Alula Characteristics as Indicators of Golden-cheeked Warbler Age

Rebecca G. Peak and Daniel J. Lusk
P.O. Box 5190
Fort Hood, TX 76544
rpeak@tnc.org

ABSTRACT

We assessed the alula of Golden-cheeked Warblers (Dendroica chrysoparia) *to determine its usefulness as a criterion for age determination. We compared the alula to the greater secondary coverts for color contrast and examined it for presence of white. Overall, 98.2% of second-year birds had an alula/greater secondary covert contrast; whereas, 100% of after-second-year birds did not have a contrast between these feather groups. All after-second-year birds had white on the alula. Our data demonstrate that these characteristics are reliable indicators of age for Golden-cheeked Warblers. Still, we advocate using them in combination with existing ageing criteria to enhance the confidence of banders' age determinations, especially during the winter and spring when degree of skull pneumaticization is no longer a reliable indicator of age.*

INTRODUCTION

Banders use a variety of techniques for ageing passerines. While degree of skull pneumaticization is recognized as the most reliable ageing technique for this group of birds, the skull of most species becomes fully pneumaticized and is no longer a reliable indicator of age at some time during the year (Pyle et al. 1987). Plumage-related criteria also provide banders with useful information for ageing passerines. For example, molt limits, the contrast between different feather generations, produce age-specific plumage patterns that allow banders to distinguish hatching-year (HY) and second-year (SY) birds from older age classes. Dwight (1900) first illustrated the utility of molt limits in ageing passerines. More recent literature on the use of molt limits to age North American passerines provide detailed descriptions of how to distinguish different feather generations from each other for a variety of species (Yunick 1984, Pyle et al. 1987, Mulvihill 1993, Pyle 1997a, Pyle 1997b).

Dendroica warblers retain greater primary coverts (hereafter "primary coverts") from the juvenal plumage but replace greater secondary coverts (hereafter "greater coverts") during the first prebasic molt (Pyle et al. 1987). Hence, comparison of color and extent of wear between these feather groups is useful for ageing members of this genus. The contrast between primary and greater coverts can be challenging for inexperienced banders to recognize. These feather groups are small, the color difference is often difficult for the untrained eye to discern, and some of these species replace the inner greater coverts during prealternate molts.

Pyle (1997a and 1997b) states the first prebasic molt of *Dendroica* warblers often includes the alula. However, while examining the primary and greater coverts of Golden-cheeked Warblers for color and extent of wear, we have observed that the primary coverts as well as the alula of SY birds are retained feathers from the juvenal plumage. In fact, while training inexperienced banders we have observed that they often recognize the color contrast between the alula and greater coverts more readily than the contrast in color between primary and greater coverts. Furthermore, we have observed that in addition to the lack of contrast in color with the greater coverts of after-second-year (ASY) birds, a variable amount of white is present on the replaced alula, similar to the description given in Pyle (1997a) for variation in the amount of

white in rectrices of *Dendroica* warblers among different age and sex classes. The objective of this study was to assess the usefulness of these alula characteristics in determining age of Golden-cheeked Warblers.

METHODS

We used recorded vocalizations of Golden-cheeked Warblers to capture them in mist nets on Fort Hood Military Reservation in central Texas between March and June 2009. See Eckrich et al. (1999) for detailed descriptions of the Fort Hood site. After capture, we banded individuals with a U.S. Geological Survey aluminum band and a unique combination of color bands and used criteria described in Pyle (1997a) to age and sex them. We examined the alula for retained juvenal plumage by comparing its color with that of the replaced greater coverts and recorded whether or not the replacement of quills was symmetric. For Golden-cheeked Warblers, alula retained from the juvenal plumage are brownish in color; whereas, alula replaced during the first prebasic molt have black centers (Pyle 1997a and 1997b). Also, we recorded whether or not any white was present on this feather group. We followed the numbering sequence for alula quills presented in Van Tyne and Berger (1971) with alula one (A1) being the innermost quill of the feather group and alula three (A3) being the outermost.

RESULTS

We examined 94 Golden-cheeked Warblers. Seventy-four (78.7%) were males and 20 (21.3%) were females. Twenty-five males and 12 females (39.4%) were aged as ASY birds. Forty-nine males and eight females (60.6%) were aged as SY birds. We did not detect any difference in either presence of retained alula or white on the alula between sexes, so we examined data by age classes only (Table 1). Sometimes, we failed to record alula data or were not able to locate a quill. We excluded these data from the analysis.Overall, 98.2% of the 57 SY birds had alula retained from the juvenal plumage. However, the percentage varied by quill; 96.5% of A3, 98.5% of A2, and 32.0% of A1 quills were retained from the juvenal plumage. We did not observe any retained alula on ASY Golden-cheeked Warblers. Although 59.6% of the 57 SY birds exhibited symmetric replacement of A1, we recorded presence of white on A1 for only one SY bird. Additionally, we recorded presence of white on A3 for two other SY birds. All ASY birds had white on the alula, but the percentage varied by quill. We recorded presence of white on 97.1% of both A3 and A2, and 54.3% of A1. For each ASY bird, alula replacement was symmetrical.

Table 1. Characteristics of alula quills of SY and ASY Golden-cheeked Warblers indicating contrast in color between alula quills (A1, A2, and A3) and greater coverts (gr cov) and presence of white.

	SY			ASY		
Characteristic	**A1**	**A2**	**A3**	**A1**	**A2**	**A3**
Alula/gr cov contrast						
Present	16	56	55	0	0	0
Not Present	34	1	2	33	36	36
Data Not Recorded	1	0	0	1	1	1
White						
Present	1	0	2	19	34	34
Not Present	41	48	45	14	1	1
Data Not Recorded	9	9	10	1	2	2
Quill Not Located	**6**	**0**	**0**	**3**	**0**	**0**

DISCUSSION

We found that presence of a color contrast between retained alula and replaced greater coverts as well as presence of white on the alula can be used reliably to age Golden-cheeked Warblers if banders only examine A2 and A3. Banders had difficulty locating A1, possibly because it is a much smaller and more difficult quill to locate than the other two quills. When banders were able to locate A1, it did not follow the same pattern that A2 and A3 did for these ageing criteria. Approximately 60% of SY birds exhibited symmetric replacement of A1 indicating that it is molted independently of A2 and A3 during the first prebasic molt, first prealternate molt, or both molts.

These findings meet the Bird Banding Laboratory's policy that age and sex criteria are at least 95% reliable to be recommended for use in determining age and sex of birds. Still, we advocate using these criteria in combination with existing ageing criteria to enhance the confidence of a bander's age determination, especially during the winter and spring when degree of skull pneumaticization is no longer a reliable indicator of age. We encourage banders to examine other *Dendroica* warblers, especially other members of the *Dendroica virens* superspecies complex (Golden-cheeked, Black-throated Green [*Dendroica virens*], Hermit [*Dendroica occidentalis*], Townsend's [*Dendroica townsendi*], and Black-throated Gray [*Dendroica nigrescens*] warblers; Mengel 1964), for presence of these ageing criteria.

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News, Notes, Comments

History of Computerization of Bird-Banding Records: An Addendum

Since the publication of Houston, Robbins, and Klimkiewicz, "History of computerization of bird-banding records," *(North American Bird Bander* 33:53-65, April-June 2008), four omitted or inadequately explained items have come to our attention.

1. Calendar years

During the 1920s, the banding calendar year ended 30 Jun (e.g., *Bird Banding Notes* 1, #13, Nov 1924 and *Bird Banding Notes* 1, #28, September 1929). Thus, 1 Jul was the first day of each banding calendar year. Even the transfer of the Bureau of Biological Survey from the Department of Agriculture to the Department of Interior took place on the 1 Jul 1939 *(Bird-Banding Notes* 2, # 17, October 1939), because that was the beginning of the new government fiscal year.

Then, for a few years in the early 1950s, the banding year was changed to end on 30 Apr. This was done to ensure that waterfowl bandings were submitted in time for use in setting that year's hunting season.

Finally, the banding year moved to the standard or normal calendar year through imposition of a one-time truncated eight-month year, 1 May to 31 Dec 1955. That year, an undated and untitled 15-page mimeographed document was sent from the Bird Banding Laboratory (BBL) to