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NEST AND NEST-SITE CHARACTERISTICS OF A WESTERN POPULATION OF FOX SPARROW (*PASSERELLA ILIACA*)

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Relatively little is known about nesting and breeding habits of the fox sparrow due to its secretive nature on the breeding grounds (Linsdale, 1928; Austin, 1968; Threlfall and Blacquiere, 1982). Accounts of fox sparrow nests describe materials used, species of plant the nest was found in or under, and general characteristics of the habitat in the area, but do not give nest measurements or describe vegetation immediately surrounding the nest-site (Austin, 1968; Threlfall and Blacquiere, 1982). Bendire (1889) and Pierce (1921) each gave measurements of a single representative nest for some subspecies, while Mailliard (1921) reported the ranges of measurements of 14 nests from a single population at Lake Tahoe, California. Herein we provide measurements of 23 fox sparrow nests as well as descriptions of physical and vegetative characteristics associated with 25 nest-sites from a single population. These data, viewed as phenotypic extensions with possible effects on fitness (as argued in Dawkins, 1982; Lent, 1992), add to the growing body of information about individual and geographic variation in this species (Linsdale, 1928; Swarth, 1920; Zink, 1986, in press).

Fox sparrows were studied from late May to early July 1989 in Sequoia National Forest, 7.5 km west of Hume, Fresno County, California (36°48′N, 118°59′W, altitude 1,950 m). The study site is at the boundary between two fox sparrow subspecies (*P. i. stephensi* and *P. i. megarhyncha*) interconnected by clinal variation (Zink, 1986); therefore, we do not assign a subspecies to the population we studied. Habitat at the study site consists of mostly chaparral (the most abundant species are listed in Table 1) and also some mixed coniferous forest including giant sequoia (*Sequoiadendron giganteum*), white fir (*Abies concolor*), ponderosa pine (*Pinus ponderosa*), and sugar pine (*Pinus lambertiana*).

Nests were located by observing adults and by walking through patches of vegetation while attempting to flush incubating or brooding adults. Nest and nest-site characteristics were measured after the nest was no longer active. Using a metric ruler, we measured nest size, height of nest (distance from bottom of nest to ground), height of nest plant (plant nest was placed in or under), distance from top of nest to top of nest plant, and distance from side of nest to nearest edge of nest plant. We calculated relative distance from top of nest plant by dividing distance from top of nest plant by nest plant height and relative distance from side of nest plant by dividing distance from side of nest by diameter of nest plant. We measured nest concealment by standing at edges of nest plants and then estimating, to the nearest 25%, percent of nest visible from top and any sides of the nest plant without moving any branches.

Nest-site choice may be affected by surrounding habitat as well as by physical characteristics within the immediate vicinity of the nest (Martin and Roper, 1988; Zamora, 1990). Therefore, we visually estimated percent of shrubby vegetation occupied by each plant species within circles centered on the nest and having radii of 0.5 and 4.0 m. In addition, presence and number of conif-

TABLE 1—Means and standard deviations (in parentheses) of the percentage of shrubby plant species found in 0.5-m and 4-m (radius) circular plots centered on fox sparrow nests near Hume, California.

Plant species	0.5 m	4 m
Mountain whitethorn (*Ceanothus cordulatus*)	52.3 (45.4)	50.7 (35.4)
Green-leaf manzanita (*Arctostaphylos patula*)	17.8 (33.1)	17.3 (26.5)
Bush chinquapin (*Castanopsis sempervirens*)	13.3 (32.3)	9.7 (21.2)
Sierra gooseberry (*Ribes roezlii*)	5.4 (15.1)	5.9 (10.6)
Salix spp.	3.8 (19.6)	5.5 (17.7)
Other species	7.4 (1.93)	10.9 (8.1)

erous trees were noted for each 4-m circle. All values are reported as means ± one standard deviation.

All nests were bulky, made of sticks and bark, and densely lined with fine grass. Nests had a mean outside diameter of 15.5 ± 3.9 cm, inside diameter of 6.9 ± 1.2 cm, depth of 4.8 ± 0.9 cm, and outside height of 6.7 ± 1.2 cm. Means for our nest size measurements fall within ranges of values reported for other western fox sparrow nests (Bendire, 1889; Mailliard, 1921; Pierce, 1921; Harrison, 1979), with the exception that many of our nests had larger outside diameters (range = 10.0–27.0 cm) than those reported by Harrison (1979). Nest size and shape, like any phenotypic trait, may vary intraspecifically with geography (Schaefer, 1976; Kern, 1984). Therefore, the differences observed between our study site and the measurements reported by Harrison (1979) may be due to interpopulational variation in nest construction.

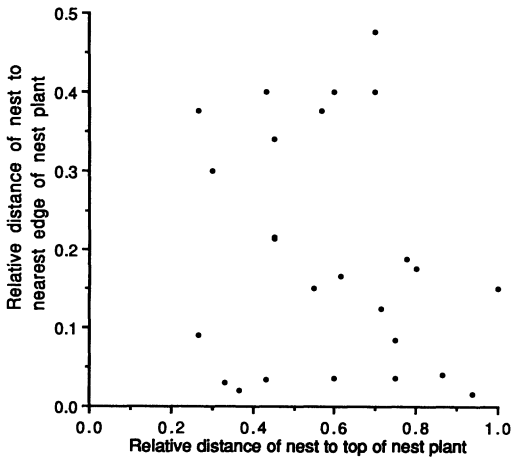

FIG. 1—Relative nest position in nest plant of fox sparrow nests near Hume, California.

Fourteen of 23 nests (61%) were placed on the ground. Mean height of nine above-ground nests was 30.0 ± 10.8 cm. Mean height of nest plants was 1.41 ± 0.66 m. Almost half (40%) of nests were completely concealed, 32% were only 25% visible, 12% were 50% visible, and 16% were completely visible without moving any branches. On average, fox sparrows placed their nests 85.2 ± 65.5 cm from the nearest edge of the nest plant and 83.8 ± 67.6 cm from the top of the nest plant. The distribution of relative distances from the top and side of nest plant (Fig. 1) compared with the nest concealment data indicate fox sparrows place nests in a variety of locations within a nest plant as long as the nest is well concealed.

Mean percentages of shrubby plant species were similar for the 0.5-m and 4-m nest-site plots (Table 1). Only half (48%) of the 4-m nest-site plots contained coniferous trees larger than 1 m. An average of 3.8 ± 2.7 coniferous trees occurred in plots containing coniferous trees. Fox sparrows commonly nest in or under coniferous trees in eastern North America (Terrill, 1968; Threlfall and Blacquiere, 1982), but we found no nests in or under coniferous trees at Hume. The majority of nests (59.2%) were located in or under mountain whitethorn, 18.5% were in or under green-leaf manzanitas, 14.8% were associated with bush chinquapin, 3.7% were under sierra gooseberry, and 3.7% were in willows. The similarity of these values to occurrence of shrubby plant species in the 0.5-m and 4-m plots (Table 1) suggests that fox sparrows do not prefer a different kind of habitat immediately surrounding the nest than what is found within the 4-m plot surrounding the nest site. Many studies of nest-site selection have indicated that certain species of plants are more common around nest-sites than in the surrounding habitat (e.g., Martin and Roper, 1988). In contrast, our data revealed no preference for

any particular plant species, other than the general requirement of chaparral. Instead of choosing nest-sites based on species of plants present, fox sparrows may be focusing on more general habitat characteristics such as presence of dense, shrubby vegetation for concealment from predators.

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A LATE-PLEISTOCENE OCCURRENCE OF ERMINE (*MUSTELA ERMINEA*) IN SOUTHEASTERN NEW MEXICO

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Pleistocene climates in the western United States greatly affected the geographic ranges of numerous extant species, particularly in allowing northern or highland species to occur much farther to the south or at notably lower elevations. Many are known from New Mexico as fossils from late in the last glacial age; others, expectable under hypothesized climatic and floral conditions, have not been reported (Harris, 1990). The latter includes *Mustela erminea* (ermine). This note doc-