Diet and Weight of American Kestrels in Central Chile

JOSÉ L. YÁÑEZ,[1] HERMAN NÚÑEZ,[1] ROBERTO P. SCHLATTER,[2] AND FABIAN M. JAKSIĆ[3,4]
[1]*Museo Nacional de Historia Natural, Santiago, Chile,* [2]*Instituto de Zoología, Universidad Austral, Valdivia, Chile, and* [3]*Museum of Vertebrate Zoology, University of California, Berkeley, California 94720 USA*

The American Kestrel (*Falco sparverius*) is widely distributed in North and South America (Brown and Amadon 1968). Even though it is found throughout Chile (Johnson 1965), the only quantitative information regarding its food habits and weight has been gathered in Malleco Province by Greer and Bullock (1966). In this paper we report the diet and weight of American Kestrels (*Falco sparverius cinnamominus*) in central Chile, as part of a general survey of the food habits of the hawks and owls present in the area (see Jaksić and Yañez 1979; Jaksić et al. 1980; Schlatter et al. 1980a, 1980b; for detailed descriptions of the study sites).

We collected 202 pellets beneath perches of American Kestrels in La Dehesa (33°21'S, 70°32'W; 875 m elevation; 20 km east of Santiago) between November 1973 and February 1974, that is, early spring through early summer. A subsample of 142 pellets was measured and dry-weighed, resulting in the following figures: length, 24.7 ± 0.51 mm ($\bar{x}$ ± SE); width, 11.3 ± 0.33 mm; weight, 0.48 ± 0.01 g. In addition, during February and March 1979 (late summer) we collected 12 female and 6 male American Kestrels in Pudahuel (33°26'S, 70°47'W; 475 m elevation; 15 km west of Santiago) in order to obtain their body weight and examine their stomach contents. Because in both samples (pellets and stomachs) arthropods were more numerous than vertebrates and represented greater taxonomic diversity, we present our results separately for the two types of prey.

Insects are the most common arthropod prey of American Kestrels in central Chile in both pellet and stomach samples (Table 1). Grossly the same results have been obtained by Bryant (1918, 1921) and Balgooyen (1976) in California, an area of similar climate, physiognomy, and resources (Thrower and Bradbury 1977). If the availability of arthropod prey be comparable in the two Chilean localities studied, the absence of dipterans, hymenopterans, and trichopterans from the pellets may be due to their small size and relatively soft bodies, which allow their identification only in the stomachs of the raptors. The absence of lepidopteran larvae in the stomach sample is readily explained by the date this sample was collected (late summer), as compared to that of the pellets (early spring through early summer). The exclusive presence of arachnids and chilopods in the pellet sample may be associated with the differential availability of this prey either between-sites or between-seasons, but could also be related to the small stomach sample analyzed. The results here discussed are very similar to those reported by Greer and Bullock (1966) for American Kestrels in Malleco Province.

Rodents, passeriformes, and lacertilians are obviously the most common vertebrate prey of the American Kestrels in central Chile (Table 1). Because the stomach sample is small, we will concentrate only on the prey identified in the pellets. Again, our results are grossly similar to those reported in California (Balgooyen 1976), except for the absence of amphibians in the Chilean sample. As compared to the food habits of the other diurnal raptors present in La Dehesa (Burrowing Owl, *Athene cunicularia*; Harris' Hawk, *Parabuteo unicinctus*; White-tailed Kite, *Elanus leucurus*), the American Kestrel preys only on the juveniles of the smallest rodents available on this site (see Jaksić et al. 1980; Schlatter et al. 1980a, 1980b, for prey diversity and sizes). Its consumption of only very young degus (*Octodon degus*; 40 g), the most common diurnal rodent in the area (Jaksić and Yáñez 1978), is also consistent with this pattern. On the other hand, predation upon passeriformes and lacertilians by the American Kestrel is much greater than that exhibited by the other diurnal raptors in La Dehesa (see Jaksić et al. 1980; Schlatter et al. 1980a, 1980b). The absence of amphibians from its pellets is probably associated with unpalatability of this kind of prey, as the Burrowing Owl in La Dehesa kills but does not eat the two most common amphibians in this locality (Schlatter et al. 1980b). Results reported by Greer and Bullock (1966) in Malleco Province are not very similar to ours, as the relative importance of lacertilians is greater than that of Rodents, and neither passeriforms nor ophidians are reported in the sample examined by those authors. This could be related to differences in the availability of those prey in Malleco but also to the different time of the year that Greer and Bullock (1966) collected their specimens (early spring).

Regarding weight, American Kestrels in central Chile are not significantly different from those in Cali-

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[4] Send reprint requests to: Fabian M. Jaksić.

TABLE 1. Arthropod and vertebrate prey of the American Kestrel in central Chile, based on the analysis of 202 pellets collected in La Dehesa between November 1973 and February 1974 and of 18 stomachs obtained in Pudahuel during February and March 1979. Vernacular names of vertebrates are reported by Jaksić and Yáñez (1979) and Jaksić et al. (1980).

Prey	Total in pellets	Percent	Total in stomachs	Percent
Arthropods				
Insects	(245)	96.8	(131)	100.0
Coleoptera	70		25[a]	
Diptera	—		1	
Hymenoptera	—		3	
Lepidoptera	19[a]		—	
Odonata	86		14	
Orthoptera	44		87	
Trichoptera	—		1	
Arachnids	(1)	0.4	(0)	0.0
Scorpionida	1		—	
Chilopods	(7)	2.8	(0)	0.0
Unidentified	7		—	
Total arthropods	253	100.0	131	100.0
Vertebrates				
Rodents	(42)	33.6	(1)	33.3
Akodon olivaceus	4		—	
Octodon degus	7[b]		—	
Oryzomys longicaudatus	9		—	
Unidentified	22		1	
Passeriformes	(48)	38.4	(0)	0.0
Unidentified	48		—	
Lacertilians	(31)	24.8	(2)	66.7
Liolaemus lemniscatus	—		2	
Unidentified *Liolaemus*	31		—	
Ophidians	(4)	3.2	(0)	0.0
Philodryas chamissonis	4		—	
Total vertebrates	125	100.0	3	100.0

[a] Larvae.
[b] Juvenile.

fornia (*Falco sparverius sparverius*; see Balgooyen 1976, also Roest 1957), either in male-male ($P > 0.20$) or in female-female comparisons ($P > 0.90$). Figures from central Chile are ($\bar{x} \pm$ SE); 117.9 ± 2.71 g (n = 12 females); 110.8 ± 0.78 g (n = 6 males); 115.8 ± 2.07 g (n = 18, sexes combined). Interestingly, the size dimorphism in American Kestrels of central Chile is so slight that the difference in mean weight between males and females is nonsignificant ($P > 0.10$; the statistic used in all these comparisons is the weighted-variances t-test; see Sokal and Rohlf 1969: 220). This phenomenon is related either to the greater weight of males in central Chile as compared to that of males in California (see Balgooyen 1976) or to the lesser weight of central Chile females as compared to those in Malleco Province (see Greer and Bullock 1966). Unfortunately, these latter authors do not provide confidence intervals for the mean weights they calculated; hence, the significance of the trend cannot be assessed. On the other hand, the sample size in central Chile is small; thus, any conclusion drawn from our data should be taken cautiously.

In summary the food habits and weight of American Kestrels in central Chile are quite similar to those observed in California birds, even though they belong to different subspecies. Regarding its food-niche, the American Kestrel in central Chile appears to be a generalized predator of vertebrates (mainly of small diurnal mice, songbirds, and lizards) and arthropods (mainly of insects), which is essentially the same conclusion drawn by Balgooyen (1976) in California.

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LITERATURE CITED

BALGOOYEN, T. C. 1976. Behavior and ecology of the American Kestrel (*Falco sparverius* L.) in the Sierra Nevada of California. Univ. Calif. Publ. Zool. 103: 1–83.

BROWN, L. H., & D. AMADON. 1968. Eagles, hawks, and falcons of the world. New York, McGraw-Hill.

BRYANT, H. C. 1918. Evidence on the food of hawks and owls in California. Condor 20: 126–127.

———. 1921. California hawks: How to identify them. California Fish Game 7: 133–147.

GREER, J. K., & D. S. BULLOCK. 1966. Notes on stomach contents and weights of some Chilean birds of prey. Auk 83: 308–309.

JAKSIĆ, F., & J. YÁÑEZ. 1978. Variación anual de la composición comunitaria de micromamíferos en Los Dominicos, Santiago. Noticiario Mensual, Museo Nacional Historia Natural (Chile) 267: 10–11.

———, & ———. 1979. The diet of the Barn Owl in central Chile and its relation to the availability of prey. Auk 96: 619–621.

———, ———, & R. P. SCHLATTER. 1980. Prey of the Harris' Hawk in central Chile. Auk 97: 196–198.

JOHNSON, A. W. 1965. The birds of Chile and adjacent regions of Argentina, Bolivia, and Peru. Buenos Aires, Platt Establecimientos Gráficos.

ROEST, A. I. 1957. Notes on the American Sparrow Hawk. Auk 74: 1–19.

SCHLATTER, R. P., B. TORO, J. L. YÁÑEZ, & F. M. JAKSIĆ. 1980a. Prey of the White-tailed Kite in central Chile and its relation to the hunting habitat. Auk 97: 186–190.

———, J. L. YÁÑEZ, H. NÚÑEZ, & F. M. JAKSIĆ. 1980b. The diet of the Burrowing Owl in central Chile and its relation to prey size. Auk in press.

SOKAL, R. R., & F. J. ROHLF. 1969. Biometry. San Francisco, California, W. H. Freeman.

THROWER, N. J. W., & D. E. BRADBURY (Eds.). 1977. Chile-California mediterranean scrub atlas: a comparative analysis. Stroudsburg, Pennsylvania, Dowden, Hutchinson, and Ross.

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Nest-site Selection in the Brown Jay

MARCY F. LAWTON[1] AND ROBERT O. LAWTON[2]
[1]*Committee on the Conceptual Foundations of Science, The University of Chicago, Chicago, Illinois 60637 USA and* [2]*Department of Biology, The University of Chicago, 1103 E. 57th St., Chicago, Illinois 60637 USA*

The choice of nest sites by many species of birds is known to be affected by topographic or climatic variables (Welty 1975). Among corvids, nest-sites vary widely and may be chosen with respect to protection from predators or weather (Goodwin 1976). Eurasian Crows (*Corvus corone cornix*), for instance, prefer to nest in conifers, where predation is lower than in deciduous trees (Loman 1979). Piñon Jays (*Gymnorhinus cyanocephalus*) place their nests to maximize insolation but do not distinguish between windward and leeward sides of trees (Balda and Bateman 1972).

Little is known about the ecological correlates of nest-site selection in neotropical jays. As part of a study of the breeding behavior of a montane population of Brown Jays (*Psilorhinus morio*) in Monteverde, Costa Rica, we found that two opposing factors in nest-site selection are predation and wind.

Brown Jays are communal breeders with helpers at the nest (Skutch 1935, Lawton and Guindon in press). Unlike most species, especially in the tropics, Brown Jays are conspicuous and noisy while breeding. Throughout incubation, breeding birds spend extended periods whining loudly from their nests. After eggs hatch, nest attendants fly directly to the nest, often calling as they land. That such behavior does not result in predation of many nests probably derives from two phenomena. First, Brown Jays are large, aggressive birds, well able to defend their nests against many diurnal predators. In Monteverde we have seen flocks drive off Broad-winged Hawks (*Buteo platypterus*), Common Black Hawks (*Buteogallus anthracinus*), red-bellied squirrels (*Sciurus variegatoides*), white-faced monkeys (*Cebus capucinus*), and domestic cats (*Felis catus*). Second, the position of nests probably reduces nocturnal predation by animals that hunt the forest canopy. In Monteverde these include the opossum (*Didelphis virginianum*), the margay (*Felis weidii*), the ocelot (*F. pardalis*), a weasel (*Mustela frenata*), and assorted snakes.