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Using Alulas and the Carpal Covert to Assess Age in Some Formative and First Alternative Plumaged Western Passerines

Most oscines and suboscines go through an incomplete or partial preformative molt (Mulvihill 1993). The incomplete or partial nature of the preformative molt provides recognizable and repeatable age-related criteria for field biologists (Wolfe et al. 2010). During the preformative molt, oscines and suboscines typically replace first the lesser and median coverts, then a few feathers to the entire tract of greater coverts, and perhaps, a few tertials and/or center retrices (Froehlich 2003). The preformative molt is often concluded after replacing the last greater covert creating a molt limit (i.e. boundary between replaced and retained feathers) between greater coverts and primary coverts. Additionally, many warblers, vireos, and sparrows exhibit a preformative molt which continues replacement through the carpal covert and into the lesser alula and, perhaps, the greater alula (Pyle 1997b). Variability in covert and alula replacement within a species, or an individual bird, depends upon a number of factors including weather, nutrition, and hatching date (Mulvihill 1993, Mulvihill and Winstead 1997, Bojarinova et al. 1999, Flannery and Gardali 2000).

Eastern banding operations (e.g., Powdermill Avian Research Center) noted that molt limits within the carpal covert and alula tract are easily recognizable and use them to identify formative and first alternate plumages (M. Lanzzone pers. comm.) Despite eastern advances in recognizing and utilizing carpal covert and alula tract molt limits, many western banding operations apparently continue to rely primarily upon contrast between primary and greater coverts as the definitive molt limit for many warblers, vireos, and sparrow species (Pyle 1997a). Pyle (1997a) states that alula tracts and the carpal covert are "parallel" with greater coverts, as it pertains to age categorization and are subsequently rarely discussed within species accounts (Pyle 1997b). Thus, the uses of

alula and carpal covert molt limits have been overlooked by many western banding operations.

In 2008, Redwood Sciences Laboratory (RSL) began documenting the presence of molt limits in the alula tract and carpal covert of captured landbirds in northern California. Over the course of three banding seasons, RSL found that, just as in the east, many formative and first alternate plumaged western landbirds exhibit a noticeable molt limit between or within the carpal covert and alulas. RSL routinely documented alula and carpal covert molt limits in most warblers (Family: Parulidae), sparrows (Family: Emberizidae), vireos (Family: Vireonidae), Pine Siskin (*Carduelis pinus*) and *Carpodacus* finches. RSL found that alula and carpal covert molt limits typically could not be applied to species with eccentric replacement patterns (e.g., Yellow-breasted Chat, *Icteria virens*, or many western populations of Song Sparrow, *Melospiza melodia*); however, more study is needed. The occurrence of alula and carpal covert molt limits in some species of *Empidonax* flycatchers that exhibit complete greater covert replacement remained unsubstantiated.

In practice, we suggest using multiple plumage criteria to categorize age. For example, when in the bander's grip an individual bird's wing can be held gently and slightly open by the middle and index fingers, framed by the thumb, facilitating a quick assessment of the outer greater coverts, primary coverts, carpal covert and alula tract at a single glance (Figs. 1-2). This method promotes age categorization based on the agreement of multiple plumage criteria which can be assessed quickly. Of course, a slight variation in the hold may be necessary if the bird is larger (a jay, for example) or the bander has small hands. In either of these cases, holding the bird in the bander's grip and using the other hand to open up the wing to view the feathers is an appropriate method.

Just as with discerning whether primary coverts are retained or replaced, we encourage caution when documenting alula and carpal covert molt limits. We recommend checking for molt limits between

the carpal covert and the two alula feathers commonly used for ageing: alula covert and lesser alula (Fig. 3). Next, inspect the alula covert and lesser alula for contrast (Fig. 4). Pyle (1997a) suggests that the carpal covert and lesser alula are connected to the greater covert molt sequence, independent of the alula covert which may be associated with the median or lesser coverts. Because the alula covert may be replaced "independently" of the greater coverts, carpal covert and alula tracts, the carpal covert and the lesser alula will be retained occasionally, while the alula covert will be replaced (Fig. 5). Importantly, the greater alula often becomes worn in definitive plumaged individuals thereby creating a "pseudolimit" and should not be used, or at least, used with caution. We have found that carpal covert and alula molt limits are often discerned more easily relative to the recognition of contrast between primary and greater coverts in formative and first alternate plumaged landbirds.

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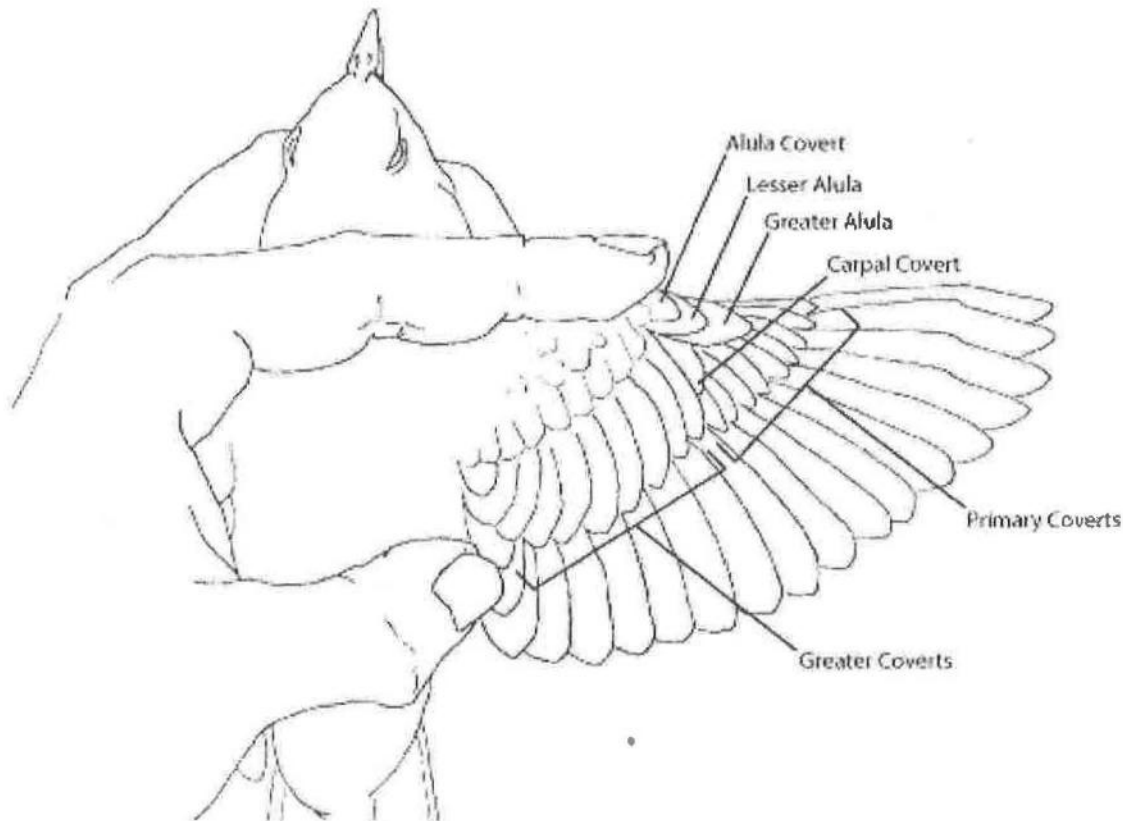


Fig. 1. Recommended method for holding the wing for examining the alulas and carpal coverts.
Note how the bird's wing is held between the index and middle fingers, while in the bander's grip.



Fig. 2. First alternate plumaged Audubon's Warbler (*Dendroica coronata auduboni*) with replaced greater coverts through the carpal covert and alula covert while the lesser alula and primary coverts have been retained. Note the single replaced inner primary covert (rarely occurring in formative and/or first alternate plumaged *Dendroica* spp.) (Ed. Note: A sharper color image of Fig. 2 can be found on the WBBA website at http://www.westernbirdbanding.org/NABB35_1_Row.pdf)

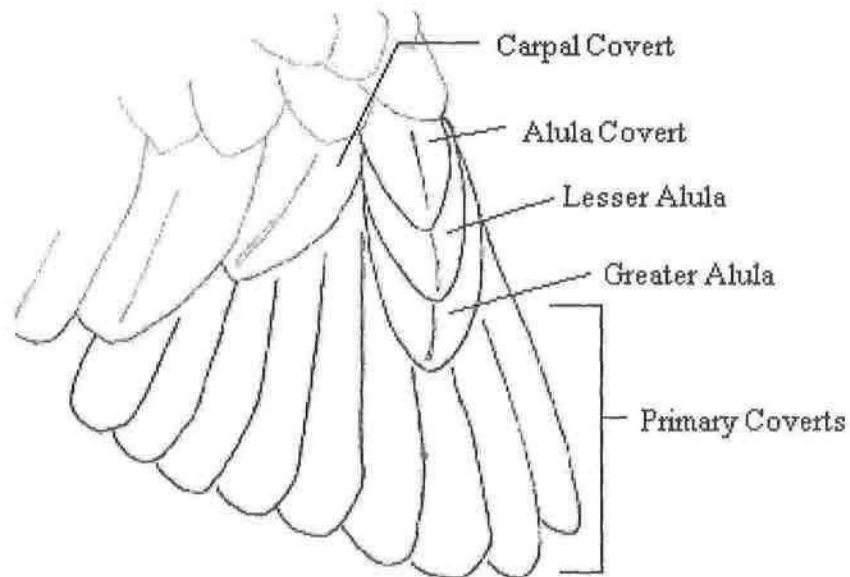


Fig. 3. Molt limit between the carpal covert and alulas. The bird has replaced all greater coverts and the carpal covert but not the alula tract. Gray indicates replaced plumage.

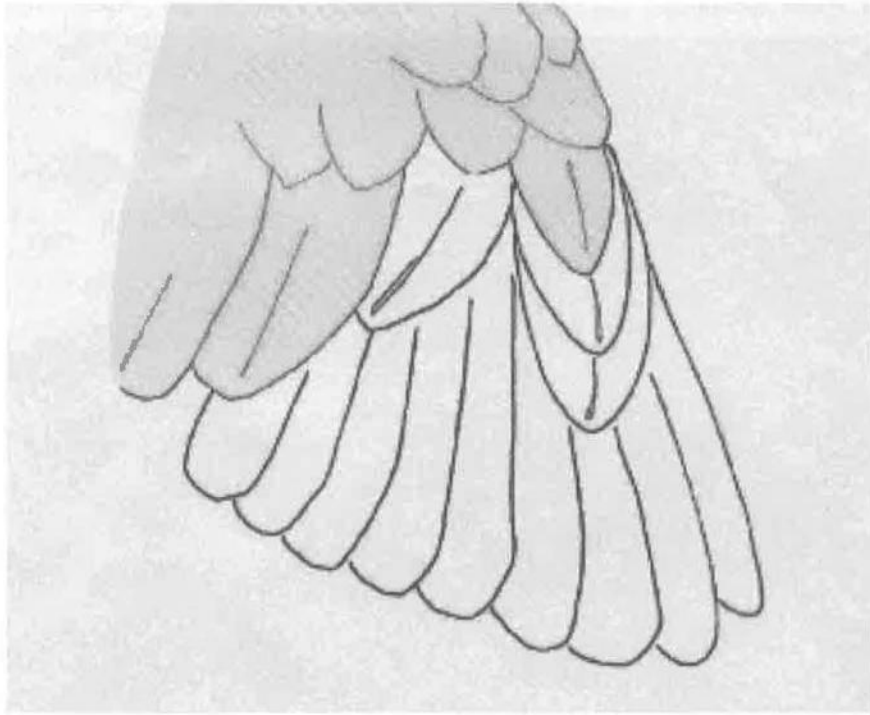


Fig. 4. Molt limit between the alula covert and the lesser alula (refer to Fig. 2). This replacement pattern is an extension of the previous example: the bird has replaced all the greater coverts, carpal covert and alula covert but not the lesser alula. Gray indicates replaced plumage.

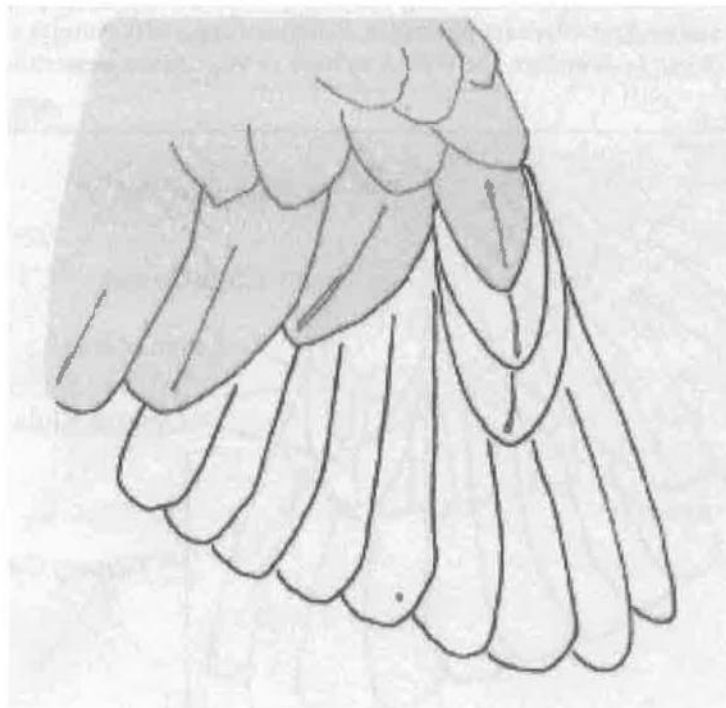


Fig. 5. Molt limit between the carpal covert and the alula covert (refer to Fig. 2). The alula covert, potentially in sequence with the lesser or median coverts, has been replaced, while the carpal covert and lesser alula have been retained.