

History Section of the Missouri Department of Conservation. Nancy Thompson-Toland assisted in the field and helped with expenses.

LITERATURE CITED

- BROWN, L. H., AND D. AMADON. 1968. Eagles, hawks and falcons of the world. McGraw-Hill, New York.
- CRAIGHEAD, J. J., AND F. C. CRAIGHEAD. 1956. Hawks, owls and wildlife. Stackpole Co., Harrisburg, Pennsylvania.
- FISHER, A. K. 1893. The hawks and owls of the United States and their relation to agriculture. U.S. Dep. Agr. Bull. 3, Washington, D.C.
- HAMERSTROM, F. N., AND F. HAMERSTROM. 1951. Food of young raptors on the Edwin S. George Reserve. *Wilson Bull.* 63:16-25.
- MCDOWELL, R. D. 1941. The Cooper's Hawk in Pennsylvania. *Pennsylvania Game News* 12:4.
- MENG, H. 1959. Food habits of nesting Cooper's Hawks and Goshawks in New York and Pennsylvania. *Wilson Bull.* 71:169-174.
- SCHWARTZ, C. W., AND E. R. SCHWARTZ. 1959. The wild mammals of Missouri. Univ. Missouri Press and Missouri Dept. Conserv., Columbia.
- SHERROD, S. K. 1978. Diets of North American falconiformes. *Raptor Res.* 12:49-120.
- SNYDER, N. F. R., AND J. W. WYLIE. 1976. Sexual size dimorphism in hawks and owls of North America. *Ornithol. Monogr.* 20.
- STEENHOF, K. 1983. Prey weights for computing percent biomass in raptor diets. *Raptor Res.* 17:15-27.
- STORER, R. W. 1966. Sexual dimorphism and food habits in three North American accipiters. *Auk* 83:423-436.
- TERRES, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, Inc., New York.
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Identification of Second-year and After-second-year Eastern Bluebirds.—Comparisons of 10th primary coverts from known-age Eastern Bluebirds (*Sialia sialis*) suggest these feathers may be used to distinguish second-year (SY) from after-second-year (ASY) individuals. Tenth primary coverts from fully-developed nestlings and SY birds are virtually identical. Apparently 10th primary coverts are not molted with the remainder of the juvenal plumage. The 10th primary of Eastern Bluebirds is much shorter than the other primaries, averaging 15.3 mm (13.0-18.0, SD = 1.35, $n = 20$). It has only 1 covert which is 7.5-11.0 mm long ($\bar{x} = 9.0$, SD = 0.8, $n = 20$) and is completely covered by the 9th primary greater covert which is 17.0-21.0 mm long ($\bar{x} = 19.0$, SD = 1.02, $n = 20$).

A 10th primary covert was collected from 27 known-age males (18 SY and 9 ASY) and 29 known-age females (16 SY and 13 ASY) in Obion Co., Tennessee, during the 1981-1984 nesting seasons. Five of the birds (2 females, 3 males) were banded as nestlings and then recaptured in both their second and third years.

While several characteristics of the 10th primary covert were examined, the 2 features of most value for age determination were the shape of the tip and the color of the pigmented part of the feather. Each 10th primary covert has a dark central area surrounded by a white border. The border varies in width; wide white borders are more frequently seen in SY birds, but border width is not a reliable indicator of age in either sex.

In males, the most consistent difference between age classes was the shape of the covert tip (Fig. 1). All SY coverts (18 of 18) had tips without distinct, or pointed, tips, while all ASY (9 of 9) coverts were sharply pointed. Seventeen of 18 SY coverts were dark grayish brown (20) or fuscous (21), while 1 SY covert was cerulean blue (67). (Color names and numbers are from Smithe, *Naturalist's Color Guide, Part I, Color Guide, Am. Mus. Nat.*

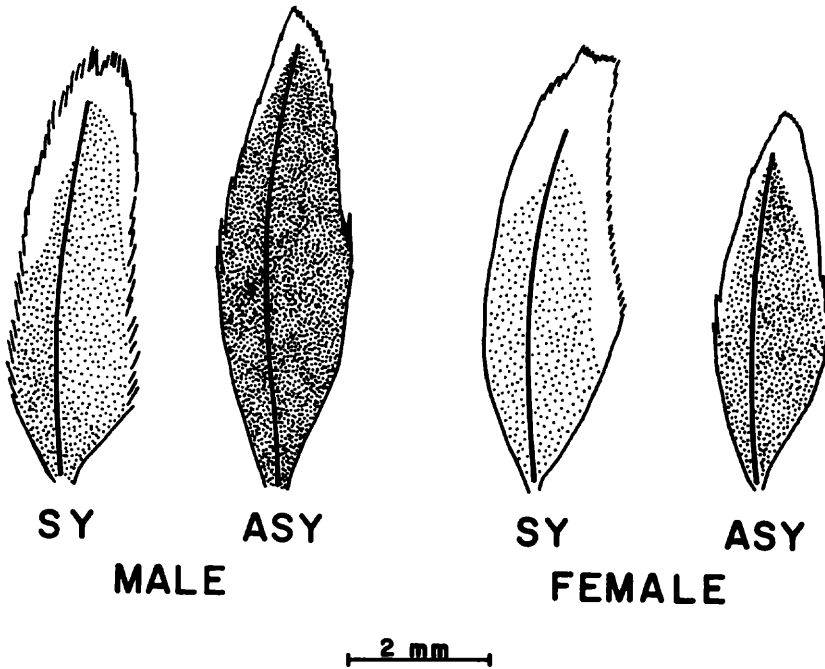


FIGURE 1. Comparison of 10th primary coverts from known-age Eastern Bluebirds.

Hist., New York, New York, 1975.) Eight of 9 ASY male coverts were cerulean blue (67) or cobalt (68), and 1 of 9 was dark grayish brown (20).

The best indicator of age in females, as in males, was the shape of the 10th primary covert tip (Fig. 1). Fifteen of the 16 SY coverts were blunt; 1 SY covert was slightly pointed. Twelve of 13 ASY coverts were distinctly pointed; 1 ASY covert was rounded, and, without consideration of color, might have been confused with a SY covert. None of the SY coverts was blue; all of the ASY coverts showed some blue. Female ASY coverts are only faintly

TABLE 1. Keys for identification of second-year (SY) and after-second-year (ASY) Eastern Bluebirds during the nesting season.

Females	
1a.	Tip of 10th primary covert frayed and not sharply pointed; pigmented area of covert brown and non-symmetrical SY
1b.	Tip of 10th primary covert distinctly pointed; pigmented area of covert showing some blue (blue may be faint) and usually symmetrically shaped ASY
1c.	Tenth primary covert cannot be readily placed in either 1a or 1b AHY
Males	
1a.	Tip of 10th primary covert frayed and not sharply pointed; pigmented area not distinctly blue, usually grayish brown or fuscous SY
1b.	Tip of 10th primary covert sharply pointed; pigmented area distinctly (at first glance) cerulean blue or cobalt ASY
1c.	Tenth primary covert cannot be readily placed in either 1a or 1b AHY

blue, not the bright blue seen in male ASY coverts. Consequently, color differences between SY and ASY female coverts are less obvious than in males. Table 1 summarizes differences between age classes of both sexes.

The Bird Banding Laboratory requires an accuracy of 95+% for recommended aging techniques (U.S. Fish and Wildlife Service and the Canadian Wildlife Service, Bird Banding Manual, Vol. II, Bird Banding Techniques, Population and Survey Division of the Canadian Wildlife Service, 1977). Eleven known-age adults whose coverts were not used in construction of the keys were all correctly aged with the keys. Normally, however, the technique described here will not readily determine the age of all adult bluebirds. For example, 3 of 88 (3.4%) unknown-age bluebirds trapped during the 1983 and 1984 nesting seasons could not be definitely assigned to either the SY or ASY age class; such birds are aged as after-hatching-year (AHY).—T. DAVID PITTS, *Biology Department, University of Tennessee at Martin, Martin, Tennessee 38238*. Received 17 Sept. 1984; accepted 20 Sept. 1985.

First Central American Recovery of Blue-winged Warbler.—Through 1983 only 7 Blue-winged Warbler (*Vermivora pinus*) recoveries (outside the 10' block of banding) had been reported to the U.S. Fish and Wildlife Service Bird Banding Laboratory. All were banded and recovered in the northeastern U.S. between coastal Virginia and Massachusetts.

In the course of fieldwork in southern Belize, Central America, one of us (DSW) collected a banded Blue-winged Warbler, the first recovery for this species outside the U.S. This specimen, an adult female, is now in the collections of Carnegie Museum of Natural History (CM-P-162520). The bird was collected on 6 April 1984 at the foot of the first hills of the Maya Mountains at the point where the Bladen Branch of the Monkey River exits the hills (approximately 12 km north of Medina Bank). The specific habitat was an area of low (3 m high) dense vegetation adjacent to second-growth forest on the nearby hills.

This individual (band number 1610-19412) was banded as a hatching year bird of unknown sex at the Kalamazoo Nature Center on 9 August 1982 (by RJA). We are not certain of the wintering area for this bird because the collecting date is during the early migration season. However, we think southern Belize to be the likely area because the bird did not appear ready to migrate (little fat, weight of 6.4 g) at the time it was collected.

Despite the common occurrence of Blue-winged Warblers as breeding birds throughout much of the northeastern United States, relatively few are banded each year. According to the annual banding summaries distributed by the Banding Office, between 1968 and 1982 only 5835 of these birds were banded (a yearly average of only 389). In contrast, yearly banding totals for many warbler species exceed 2000. During the same period (1968-1982) only 5 recoveries were reported for the Blue-winged Warbler, a recovery rate of slightly less than 0.1%. Such a low level is not unusual: data on *all* warblers banded at Powdermill Nature Reserve over the 20-year period 1962-1981 (25 recoveries, 39,570 original bandings) show a recovery rate of only 0.06% (Leberman and Wood, 1983, Powdermill Nature Reserve Res. Rept. 42).

The winter range of the Blue-winged Warbler extends from southern Mexico to central Panama. The majority of the birds seem to migrate through much of the southeastern U.S. (except the very southeast) and across the Gulf of Mexico to Central America, although small numbers probably migrate through the Caribbean (American Ornithologists' Union, 1983, Check-list of North American Birds, sixth edition). In Belize it is not a common wintering species, but has been recorded on all but two of the 21 Audubon Christmas Counts there (Young 1973-1984, *Am. Birds* 27-38). During our fieldwork (March-April 1984) we encountered Blue-winged Warblers at every locality we visited, but in low numbers (1 to 4 per locality).

We thank the Bird Banding Laboratory of the U.S. Fish and Wildlife Service for providing data on recoveries of Blue-winged Warblers. We are greatly indebted to the Ministry of Natural Resources, Government of Belize, for permission to conduct fieldwork