

Short communication

The diet of the Burrowing Owl, *Athene cunicularia*, in the arid lands of northeastern Patagonia, Argentina

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Abstract

We studied the diet of the Burrowing Owl (*Athene cunicularia*) through 1-year pellet analysis in the southern portion of the Monte Desert, Patagonia. The pellets were collected in Protected Natural Area Península Valdés, Chubut, Argentina. We identified 3787 individual prey items belonging to 19 prey species in 589 pellets analyzed and we found a mean of 1.36 ± 0.65 vertebrate individuals (range = 1–4) per pellet. Insecta were the main prey items accounting for 51.9% of individuals consumed, followed by Chelicerata (25.3%) and Mammalia (20.9%). However, the greatest contribution of biomass to owl diets came from the consumption of small rodents (94.4%). Our results suggest that the Burrowing Owl were mainly nocturnal hunters and evidenced a generalist diet, consuming a wide spectrum of prey items, including invertebrates (insects and chelicerates), and several types of vertebrates (mammals, birds and lizards).

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1. Introduction

The Burrowing Owl, *Athene cunicularia*, is widely distributed throughout the Americas, from the south of Canada to the southern end of Argentina and Chile (Burn, 1999). Its food habits have been studied patchily throughout its range (e.g., Gervais et al., 2000; York et al., 2002). Studies in South America have included mainly Southern Brazil (e.g., Silva-Porto and Cerqueira, 1990), Central Chile (e.g., Jaksic and Marti, 1981; Schlatter et al., 1980; Torres-Contreras et al., 1994; Yañez and Jaksic, 1979; Zunino and Jofré, 1999), and some Argentinean agroecosystems (e.g., Bellocq, 1987; Bellocq and Kravetz, 1994; Coccia, 1984). For the vast Patagonian desert and semi-deserts (ca. 770 000 km²) almost nothing is known about the diet of this small-sized and generalist owl; in fact, only three contributions were made on this topic (Andrade et al., 2004a; De Santis et al., 1997; Massoia et al., 1988).

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The Protected Natural Area Península Valdés, which encompass ca. 400 000 ha and has been declared World Heritage Site (UNESCO, 1999), is one of the largest and effectively protected area in Patagonian arid lands. There, both the small mammal communities and the predators are poorly known. In this context, *A. cunicularia* is one of the most common owls present and the study of its diet constitutes a suitable approach to take a preliminary picture on this topic.

The main objectives of this study were to define the food habits of the Burrowing Owl, based on pellet samples and to use this information to make inferences about the small mammal assemblages existing in the southern portion of the Monte Desert, Patagonia.

2. Materials and methods

Our study was conducted in the western portion of the Protected Natural Area Península Valdés, Chubut province, Argentina. The area is located in the Monte Desert Phytogeographic Province (León et al., 1998), characterized by spiny shrubs patchily dispersed on sandy soils within flat and open landscapes. We collected Burrowing Owl pellets on five ranches (arranged by decreasing latitude, Estancia El Doradillo [42°37'S, 65°01'W], Estancia El Deseado [42°31'S, 64°51'W], Estancia El Desempeño [42°30'S, 64°44'W], Estancia Las Charas [42°29'S, 64°40'W], Estancia El Pampero [42°25'S, 64°36'W]), in November 2001, July 2002, and November 2002. The pellets were collected around burrows occupied by the owls. Each pellet was dissected using standard techniques (Marti, 1974). Prey organisms were identified to the finest possible taxonomic level using taxonomic keys and by consultation with specialists. Prey were quantified by assuming minimum number of individuals (MNI). For vertebrate prey, paired cranial elements of each taxon were separated and the largest number of elements from either left- or right-hand side quantified. The same procedure, but mainly with odd elements (e.g., head, thorax), was used to estimate the MNI for invertebrate prey.

3. Results and discussion

A total of 3787 prey items were identified from 589 pellets (pooled samples; Table 1). A sub sample of 391 pellets measured (mean \pm standard deviation) averaged 35.3 ± 8.8 mm in length (range = 14.6–64.5 mm), and 15.1 ± 2 mm in width (range = 9.8–27 mm). Mean number of vertebrate prey found per pellet were 1.36 ± 0.65 individuals (range = 1–4). The Burrowing Owl in the Protected Natural Area Península Valdés feed largely on insects and scorpions (>75%). Rodents were the most abundant group of mammals (94.8%). Sigmodontine rodents (Cricetidae) accounted the 96.4%, and the larger caviomorphs (Caviidae and Octodontidae) only 3.6%. Birds and lizards were a minor component of the diet (Table 1).

Prey biomass ranged from 0.07 g (Hymenoptera) to 210 g (adults *Microcavia australis*). However, 60% of the consumed taxa ranged from 0.07 to 20 g (Table 1). Mammals made up the largest proportion of the biomass consumed (94.4%) and were comprised primarily of the rodents *Eligmodontia typus* and *Graomys griseoflavus*.

Burrowing Owl in our study had a generalist diet, consuming a wide spectrum of prey items, including invertebrates (insects and chelicerates), and several types of vertebrates (mammals, birds, and lizards). The same pattern has been found in previous studies in Península Valdés (Massoia et al., 1988), in Pampean region agroecosystems and grasslands (e.g., Bellocq, 1987; Coccia, 1984), in the Monte Desert of Mendoza Province (Ojeda et al., 1986), and in the montane grasslands of Tafí del Valle (Alvarez, 1992). A generalist diet for the Burrowing Owl has also been reported in several other countries (e.g., Chile, Brazil, USA, Canada; see Burn, 1999). Significant consumption of chelicerates has been reported for the Burrowing Owl in the Central Monte Desert (Ojeda et al., 1986), in the scrubland of Central and the Norte Chico, Chile (Jaksic and Marti, 1981; Yañez and Jaksic, 1979), and in the Parque Nacional Médanos del Chaco, Paraguay (Andrade et al., 2004b).

Mammals represented the main biomass input to the diet of the Burrowing Owl. Although the insects were the most frequent prey of Burrowing Owl in this region, they represented only a small fraction of the total contribution of ingested biomass, a conclusion also reported by previous studies (Bellocq, 1987; Jaksic and Marti, 1981; Torres-Contreras et al., 1994).

This predator consumed almost all small mammals species reported for northeastern Chubut assemblages (Pardiñas et al., 2003), with the exception of the cavid *Galea musteloides*. The sigmodontines *E. typus* and

Table 1
Burrowing Owl diet in Protected Natural Area Península Valdés (Chubut, Argentina)

	Mean weight ^a	MNI	F%	B%
Mammals		792	20.9	94.4
Rodents				
<i>Akodon iniscatus</i>	20	54	1.4	4.5
<i>Akodon molinae</i>	34	3	0.1	0.4
<i>Calomys musculinus</i>	14	60	1.6	3.5
<i>Ctenomys</i> sp. (adults)	145	14	0.4	8.4
<i>Ctenomys</i> sp. (young)	70	10	0.3	2.9
<i>Eligmodontia typus</i>	17	408	10.8	28.6
<i>Graomys griseoflavus</i>	44.5	148	3.9	27.2
<i>Microcavia australis</i> (adults)	210	1	0.0	0.9
<i>Microcavia australis</i> (young)	80	2	0.1	0.7
<i>Reithrodon auritus</i>	80	46	1.2	15.2
Unidentified rodents		5	0.1	
Marsupials				
<i>Thylamys</i> sp.	25.0	41	1.1	4.2
Birds		23	0.6	
Unidentified birds		23	0.6	
Reptiles		49	1.3	
Unidentified reptiles		49	1.3	
Chelicerates		958	25.3	3.6
Lycosidae	0.83	45	1.2	0.2
Bothriuridae	0.92	913	24.1	3.4
Insects		1965	51.9	2.0
Carabidae	0.62	280	7.4	0.7
Curculionidae	0.23	861	22.7	0.8
Elateridae	0.18	10	0.3	0.0
Hymenoptera	0.07	1	0.0	0.0
Scarabaeidae	0.14	36	1.0	0.0
Tenebrionidae	1.5	93	2.5	0.6
Unidentified insects		684	18.1	
Total		3787		

MNI, minimum number of individuals; F%, frequency calculated over the total number of prey; B%, percent of total prey mass consumed.

^aIn grams, data obtained from specimens captured in the study area and housed at the Centro Nacional Patagónico Mammal Collection.

G. griseoflavus were the most abundant vertebrate prey which corresponds with the high densities of these species in the Monte Desert (Saba et al., 1995). The small mammals present in the diet of the Burrowing Owl have wide distributions in the Patagonian Monte Desert (Pardiñas et al., 2003) and Península Valdés surroundings (e.g., Monjeau et al., 1997; Saba et al., 1995). Our pellet analyses contributed new knowledge of the distribution of small mammals, providing new data records for the western portion of the Protected Natural Area Península Valdés, particularly, the poorly known *Akodon molinae* (see Nabte, 2003). Previous records for this rodent were from coastal localities in Isla de los Pájaros, Playa El Doradillo, and Riacho San José (Apfelbaum and Reig, 1989; Daciuk, 1974; Massoia et al., 1988 [here mentioned as *A. varius neocensus*]).

To estimate of the period of the day/night that the Burrowing Owl engages in its hunting activity in the study area, we inferred its timing of hunting by using known activity patterns of the small mammal prey species. The small nocturnal mammal species in owl pellet were *E. typus*, *G. griseoflavus*, *Calomys musculinus*, *Akodon iniscatus*, *Reithrodon auritus*, and *Thylamys* sp. (Nabte, 2003) Conversely, *Ctenomys* sp., *A. molinae* and *M. australis*, are primarily active during daylight hours. Fewer day-active mammals were eaten by Burrowing Owl. This owl ate a large number of scorpions, an abundant nocturnal invertebrate. Our data suggests that the Burrowing Owl activity in Protected Natural Area Península Valdés is primarily

nocturnal-crepuscular similar to reports by Coccia (1984). These inferences should be tested with direct observations and/or radio-tracking studies of the birds over a significant period of time (Haug and Oliphant, 1990).

Finally, it is important to note that De Santis et al. (1997) reported a case of exclusive predation on mammals by the Burrowing Owl in Puerto Madryn, near our study area. These authors very probably underestimated the content of insects, a common tendency in the study of owl pellets in Argentina, studies that have historically emphasized mainly the mammalian prey species (Pardiñas and Cirignoli, 2002).

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