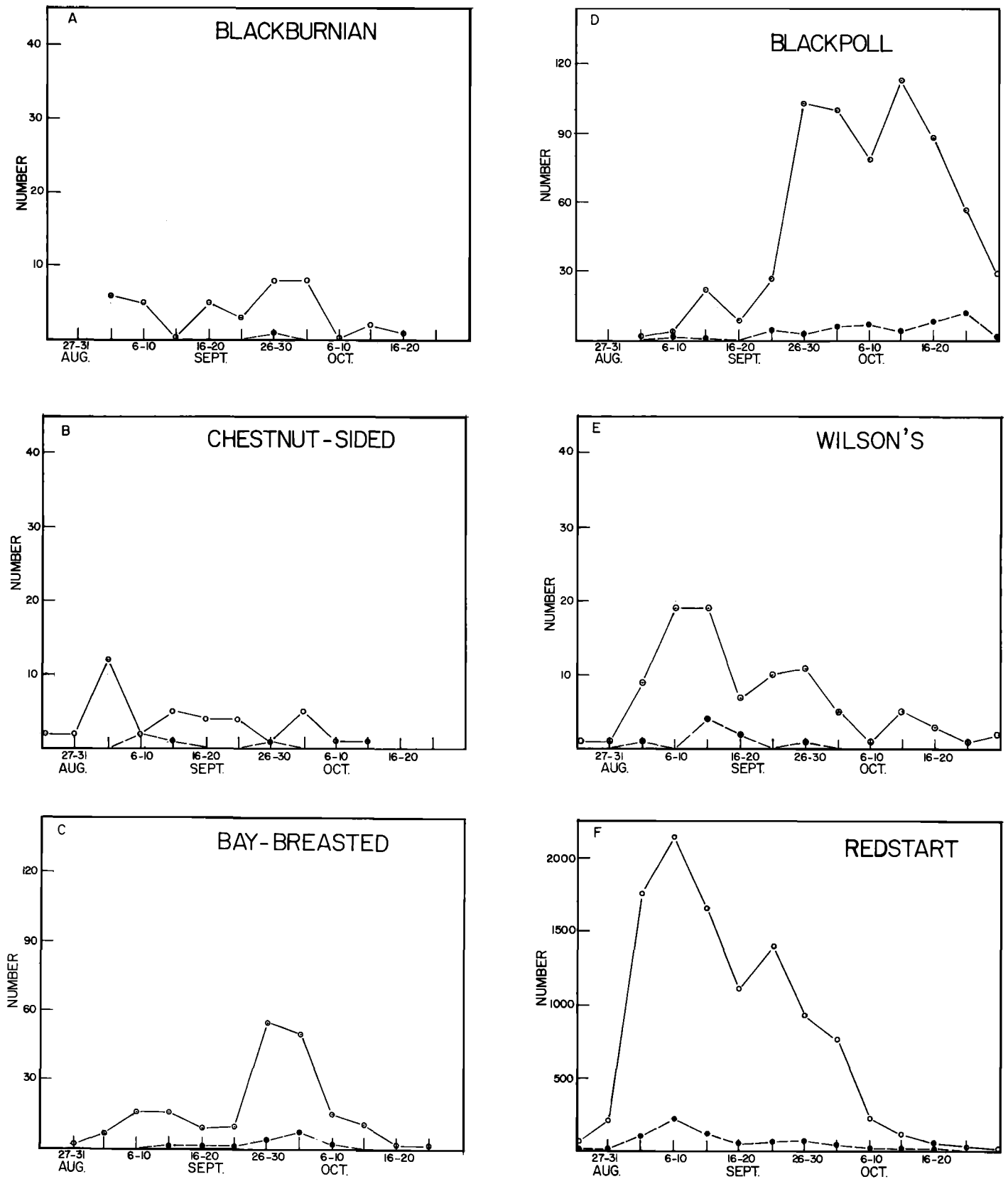
Table 1. Total numbers of wood warblers captured in coastal Virginia and percentages represented by AHY birds.

Species	N	%AHY
Tennessee (<i>Vermivora peregrina</i>)	368	4.6
Nashville (<i>Vermivora ruficapilla</i>)	187	3.2
Magnolia (<i>Dendroica magnolia</i>)	1024	8.1
Cape May (<i>Dendroica tigrina</i>)	425	5.4
Black-throated Blue (<i>Dendroica caerulescens</i>)	2513	4.9
Black-throated Green (<i>Dendroica virens</i>)	78	0.0
Blackburnian (<i>Dendroica fusca</i>)	46	2.6
Chestnut-sided (<i>Dendroica pensylvanica</i>)	60	9.3
Bay-breasted (<i>Dendroica castanea</i>)	225	7.6
Blackpoll (<i>Dendroica striata</i>)	690	7.0
Wilson's (<i>Wilsonia pusilla</i>)	103	7.8
American Redstart (<i>Setophaga ruticilla</i>)	11372	6.5
Total and average	16955	5.6

At his coastal station in New Jersey, Murray (1966) noted wood warblers arriving from over the Atlantic Ocean and suggested that the higher proportion of HY compared with AHY birds in his coastal area may result from HY birds stopping at the first landfall, with AHY birds continuing their flight inland. My examination of the facts as they relate to the coastal station in Virginia and the inland station in the mountains of West Virginia leads me to conclude that more AHY birds are lost traveling from their breeding grounds to the coastal than to the inland sampling station, the birds traveling a more hazardous route to the coastal than to the inland station. In traveling to the coastal station more over-water flight is involved where the birds must continue their flight or perish; whereas, the flight to the inland station is more over land and thus over habitat into which the birds can fly to escape the necessity of continued flight.

But more inexperienced HY than experienced AHY birds successfully make the hazardous over-ocean flight, suggesting the HY birds have an advantage lacked by AHY birds. The AHY birds, of course, are taxed with the physiological burden of reproduction and of preparing their offspring for their migratory flight, a cost to the AHY and a benefit to the HY birds. Even more importantly, starting in July, AHY wood warblers undergo a complete plumage molt, an experience not shared by HY birds (Dwight 1900). Clearly the AHY birds undertake their fall migration with disadvantages not shared by HY birds.

Figure 2. Numbers of birds captured in coastal Virginia plotted against dates. Solid line = HY, and dashed line = AHY birds.



Many passerine birds have been reported in migration over the North Atlantic, and many of the smaller birds, particularly wood warblers, have been found dead or dying on ships at sea (Scholander 1955). A sample of 44 Blackpoll Warblers found dead or dying on a ship in the Atlantic Ocean 70 km from the Massachusetts mainland on 9 October 1979 was aged and found to contain 30 (68.2%) AHY and 14 (31.8%) HY birds (Cherry et al. 1985), showing the expected higher mortality of AHY birds. With the average of 32.7% AHY birds at the inland station and 5.6% at the coastal station, the population of AHY birds on the coastal route can be seen as having been reduced by 82.8%.

In considering the low proportion of AHY relative to HY birds in coastal compared with inland populations, Ralph (1981) hypothesized that a high proportion of AHY birds in the population may indicate the location of the main route of travel for a species and a low proportion may indicate the location of the periphery of that route. The hypothesis assumes that inexperienced HY birds are more likely than experienced AHY birds to stray from the main route. The 12 species considered in this paper were chosen by Hall (1981) as being the only species for which he had captured in sufficient numbers to warrant analysis. Accordingly, the birds captured in West Virginia were likely to have been on or near their main migration routes. The relative numbers captured of some species seem to suggest that the birds were in fact on or near their main migration routes at the inland station and at the periphery at the coastal station. Following are these species, with total numbers captured at both stations: Tennessee Warbler, with 3191 at the inland and 368 at the coastal station; Cape May Warbler, with 2582 at the inland and 425 at the coastal station; Black-throated Green Warbler, with 991 at the inland and 78 at the coastal station; Blackburnian Warbler, with 1071 at the inland and 46 at the coastal station; Bay-breasted Warbler, with 1267 at the inland and 225 at the coastal station; and Blackpoll Warbler, with 3436 at the inland and 690 at the coastal station.

However, the large number of American Redstarts captured at the coastal station (11,372) compared with the inland station (192) suggests that these birds were on these main migration route at the coastal station and at the periphery of that route at the inland station. Nevertheless, 6.5% of the American Redstarts captured at the coastal station and 29.1% of those at the inland station were AHY birds. Also, with 2237 Black-throated Blue Warblers captured at the inland station and 2513 at the coastal station, neither route was shown favored by this species. But the proportion of AHY Black-throated Blue Warblers was 4.9% at the coastal and 31.6% at the inland station. These facts fail to support Ralph's (1981) hypothesis that the periphery of the main migration route is indicated by a low proportion of AHY relative to HY birds. Ralph's hypothesis involves a valid principle, but it is not sustained in a test on some species of wood warblers migrating through Virginia and West Virginia.

The synchronus but independent fall migration of HY and AHY wood warblers thru coastal Virginia has already been considered, with the results published elsewhere (Stewart 1984). It was clearly shown there that individuals of these two age groups migrate independently from their breeding to their winter grounds. However, with the two age groups migrating at the same time it is inevitable that individuals should sometimes travel together although traveling independently. Thus, Taylor (1973) improperly deduced the assumption that HY and AHY Black-throated Blue and Cape May warblers migrate together because individuals of both age groups were found together after being killed by striking a Florida tower. In any event, the conclusion that HY follow AHY birds from their breeding to their winter grounds cannot be drawn from this selected supportive case.

Summary

The fall migration of 12 species of wood warblers through a coastal station in eastern Virginia was compared with migrations of the same species through an inland station in West Virginia. Migration through the inland station was 5-15 days earlier than through the coastal station. This later migration through the coastal station was thought to result at least partly from the relationship of migratory movements with weather patterns and the eastward movement of weather patterns. Birds captured at the coastal station consisted of an average of 5.6% AHY birds compared with 32.7% at the inland station. The suggestion is offered that the lower proportion of AHY birds in the coastal population results from their migration over a more hazardous route and that the AHY birds are less able than the HY birds to make the flight because of the expense to them of raising their young and because of their molting their flight and tail feathers shortly before their southward flight.

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(Inland)

Occurrence of White in the Wing Coverts of Dark-eyed Juncos

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Character states that distinguish a subspecies may be expected to occur to some degree in populations of adjacent subspecies. In the Dark-eyed Junco (*Junco hyemalis*), the subspecies *aikeni* has "middle and greater wing coverts usually tipped with white, forming two distinct bands" (Ridgway, 1901). Ridgway made no mention of white in the wing coverts of other entities in *Junco*. In a detailed study of color characters in *Junco*, Dwight (1918) wrote, "We do not, for example, ever find red coverts in Canada or white ones forming a wing-band anywhere else than in the Black Hills [= *aikeni*] although occasional specimens of *Junco* from elsewhere may have coverts slightly tipped with white." The most exhaustive study of characters in *Junco* is that of Miller (1941). He pointed out that not only is the amount of white in the wing of *aikeni* itself highly variable (none in 5 of 86 males, p347), but that some white occurs in individuals of other races. In *mearnsi* to the west of *aikeni* he found 1.82% with white in the wing coverts, in *caniceps* to the southwest he found 1.29% so marked (p. 240), and in the wide-ranging *hyemalis* he found 2.66% (3.50% in males and 1.19% in females, p315). Miller placed these 4 races in 4 different species.

While banding *J. h. hyemalis* at Beckleysville, Baltimore County, Maryland (coordinates 393-0764), I became aware some years ago of white-flecked wing coverts. For the past ten years I have recorded the incidence of this trait but have not differentiated birds by sex. A bird was scored as positive if it had one or more greater or middle wing coverts with a terminal white fleck regardless of the fleck's size. It is possible that a few birds may have been erroneously scored positive on the basis of coverts abnormally retained from the juvenal plumage. Results are shown in Table 1.

Table 1. Incidence of white in wing coverts of *Junco hyemalis hyemalis* at Beckleysville, Baltimore County, Maryland.

Year	Number banded	Number with white	Percent
1975	169	3	1.78
1976	200	3	1.50
1977	184	3	1.63
1978	283	7	2.47
1979	264	5	1.89
1980	237	1	0.42
1981	170	1	0.59
1982	130	6	4.62
1983	191	9	4.71
1984	281	14	4.98
TOTAL	2109	52	2.47