

Bats (*Chiroptera*) found in bat boxes in Southeastern Lithuania

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The study was carried out in Southeastern Lithuania. In total, 255 bat boxes were erected in 14 areas between 2004 and 2006. The boxes were attached to trees standing in clearings of mixed forests, always three boxes to one tree. In summer 2006, three bat species were found in the boxes. *Pipistrellus nathusii* constituted 96.8%, *Nyctalus noctula* 1.1 % and *Plecotus auritus* 2.1%. In early July, only males of *P. nathusii* were found in the boxes, while later in the season both sexes were present. Bats were abundant in the boxes from late July till the beginning of September. To attract other forest-dwelling bat species, bat boxes of different design should be probably used.

Key words: bats, *Pipistrellus nathusii*, *Nyctalus noctula*, *Plecotus auritus*, bat boxes, Lithuania

INTRODUCTION

During the warm season, bats often use tree-holes, cavities in houses, spaces in hollow trees and behind bark, and other cavities, like bat boxes and bird boxes. The presence of bats can hardly be seen when they are hiding in tree holes and other non-accessible spaces. Bat boxes can be used to investigate certain bats roosting in the forest, including territorial males, nursing females or mating groups.

Bats roosting in bat boxes have been studied in many areas of Europe and North America (Stebbins, 1988; Gerell, 1985; Racey, 1992; Altringham, 1998; Pauža, Paužienė, 1996; Park et al., 1998; Mitchell-Jones, 2004; Mitchell-Jones et al., 1999; Schmidt, 1994, 1997; Kowalski et al., 1994; Kiser, 2002; Lourenço, Palmeirim, 2004; Ciechanowski, 2005; Sachanowicz, Ciechanowski, 2005). In Lithuania, bats in bat boxes were investigated by Baranauskas et al. (2005) and Mickevičienė (2005).

In Lithuania, the following fourteen bat species were recorded during summer: pond bat *Myotis dasycneme*, Daubenton's bat *Myotis daubentonii*, Natterer's bat *Myotis nattereri*, Brandt's bat *Myotis brandtii*, brown long-eared bat *Plecotus auritus*, European barbastelle *Barbastella barbastellus*, noctule *Nyctalus noctula*, Leislers' bat *Nyctalus leisleri*, parti-coloured bat *Vespertilio murinus*, Nathusius' pipistrelle *Pipistrellus nathusii*, common pipistrelle *Pipistrellus pipistrellus*, serotine bat *Eptesicus serotinus*, northern bat *Eptesicus nilssonii* (Pauža, Paužienė, 1996; Masing et al., 1997; Balčiauskas et al., 1999, 2005; Mickevičienė, Mickevičius, 2001; Baranauskas et al., 2005), and soprano pipistrelle *Pipistrellus pygmaeus* (Pauža et al., 2004; Masing, Siivonen, 2005).

The purpose of the present study was to assess the occupancy rate of bat boxes during summer.

MATERIALS AND METHODS

During 2004–2006, so-called “standard” wooden bat boxes were erected in 14 sites of southeastern Lithuania (Table 1). Internal dimensions of the boxes were 25 cm × 15 cm × 10 cm, with entrance 15 × 2 cm and walls 2.5 cm thick. In May 2004, a total of 72 bat boxes were erected in the Verkiiai regional park. In April and May 2005 and 2006, 120 and 63 boxes, respectively, were erected in other 13 places.

Table 1. Numbers of bat boxes erected in different areas of Southeastern Lithuania in 2004–2006

Area	Number of bat boxes/box groups	Year of erecting bat boxes
Aukštaitija National Park (NP)	9/3	2005
Dzūkija National Park (NP)	27/9	2005
Trakai Historical National Park (HNP)	12/4	2005
Aukštadvaris Regional Park (RP)	36/12	2005
Gražutės Regional Park (RP)	27/9	2006
Labanoras Regional Park (RP)	9/3	2005
Nemuno Kilpos Regional Park (RP)	15/5	2006
Neris Regional Park (RP)	9/3	2005
Pavilniai Regional Park (RP)	6/2	2006
Veisiejai Regional Park (RP)	6/2	2006
Verkiiai Regional Park (RP)	72/24	2004
Strošiūnai Reserve	9/3	2005
Maišiogala Forest	9/3	2006
Vanagynė Forest	9/3	2005
Total	255/85	

Bat boxes were attached to trees (pine trees and oaks) standing in open places in forest clearings surrounded by mixed forest. They were established 4–6 m above the ground, in each case three boxes to one tree, facing south, east and west (Park et al., 1998). In total, 85 box groups were formed on 85 trees.

The boxes were checked for bats on July 1–2, July 28–29, August 15–16, September 1–2 and September 11–12 of 2006. Each time the inspection lasted two days. Bats found in boxes were captured, their species and sex were determined. Any damage to boxes made by woodpeckers (*Picidae*) were also noted.

RESULTS

During the study, 187 bats belonging to three species were found in bat boxes (Table 2). *Pipistrellus nathusii* constituted 96.8%, *Nyctalus noctula* 1.1% and *Plecotus auritus* 2.1%. In early July, only males of *P. nathusii* were observed in the boxes, while later in the season both sexes were present. Bats were abundant in the boxes from late July till the beginning of September. From 180 individuals of *P. nathusii*, 43.9% were males. All five animals of *P. auritus* were males. From two individuals of *N. noctula*, one was male and another female.

At the beginning of July, bat boxes were mostly occupied by *Pipistrellus nathusii*, all males. Out of 85 box groups erected, 14 box groups situated in 8 areas were used by *P. nathusii* (Table 2). *Plecotus auritus* was found in one box in the Verkiai RP and in another box in the Vanagynė forest; both animals were males. In the regional parks of Gražutės, Labanoras, Pavilniai, Veisiejai and in the forest of Maišiogala, all bat boxes were empty. Thus, in early July 14 individuals of *P. nathusii* and two of *Plecotus auritus* were found in bat boxes.

At the end of July, 11 box groups situated in 10 areas were used by bats (Table 2). Both males and females (62.1% and 37.9% respectively) of *P. nathusii* were found in bat boxes during this count. *Plecotus auritus* was present again in the same localities as at the beginning of July (Verkiai RP and Vanagynė forest). Small changes appeared in the number of males of *P. nathusii* compared to the previous count. In four areas, the regional parks

of Neris, Nemuno Kilpos, Labanoras and Verkiai harem-groups of *P. nathusii* (4–6 individuals together) were found. Thus, in late July, 27 individuals of *P. nathusii* and two of *Plecotus auritus* (all males) were found in bat boxes.

On 15–16 August, 24 bat box groups situated in 12 areas were occupied by bats (Table 2). Empty boxes were only found in regional parks of Pavilniai and Gražutės. All boxes (with the exception of those in Vanagynė forest) were used by *P. nathusii*. Bat boxes in the Maišiogala forest and Veisiejai RP were used by single males of *P. nathusii*. In 21 areas, harem-groups of *P. nathusii* were found. Thus, in mid-August 101 individuals of *P. nathusii* (22.7% males and 77.3% females) and one of *Plecotus auritus* (male) were found in bat boxes.

On 1–2 September, 11 bat box groups situated in 8 areas were occupied by bats (Table 2), of them 10 box groups by *P. nathusii*. Three harem-groups were found, two of *P. nathusii* and one of *N. noctula*. One bat box (damaged by a woodpecker) in Aukštadvaris RP was used by two animals *Nyctalus noctula*. Thus, in the first days of September, 29 animals of *P. nathusii* (24.1% males and 75.9% females) and two of *Nyctalus noctula* (male and female) were found in bat boxes.

On 11–12 September, 2 bat box groups situated in 2 areas were occupied by bats (Table 2), all *P. nathusii*. One harem-group was found. A single male of *Pipistrellus nathusii* used a box in the Trakai Historical Park, while two such shelters were used by bats in Nemuno Kilpos RP. Thus, in mid-September, 7 animals of *P. nathusii* (2 males and 5 females) were found in bat boxes.

Bat boxes in 4 localities were damaged by woodpeckers (Table 3). It is interesting to note that in the Verkiai regional park in seven cases all bat boxes (groups of three boxes to one tree) were damaged by woodpeckers. Almost 15% of bat boxes erected in the area of investigations during 3 years were damaged by woodpeckers.

DISCUSSION

In 255 standard wooden bat boxes used in the present study *P. nathusii* was dominating, constituting 96.8% of all bats. In

Table 2. Numbers of bats found in bat boxes in summer

Locality	1–2 July	28–29 July	15–16 August	1–2 September	11–12 September	Total
Aukštaitija NP	1	1	7	2	–	9
Dzūkija NP	2	–	11	1	–	14
Trakai NHP	1	1	8	2	1	13
Aukštadvaris RP	3	3	9	7 (2 N)	–	22
Gražutės RP	–	–	–	–	–	–
Labanoras RP	–	4	6	2	–	12
Nemuno Kilpos RP	3	5	16	11	6	41
Neris RP	1	6	18	–	–	25
Pavilniai RP	–	–	–	–	–	–
Veisiejai RP	–	–	1	1	–	2
Verkiai RP	3 (1P)	6 (1P)	17	–	–	26
Strošiūnai Reserve	1	1	7	3	–	12
Maišiogala Forest	–	1	1	–	–	2
Vanagynė Forest	1 (P)	1 (P)	1 (P)	–	–	3
Total	16	29	102	31	7	187

Note. In the Table, all bats are *Pipistrellus nathusii*, with the exception of *Plecotus auritus* (P) and *Nyctalus noctula* (N).

Table 3. The numbers of bat boxes damaged by woodpeckers in different areas of Southeastern Lithuania in 2004–2006

Area	Number of bat boxes	Damaged by woodpeckers	
		number	%
Dzūkija NP	27	7	26.0
Aukštadvaris RP	36	5	13.9
Verkiai RP	72	23	31.9
Strošiūnai Reserve	9	4	44.4
Total	144	39	

addition, *P. auritus* and *N. noctula* constituted 2.1% and 1.1%, respectively. Similar data were received in Dzūkias National Park and Čepkeliai Reserve. Thus, checking of 252 bat boxes in Southern Lithuania (forests of Dzūkija NP and Čepkeliai Reserve) between 2000 and 2003 showed that *P. nathusii* was dominating (95.4%), especially during the breeding season (Mickevičienė, 2005). The other four bat species found in Dzūkija NP (*Plecotus auritus*, *Eptesicus serotinus*, *Eptesicus nilssonii*, *Myotis dasycneme*) were found in quantities 0.3–2.4% per species.

Consequently, it seems that in Southern Lithuania standard wooden bat boxes are mostly attractive to *P. nathusii*.

The investigations showed that brown long-eared bat is one of the bat species mostly found in bird nestboxes, and *Nathusius pipistrelle* is the second bat species found rather often in bird boxes, but serotine bat and northern bat are very rare in such shelters (Juškaitis, 1999; 2005). Brown long-eared bat is very often found in bird boxes (Pauža, Paužienė, 1996). In Latvia, bats use bird boxes (Petersons, Vintulis, 1998).

In Poland, in some localities in bat and bird boxes *P. pipistrellus* are constituting 50–99% of bats recorded (Sachanowicz, Ciechanowski, 2005). At least 13 bat species were recorded in nest boxes for birds and bats in Poland (Kowalski et al., 1994). Over half of the 21 bat species occurring in Poland used nest boxes (Ruprecht, 1983). According B. Woloszyn (1991), *Myotis nattereri*, *Myotis brandtii*, *Pipistrellus nathusii*, *Nyctalus leisleri*, *Plecotus auritus* are found in bird boxes. *Nathusius pipistrelle*, in totally 303 individuals (161 males and 142 females), were captured in bird nest boxes and bat boxes during 1995–1998 in northern Poland (Jarzembowski, 2003). *Nathusius pipistrelle* is found in bat boxes in Germany (Schmidt, 1994, 1997). Some species using nest boxes in other European countries did not occur in nest boxes in Poland. Regional differences in the use of nest boxes by different species reflect their preference for different shelters, as well as the distribution and density of local populations (Kowalski et al., 1994).

The damage of bat boxes by woodpeckers can be rather significant. During three years, 15% of bat boxes were damaged by woodpeckers. Few damaged bat boxes were occupied by small passerine birds. In eastern Poland, in a heavily managed woodland, 4.3% and 29.3% of bat boxes were damaged by woodpeckers after 3 and 5 years, respectively (Sachanowicz, 2003).

CONCLUSIONS

1. The majority of bats found in bat boxes erected in forest clearings of eastern Lithuania belonged to *Pipistrellus nathusii*. To at-

tract other forest-dwelling bat species, probably different types of bat boxes should be used.

2. *Pipistrellus nathusii* used bat boxes mostly during the second half of summer, often forming harem-groups.

3. Maybe one of the main migration routes of *Nathusius pipistrelle* in southeastern Lithuania runs through the Regional Park of Nemuno Kilpos, because all five box groups were occupied by bats during this season.

4. The damage of bat boxes by woodpeckers can be rather significant, and during three years in some woodlands more than 15% of all bat boxes may be damaged.

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ŠIKŠNOSPARNIŲ (*CHIROPTERA*) NAUDOJIMASIS INKILAIS PIETRYČIŲ LIETUVOJE

S a n t r a u k a

2006 m. keturiolikoje Pietryčių Lietuvos vietovių tirta šikšnosparnių naudojimas inkilais šiltuoju metų laiku. Iš viso buvo išskelta 255 inkilai. Vasaros–rudens sezonu inkiluose buvo aptikta trijų rūšių šikšnosparnių. Natuzijaus šikšniukai *Pipistrellus nathusii* sudarė 96,8%, rudieji nakvišos *Nyctalus noctula* ir rudieji ausyliai *Plecotus auritus* – 3,2%. Šikšnosparnių ikimigraciniu laikotarpiu inkiluose buvo aptinkami tik teritoriniai patinai. Absoliuti šikšnosparnių dauguma inkiluose buvo aptikta migraciniu-poravimosi sezonu. Natuzijaus šikšniukai ir rudieji nakvišos ruggpjūtį ir rugsėjį inkilus naudojo poravimosi grupuotėms – haremsams formuoti. Kitų rūšių šikšnosparnių priviliojimui reikalingi kitokie inkilų konstrukciniai sprendimai.

Raktažodžiai: *Pipistrellus nathusii*, *Nyctalus noctula*, *Plecotus auritus*, šikšnosparnių inkilai, Lietuva