ambient temp, females with a larger body size are better able to incubate a large clutch of eggs than a male (Cade 1960). If climate and latitude affect incubation duties, then rates at each latitude should reflect severity of the climate at the eyrie (i.e., females taking a larger share of duties in northern latitudes and less in the south). It is difficult to speculate from the limited data available how much latitude and climate influence incubation rates, though there appears to be much variation. When incubation rates of the northern New Mexico pair are compared to others, it is clear that the male incubated for a greater length of time/d and had a higher daytime incubation rate than reported elsewhere. Closer observations of incubating Peregrines are needed at different latitudes and climates in order to determine how the sexes are influenced by such factors as latitude, daylength, climate and individual behavioral variability.

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NEST SITE CHARACTERISTICS OF PRAIRIE FALCONS IN THE MOJAVE DESERT, CALIFORNIA

DOUGLAS A. BOYCE JR.

Runde and Anderson (1986) summarized characteristics of Prairie Falcon (*Falco mexicanus*) nest sites in the western U.S. from written accounts (Decker 1931; Enderson 1964; Leedy 1972; Ogden 1973; Porter and White 1973; Platt 1974; Denton 1975; Ogden and Hornocker 1977; Williams 1981) and from their own work. Data from virtually all western states were included, except Arizona and California. This paper supplements Runde and Anderson's (1986) summary because: 1) the Mojave Desert is a major biotic province (Mojavian; Dice 1943) containing a large breeding population of Prairie Falcons (Boyce et al. 1986) for which nest site characteristics have not been previously reported in detail, 2) some of my findings for the Mojave Desert differ from their data, and 3) I include data gathered at 44 nests studied by Millsap (1984) in westcentral Arizona.

I collected data on characteristics of Prairie Falcon nest sites in the Mojave Desert, California, from 1977 to 1979. In this report *nest site* refers to a specific location where falcons nest, usually a cliff but there are exceptions (cf., MacLaren et al. 1984). The *nest,* or *eyrie,* is the exact location at a nest site where eggs are laid. Nest variables measured included height (floor to ceiling, centered on the scrape), opening height and width (taken at nest entrance), length (entrance to back wall), floor area, entrance area, and aspect. Nests were categorized as either a pothole, crevice, ledge or stick nest. *Cliff height* was measured at the nest. *Eyrie height* was measured from the nest floor to the cliff base. *Cliff face area* was measured from photographs using a compensating polarimeter calibrated to known cliff height. Mean eyrie exposure and nonrandom orientations of circular data were inferred using Rayleigh's test (Zar 1984).

Nest Sites. Runde and Anderson (1986) noted that mean cliff height and eyrie height for western U.S. nest sites were highly correlated and that eyrie height averaged 63% of cliff height. The mean cliff height of 29.3 m (N = 52; SE = 7.1) for Mojave Desert nests was exactly the same as the mean for eight other western states, and the mean eyrie height of 18.3 m (N = 52; SE = 1.5) was only 0.2 m less than the western average. In westcentral Arizona mean cliff height and mean nest height were 19.8 m and 14.4 m, respectively, and nest height averaged 73% of cliff height (Millsap 1984). It is interesting to note that mean California and Arizona eyrie heights (as a percent of cliff height) were again in the same narrow range as other western nests. On this basis, nest site selection is inferred but data on availability of potential eyries at different heights has yet to be collected to test this hypothesis.

Mean cliff area for Mojave Desert nests was 1414 m^2 (N = 49; SE = 238) and was correlated with cliff height ($r^2 = 0.78$). The correlation is not surprising since I calibrated cliff area using known cliff heights. This suggests, however, that cliff width must be relatively constant. If the correlation holds for other western U.S. localities, I would expect mean cliff area to be the same as that for the Mojave Desert since mean cliff heights, used in the calculation for both areas were the same. Millsap (1984) reported that in westcentral Arizona mean cliff area was considerably larger (7888 m^2) than the Mojave Desert even though mean cliff height was lower, meaning falcons nested on low, wide cliffs.

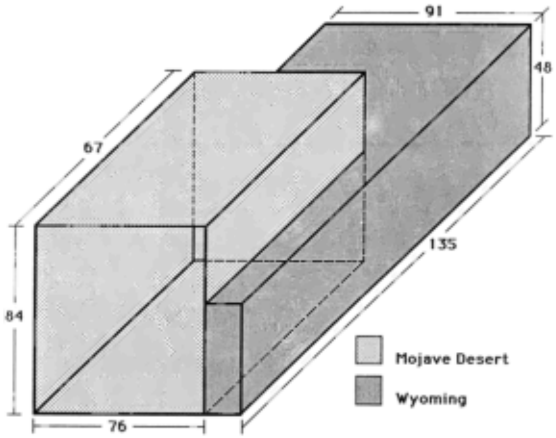

Figure 1. Comparison of the average three-dimensional shape of Mojave Desert Prairie Falcon nests with the mean shape for Wyoming nests. Dimensions are mean distances (cm) listed in Table 1.

Nests. Mean nest height (floor to ceiling) was much higher than was reported from Wyoming (Table 1) but nest length and width were much shorter. Average floor area for Mojave Desert nests was 47% smaller, and the mean shape of nests differed considerably from the mean Wyoming shape (Fig. 1). This may be due to microenvironmental requirements. Williams (1984) recorded temps at one Prairie Falcon nest in Colorado during a 23 hr period on 10 June 1980. Nest temp fluctuated 7.4°C while ambient temp fluctuated 21.1°C during the day. Since the Mojave Desert is considered a hot North American desert (Jaeger 1957), the nest microenvironment may need to be different from the cooler Red Desert area of Wyoming in order for nest success to occur.

Stable nest temp may buffer nestlings from ambient temp extremes. Nest shape or volume may influence the temp range to which nestlings are subjected. The advantage of smaller floor area and smaller eyrie volume in the Mojave Desert is uncertain. It would seem that greater air volume would provide greater thermal enertia to changes

Table 1. Characteristics of Prairie Falcon nest sites in the Mojave Desert and southern Wyoming.

	MOJAVE DESERT				WYOMING[a]			
VARIABLE	$\bar{X}$	SE	RANGE	N	$\bar{X}$	SE	RANGE	N
Nest height (cm)	84.1	44.1	15–285	32	47.9	3.6	11–193	68
Nest width (cm)	76.2	6.1	34–244	50	91.2	7.5	18–313	70
Nest length (cm)	66.9	4.6	33–220	50	135.4	8.8	43–400+	71
Floor area (cm^2)	7056	1936	645–23 658	53	9325	770	1600–29 275	70
Entrance (cm^2)	6724	900	2235–190 602	39	5375	975	875–53 500	56

[a] From the "Red Desert" area (Runde and Anderson 1986).

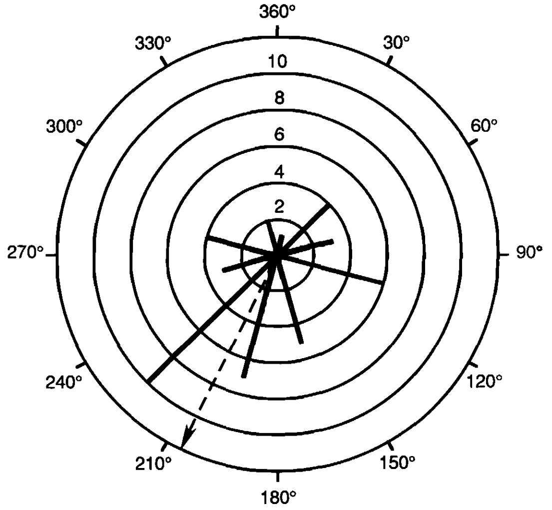

Figure 2. Frequency histograms of eyrie exposure for Prairie Falcons in the Mojave Desert 1977–79. The mean exposure is indicated by a broken line.

of ambient temp within the nest, which implies that nest selection is occurring. Again, data on availability of nest sites is needed to infer selection.

Prairie Falcons nest on ledges, in potholes, crevices and stick nests (Brown and Amadon 1968). Stick nests of the Common Raven (*Corvus corax*), the Red-tailed Hawk (*Buteo jamaicensis*) and the Golden Eagle (*Aquila chrysaetos*) were used by Prairie Falcons in the Mojave Desert. In other western U.S. localities, Prairie Falcons used potholes more (45%) than any alternative (crevice 15%, ledge 24%, stick nest 16%; Runde and Anderson 1986), but in the Mojave Desert Prairie Falcons used stick nests (49%) most often (crevice 0%, ledge 21%, pothole 30%). Stick nests were found on ledges (N = 20), in crevices (N = 4), and in potholes (N = 2). To eliminate stick nests as a category, I sorted stick nests into the three aforementioned categories (crevice, ledge, pothole) and then combined them with non-stick nests. On this basis, 31 nests (58%) were located on ledges, 18 (34%) were in potholes and four (8%) were in crevices.

There appear to be two reasons why stick nests are used frequently in the Mojave Desert. First, ravens are common in the desert and build nests on cliffs in locations that would otherwise be unsuitable for Prairie Falcons. They also build nests in locations that are suitable for Prairie Falcons. Second, potholes seem to be uncommon in the Mojave Desert. Potholes occur more commonly in sandstone cliffs. Granite, limestone and conglomerate cliffs dominate the landscape in the Mojave Desert, while sandstone cliffs occur infrequently.

Aspect. Twenty-one nests (40%) faced southwest, 15 (28%) faced southeast, 12 (13%) faced northwest, and five (9%) faced northeast (Fig. 2). The mean eyrie aspect averaged 207°, a definite southern exposure, and was only weakly significant ($r = 0.21$; $P < 0.10$). I do not know if the mean aspect of nests is due to a preponderance of south-facing cliffs. There was no relation between nest success and aspect (Boyce 1982). However, in westcentral Arizona Millsap (1984:30) noted "below 600 m elevation north facing cliffs were used more often and south facing less often than expected . . . . There was no detectable bias in cliff selection by aspect at higher elevation." His opinion was that Prairie Falcons selected nests at low elevations to reduce heat stress.

Runde and Anderson (1986:26) inaccurately reported on Tyler's (1923) observations for California: "In fact, Tyler (1923) reported that most Prairie Falcon eyries in southern California had northerly aspects and none were southerly. He attributed this to a scarcity of south-facing cliffs and an abundance of north-facing cliffs." Tyler visited 17 nests over 22 seasons and confined his studies to a small area in central California, not southern California. Runde (pers. comm.) only mentioned Tyler's work as it hinted at the availability of cliffs with southern aspects and suggested that a lack of south-facing cliffs could explain the lack of south-facing eyries.

Management. Descriptions of Prairie Falcon nest sites may be useful in formulating specific nest site management plans. The next two important steps are to 1) examine the relationship between physiographic characteristics of nest sites and productivity throughout the species' range, and 2) adequately address the issue of use vs. availability in order to make more meaningful management recommendations. In the Mojave Desert, for example, Prairie Falcons fledged more young (<2) from nests located higher on the cliff ($\bar{X} = 21.1$ m) than from nests located lower on the cliff ($\bar{X} = 15.8$ m) and successful nests were higher in elevation ($\bar{X} = 1084.5$ m) than unsuccessful nests ($\bar{X} = 927.5$ m) (Boyce 1982). Once a relationship between nest site characteristics and reproduction is established, changes can be implemented at historical nest sites to improve reproduction or new nests can be created at previously unsuitable cliffs. Cliffs have been altered to improve existing natural features with subsequent nesting success (Boyce et al., 1980; Boyce et al. 1982).

Runde and Anderson (1986) suggested management guidelines for creating new nest sites, based on mean values derived from summarizing their data and data from eight other studies. There may be in fact an optimally shaped artificial nest that would be suitable throughout the entire breeding range. The fact that Mojave Desert nest shape differs substantially from Wyoming nests should alert managers to be especially aware of local patterns when implementing management programs. However, until it has been shown that regional differences in Prairie Falcon nest characteristics are due to selection, managers should be cautious in developing plans.

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ADULT PAIR OF MERLINS IN SOUTHERN UTAH IN JUNE

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While participating in a Utah Peregrine Falcon (*Falco peregrinus*) survey, the author and a co-observer sighted and confirmed the presence of an adult pair of Merlins (*Falco columbarius*) in southern Utah. The falcons were light in color and were thought to be *F. c. richardsonii.* Positive identification of the subspecies by a tail-band count was not possible.

Observations occurred on 1 June 1984, between 0955 and 1008 H (MDT), south of Bryce Canyon National Park (approx. 112°20′W longitude, 37°27′N latitude). Observations were made using a spotting scope (15 × 30). The female Merlin was sighted at 0955 H perched in a snag at the top of a 120 m, southeast-facing cliff, approximately 0.5 km from the observation site. At 0958 H she