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DISTRIBUTION OF THE SUBSPECIES OF GREAT HORNED OWLS IN TEXAS

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ABSTRACT.—The ranges of two subspecies of Great Horned Owls (*Bubo virginianus virginianus* and *B. v. pallescens*) in Texas were determined by comparison of 157 specimens from Texas and smaller series of each subspecies from east and west of Texas respectively, with the same three specimens (pale, medium and dark). Six color characters were used. The values of these were summed, and mapped. The range of nominate *virginianus* was found to be closely dependent on the distribution of hardwood, pine and oak dominated wooded areas in Texas.

The Great Horned Owl, *Bubo virginianus,* is an abundant, widespread, and successful avian predator in diverse habitats. Two distinctive subspecies occur in Texas. In the wooded areas of the east is the dark, heavily barred, richly ochaceous nominate subspecies, *B. v. virginianus*, while the paler, more xeric adapted subspecies, *B. v pallescens,* (type locality: Watson Ranch, on the Medina River, 18 miles southwest of San Antonio, [Bexar Co.]) occurs in the western part of the State. Oberholser (1974), based apparently on 50 specimens (solid symbols on his map, p. 447) mapped the range of *pallescens* from Clay County on the Oklahoma border in a line bending eastwards to Navarro County, south to DeWitt County, and thence southwest to Webb County on the Rio Grande with *virginianus* occurring in the eastern third, and southern Texas.

This study was instigated because of the author's need to understand more fully the population upon which the name *B. v. pallescens* was based for an ongoing study of the geographic variation in the species in the Rocky Mountains. It is also, in part, a continuation of my defining the zone of intergradation between these two subspecies in the forest/prairie interface in the United States (Dickerman 1993 and 2002).

MATERIALS AND METHODS

To provide a standard by which to evaluate birds from Texas, a series of 21 specimens from the eastern states representing *virginianus*, and a series of 25 birds from Arizona and New Mexico, representing *pallescens* were compared to three specimens ranging in color from light to dark (Fig.4). Six color characters were selected as described beyond, and all specimens in this study were compared to the same three color standard specimens. The values for the relatively small series of non-Texas *virginianus* and *pallescens* that were color coded do not overlap (Fig. 2).

Thus summed values of 4.5 to 11.5 were considered to represent *pallescens,* and values of 14.0 to 19.5 were considered to represent *virginianus.* It should be noted that the summed color values for the type specimen of *pallescens* (8.5) falls well within the values for the Arizona and New Mexico population.

In January 1995 I first visited most of the collections in Texas (see Acknowledgments), comparing all specimens with full data to the series of three color standard birds. At that time, Texas specimens were assigned a value from one to four or five for six characters, and they were identified subjectively as *virginianus, pallescens* or intermediate. One color character was foot color which had to be thrown out because half or more of the large series

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at Texas A & M had been under water when the collection was housed in a basement and was flooded. Such specimens all had tan feet!

The process was repeated a year later, using another suite of six characters: dorsal blackness (0.5–4), crown blackness (0.5–4), ventral barring (0.5–5), extent of foot markings(0.5–3), depth of ochraceous coloration (0.5–4) and extent of dusky markings in the outer web of the second retrix (0.5–3). All specimens were reevaluated using those new standards. Interestingly the value of 5 was used for a single bird in the entire study.

Subsequently specimens in the American Museum of Natural History, the National Museum of Natural History and the Museum of Southwestern Biology were compared to the same color standards using the same suite of characters. A few additional specimens from Texas found scattered in other collections (see Acknowledgments) were identified to subspecies.

A total of 157 specimens from Texas were color-coded. The values for the six characters were totaled and were plotted on the bar-graph (Fig. 2) and mapped by county (Fig. 1).

RESULTS

When summed scores of eastern, western and Texas specimens were plotted on a bar graph (Fig. 2) about 30% of Texas birds fall in the gap between the values for *pallescens* and *virginianus*. When mapped those intermedi-

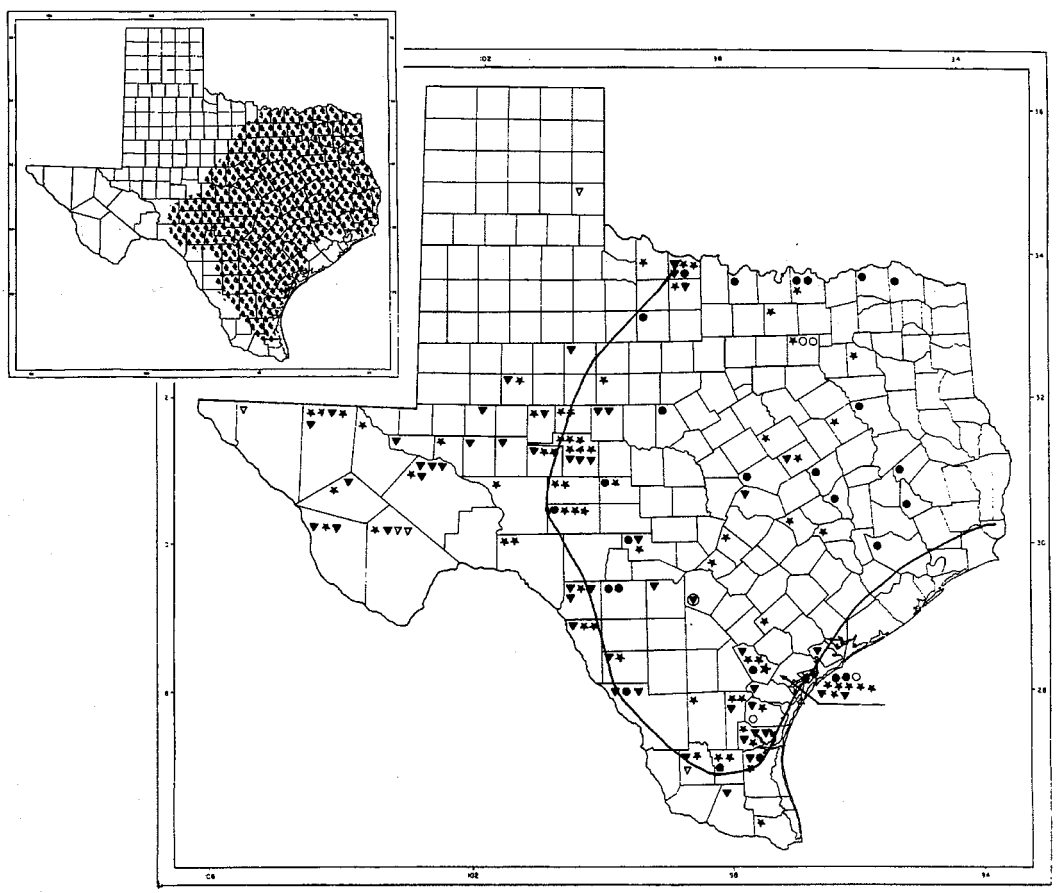

Figure 1. Distribution of specimens of Great Horned Owls by summed color values. triangles = values 6.5–11.5; stars = values 12.0–14.0 and circles = values 14.5–19.5. Solid line outlines western and southern limit of circles which denotes the range of *B. v. virginianus* in Texas. Inset shows the distribution of "wooded" lands in Texas, dominated by mixed hardwood, pine, and oak associations.

ate birds largely occurred within a county on either side of the line defining the range of the two subspecies (Fig.1).

When a line is drawn connecting the solid circles outlining the distribution of *B. v. virginianus* in Texas, its range proved to be far more extensive than was mapped by Oberholser (1974). When this distribution is compared with the distribution of wood- lands in Texas, including hardwood, and pine and oak dominated associations (derived from Frye, Brown and McMahan 1984, Figure 1) it is amazing how similar they are. The shadow of the former dis-

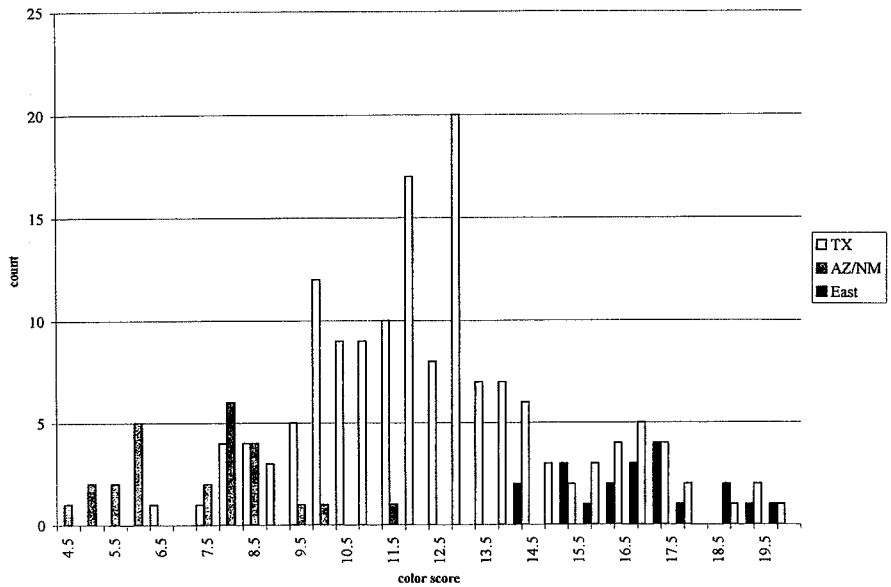

Figure 2. Distribution of specimens of *pallescens* (gray bars) from Arizona and New mexico, Texas specimens (white bars), and *virginianus* (black bars) from eastern states by summed color values for six characters (see text for explanation).

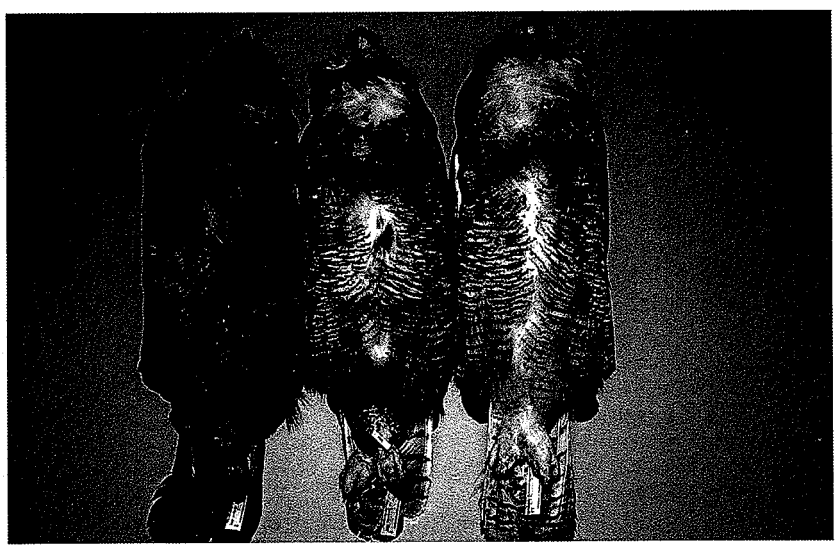

Figure 4. Specimens used as color standards, left to right: *B. virginianus virginianus* MSB 17940 Oklahoma, Muskogee Co., Warner, 7 mi. east, 10 April 1997; intermediate MSB 20403 Texas, Crocker Co., Sheffield, 14 mi. east, 26 December 1997; *B. v. pallescens* MSB 7684 New Mexico, Lincoln Co., Corona, 20 mi. south, 29 September 1991.

tribution of these wooded areas remains in some cases, *eg.* along the Red River in Wichita County, even though some habitats have been drastically modified. Typical specimens of *pallescens*, such as the type specimen, from well within the range of *virginianus* may occur in island-like pockets of suitable xeric habitat (Dickerman 1993).

Ten dark birds from central and Transpecos Texas were not mapped as they represent either long distant migrants (Dickerman ms), or a dark, undescribed Rocky Mountain subspecies occurring in the Transpecos region (Dickerman ms).

The transition from darker more mesic adapted *virginianus* to paler, more xeric adapted *pallescens* in Texas is very abrupt, essentially being only 2–3 counties wide, compared to this transition in the prairie states where it is almost state-wide (Dickerman 1993).I suggest that this rapid transition from one form of Great Horned Owl to another may be more common than one might think *eg.* the border between the southern Rocky Mountain population and that of the northern Rockies is essentially the Snake River Valley (Dickerman unpubl.data),and the transition from the pale aspen parkland *subarcticus* to the very dark northern Rocky Mountain population *lagophonus,* occurs in the lower valleys of the eastern slopes of the Rockies (Dickerman 2002).

The paucity of material from certain regions of Texas must be stressed, particularly from the northern panhandle, although suitable habitat in that largely agricultural region is limited, but compare Figure 1 with the species distribution map in the Texas Breeding Bird Atlas (Benson and Arnold 2001). It is interesting to compare Texas with Nebraska, Kansas and Oklahoma combined (Dickerman 1993). Texas has 254 counties and covers about 267,000 square miles; these data for NE, KA, and OK combined have 258 counties and 250,000 square miles. A total of 163 specimens from Texas were used in this study (1/1647 sq. miles) compared to 115 specimens total for NE, KA, and OK (1/2173 sq. miles). No specimens were available from 168 Texas counties.

Finally the results of the two techniques; old fashioned color comparison, subjective subspesific identification, and the more precise assignment of color values by comparison with a standard series of specimens, were essentially the same. Both yielded maps plotting the range of *B. v. virginianus* in Texas coincident with the range of forests of pines, hardwoods and oaks.

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I examined some specimens collected by Warren M. Pulich, and he provided me with data on specimens not immediately available. A few specimens were examined in the University of Arizona, Tucson; James Ford Bell Museum of Natural History, University of Minnesota; Museum of Comparative Zoology, Harvard University, and the San Diego Museum of Natural History.

John P. Hubbard suffered through endless hours of discussion of my Great Horned Owl studies, and C. S. Houston and F. Gehlback thoughtfully reviewed the manuscript.

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