

# Peregrine Falcon feeding on bats in Suriname, South America

*With notes on bat predation by other members of the genus Falco*

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BATS ARE AN ABUNDANT potential food source in the New World, especially in the Neotropics (Morris, 1965 and *pers. obs.*), and a number of raptors have been reported to feed on them. Published reports on bat predation in the Neotropics include Aplomado Falcon, *Falco femoralis* (French, 1967), Bat Falcon, *F. ruficularis* (Brown & Amadon, 1968, Cade, 1982), Orange-breasted Falcon, *F. deiroleucus* (Cade, 1982), Merlin, *F. columbarius* (Bent, 1938), Broad-winged Hawk, *Buteo platypterus* (Norris, 1953), Barn Owl, *Tyto alba* (Haverschmidt, 1968), Tropical Screech-Owl, *Otus choliba* (Walker *et al.*, 1964), and reports at two locations for the Peregrine Falcon, *F. peregrinus* (Sick, 1961, Sprunt, 1951, and Stager, 1941).

During two trips to Suriname in 1979 and 1981 we had the opportunity to make a series of observations on a Peregrine Falcon feeding on bats in the capital city of Paramaribo.

Paramaribo is situated on the west bank of the Suriname River, approximately 40 km upstream from its outlet into the Atlantic. At the capital the river is approximately one km wide. A large number of bats roosts in or near the city during the day, and thousands can be seen flying across the river to and from the city at dawn and dusk. Our observations suggest that, by size, shape, and behavior, the bats belong to the family Molossidae, genus *Molossus* (G. McCracken, *pers. comm.*). These are common insectivorous bats widespread in the Neotropics (Walker *et al.*, 1964). Husson (1962) supports our conclusion describing *Molossus mollossus* and *M. ater* as the most common insectivorous bats roosting in buildings in Suriname.

Donahue first observed a Peregrine chasing these bats during a late afternoon visit to the city's waterfront on January 25, 1979. The falcon made several attempts at taking bats but no capture was observed. Donahue returned the next day

at dusk and again noted a Peregrine, presumably the same individual, pursuing bats. The dusk bat flight was already well under way, and hundreds were crossing the river from the city. Donahue observed the falcon hunting for 25 minutes, during which time it captured two bats during two sallies (a sally being defined here as the time spent away from a hunting perch in active pursuit of prey). After each capture it flew back toward the city, apparently to feed. On January 28 both authors went to the waterfront to watch for the Peregrine at dusk. On this occasion the Peregrine was noted for the first time perching in a tall radio tower (tower A), approximately 55 m high and located approximately 50 m from the river. During three hunting sallies observed that evening the Peregrine captured a total of four bats, including two during the first sally. A total of eight attempts was made. We do not know if this represented a complete hunting session. During this and all subsequent observations the plumage indicated that the falcons were of the migratory race *F.p. tundrius* (White, 1968).

UPON OUR RETURN to Suriname in January of 1981 we again found a Peregrine in residence in Paramaribo and decided to make a series of observations of its hunting technique. We believe that, at least through our 1981 observations, from January 14 to March 2, our sightings refer to the same individual. This assumption is supported by the consistent appearance of the bird's plumage and size and by our observation of an aggressive interaction between this individual, by size presumed a male, and an intruding female. While the male was perched in tower A, the female approached the area and perched high in a nearby radio tower (tower B), approximately 60 m tall and located 250 m from the river. The male immediately flew to tower B and chased the female away. This observa-

tion indicates that the male may have been territorial at this site throughout its winter stay in Paramaribo. Additionally, we believe that it is quite likely, although by no means certain, that the 1979 and early 1981 sightings also were of the same adult male. Donahue again noted an adult male at the waterfront on December 19, 1981. If this was the same individual, it would represent a return to the same winter site in at least three out of four years.

In 1981 the Peregrine regularly hunted bats at dusk, and, although we made only one morning observation, we believe the bird probably hunted regularly at dawn as well. We observed the Peregrine for a total of 6 hours 40 minutes, including six complete dusk hunting sessions and one complete dawn session and a total of 28 separate sallies.

The dusk bat flight from the city typically started at about 1800 hours, approximately 45 minutes before complete darkness. The Peregrine would often start hunting before any bats were visible to us and would continue through the heavy flight of bats between 1810 and 1830 hours. Although many bats were still visible, the bird usually would return to its roost in tower B for the night by 1835 hours, by which time it may have been too dark for effective pursuit. Our one morning's observations showed, in terms of lighting conditions, approximately the same timing in reverse.

OUR OBSERVATIONS SUGGEST that, when it was inactive during the day and night, the Peregrine would roost high on tower B, using tower A as the take-off point during hunting sessions and also returning there to consume its prey. These two towers are by far the highest points near the waterfront. A typical hunting sequence included departure from tower A and a long steady climb or spiral to gain height over the bats, which typically flew 25-70 m above the river,

the Peregrine would pause momentarily at the top of its rise, angle downward, give a number of powerful wingbeats to gain speed, then set its wings for the stoop. If successful, the bird would either snatch the bat in mid-air or strike it, stunning it or killing it instantly and causing it to tumble down, whereupon the Peregrine would swoop down to catch the bat or failing that, pick it from the surface of the river. Occasionally a bat would be hit but would recover and continue flying. Upon capture, prey was carried back to tower A for consumption. We never observed prey eaten in the air, as mentioned by Sprunt (1951). If the Peregrine failed to hit a bat, it would open its wings to brake, sweep up, often make what looked to us like a half-hearted second attempt at the same bat, or simply begin climbing again for the next stoop. On two occasions, however, the Peregrine made a series of three attempts at different bats in one continuous sloping stoop, pulling up only after missing the third bat.

ALTHOUGH THE Peregrine was seen to approach bats from virtually all directions, the most common approach was from the rear. During a stoop beginning above and behind the bat, the bird typically would drop slightly below the level of the bat and rise to strike it. This approach from the rear may, as suggested by Rodriguez (1972), take advantage of a blind spot in the prey's sphere of vision.

As suggested by Brown (1976), the Peregrine appeared to choose its prey while still perched. It would leave the tower in a specific direction and continue, undistracted by other nearby bats that seemed to present easy targets, until it had apparently secured the desired position above its chosen prey.

The Peregrine showed a strong preference for hunting over the river rather than the city. Of 28 sallies, 21 (75%) were over the river. This apparent preference probably is related to the difficulty of retrieving fallen prey from busy city streets or rooftops. Brown (1971), in discussing the feeding habits of the Bat Hawk, *Machaerhamphus alcinus*, of Africa, and Beebe (1974), in discussing Peregrines, also have suggested that open areas are preferred because they present an unobstructed line of sight to the prey and a uniform background color against which to see the bats, and because high speed chases are safer there.

The 28 sallies we observed during the seven sessions covered a total time of 96

minutes. During this time a minimum of 155 capture attempts was made and at least 19 bats were taken. Never more than one bat per sally was taken in 1981. Thus during our observations the average sally time was 3 minutes 26 seconds, and an average of 8.16 attempts were made for every bat captured. This represents a success rate of 12.2%. Ratcliffe (1980), however, suggests that many chases may not be actual attempts at prey capture but may instead be play, making the success rate of capture seem lower than it is. This could also be the case with our Peregrine. Sometimes he would seem listless in its efforts to capture a bat and yet on other occasions would appear to take prey with great ease. The minimum number of attempts per sally was one while the maximum was 29.

During the six dusk sessions the bird captured 18 bats for an average of three bats per session. The one morning session we observed yielded only one capture for four sallies before the bird appeared to roost for the day. We do not know if this apparent discrepancy between evening and morning capture rates is representative of the bird's daily feeding habits throughout its winter stay in Suriname.

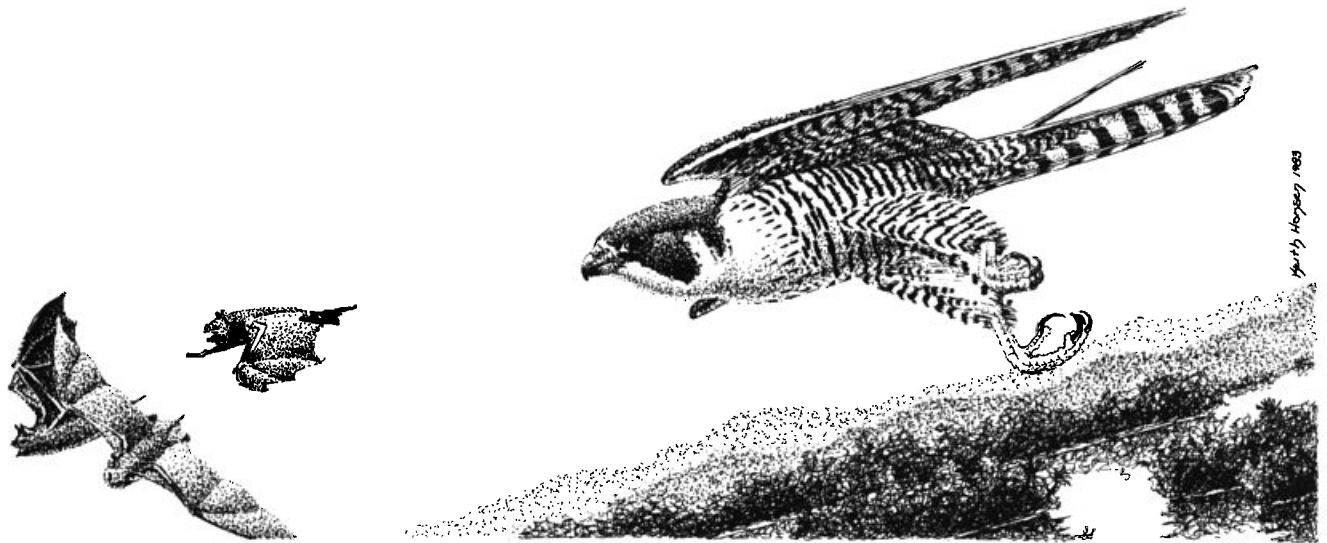
Since we did not observe the Peregrine for an entire day, we are also not certain how much of the bird's total hunting effort these morning and evening sessions represent. It has been noted (Beebe, 1974 and *pers. obs.*) that there is a strong preference among Peregrines for hunting at dawn and dusk. It is possible that the bird occasionally chased Rock Doves, *Columba livia*, during the day as we observed two such pursuits, both unsuccessful, during evening sessions. However, we believe that additional hunting during the day is unlikely considering the abundance of prey and the ease of capture at dawn and dusk. Also, Brown and Amadon (1968) have noted that the food requirement of a Peregrine in warm weather is about 11-12% of its body weight. According to White (1968), the weights of adult male *F. p. tundrius* range from 550 to 647 g. Thus a daily average consumption of at least four and possibly as many as six *Molossus* bats, each weighing 10-30 g (Walker *et al.*, 1964), would seem sufficient to meet the bird's food needs. It should be noted that we did not observe the bird to discard any uneaten parts. The bird appeared to consume the entire bat. Although we searched the area beneath the towers for prey remains, none could be found other than those of a Rock Dove

which may have been captured by a Peregrine.

WE KNOW OF AT LEAST three other instances of bat hunting by Peregrines. Sick (1961, in Brazil) and Stager (1941, and others at the same location in Texas) have reported Peregrines preying on bats. Both of these cases involved one or more Peregrines attacking concentrated groups of Brazilian Free-tailed Bats (*Tadarida brasiliensis*, also *Molossidae*) as they left their roosts in caves. Our 1979 and 1981 sightings differ from these two published reports in that the bats in Paramaribo were evenly distributed in flight over a large area. Bats were visible crossing the river for at least two km along the waterfront. Lastly, on November 11, 1976, Donahue observed an immature Peregrine make an attempt at capturing an insectivorous bat (probably also a *Molossid*) at dawn in the Caroni Swamp in Trinidad.

In tropical South America three other members of the genus *Falco* also are known to take small bats as prey. French (1967) has observed Aplomado Falcon hunting *Molossid* bats in Trinidad. The Orange-breasted Falcon "commonly catches bats. . . . in the air and shows a decidedly crepuscular pattern of activity" (Cade, 1982). The Bat Falcon is probably the commonest and most widespread of the falcons which prey on bats in tropical South America. It is probably also the species of raptor which preys most regularly on bats in this area (Brown and Amadon, 1968, Cade, 1982, and *pers. obs.*). As with Peregrine and Orange-breasted Falcon, it is also decidedly crepuscular in its hunting (Cade, 1982, and *pers. obs.*). In Suriname we have twice observed this species pursuing *Molossid* bats at dawn, once over marshes and once over forest and forest edge. Donahue also frequently has observed Bat Falcons pursuing bats in eastern Peru, primarily over lakes and rivers in forested regions, and almost always at dawn or dusk. A fourth species of *Falco*, the Merlin, a winter resident in coastal areas of tropical South America, can probably safely be assumed, during this time, to feed on bats as well. It has been observed by us in areas where *Molossid* bats are common, and also has a crepuscular pattern of activity (*pers. obs.*)

Wintering Peregrines in Suriname may at times compete for bats with resident Bat Falcons, although the two species are generally segregated by habitat. In Suriname, Bat Falcons usually are seen over



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forest or near forest edge, and especially along rivers, in the interior and in the coastal region. On the other hand, Peregrines favor large open areas, such as beaches and marshes, near the coast, as well as the immediate vicinity of Paramaribo. Although we have never observed Peregrines over forested areas in Suriname, nor Bat Falcons along the immediate coast or in Paramaribo, there is some overlapping over large marshy expanses and large agricultural areas near the coast. . . . areas where *Molossid* bats are very common. Competition in Suriname between Peregrines and the other three species of bat-eating falcons is probably negligible. Orange-breasted Falcon and Aplomado Falcon are both rather rare in the coastal area of Suriname (*pers. obs.*), and the Merlin has yet to be recorded for the country (Haverschmidt, 1968).

**A**LTHOUGH THE TOTAL wintering population of Peregrines in Suriname is not known, they are not rare and can be seen regularly in small numbers near the coast during the northern winter (Haverschmidt, 1972, and *pers. obs.*). Our observation of a large female in the Paramaribo area in 1981 may indicate that more than one Peregrine uses the abundant bats as a food source there and that there may be competition for suitable tall hunting perches.

Considering the widespread distribution and abundance of *Molossus* and other small bats in Suriname and elsewhere in the Neotropics, these may represent an important winter food source for Peregrines. Additionally, *Molossus* bats may be preferred because of their high

and direct flight, which may make them easier to catch than bats with a more erratic flight. Whether or not these bats are heavily contaminated by pesticides in Suriname and other areas of Central and South America is unknown. However, being insectivorous, *Molossus* bats could easily accumulate pesticides, including DDE, since they forage over agricultural areas. Chlorinated hydrocarbon pesticides are known to have been, and still may be, heavily used in agricultural areas along the Suriname coast (Haverschmidt, 1968, p. 91, under Purple Gallinule entry). In New Mexico, the drastic decline in Brazilian Free-tailed Bats, at the Carlsbad Caverns is thought to be attributable to pesticide poisoning (Cockrum, 1970). To further assess the role of bats in the diet of Peregrines, other instances of bat hunting should be watched for carefully in other areas of the Neotropics where Peregrines occur.

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