

RANGES OF THE SUBSPECIES OF THE WHITE-BREASTED NUTHATCH IN CALIFORNIA

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ABSTRACT: There are significant discrepancies among the published descriptions of the ranges of California's two subspecies of the White-breasted Nuthatch, *Sitta carolinensis aculeata* and *S. c. tenuissima*. To reevaluate the relationship between their ranges in the state, we recorded observations along the west edge of the range of *S. c. tenuissima* and the east edge of the range of *S. c. aculeata*, identifying birds to subspecies by diagnostic vocalizations. We made 457 observations in which the subspecies could be confirmed vocally. We found that the two subspecies are generally well separated in the north-central portions of the Sierra Nevada, with *S. c. aculeata* found well west of the crest and *S. c. tenuissima* east of the crest or at the higher elevations on the west side. The relatively wide band of dense fir (*Abies* spp.) and mixed conifer forest at the middle to lower elevations of the west side likely forms a barrier between them. In the southern Sierra and at the southern edge of the Cascades, the two subspecies come into close contact and we found evidence suggesting intergradation in the latter area.

The ranges of the two California subspecies of the White-breasted Nuthatch, *Sitta carolinensis aculeata* and *S. c. tenuissima*, remain uncertain because of discrepancies among various sources. While all agree that *S. c. aculeata* is the subspecies found west from the lower slopes of the west side of the Sierra Nevada and throughout southern California, there is considerable disagreement regarding how far east this subspecies occurs and regarding the range of *S. c. tenuissima* in the state.

Grinnell (1918) identified specimens of *tenuissima* from the White and Panamint mountains in eastern California and suggested, in part on the basis of Ridgway (1904), that this subspecies likely ranges north along the western edge of the Great Basin at least into southern Oregon. However, Miller (1941) showed the range of *tenuissima* not extending north of central Nevada and restricted in California to the White and Panamint mountains. Aldrich (1944) described the range of *tenuissima* as extending north to southern British Columbia and all along the east side of the Cascade Range and Sierra Nevada. In contrast, Grinnell and Miller (1944) mapped the range of *tenuissima* in California as restricted to the White and Panamint mountains, with the range of *aculeata* extending well east of the crest of the Sierra, all the way to the Nevada border from Mono County north into Plumas County. These authors also mapped *S. c. nelsoni* as the subspecies found in northeastern California from Plumas County north to the Oregon border. A comprehensive analysis of specimens of all the western subspe-

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cies of the White-breasted Nuthatch by Hawbecker (1948) largely confirmed the ranges suggested by Aldrich (1944) and differed significantly from the ranges mapped by Grinnell and Miller (1944). In particular, Hawbecker (1948) showed that *tenuissima* was the subspecies occurring all along the east side of the Sierra Nevada and Cascade Range, that *aculeata* does not occur east of the Sierra crest, and that *nelsoni* is not found in California.

In spite of Hawbecker's work, more recent sources have continued to rely largely on the ranges suggested by Grinnell and Miller (1944). Moffitt and Orr (1971) noted *aculeata* as the subspecies found in the Lake Tahoe basin (east of the Sierra crest), deferring to Grinnell and Miller (1944) in spite of noting that the specimens they examined appeared to be "intermediate with respect to most characters between *aculeata* and *tenuissima*." Genetic analysis of White-breasted Nuthatch subspecies (Spellman and Klicka 2007) largely confirmed the ranges suggested by Hawbecker (1948). However, the map of the ranges of the subspecies of the White-breasted Nuthatch in the sixth edition of the *National Geographic Field Guide to the Birds of North America* (Dunn and Alderfer 2011) essentially reproduced that of Grinnell and Miller (1944), except that it shows *tenuissima* rather than *nelsoni* as the subspecies found in northeastern California.

At least some of the confusion about the ranges of these subspecies is due to their very similar and overlapping physical characters (Pyle 1997, Mlodinow 2014), leading to uncertainty in identifying birds in the field or even in the hand. The vocalizations of California's two subspecies of the White-breasted Nuthatch, however, differ greatly (Dunn and Blom 1987, Gaines 1988, Sibley 2000, Mlodinow 2014), and some of these can be used to identify them in the field (Pandolfino and Pieplow 2015). To clarify the ranges of these two taxa in California, we compiled encounters with these distinct vocalizations along the eastern edge of the range of *aculeata* and the western edge of the range of *tenuissima* in all four seasons, using the range maps of Hawbecker (1948) as a working model.

METHODS

Between January 2010 and November 2015 we noted observations of the White-breasted Nuthatch throughout much of its range in California. We focused our efforts on the Cascade Range, Sierra Nevada, and areas to the east of those mountains, the areas of most of the discrepancies in published ranges. We did not survey west of the Sierra as there is no controversy about the subspecies (*aculeata*) found there. We identified birds to subspecies by the diagnostic vocalizations described by Pandolfino and Pieplow (2015). Following their terminology, we identified *aculeata* by either the "modulated quank" note or the "tuey" song, and identified *tenuissima* by either the "rapid quank" or "disyllabic quank" calls. Examples of these calls are available at www.westernfieldornithologists.org/W-B_Nuthatch. As noted by Pandolfino and Pieplow (2015), one cannot confidently distinguish between the calls of *tenuissima* and *nelsoni*. However, given that there is no specimen or genetic evidence of the latter occurring in California, we assumed that birds giving either the "rapid quank" or "disyllabic quank" were *tenuissima*.

We made 448 observations in which the subspecies could be identified

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and used nine observations by other persons familiar with the vocalizations of these subspecies. We surveyed in all four seasons, making 99 observations in winter (December–February), 96 in spring (March–May), 134 in summer (June–July), and 128 in fall (August–November). Of the 457 observations (list by date and locality available at www.westernfieldornithologists.org/W-B_Nuthatch2/Nuthatch-Supplemental_Table.pdf), 145 (32%) are substantiated with recordings (selection available at www.westernfieldornithologists.org/W-B_Nuthatch2; others on request).

RESULTS AND DISCUSSION

Our results are consistent with the ranges proposed by Hawbecker (1948) on the basis of physical characters as well as those of Spellman and Klicka (2007) based on genetic analysis. Subspecies *aculeata* is found west of the Sierra/Cascades crest and in southern California, while *tenuissima* is found at the higher elevations of the Sierra and east of the crest (Figure 1). Points along the eastern edge of the range of *aculeata* include Copco Lake in northern Siskiyou County (750 m), near Day in southwestern Modoc County (1200 m), near Nevada City in Nevada County (800 m), just east of Calaveras Big Trees in Calaveras County (1500 m), Yosemite Valley in Mariposa County (1200 m), near Shaver Lake in Fresno County (1700 m), and Chimney Creek Campground in southeastern Tulare County (1700 m). Localities along the western edge of the range of *tenuissima* include Juanita Lake in northern Siskiyou County (1600 m), along Forest Road 40N04 near the Siskiyou–Shasta County line (1100 m), the west side of Lake Almanor in Plumas County (1400 m), the Lake Tahoe basin (1900 m), Grover Hot Springs in Alpine County (1800 m), south of Courtright Reservoir in Fresno County (2500 m), and Chimney Creek Campground in southeastern Tulare County (1700 m). This distribution differs substantially from that of Grinnell and Miller (1944) mainly in the area around and to the north of Lake Tahoe. Those authors identified the White-breasted Nuthatches there as *aculeata*, but we found only *tenuissima* in that area. The two subspecies come into close contact north of the Sierra and in the southern Sierra, as we examine in more detail below.

Figure 1 depicts the relatively dense forests of fir (*Abies* spp.) and mixed conifers. Much of these forests is characterized by a closed canopy and dense understory, both features that all subspecies of the White-breasted Nuthatch tend to avoid (Gaines 1988, Grubb and Pravosudov 2008, Hardy et al. 2013). The two California subspecies are well separated along this band of forests in the north and central Sierra, and these habitats likely form a barrier between them. Where these forest types become less extensive north of the Sierra and in the southern Sierra, their ranges overlap to some extent, as discussed in more detail below. Another zone of separation lies between the Greenhorn Mountains (north-central Kern and south-central Tulare counties) and the higher elevations of eastern Tulare County. The deep gorge of the north fork of the Kern River, as well as more open xeric habitats of the Kern Plateau, may explain this separation.

In some areas the appearance of proximity can be misleading. For example, one finds *aculeata* in Yosemite Valley, an area dominated by open woodland of black oak (*Quercus kelloggii*), *tenuissima* in open pine forest

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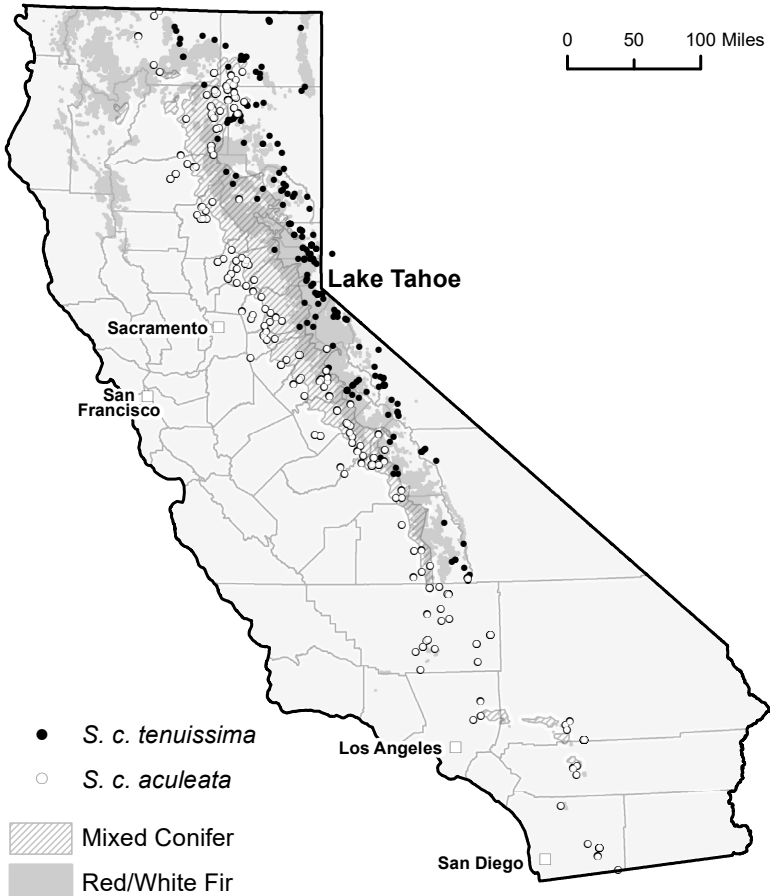


Figure 1. Locations of White-breasted Nuthatches identified to subspecies by vocalizations. Dark gray shading, primary ranges of white fir (*Abies concolor*) and red fir (*A. magnifica*) combined. Diagonal hatching, forest of mixed conifers, dominated by incense cedar (*Calocedrus decurrens*), sugar pine (*Pinus lambertiana*), and Douglas fir (*Pseudotsuga menziesii*). Encounters west of the Sierra Nevada, where only *S. c. aculeata* occurs, not mapped. Ranges of firs from the U. S. Forest Service's CALVEG Mapping Zone databases (www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5347192). Ranges of mixed conifer forest from Griffin and Critchfield (1972).

only 3 km away as measured horizontally. The difference in elevation between this sites, however, is well over 1000 m. In general, we found *aculeata* most frequently in open oak woodlands and *S. c. tenuissima* most commonly in open pine woodlands, primarily of *Pinus jeffreyi*. Subspecies *aculeata* does occur in conifer-dominated landscapes with few oaks in the Cascades, the Sierra, and the mountains of southern California (Gaines 1988, Unitt

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2004, pers. obs.). Such locations include north of Lookout in southwestern Modoc County, the west side of Lassen National Park, Mariposa Grove in Yosemite National Park, and patches of Cuyamaca Rancho State Park in San Diego County that did not burn in the fire of 2003. Likewise, *tenuissima* occurs in some woodlands of juniper (*Juniperus osteosperma*) and pinyon (*Pinus monophylla*), for example, along Leviathan Mine Road in eastern Alpine County. Subspecies *tenuissima* is found as well as in habitats that include some oak (Garrett and Dunn 1981, Gaines 1988, pers. obs.), such as near Quincy in Plumas County, Janesville in Lassen County, and south of Wishon Reservoir in Fresno County. The common feature for both taxa in all regularly occupied habitats tends to be open woodlands with fairly large trees.

Figure 2 shows the locations of all our observations by season. As expected for a relatively sedentary species (Grubb and Pravosudov 2008), the distribution of observations in all seasons is similar. The lack of winter observations at higher elevations in the southern Sierra is due to difficulty of access at that season. Notably, however, some White-breasted Nuthatches have occurred well beyond their breeding range. Subspecies *aculeata* has been recorded many times from late summer into winter in the deserts of southeastern California and eastern Kern County, well east of its southern California breeding range (Garrett and Dunn 1981, Patten et al. 2003, Unitt 2004). The eastern subspecies, nominate *carolinensis*, has wandered as far west as New Mexico (Baumann et al. 2013). White-breasted Nuthatches giving calls of the interior subspecies *tenuissima* or *nelsoni* have been found in winter at Arroyo Verde Park in western Ventura County (27–31 December 1987, Dunn pers. obs.), in fall in San Diego County (Unitt 2004), and in Imperial County in southeastern California (Patten et al. 2003).

Areas of Co-occurrence

We found two areas where both subspecies occur in very close proximity, even simultaneously at the same site (Figure 3). One is in the southeastern Sierra Nevada at the very southern edge of the range of *tenuissima* in Tulare County around Chimney Creek Campground, elevation 1700 m, 35.839° N, 118.042° W. Both subspecies were present within less than 500 m of each other 11 July 2011. The habitat here is open woodland with pinyon pine (*Pinus monophylla*), gray pine (*P. sabiniana*), and interior live oak (*Quercus wislizenii*), with Fremont cottonwood (*Populus fremontii*) and willow (*Salix* spp.) in the drainages. The understory is dominated by sagebrush (*Artemisia* spp.).

The other area is north of the Sierra Nevada in eastern Shasta, northwestern Lassen, and southwestern Modoc counties. We have several observations of these taxa coming within a few meters of each other and at least one example on 11 July 2015 in southwestern Modoc County where they appeared to be interacting directly. The habitat here typically consists of relatively open woodland of Jeffrey or ponderosa (*Pinus ponderosa*) pine with some incense cedar (*Calocedrus decurrens*), fir, and sugar pine (*P. lambertiana*). Some locations include an understory of small black oaks, but others lack oak. We have more than 70 observations from this area in all months except April and May. In the course of making observations in southwestern Modoc County on 27 July 2015, Able found individuals at two

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Winter



Spring



Summer



Fall



- *S. c. tenuissima*
- *S. c. aculeata*

Figure 2. Locations of White-breasted Nuthatch encounters confirmed by vocalizations by season (winter, December–February; spring, March–May; summer, June–July; fall, August–November).

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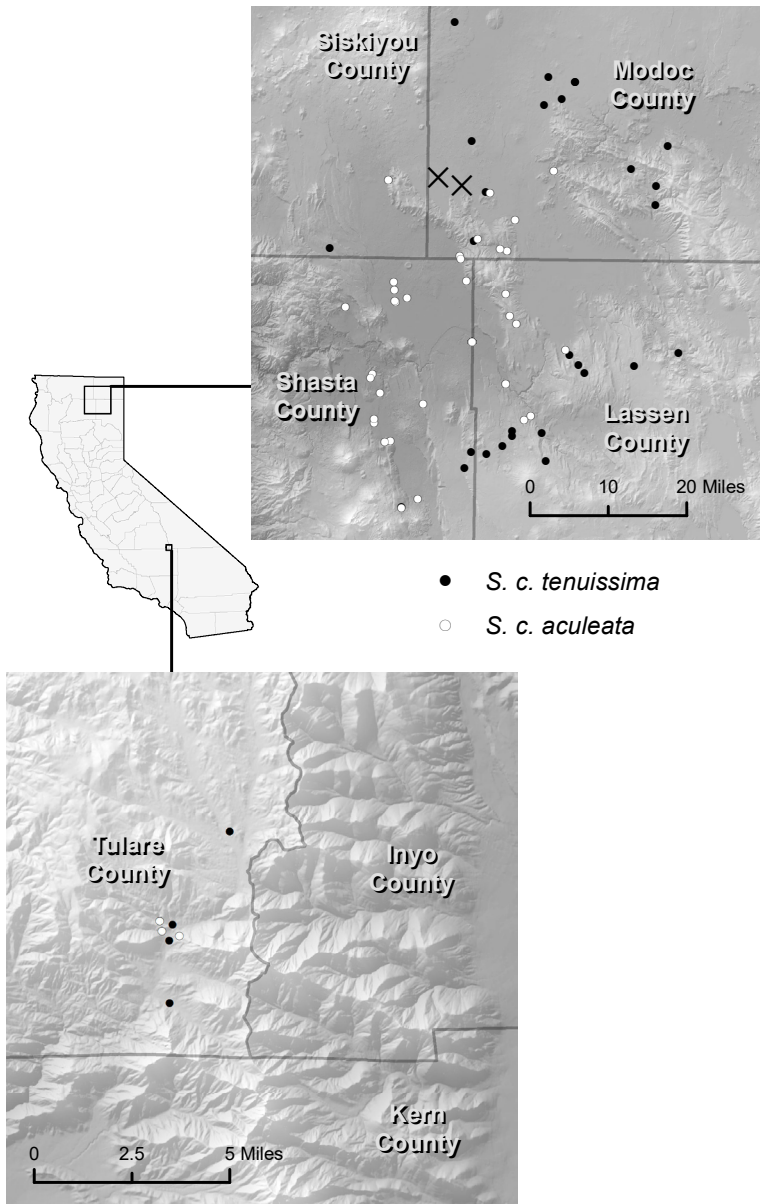


Figure 3. Locations of White-breasted Nuthatch encounters in areas where subspecies *Sitta carolinensis aculeata* and *S. c. tenuissima* come into close contact. In the upper inset map, × symbols mark the locations of two individuals giving calls of both subspecies.

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locations (41.318° N, 121.362° W and 41.333° N, 121.421° W) that gave calls of both subspecies (Figure 3). Both birds were recorded giving calls of *tenuissima*, followed by calls very similar to those of *aculeata*—“modulated quanks,” according to the terminology of Pandolfino and Pieplow (2015). These calls were nearly identical to those of *aculeata* in terms of length, frequency modulation, and their over-slurred pattern of pitch rising then falling. However, they were given at a pitch lower than any calls of that subspecies analyzed by Pandolfino and Pieplow (2015). As the song and calls of *tenuissima* are lower in pitch than those of *aculeata*, this difference is in the direction one might expect for an intergrade. Thus southwestern Modoc County may be an area where these subspecies intergrade. It is also possible that birds of one subspecies learned the calls of the other. Although call notes of most species are considered innate (Thorpe 1961), numerous studies have demonstrated that many passerines as well as nonpasserines can and do learn calls (Mundinger 1979, Marler 2004). Given that Spellman and Klicka (2007) and Walstrom et al. (2011) have proposed that these taxa be recognized as separate species, the birds in this area should be studied more closely. Collection of specimens and tests of responses to playback of vocalizations in this area are needed to reveal whether, and to what extent, these subspecies may be intergrading or hybridizing.

Our observations suggest that overlap of this extent between these taxa is unlikely in any other area of California. But similar work in Oregon and Washington might reveal other regions of overlap. The area on both sides of the Columbia River between Troutdale and Hood River, Oregon, is intriguing, as reports to www.eBird.org suggest that White-breasted Nuthatches are found throughout this zone, which extends from the known range of *aculeata* on the west to that of *tenuissima* on the east.

A Cautionary Tale

It is surprising that controversy about the ranges of these two subspecies in California has persisted for so long. The thorough specimen analysis of Hawbecker (1948) should have resolved the question, especially once corroborated by the genetic work of Spellman and Klicka (2007). Most sources (e.g., Moffitt and Orr 1971, Dunn and Alderfer 2011) simply accepted the maps of Grinnell and Miller (1944), likely because of the justifiably high regard most hold for their work. Hawbecker’s work, in spite of being published in a major ornithology journal (*Condor*), has been largely ignored. His publication was not cited by Spellman and Klicka (2007), Grubb and Pravosudov (2008), or Baumann et al. (2013). There is a lesson here that even the most respected sources should be questioned and subjected to critical re-examination. Now that Hawbecker’s analysis has been confirmed by two independent means (genetics and vocalizations), we hope this issue is resolved.

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