On separating Sagebrush Sparrow (*Artemisiospiza nevadensis*) from Bell's Sparrow (*A. belli*) with particular reference to *A. b. canescens*.

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The AOU's 54th supplement will be splitting what was formerly one species, Sage Sparrow (*Artemisiospiza belli*) into two species, Sagebrush Sparrow (*A. nevadensis*) consisting of former subspecies *nevadensis* but now monotypic, and Bell's Sparrow (*A. belli*), consisting of subspecies *belli*, *canescens*, *cinerea*, and *clementae*. Details and recent literature can be found at the AOU Checklist Committee' proposal document 2013-A:
http://www.aou.org/committees/nacc/proposals/2013-A.pdf

Within Bell's Sparrow, subspecies *A. b. canescens* is phenotypically most similar to *nevadaensis* Sagebrush Sparrow. Subspecies c*anescens* breeds in the Mohave Desert region of Southern Nevada and southeastern California and shows limited upslope and southward migration, while *nevadensis* breeds throughout the Great Basin and migrates southward in winter, broadly overlapping the winter range of *canescens* in October-March. There is thus an increased need to define criteria separating these taxa in winter, for those working at the species level.

On 15 August 2013, I visited the collection at Museum of Vertebrate Zoology (MVZ), Berkeley, California, to look into the separation of *nevadensis* Sagebrush Sparrow from *canescens* Bell's Sparrow. The collection had about 250 specimens of each of these taxa. I was particularly interested in how wear might affect identification criteria throughout the annual cycle, but concentrated on the separation of fresher basic-plumaged individuals in September-March, when the two taxa can overlap in range. The following brief summary and photographs result from this visit. I intended to look into the other subspecies of Bell's Sparrow as well, but ran out of time after a quick assessment of nominate *belli*.

Fresh plumage of both taxa is characterized by browner upperparts contrasting more distinctly with grayer heads, more distinct streaks to the backs, less-distinct (blurrier) streaks to the underparts including the malar streak, and browner wash to the sides. Basically, brown and buff feather veiling wears off through winter and spring, revealing grayer feather centers to the upperparts and whiter and more distinct markings to the underparts. I was surprised that the upperpart streaking became less distinct in spring, and don't quite know how this happens, but it seemed evident in specimens that this was the case (there is little or no prealternate molt in this species group). Figures 1-4 show trays with fresh and worn individuals of both taxa (upperparts).

In fresh plumage there was little or no overlap in the extent of black streaking to the upperparts, *nevadensis* wintering in California showing more extensive and more distinct streaking than *canescens* (Figs. 5-6, 9). In a quick assessment of geographic variation in *nevadensis* it appeared that individuals collected in Wyoming and Utah averaged less and less-distinct back streaking (Fig. 11), but the degree of variation within each of these groups may have been similar. As plumage wears through winter and into spring, the two species may become more similar in degree of back streaking (Figs. 3-4), but there still appears to be little overlap.

The extent and strength the malar streak averages less in *nevadensis* than in *canescens* (Figs. 7-8), with only minimal overlap between *nevadensis* individuals with maximum malar streak and *canescens* individuals with minimum malar streak (Fig. 10). Within *nevadensis,* there appeared little to no geographic variation in strength of and variation in the malar streak. As plumage wears through winter and into spring the malar streak may become bolder in both taxa, so this should be considered when assessing this character.

Thus, it appears a combination of bolder back streaking and reduced malar can be used to separate most or all *nevadensis* from most or all *canescens*. There may be some correlation between degree and distinctness of back and malar streaking in *nevadensis*; e.g., MVZ 63282 was independently selected as having the most distinct back streaking and the most reduced malar streak (Figs. 5, 7) so this should be kept in mind, as well as the possibility that individuals of each taxon may approach the other in these characters where breeding ranges come closest. All in all, though, I did not find any intermediates in fresh plumage that could not be placed to species.

Other characters to consider are size (*nevadensis* is larger than *canescens*) and the contrast of gray head and brown back, *nevadensis* appearing to be grayer-headed than *canescens* in fresh plumage (Figs. 1-2). It is possible that these and other characters may be of further use in species identification. A quick look at nominate *belli* showed that, besides being darker and browner, the degree of streaking and strength of malar was much more similar to canescens than to nevadenisis, so these identification criteria may be species wide (although variation in Bell's Sparrow subspecies *cinerea*, and *clementae* still needs assessment).

More details on each specimen shown in the figures below can be obtained from the MVZ database:
http://mvz.berkeley.edu/Bird_Collection.html
http://arctos.database.museum/SpecimenSearch.cfm?collection_id=29

Figure 1. Fresh Sagebrush Sparrows (*A. nevadensis*) collected in Inyo and San Bernardino counties, California, October-December.

Figure 2. Fresh Bell's Sparrows (*A. b. canescens*) collected in Kern County, California, September.

Figure 3. Worn Sagebrush Sparrows (*A. nevadensis*) collected in Humboldt County, Nevada, May.

Figure 4. Worn Bell's Sparrows (*A. b. canescens*) collected in Nye County, Nevada, May-June.

Figure 5. Fresh Sagebrush Sparrows (*A. nevadensis*) showing variation in back streaking: maximum (left, MVZ 63282, Oct), typical (center, MVZ 72959, Dec), and minimum (right, MVZ 72957, Dec). Collected in Inyo and San Bernardino counties, California.

Figure 6. Fresh Bell's Sparrows (*A. b. canescens*) showing variation in back streaking: maximum (left, 117561), typical (center, MVZ 117556), and minimum (right, MVZ 117563). Collected in Ken County, California, 11-12 September.

Figure 7. Fresh Sagebrush Sparrows (*A. nevadensis*) showing variation in malar streak: minimum (left, MVZ 72965, Dec), typical (center, MVZ 72963, Dec), and maximum (right, MVZ 63282, Oct). Collected in Inyo and San Bernardino counties, California.

Figure 8. Fresh Bell's Sparrows (*A. b. canescens*) showing variation in malar streak: minimum (left, 117564), typical (center, MVZ 117557), and maximum (right, MVZ 117556). Collected in Ken County, California, 11-12 September.

Figure 9. Fresh Sagebrush Sparrow (*A. nevadensis*, upper) and Bell's Sparrow (*A. b. canescens*, lower) showing minimum and maximum back streaking, respectively. See Figures 5 and 6 for specimen numbers and collection locations. See also Figure 11 regarding geographic variation in *nevadensis*.

Figure 10. Fresh Sagebrush Sparrow (*A. nevadensis*, upper) and Bell's Sparrow (*A. b. canescens*, lower) showing maximum and minimum malar streak, respectively. See Figures 7 and 8 for specimen numbers and collection locations.

Figure 11. Fresh Sagebrush Sparrows (*A. nevadensis*) collected in Wyoming and Utah, averaging less back streaking than those collected in California (Fig. 5) but still showing more than in Bell's Sparrows (*A. b. canescens*; Fig. 6). Average strength of malar streaking in these specimens appeared typical of the California-collected Sagebrush Sparrows (Fig. 7). Specimens: MVZ 78094-95 (Wyoming, Sep), MVZ 128487 (Utah, August), MVZ 84465-66 (Utah, Sep).