

Bat predation by Barn Owls (*Tyto alba*) in central-eastern Argentina

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Abstract. We report the predation of bats by Barn owls (*Tyto alba*) in Entre Ríos province (~33.2° S-33.7° S), central-eastern Argentina. We studied pellet samples from 87 localities, registering 12 species of bats of two families. The best-represented taxa in the samples were the molossids *Tadarida brasiliensis* (40.7%), *Molossus molossus* (8.7%), the vespertilionids *Myotis* spp. (19.67%) and *Eptesicus furinalis* (9.2%). *Molossops temminckii* was documented for the first time in the province. The average weight of bats consumed by Barn Owl ranged from ~4 g (*Myotis* spp.) to ~68 g (*Eumops perotis*). In terms of frequency, bats represented between 0.04 and 5.11% of the owl's diet. Our results, together with literature records, suggest that bats tend to be captured more regularly in tropical to subtropical areas than in temperate to cold ones, and that they represent a minor item in the diet of Barn Owls.

Keywords. Bat predators, Chiroptera, Molossidae, *Tyto alba*, Vespertilionidae.

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The Barn Owl (*Tyto alba*; Aves, Strigiformes) feeds mainly on terrestrial micromammals (Bellocq 2000; Taylor 2004). The inclusion of other items in its diet (e.g., birds, insects) is usually less frequent; however, under some exceptional circumstances, some zoological groups may represent a significant proportion of the consumed preys (Taylor 2004). Bats, for example, are occasionally hunted by this owl (e.g., Massoia 1988, 1989). Nonetheless, there are some records in the literature that suggest specialization by the consumption of these mammals (e.g., Massoia et al. 1988; Romano et al. 2002; Vargas et al. 2002).

In this work we report predation of bats by Barn owls in Entre Ríos province (~33.2° S-33.7° S), which from the point of view of its bat fauna, is one of the least known studied locations in Argentina (Barquez 2004). In addition, we briefly discuss the importance of this group of mammals in the diet of this owl in southern South America.

We examined 87 samples of Barn Owl pellets collected in the province of Entre Ríos, central-eastern Argentina. The cranial and dentary

remains of each pellet were identified to the genus or species level using diagnostic characters indicated in bibliography (Barquez et al., 1999) and by comparison with reference collections housed in the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (Buenos Aires, Argentina). All studied materials were deposited in the Departamento de Ecología, Genética y Evolución, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina.

The best-represented taxa in the samples were the molossids *Tadarida brasiliensis* (40.7%), *Molossus molossus* (8.7%), the vespertilionids *Myotis* spp. (19.67%), and *Eptesicus furinalis* (9.2%). At least two species of *Myotis*, *M. albescens* and *M. levis*, are widely sympatric in the province of Entre Ríos, and a third one, *M. riparius*, may be present on its eastern fringe (cf. Wilson 2009). Due to the difficulties in the differentiation of these entities from fragmentary remains, we chose for this genus an open taxonomy.

Sixteen species of bats have been recorded in Entre Ríos province, corresponding to four families (Barquez et al. 1999; de Souza & Pavé 2008, 2009). In this study we registered 12 species and two families. The 32 localities (Fig. 1) reported in Table 1 are novel and contribute to fill information gaps in the distribution of the identified taxa. This is a significant information addition, since the province has records of bats for only 26 locations so far. *Molossops temminckii* is documented for the first time in the province, though its presence in the area was presumed according to its previously known distribution (cf. Barquez et al. 1999). *Eptesicus diminutus*, *E. patagonicus*, *Eumops dabbenei* and *Eumops perotis* are recorded for the second time in Entre Ríos (cf. Udrizar et al. 2008; Souza & Pavé 2008, 2009; Bierig et al. 2013). For all the other species, the number of records duplicate or triplicate previous references to the province (cf. Barquez et al. 1999; Merino et al. 2003; Udrizar et al., 2008; Souza & Pavé 2008, 2009).

The average weight of bats consumed by the Barn Owl ranged from ~4 g (*Myotis* spp.) to ~68 g (*Eumops perotis*). In terms of frequency, bats represented between 0.04 and 5.11% of owl's diet (Table 1), which preyed on them in 32 of 87 locations considered (34.4%). For samples of the Pampean region (~33.6° S-39° S), south of Entre Ríos, bats were detected in 17 of 90 data sets (18.8%), with proportions ranging between 0.1 and 1.32% (Gonzalez Fischer et al. 2011; Teta et al. 2012). Their capture further decreased in Patagonia (south of 39° 30' S), where its frequency ranged from 0.1 to 0.9% and were recorded in 2 of 15 localities (13.3%) (Trejo & Lambertucci 2007; see also Udrizar Sauthier et al. 2013). In all cases bats represented a minor component of the owl's diet and tended to be captured more regularly in tropical to subtropical areas than in temperate to cold ones. This situation is consistent with the increase in richness and abundance in bat communities towards the tropics (cf. Findley 1993) and with the trophic opportunism exhibited by *Tyto alba* (Taylor 2004). In fact, the only three cases of high bat consumption by this owl were recorded in subtropical to tropical environments of northern Argentina (Massoia et al. 1988; Romano et al. 2002) and Bolivia (Vargas et al. 2002).

In agreement with previous studies, we highlight the dominance of two bat families in the pellet samples obtained from *Tyto alba*, Vespertilionidae and Molossidae, especially the genera

Myotis, *Eumops*, *Molossus* and *Tadarida* (e.g. Massoia et al. 1988; Romano et al. 2002; Vargas et al. 2002). These taxa are also the most frequent in the diet of the Stygian Owl (*Asio stygius*) in southeastern Brazil (Motta Junior & Taddei 1992) and the Burrowing Owl (*Athene cunicularia*) in northwestern Paraguay (Andrade et al. 2005). All these bats are insectivorous, mostly gregarious species, that forage in open spaces and whose populations reach high densities in subtropical to tropical areas (Barquez et al. 1999).

According to observations made in Santa Fe province, east of Entre Ríos, Barn Owls often capture bats in flight, especially when they emerge from their shelters in compact groups (Romano et al. 2002). Rupretch (1978) suggests that the frequency of bats in the diet of owls reflects the degree of contact between predator and prey, which increases when both share the same roosts. Owls and bats typically occupy the same buildings, but not necessarily the same spaces within them (Romano et al. 2002). Both molossids and vespertilionids usually occupy human constructions, where they can take part of mixed colonies (Barquez et al. 1999).

In summary, the data presented here confirm the importance of studying the feeding habits of *Tyto alba* to help detect rare species or define their distribution at regional scale, even for preys that are rarely consumed, like bats (e. g. Udrizar Sauthier et al. 2012). In most cases, bat remains are so rare in the diet of this owl that it is evident that consumption of these animals is opportunistic

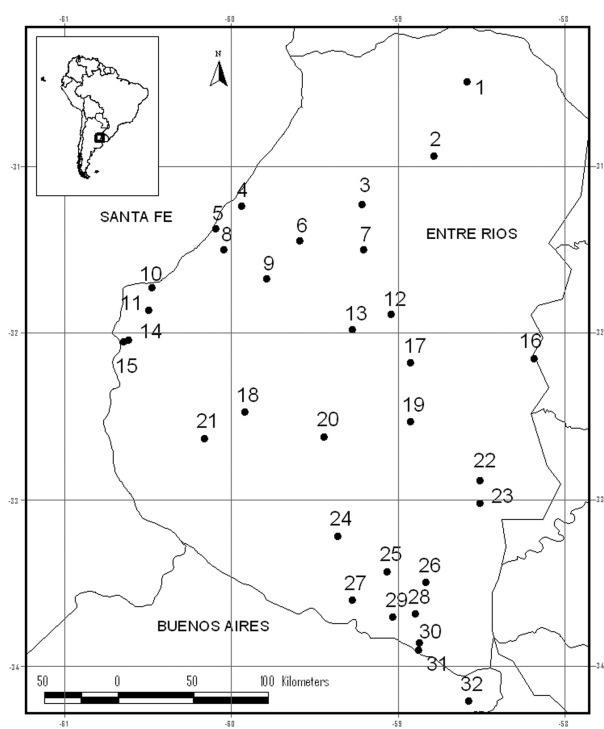


Figure 1. Entre Ríos province, Central-Eastern Argentina. Numbers correspond to those in Table 1.

and that it is not a preferred prey.

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Table 1. Bats predated by Barn owl (*Tyto alba*), expressed as minimal number of individuals, in Entre Ríos province, central-eastern Argentina.

Locality	<i>Eptesicus furinalis</i>	<i>Eptesicus cf. E. diminutus</i>	<i>Lasiurus blosevilli</i>	<i>Lasiurus cinereus</i>	<i>Lasiurus ega</i>	<i>Myotis</i> spp.	<i>Eumops bonariensis</i>	<i>Eumops patagonicus</i>	<i>Eumops perotis</i>	<i>Eumops</i> sp. (a)	<i>Molossus molossus</i>	<i>Molossops temminckii</i>	<i>Tadarida brasiliensis</i>	Chiroptera indet.	Total (bats)	Total (all prey)	% bats on diet
1 La Verbena	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	141	0,71
2 Federal	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	338	0,30
3 Sauce de la Luna	8	-	-	-	-	-	-	-	-	-	-	-	-	1	9	399	2,26
4 Hernandarias	1	-	-	-	-	1	-	-	-	-	2	-	-	-	4	224	1,79
5 Brugo	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	473	0,21
6 Alcaraz	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	297	0,34
7 Mojones Norte	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	542	0,18
8 General Paz	-	-	-	-	-	1	-	-	3	-	-	-	-	-	4	429	0,93
9 María Grande	-	-	-	-	-	1	-	-	-	-	2	-	-	-	3	448	0,67
10 Seminario Paraná	-	-	1	-	1	-	-	-	4	2	1	-	3	-	12	450	2,67
11 Tezanos Pinto	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	212	0,47
12 Villaguay	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	326	0,31
13 Durazno	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	505	0,20
14 Strobel	-	-	-	-	-	4	-	1	-	-	-	-	11	-	16	362	4,42
15 Diamante	-	-	-	1	1	-	-	-	-	-	-	-	-	-	2	66	3,03
16 Liebig	-	-	-	-	-	1	1	-	-	-	-	-	-	-	2	260	0,77
17 Villa San Marcial	-	-	2	-	-	-	-	-	-	1	-	-	-	-	3	361	0,83
18 Febre	-	-	-	-	-	1	-	-	-	-	1	-	-	-	2	522	0,38
19 Gilbert	-	-	-	-	-	1	-	-	-	-	-	-	1	-	2	418	0,48

Table 1. Bats predated by Barn owl (*Tyto alba*), expressed as minimal number of individuals, in Entre Ríos province, central-eastern Argentina (*cont.*).

Locality	<i>Eptesicus furinalis</i>	<i>Eptesicus cf. E. diminutus</i>	<i>Lasiurus blosevilli</i>	<i>Lasiurus cinereus</i>	<i>Lasiurus ega</i>	<i>Myotis</i> spp.	<i>Eumops bonariensis</i>	<i>Eumops patagonicus</i>	<i>Eumops perotis</i>	<i>Eumops</i> sp. (a)	<i>Molossus molossus</i>	<i>Molossops temminckii</i>	<i>Tadarida brasiliensis</i>	Chiroptera indet.	Total (bats)	Total (all prey)	% bats on diet
20 Remonta	-	-	1	1	-	-	-	-	-	-	-	-	-	-	2	305	0,66
21 Victoria	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	116	0,86
22 Reserva Las Piedras	-	2	-	-	-	4	-	-	-	1	2	-	22	-	31	625	4,96
23 Gualaguaychú	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	411	0,73
24 Puerto Ruíz	1	-	-	-	-	-	-	-	-	-	-	-	-	2	3	211	1,42
25 Médanos	-	1	-	-	-	1	-	-	-	-	-	-	1	1	4	1382	0,29
26 Ceibas	5	-	-	-	-	11	3	-	-	1	6	-	22	-	48	2295	2,09
27 Mazaruca	-	-	-	-	-	2	-	-	-	-	2	-	10	-	14	274	5,11
28 Sagastume	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	2596	0,04
29 San Martín	-	-	-	-	-	3	-	-	-	1	-	-	2	-	6	957	0,63
30 Brazo Largo	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	154	0,65
31 Zarate	1	-	-	-	-	1	-	-	-	-	-	-	-	-	2	182	1,10
32 Arroyo Estudiantito	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	340	0,29

(a) Including fragmentary remains that could not be distinguished between *E. bonariensis* and *E. patagonicus*.