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MIGRANT AND BREEDING PEREGRINE FALCONS IN NORTHWESTERN PERU

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Peregrine Falcons (*Falco peregrinus*) have been sighted regularly throughout most of western South America from Colombia to Chile (Blake 1977) and have been found breeding in Ecuador (Jenny et al. 1981, Jenny et al. 1983), Chile (Johnson 1965), and Argentina (Ellis and Peres 1983). They are also suspected of breeding in southwestern Peru (Ellis and Glinski 1980), and this area has been included in the species' breeding range (Cade 1982). North American peregrines are known to winter in Central and South America as far south as Chile (Johnson 1965, Blake 1977). Parker et al. (1982) listed this species as a rare migrant in Peru from the coast to the central Andes. We present here the first evidence that Peregrine Falcons breed in the western foothills of the Peruvian Andes, and we summarize observations of migrating Peregrine Falcons at one point along the coast of northwestern Peru.

From June, 1980 to August, 1982, we watched migrating Peregrine Falcons in the Cerro Illescas, a peninsular range of rugged 400-m high desert hills in northwestern Peru (6°0′S, 81°0′W). Although the area's vegetation is sparse, consisting mainly of *Prosopis juliflora, Acacia* sp., *Capparis angulata* and *C. ovalifolia,* the cold coastal waters are rich in aquatic life and support large populations of sea and shore birds.

We also discovered and monitored three pairs of breeding Peregrine Falcons 200 km to the east, on cliffs rising 450 to 1,000 m from the 150-m scrub-desert floor near Olmos, Peru (5°59′S, 79°46′W). The vegetation and climate of this area are markedly different from that of the coast. The highly dissected peaks are forested with 5- to 15-m tall trees, including *Loxopterygium lusango, Cavanillesia platanifolia, Bursera graveolens* and *Bombax* sp. (Tosi 1960:32–96). The scrub-desert floor vegetation shares several species with that of the coast, but is more lush owing to a mild rainy season from January to April.

During our two years in Peru, at least one observer was in the field on the coast every day, but not specifically looking for falcons. When a falcon was sighted, we watched it with binoculars. We guessed the sex on the basis of size for 62 of 90 peregrines, in most cases at fairly close range. Age was determined on the basis of plumage for 50 birds.

While it is generally accepted that North American peregrines winter in Central and South America, we present more specific data on timing of migration, and sex and age ratios for these birds. We considered the majority of peregrines that we saw along the coast to be migrants from North America, rather than migrant *F. p. cassini* or local residents, for the following reasons. We did not find any eyries or birds resident on cliffs in the Cerro Illescas region, despite our extensive search of cliffs. We saw falcons during distinct migration seasons, mostly flying southward from October through December, and northward from late January through April. Seventy of the 90 falcons were sighted in November, February, and March. Finally, all birds that we saw at close range (<20 m) appeared pale, with little or no rufous wash on the breast, extensive white auricular areas, and a rather narrow malar stripe, all characteristics of the Arctic subspecies, *F. p. tundrius* (White 1968).

Of the 15 falcons that we saw during the 1980–1981 migration season, at least four were females and six were immatures. We made 75 sightings during the 1981–1982 season, owing to more effort on our part, and we identified 58 falcons to sex and 44 to age. The ratio of males to females was fairly even (28 ♂, 30 ♀) and remained so throughout the season, but adults (33) outnumbered immatures (11; Table 1). The ratio of adults to immatures in October and November (11:9) was significantly different from the ratio in February and March (21:2; $\chi^2 = 14.53$, $P < 0.001$). This suggests either that immature peregrines wintering in South America have lower survivorship than do adults, or that adults and immatures have different seasonal migration routes.

We visited three Peregrine Falcon eyries in the western foothills of the Andes, monthly to every few months, but remained to make observations only when we saw behavior that suggested breeding. We found a pair at Site A on 27 October 1980 when an adult male was seen chasing Andean Condors (*Vultur gryphus*) along a cliff face. This cliff site contained several ledges about 80 m up a craggy, 450-m high ridge. One ledge was heavily white-washed with excrement, suggesting long-term occupancy. We visited this cliff again on 28 August 1981 and saw a young male flying with two adults and, subsequently, feeding on the well-used ledge. This site produced this one male fledgling in late July–mid-August, 1981, and another fledgling in late May, 1984. We saw no conclusive evidence of breeding success in 1982 and made no observations in 1983.

Site B, about 60 km south of site A, was found on 2 July 1981. This site consisted of several caves 30 m up a 600-m, east-facing cliff. The main cave was divided into two compartments, and was heavily coated with excrement. A female nestling was in this cave on the day the site was discovered, and had fledged by 18 July. This site produced the one female fledgling in mid-July, 1981, and a male fledgling in early July, 1982; it was not inspected in 1983 or 1984.

Site C, about 15 km south of site B, was discovered on 8 December 1981. The site was halfway up a 500-m high, west-facing cliff. The occupants frequented a ledge at the back of a narrow gorge and were considerably harder to watch than the other two pairs because of the inaccessibility of the site. We saw behavior that suggested nestling care in May, 1982, and then saw a single immature flying above the eyrie in June. We did not visit this site after August, 1982.

During our observations of these breeding pairs, we saw Peregrine Falcons either chase or capture Scarlet-backed Woodpeckers (*Veniliornis callonotus*), Tropical Gnatcatchers (*Polioptila plumbea*), White-winged and Eared doves (*Zenaida asiatica* and *Z. auriculata*), and Pacific Parrotlets (*Forpus coelestis*).

All three pairs of Peregrine Falcons were most evident at the nest sites between the months of April and September, and they produced young between late May and mid-August. These dates are intermediate between the October-to-February breeding period reported for one site in Ecuador (Jenny et al. 1981, Jenny et al. 1983) and the September-to-December period reported for nine sites in Patagonia (Ellis and Peres 1983).

TABLE 1. Number of migrant Peregrine Falcons sighted in northwestern Peru.

Observation period	Numbers of Peregrine Falcons observed				
	Total	Adults	Immatures	Males	Females
Oct. 1980	0	0	0	0	0
Nov. 1980	2	—	—	—	1
Dec. 1980	3	—	1	—	—
Jan. 1981	4	—	3	—	2
Feb. 1981	3	—	1	—	1
Mar. 1981	3	—	1	—	—
Apr. 1981	0	0	0	0	0
Oct. 1981	4	—	—	1	—
Nov. 1981	22	11	9	10	11
Dec. 1981	5	1	—	3	2
Jan. 1982	6	—	—	1	3
Feb. 1982	16	9	2	6	7
Mar. 1982	16	12	0	5	5
Apr. 1982	6	—	—	2	2
	90	33	17	28	34

In summary, our observations, when considered with those of other investigators, suggest that the Peregrine Falcon's breeding range extends from Ecuador to Chile and Argentina, throughout the western foothills of the Andes, and possibly into the central and eastern Andes as well. Our observations also document the migration of North American Peregrines at one point along the coast of western South America.

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A REEXAMINATION OF THE METABOLIC RESPONSE OF HOUSE FINCHES TO TEMPERATURE

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Resting metabolic rates (*RMR*) have afforded important baseline information for our studies of seasonal acclimatization in cardueline finches (see, for example, Dawson and Carey 1976, Carey et al. 1978, Marsh and Dawson 1982, Yacoe and Dawson 1983, Dawson et al. 1983b). In studying the House Finch (*Carpodacus mexicanus*; Dawson et al. 1983a, Marsh et al. 1984), we have needed such *RMR* data. Accordingly, we determined the effects of temperature on resting metabolism of birds from one population of this species. The results, summarized here, update one facet of Salt's (1952) metabolic study of members of the genus *Carpodacus*. His study represented an early and innovative application of the comparative method for investigating the physiological ecology of birds. Criteria at that time for determination of *RMR* in birds, however, were far less well defined than at present.

Here, we also present seasonal comparisons of standard metabolic rate (*SMR*), i.e., *RMR* in the zone of thermal neutrality, for House Finches from two localities that differ in severity of winter weather. We undertook these comparisons in part to determine whether *SMR* of House Finches shifts between winter and spring at either locality. Such shifts figure prominently in laboratory studies in which birds are acclimated to various temperatures (summarized by Gelineo 1964). We also wanted to see if *SMR* changed with latitude in House Finches. A direct correlation between these two variables has been described for passerines at the interspecific level (Weathers 1979).

MATERIALS AND METHODS

We made most of our measurements on birds from Riverside, Riverside County, California (hereafter identified as CA). Members of this population were studied from 18 January to 8 March, and from 10 to 24 May 1979, within a week of capture. During the former period, we examined the relation of metabolism to ambient temperature (T_a). Our efforts in May, however, were confined to determination of *SMR*s. While in captivity, the CA birds were kept in 0.6-m^3 outdoor cages on the roof of a building at the University of California, Riverside, where water and a seed mixture consisting principally of millet were freely available.

From 1 to 5 March and from 1 to 22 May 1979, *SMR*