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Building-dwelling bats in the Nationalpark Hohe Tauern (Carinthia, Salzburg, Tyrol)

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Abstract

We studied the species composition of bats in the higher altitudes of the Nationalpark Hohe Tauern in the Austrian Alps in 1998 (Salzburg), 2002 (Carinthia) and 2003 (Tyrol). 457 buildings at altitudes between 1000 and 2000 m above sea level were surveyed. The following species were found: *Myotis brandtii, Myotis mystacinus, Eptesicus nilssonii, Vespertilio murinus, Pipistrellus pipistrellus/pygmaeus* and *Plecotus auritus/macrobullaris*. Bats were found in 7.6 % of the checked buildings, faeces of bats in 22.2 %. In Carinthia 37 % of the buildings had been used by bats, in Salzburg 32 %, in Tyrol only 12 %. Overall, whiskered bats dominated (*M. mystacinus/brandtii*), followed by *Eptesicus nilssonii*, and some individuals of *Pipistrellus sp.*, *Plecotus sp.* and *Vespertilio murinus. Myotis brandtii* was not recorded in Tyrol, whereas *Vespertilio murinus* was only found in Tyrol. Within a species, individuals were found at higher altitudes in the southern parts than in the northern parts of the national park. As the roosts in the national park predominantly hold single individuals the potential threats for the bats are not as eminent as in the surrounding valleys. The valleys and villages at the edge of the national park, however, are very important for the bats of the region, especially in Salzburg.

Keywords

Bats, altitudinal distribution, species composition, Nationalpark Hohe Tauern, Austria

Background and Project aims

The first systematic summer investigations of bats in the national park took place in Salzburg in 1986. In the 1990-ies the adjacent valleys of the national park region Hohe Tauern have been studied quite thoroughly in Salzburg, Carinthia and Tyrol, but not the higher altitudes of the national park. To investigate possible changes in the bat community of the Salzburg part, the national park valleys where reinvestigated in 1998. In 2002 the Carinthian part of the national park and in 2003 the Tyrolean part of the Hohe Tauern were surveyed.

The aim of the studies was to investigate the species composition of the bat fauna in the three parts of the national park, to assess the numbers of individuals and preferred roost types, and to investigate potential differences between the northern and southern slope of the central alps. Given these results we identify potential threats for the bat community and conservation measures to preserve the bat fauna of the protected area and its surroundings.

Study area

The study took place in the Nationalpark Hohe Tauern, a 1836 km² protected area in Carinthia (420 km²), Salzburg (805 km²) and Tyrol (611 km²), which has been nominated as a Natura 2000 site of the European Union in 1995. The national park extends 100 km in the east-west direction and 40 km in the north-south direction. Altitude ranges from 1.010 m to 3.798 (Großglockner, highest mountain of Austria). The area covered in the present study area comprised most of the important valleys of the national park in Carinthia, Salzburg and Tyrol, concentrating on elevations between 1000 and 2000 m. Most of the investigated area consists of forest in the lower parts and mountain pastures in the higher regions.

Methods

A total of 457 buildings was checked for the presence of bats by searching all potential roosts (all sorts of crevices, attics if possible) for faeces (indirect proof), living or dead animals (direct proof). In Salzburg 183 buildings were investigated in 1998 (13 days, mostly in July), in Carinthia 179 buildings were checked between June and August 2002 (11 days), and in Tyrol 95 buildings were

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controlled in July 2003 (2 days). The roost records were divided into roosts of single individuals and maternity roosts (juveniles, lactating females). When possible, living animals were caught for species identification. During the study we did not distinguish between *Pipistrellus pipistrellus* and *Pipistrellus pgymaeus* as well as between *Plecotus auritus* and *Plecotus macrobullaris*. The determination of *Myotis brandtii* and *Myotis mystacinus* was only possible, when the individual was caught, all the others are referred to as *Myotis mystacinus/brandtii*. Species identification from faeces was not attempted. Instead faeces were classified as coming from either small or medium-sized to large species (*Chiroptera indet*). In addition to the survey of the buildings some mist nettings took place.

Results

The vertical distribution of the checked buildings differed significantly between the three parts of the national park ($p < 0.0001$), with Salzburg reaching a mean altitude of 1426 m (ranging from 1030–1750 m), Carinthia 1612 m (1185-2030 m), and Tyrol 1753 m (1450-1975 m). We found no signs of bats in 70.2 % of the 457 buildings. Faeces only were found in 22.2 % and 7.6 % of the buildings held alive or dead individuals (Figure 1). These figures were highest for Carinthia, where in 37 % of the buildings signs of bats were detected. In Salzburg 32 % of the checks yielded bat records and in Tyrol only 12 %. The number of buildings with indirect or direct proofs of bat presence decreased with increasing altitudes (Figure 2). Preferred roost sites were alpine pasture cabins and hunting huts, where bats were using crevices in roofs, windows frames and shutters (HÜTTMEIR et al. 2003).

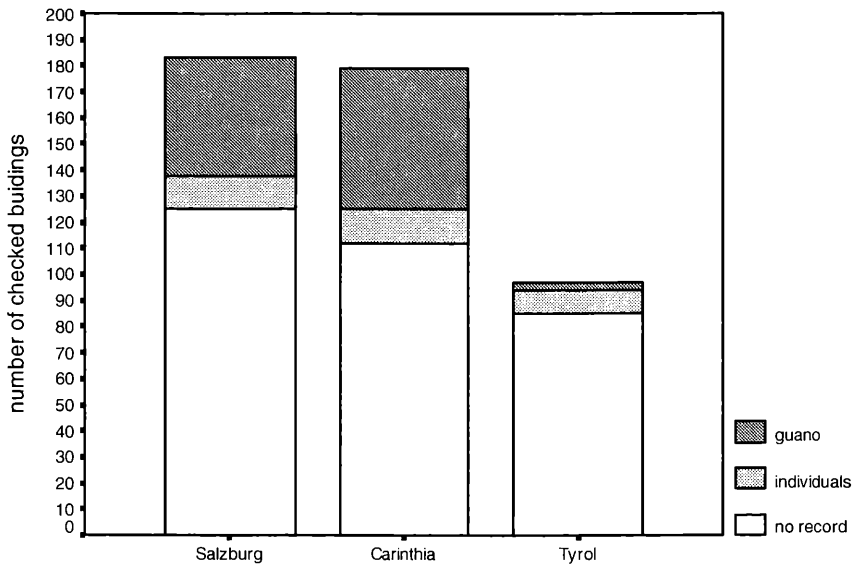

Fig. 1: Number of buildings with direct (individuals), indirect (guano) proof of presence of bats or no records

Six of the 25 Austrian bat species were found to occur in the national park: *Myotis brandtii*, *Myotis mystacinus*, *Eptesicus nilssonii*, *Vespertilio murinus*, *Pipistrellus pipistrellus/pygmaeus* and *Plecotus auritus/macrobullaris*.

A total of 52 roosting animals were determined, with the whiskered bats dominating the community (6 *Myotis mystacinus*, 4 *M. brandtii*, 20 *M. myst/brand*), followed by 13 *Eptesicus nilssonii*, 3 *Pipistrellus pip/pyg.*, 2 *Pipistrellus sp.*, 1 *Plecotus sp.*, 2 *Chiroptera indet* and 1 *Vespertilio murinus*. *Myotis brandtii* was not recorded in Tyrol, whereas *Vespertilio murinus* was only found in Tyrol. While *M. mystacinus* dominated in Salzburg, *M. brandtii* was more abundant in Carinthia, and *E. nilssonii* was observed as most abundant in Tyrol. When including faeces records, *Plecotus* species seem to be more abundant than expected from sightings only. Overall the roosts in the national park predominantly held single individuals. We only found one maternity roost in Carinthia (*Myotis mystacinus*, 1616 m), none in Salzburg and Tyrol.

The mist nettings in the national park yielded the following results: In Carinthia (4 mist netting sessions) 1 *M. brandtii*, 4 *M. mystacinus*, 5 *Eptesicus nilssonii* were caught, as well as 15 *M. brandtii*, 2 *M. mystacinus*, just outside the borders of the national park. In Salzburg 4 mist nettings just outside the national park borders yielded 13 *M. mystacinus*, 1 *E. nilssonii* and 1 *Plecotus sp.* As most of the above mentioned 15 individuals of *M. brandtii* and 13 *M. mystacinus* were lactating, we can assume maternity colonies.

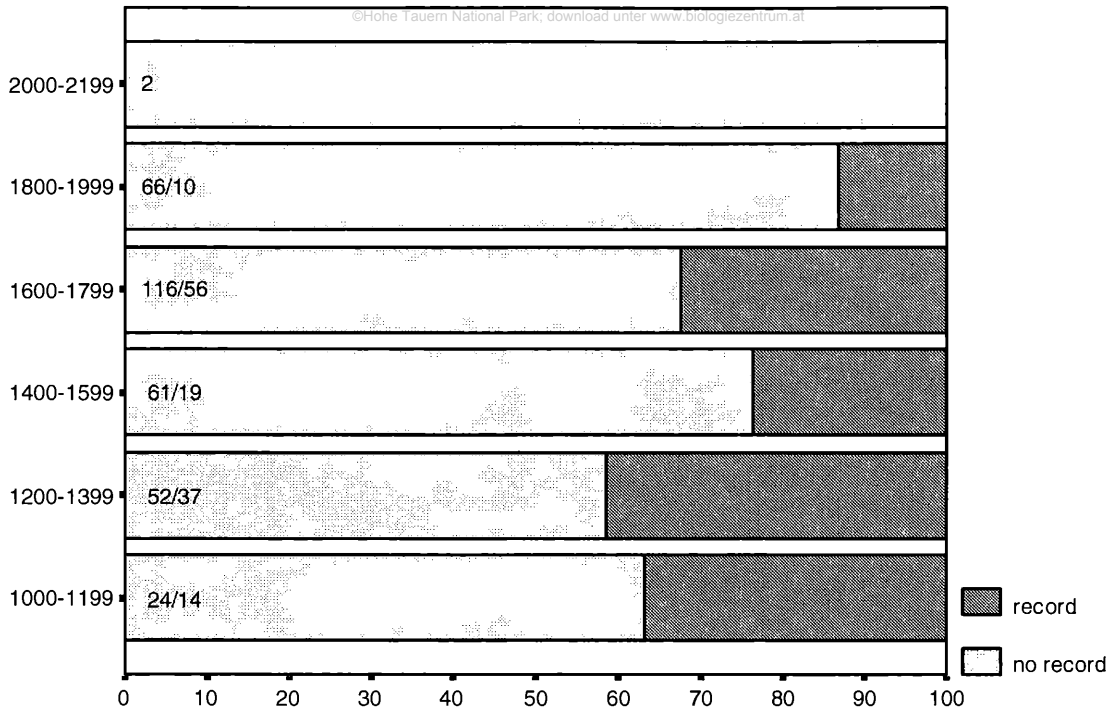

Fig. 2: Percentage of occupied buildings (record) at different altitudes (in metres), number of buildings without record / number of buildings with record

Discussion

The species composition and roost preference found in the three parts of the national park Hohe Tauern is quite similar and seems to be characteristic for subalpine and alpine areas of the alps (HOLZHAIDER & ZAHN 2001). It is – with 6 species - clearly less species-rich than the lower regions, such as the adjacent valleys in the surroundings of the national park (e.g. Salzburg 11 species, JERABEK et al. 2005).

The number of occupied roosts in buildings decreases with increasing altitude and most of the buildings at higher elevations just house single individuals rather than maternity colonies. The maximum recorded altitudes for single species are higher in the southern parts than in the northern part. This is probably due to climatic conditions and the availability of suitable roosts. The northern and southern slope of the central alps face different climatic conditions: at the northern slope the 0°C-July-Isotherm is situated about 100 m lower, precipitation is higher, strong winds and more cold spells are observed more frequently. Therefore the agriculturally used areas and hence buildings are found at higher elevations in the southern parts. This is mirrored in the distribution of bats. We only found one maternity roost inside the borders of the national park during the present study (*Myotis mystacinus*), but some maternity roosts of *Plecotus auritus/macrobullaris*, *Myotis mystacinus* and *Pipistrellus pipistrellus/pygmaeus* in Salzburg are known around 1250 m, whereas in Carinthia they reach 1600 m. However, records of single individuals can reach as high as 2300 m (AUSOBSKY 1970).

As the roosts in the national park predominantly house single individuals the potential threats for the bats are not as eminent as in the surrounding valleys. However, the traditional way of building favours crevices and should be kept up. The use of pesticides (including wood treatment) should be strictly forbidden in the national park. Overall, the conservation of roosts in the villages at the edge of the national park and the adjacent regions is essential for the long-term survival of the bats of the region. This is especially true for Salzburg, with two thirds of all maternity roosts of lesser horseshoe bats occurring in the villages adjacent to the national park. Hence, the public relations work should not stop at the borders of the protected area but help raising awareness for bats to be able to take long-term conservation measures.

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