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BATS AS PREY OF BARN OWLS (*TYTO ALBA*) IN A TROPICAL SAVANNA IN BOLIVIA

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A wealth of information is available on the diet of the Barn Owl (*Tyto alba*) in many regions of the world (Taylor 1994). Mammals, particularly rodents, are the most frequent food item (e.g., Jaksic et al. 1982). Data are overwhelmingly from temperate regions; however, information from tropical localities is scanty (Marti et al. 1993). Here, we report on the diet of the Barn Owl from Beni, Bolivia, a tropical locality where bats are taken commonly as prey.

Pellets were collected in May 1998 and 1999 at El Porvenir, the Operations Center of Reserva de la Biosfera Estación Biológica Beni (14°52′S, 66°20′W; 200 masl). The landscape is a mosaic of small forest fragments distributed over a seasonally-inundated savanna (Herrera-MacBryde et al. 2000). Pellets were collected around an occupied nest in the attic of a small building. In May 1998, there were three chicks and in 1999 there were five eggs in the nest, attended by a single adult on both occasions.

Only whole pellets with identifiable prey remains were included in the analysis. Prey were identified to the species level whenever possible, using available keys and reference collections (Aguirre and Anderson 1997, Anderson 1997, Musser et al. 1998).

We estimated the biomass contribution of each species to the diet as the percent biomass, multiplying the number of individuals in the pellets by the estimated body mass of each prey species divided by the grand sum of biomass. Also for comparative purposes, we estimated the mean mass of small mammal prey (MMSM), as the grand mean obtained from summing the products of the number of individual prey items times their mass, divided by the total number of mammalian prey in the diet (Jaksic et al. 1982). Biomass estimates of mammal species were obtained from Anderson (1997), Eisenberg and Redford (1999), and reference collections.

A total of 440 pellets yielded 567 prey items, all vertebrates except a single Coleoptera. The number of prey per pellet varied from one, an individual large prey, such as *Cavia tschudii*, to 13 individuals when they were small as in the case of bats. Mammals were the primary prey, accounting for 95% of items in the diet; birds were of minor importance. At least one bird was a Black-capped Donacobius (*Donacobius atricapillus*) (Troglodytidae), identified from a tag recovered from a 1998 pellet Among mammals, bats were the most frequent prey, accounting for 51% of the diet. *Myotis* spp. comprised more than one third of all items (Table 1). Nevertheless, bats accounted for only 3.4% of biomass. *Cavia* was the second most frequent prey (26%), but 63% (95) were juvenile or subadults. Overall, *Cavia* accounted for 83% of the total biomass (Table 1). Two rodents, *C. tschudii* and *Holochilus sciureus*, contributed 41% of prey items and 95% of biomass in the 2-yr sample (Table 1).

Barn Owls rarely prey on bats (e.g., Ruprecht 1979) The high consumption of *Myotis* in El Porvenir could be associated with its ease of capture. All bats captured by the Barn Owl were colonial species, some of which occurred in the same roost area. *Eptesicus furinalis*, *Sturnira*, and *Myotis nigricans* tend to roost in buildings (Wilson and La Val 1974, Mies et al. 1996) and we observed bats (species not identified) roosting in large numbers in the building where the Barn Owl nested at El Porvenir.

Mean mass of small mammal prey (136.6 ± 16.2 g; $\bar{x}$ ± 2 SE) was almost two times larger in El Porvenir than reported from the Mediterranean regions of Chile (71 g) and California (68 g) and six times larger than that from Spain (21 g; Jaksic et al. 1982). Trophic ecology of Barn Owls is determined by the frequency distribution of mammalian prey sizes available and the owl assemblage in each region (Jaksic et al. 1982). The consumption of larger prey at El Porvenir may be attributed to the availability of a large prey species, *C. tschudii*, whose body mass exceeds those in Mediterranean regions where the largest prey weights available are ca. 350 g compared to 600 g of *C. tschudii* (Jaksic et al. 1982). Alternatively, Barn Owls at El Porvenir may be hunting for relatively large prey because of a lower level of diffuse competition

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Table 1. Food habits of the Barn Owl (*Tyto alba*) in Estación Biológica Beni, Bolivia.

Prey	Mass (g)	Percent	1998 (*N*)	1998 Percent	1999 (*N*)	1999 Percent	Total (*N*)	Total Percent Biomass
Marsupialia								
Gracilinanus sp.	19.5	0	0	0.5	1	0.2	1	0.03
Chiroptera								
Sturnira spp.	19	0	0	1.5	3	0.5	3	0.08
Eptesicus sp.	9.5	0	0	3.4	7	1.2	7	0.09
Lasiurus spp.	12	1.1	4	1.5	3	1.2	7	0.11
Myotis spp.	7.5	24.7	90	54.2	110	35.3	200	2.0
Molossops spp.	7.5	0	0	2.9	6	1.1	6	0.06
Molossus molossus	10.5	15.4	56	6.4	13	12.2	69	0.98
Molossus rufus	25	0.3	1	0	0	0.2	1	0.03
Rodentia								
Oligoryzomys spp.	28.2	0	0	1.5	3	0.5	3	0.11
Oryzomys nitidus	57	0.8	3	0.5	1	0.7	4	0.31
Oryzomys capito	64	0.3	1	0	0	0.2	1	0.09
Oxymycterus sp.	104.5	0.3	1	0	0	0.2	1	0.14
Holochilus sciureus	112.5	21.7	79	3.4	7	15.2	86	13.14
Bolomys spp.	46	0.3	1	0	0	0.2	1	0.06
Cavia tschudii juveniles	300	18.9	71	11.5	24	16.8	95	38.71
Cavia tschudii adults	600.0	8.01	30	11.5	24	9.5	54	44.01
Birds								
Passeriformes		7.4	27	0.5	1	4.9	28	—
No. Prey		100	203	100	364	100	567	
No. Pellets				235		205		440

afforded by a reduced set of syntopic owls (Jaksic et al. 1982). Depending on the specific habitat, at El Porvenir the owl assemblage may include up to seven other owl species (Brace et al. 1997), a figure slightly higher than owl assemblages in Mediterranean habitats (5–6 species; Jaksic et al. 1982). Therefore, we suggest that the large MMSM at El Porvenir is due to the availability of a large prey. Further, the two most commonly preyed rodents, *C. tschudii* and *H. sciureus*, inhabit grasslands and marshes, an open habitat that may render them more vulnerable than species inhabiting the forest fragments located closer to the Barn Owl's nest.

The Barn Owl is considered to prey primarily on rodents throughout its distributional range (Marti et al. 1983). Our study suggests that bats may represent an important diet component in some populations of tropical Barn Owls, as has been reported in some other species, neotropical owls, Stygian Owls (*Asio stygius*) in Brazil (Motta-Júnior and Taddei 1992) and Black and White Owls (*Ciccaba nigrolineata*) in Guatemala (Gerhardt et al. 1994). The possibility this high consumption of bats is widespread among tropical owls should be examined further.

RESUMEN.—Describimos la dieta de la lechuza blanca *Tyto alba* en una sabana tropical en Bolivia. Las presas más comúnes fueron murciélagos pero en términos de biomasa, *Cavia tschudii* es la presa más importante. El tamaño de presa consumido es mayor que el hasta ahora conocido en otras poblaciones.

[Traducción de los autores]

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LITERATURE CITED

AGUIRRE, L.F. AND S. ANDERSON. 1997. Clave de campo para la identificación de los murciélagos en Bolivia. Serie Zoología No. 5, Instituto de Ecología, La Paz.

ANDERSON, S. 1997. Mammals of Bolivia: taxonomy and distribution. *Bull. Am. Mus. Nat. Hist.* 231:1–652.

BRACE, R.C., J. HORNBUCKLE, AND J.W. PEARCE-HIGGINS. 1997. The avifauna of the Beni Biological Station, Bolivia. *Bird Conserv. Int.* 7:117–159.

EISENBERG, J.F. AND K.H. REDFORD. 1999. Mammals of the neotropics. Vol. 2. The central neotropics: Ecuador, Peru, Bolivia, Brazil. Univ. of Chicago Press, Chicago, IL U.S.A.

GERHARDT, R.P., D.M. GERHARDT, C.J. FLATTEN, AND N.B. GONZALEZ. 1994. The food habits of sympatric *Ciccaba* owls in northern Guatemala. *J. Field Ornithol.* 65:258–264.

HERRERA-MACBRYDE, O., F. DALLMEIER, B. MACBRYDE, J.A. COMISKEY, AND C. MIRANDA [EDS.]. 2000. Biodiversidad, conservación y manejo en la región de la Reserva de la Biosfera Estación Biológica del Beni, Bolivia. SI/MAB Series No. 4. Smithsonian Institution, Washington, DC U.S.A.

JAKSIC, F.M., R.L. SEIB, AND C.M. HERRERA. 1982. Predation of Barn Owl (*Tyto alba*) in mediterranean habitats of Chile, Spain, and California: a comparative approach. *Am. Midl. Nat.* 107:151–162.

MARTI, C.D., E. KORPIMÄKI, AND F.M. JAKSIC. 1993. Trophic structure of raptor communities: a three-continent comparison and synthesis. *Curr. Ornithol.* 10:47–137.

MIES, R., A. KURTA, AND D.G. KING. 1996. *Eptesicus furnalis. Mamm. Species* 526:1–7.

MOTTA-JÚNIOR, J.C. AND V.A. TADDEI. 1992. Bats as prey of the Stygian Owl in southeastern Brazil. *J. Raptor Res* 26:259–260.

MUSSER, G.G., M.D. CARLETON, E.M. BROTHERS, AND A.L. GARDNER. 1998. Systematic studies of oryzomine rodents (Muridae, Sigmodontinae): diagnoses and distributions of species formerly assigned to *Oryzomys "capito"*. *Bull. Am. Mus. Nat. Hist.* 236:1–376.

RUPRECHT, A.L. 1979. Bats (Chiroptera) as constituents of the food of Barn Owls *Tyto alba* in Poland. *Ibis* 121: 489–494.

TAYLOR, I. 1994. Barn Owls. Predator-prey relationships and conservation. Cambridge Univ. Press, Cambridge, U.K.

WILSON, D.E. AND R.K. LA VAL. 1974. *Myotis nigricans Mamm. Species* 39:1–3.

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FOOD OF THE LESSER KESTREL (*FALCO NAUMANNI*) IN ITS WINTER QUARTERS IN SOUTH AFRICA

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The Lesser Kestrel (*Falco naumanni*) has undergone a drastic decline in this century in its breeding range in the southern Palearctic and is classified as RARE in the *Red Data Book* (del Hoyo et al. 1992, Tucker and Heath 1994). At present, 6000–10 000 breeding pairs occur in Europe (Gonzalez and Merino 1990). Recently, the greatest density of breeding Lesser Kestrels was reported in Spain, where an estimated 20 000–50 000 breeding pairs in 1980 had fallen to 4200–5100 by 1990 (Tucker and Heath 1994).

The Lesser Kestrel is migratory and most individuals winter in the grasslands of the Free State in South Africa (Siegfried and Skead 1971, del Hoyo et al. 1992). A drastic decline in wintering Lesser Kestrels was also noted in this province, where ca. 74 000 birds were recorded during the austral summer of 1966–67 (Siegfried and Skead 1971) and only 33 900 during the austral summer of 1992–93 (Roos and Roos 1986, Colahan 1993). Prey contaminated by pesticides and the destruction of natural habitats in the Lesser Kestrel's breeding range have been suggested as the main factors responsible for the decline (del Hoyo et al. 1992, Tucker and Heath 1994).

Food availability is one of the most important ultimate factors controlling any avian population and information on the diet of a declining species, such as the Lesser Kestrel, is therefore vital for conservation. Summer diet of the Lesser Kestrel has been investigated quantitatively in Spain, France, and Austria (Cramp and Simmons 1980, Bijlsma et al. 1988). The diet in winter has been examined through the analysis of stomach contents (An-

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