

1977

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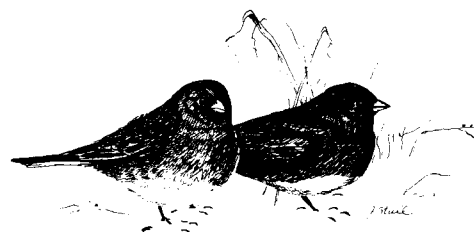
Yunick, Robert P. (1977) "Eye Color Changes in the Dark-eyed Junco and White-throated Sparrow," *North American Bird Bander*. Vol. 2 : Iss. 4 , Article 2.

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Eye color changes in the Dark-eyed Junco and White-throated Sparrow

Robert P. Yunick



Both the Dark-eyed Junco (*Junco hyemalis*) and the White-throated Sparrow (*Zonotrichia albicollis*) exhibit changes in eye color during their first year. The differences of eye color in immature and adult birds are useful for determining their age in late summer and fall and, in some cases, into the subsequent spring. Some banders are using these criteria, while others may not be aware of them. The purpose of this paper is to focus attention on their use and to offer comment on some observed seasonal changes in this color development.

Dark-eyed Junco — On its Adirondack breeding ground at Jenny Lake, Saratoga County, New York, the earliest broods of Dark-eyed Junco normally fledge from late June to 5 July. More typically, most early broods fledge during the following ten days. When fledged, the juvenals exhibit a grayish-brown eye color which varies from a Munsell Soil Color Chart rating (See Wood and Wood [1972]) of 10YR/3/2 on the brown side to a somewhat grayer version which is difficult to equate to a Munsell rating. A few individuals have a totally gray eye which lacks brown. These observations were made under a 10X magnifier lighted by a 22-watt, cool-white fluorescent lamp located four inches from the subject.

The change of eye color begins as an annulus (ring) of red-brown pigmentation about the pupil. This annulus grows outward until finally the eye becomes fully red-brown or dark brown. In an adult bird in bright sunlight, the eye can assume a rich burgundy coloration.

The earliest indication of color change observed in birds handled in the past two years occurred in an individual that was beginning its first prebasic (postjuvinal) molt between 1 and 5 August. More commonly, the change in eye color begins in late August, when the first prebasic molt is well underway. At this time, the feather molt may be as much as 75 percent complete in some individuals. The onset of this color change is quite variable, however, and an individual has been observed as late as 11 November with no change as yet evident.

The rate of change appears to vary also. Immature birds have been seen with a totally red-brown eye as early as 30 October, while others have failed to complete the transition by as late as 14 April. Beyond mid-October, one must examine the eye with care, because as the eye becomes predominantly brown or red-brown, the outer gray annulus becomes less apparent. It is necessary to make these observations in bright, direct light. Sunlight or artificial light is definitely preferred over shaded light.

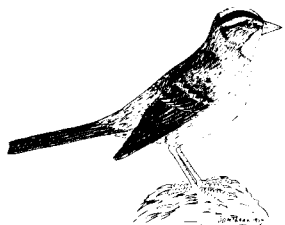
From 28 October to 4 November 1974 I recorded the eye color of 150 immature Dark-eyed Juncos at Island Beach State Park, New Jersey. I found 74 birds, or 49.3 percent, had the juvenile gray-brown or pale-brown eye with no red annulus; 71 birds, or 47.3 percent, had varying amounts of red-brown; and five birds, or 3.3 percent, had completely red-brown eyes. Thus, at this time of year, 96.7 percent of the immature or hatching year birds (HY) could be recognized by eye color.

Based on these observations at Jenny Lake and Island Beach, it is my opinion that one can reliably determine the age of young juncos by the presence of a pale-brown or gray-brown eye, while adults can be recognized by a completely red-brown or dark-brown eye up to mid-October. Beyond that, red-eyed birds should be aged by skull ossification.

White-throated Sparrow — In October 1973 I found, quite by accident, that the eye color of an immature of this species differed from that of an adult. Further investigation revealed that immatures typically exhibit a brownish eye which ranges from 10YR/3/3 to 5YR/3/2 on the Munsell Soil Color Chart. The eye of the adult is redder and is typified by a Munsell rating of 5YR/3/3. These readings were made in bright sunlight. The difference between 5YR/3/2 and 5YR/3/3 may not seem like much of a difference to one familiar with the Munsell Chart; however, if one consults the color chips, one will see that the difference in redness is considerable. Again, it requires good lighting to discern these differences, but with practice, and

correlation with birds whose age is known in early fall by skull aging, the difference in eye color can be learned and used to advantage.

Based on 82 immature White-throats examined at Vischer Ferry Wildlife Management Area, Saratoga County, New York between 22 September and 27 October 1974, and 34 examined at Island Beach State Park between 28 October and 4 November 1974, 112, or 98.2 percent, had brown eyes thereby correlating with the age determined by skull examination. At the same time, a sample of 33 adults all exhibited a red-brown eye.



Because of a scarcity of White-throats at this latitude in winter, it has been difficult to monitor changes in eye color beyond November. However, during the very mild fall and early winter of 1974-75, I was able to record eye colors of 17 White-throats (two in December, 10 in January, five in February) that attempted to winter. All 11 birds whose skulls were incompletely pneumatized had brown eyes, whereas four of the six that were completely pneumatized had brown eyes.

The White-throat exhibits some differences from the junco in the development of the adult eye color. Whereas the junco shows the first signs of change in August (one month after fledging), and completeness of change by as early as late October, with a gradual observable change lasting in some individuals into spring, the change in the White-throat appears to be delayed, and to date I have not seen an individual that I would classify as being intermediate in color between that of an adult and immature. Nor have I seen any indication of the color change progressing through the development of an annulus. Someone who has a

wintering population of White-throats that can be banded in the fall, when age is readily apparent, and monitored through the winter by repeat capture could shed some knowledge on when and how this change occurs.

Another criterion that is useful in the fall to supplement eye color during those periods at dawn and dusk when White-throats are so frequently caught, and when eye color may be difficult to determine due to low light levels, is gape color. In 1970 Dr. Will D. Merritt, Jr. called my attention to the differences in gape color of the immature and adult White-throated Sparrow in September and October. Typically, young birds have a bright yellow gape, whereas adults have a gape that varies occasionally from very pale yellow to more normally a pale flesh or sometimes pale blue-gray color.

Based on 12 HY birds examined from 18 September to 11 October 1970, 46 from 26 September to 12 October 1971 and 91 from 22 September to 27 October 1974 in my yard and at Vischer Ferry, 147, or 98.7 percent, had yellow gapes. A smaller sample of 35 HY birds from Island Beach between 28 October and 4 November 1974 had 31 birds, or 88.6 percent, with yellow gapes. From the winter sample referred to above, 10 out of 11 HY birds, or 90.9 percent, had yellow gapes.

Among 43 adult birds in fall, 38, or 88.4 percent, had gray gapes and the remainder varied from pale yellow to yellow. Since the gapes of some HY birds turn pale yellow or gray by the end of October, a pale gape does not reliably denote an after-hatching-year (AHY) bird; but a bright yellow gape appears to be reliable for denoting an HY bird. Again, someone with access to a repeating winter population could better define when this change in gape color is complete. ♦

Literature cited

Wood, D.S. and D.L. 1972. *Bird-Banding*, 43: 182-90.
1527 Myron Street, Schenectady, New York 12309

Reverse migration in the Dark-eyed Junco

John Kennard

It is well known that certain birds apparently reverse the direction of their customary annual migrations. There follow two examples of this "reverse migration" in the Dark-eyed Junco (*Junco hyemalis*):

#810-28065, banded by Mrs. F.C. Lapham, on Block Island, Rhode Island 14 November 1974, re-

trapped by J.H. Kennard, Bedford, New Hampshire 20 December 1974.

#1340-87743, banded by J.H. Kennard, Bedford, New Hampshire 26 March 1977, retrapped by E.S. Mitchell, Portland, Connecticut 27 April 1977.

John Kennard, Manchester, NH 03103