

## Bat Species of the Year 2015

### **Nathusius' pipistrelle (*Pipistrellus nathusii*)**

Facts compiled for BatLife Europe by  
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#### ***Biology and distribution***

Nathusius' pipistrelle (*Pipistrellus nathusii*) is a small bat, weighing less than 10 g (6-16 g). It is very well adapted to flight, weighing as little as a 2-Euro coin and having a wingspan of app. 230 mm.

Colouration of fur varies between reddish and dark brown dorsally and light grey to cream on the ventral surface. Moulting begins in summer prior to autumn migration.

This small bat can live up to 13 years.



Fig. 1: Bat of the year 2015: Nathusius' pipistrelle (*Pipistrellus nathusii*). © Wolfgang Forstmeier

The distribution of Nathusius' pipistrelle covers vast parts of Europe. However, the breeding areas of this species are mainly in north-eastern Europe and it hibernates mainly in south-western or southern parts of Europe.

Interestingly, within the last decades a shift of the breeding area to the south and west was recorded, while hibernating individuals were found further to the north.

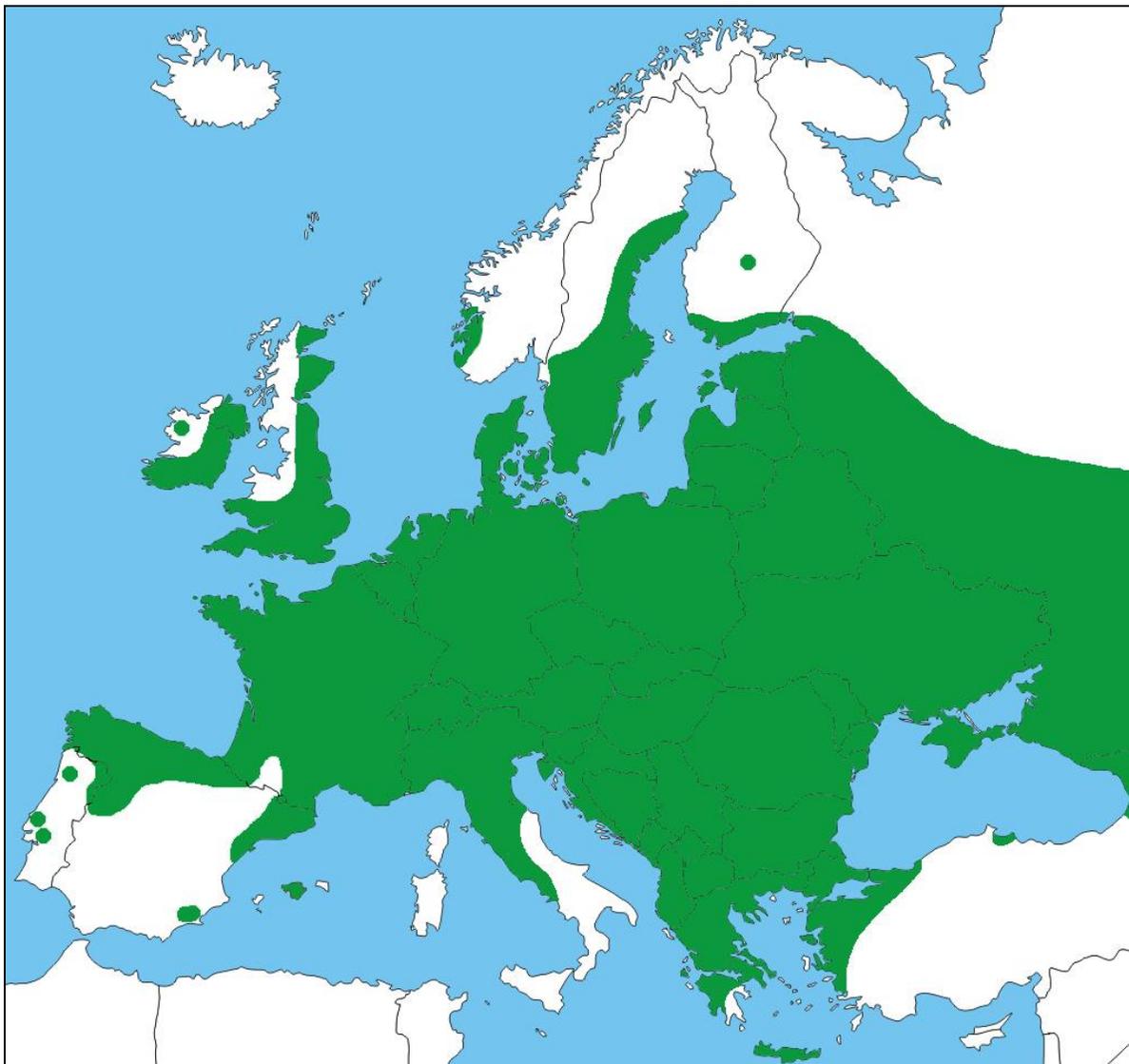


Fig. 2: Distribution of Nathusius' pipistrelle (*Pipistrellus nathusii*). Map © C. Dietz.

## ***Ecology***

Nathusius' pipistrelles emerge shortly after sunset flying 4 to 15 m above ground, fast in straight lines with strong deep wing-beats, chasing small to medium flying insects which are consumed during flight (aerial hawking). Typical foraging habitats are woodlands and water bodies.

The diet contains a high proportion of Diptera; predominately Chironomidae (non-biting midges) and other insects like Lepidoptera, Arachnida and Culicidae. The diet varies between summer colonies and migrating individuals but this could also reflect the habitat and season.

They produce a characteristic high frequency modulated sweep with a constant frequency tail seen on a sonogram as a hockey-stick shaped call. However, like most bat species, Nathusius' pipistrelle shows a high plasticity in echolocation calls and in open areas it usually produces quasi-constant calls.

The peak frequency of their call is typically between 35 (30) and 40 (43) kHz, depending on the habitat and the presence of other individuals.

## ***Mating behaviour***

The mating system of Nathusius' pipistrelle is a dynamic system controlled by female choice and various behavioural strategies of males. These include: (1) resident males, which occupy roosts from April to September, and can be associated in long-term stable groups; (2) migratory males, for which vocalisation was annually recorded at the end of August and in September at the same sites, often near or inside busy vocalisation sites; (3) males which occurred sporadically at the vocalisation sites of resident males and which may play a role of satellites or sneaks.

The wide variation in the reproductive tactics of males can be regarded as functional adaptations related to the spatial dynamics of a species with long-distance migration flights.

Females prefer only a few successful males. The advertising males exhibit high roost fidelity and return to the same area each year, whereas females return to their nursery areas.

The majority of mating takes place along its migration routes. The peak of the mating season changes according to geographical position of the locality: it appears in late July and early August in Sweden, in mid and late August and beginning of September in the Czech Republic, north-eastern Germany and Poland, whereas it takes place in September and October in the southern parts of Europe.

Nathusius' pipistrelles use advertisement calls that are usually composed of three motifs: the first 'main motif', is formed by several short FM notes and resembles the advertisement calls of other European pipistrelle species, the second motif, is formed by one steep FM note, and the third motif, is a 'trill' of several 'V-shaped' syllables (Fig. 3). However, two more motifs are known.

Some of the acoustic parameters of advertisement calls vary minimally within individuals and can be used for individual recognition.

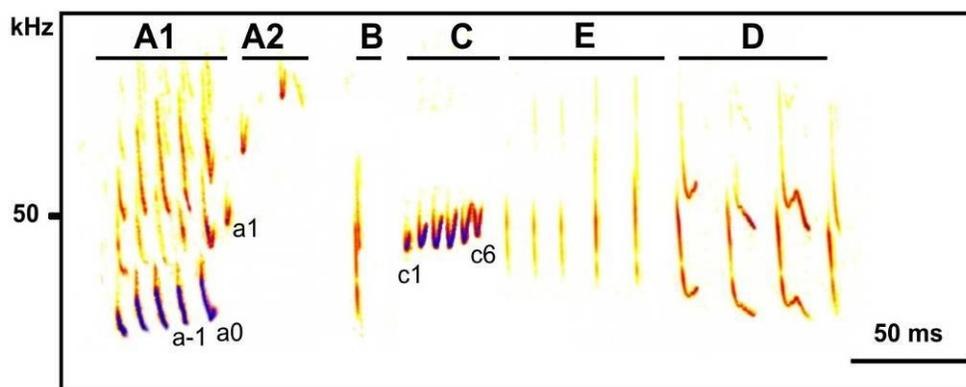


Fig. 3: The advertising call of Nathusius' pipistrelle composed of three main motifs A, B, C and two additional motifs D and E. © Helena Jahelkova

The advertisement call activity can be recorded before the beginning of mating season but the total amount of vocalisation activity is lower, and in a study by Czech bat researchers calls were recorded mainly in the early part of the night. It is suggested that emitting advertising calls in spring is probably connected with territory defence by males, including their foraging grounds.

During the course of the season, the vocalisation activity of resident males varies. At the beginning of the mating season, advertisement calls were performed almost exclusively as a songflight and comprised only a small percentage of whole night activity. Their structure was mostly simple. In the peak of the mating season, advertising activity increased to more than 50% of whole night activity and most advertisement calls were emitted at the entrances of roosts as sedentary display and their complexity grew markedly.

### ***Migration***

Nathusius' pipistrelles have adapted to seasonal climatic changes performing large-scale movements to escape harsh environmental conditions and low levels of food resources. The autumn migration period spans approximately two months.

Recovery data of banded bats highlight travel distances of up to 2,000 km and show that Central European and northern populations of Scandinavia, Baltics and Russia leave breeding grounds moving in a northeast to west/southwest direction for wintering in the Netherlands, France, Switzerland and Italy.

Even the Baltic and North Sea are crossed regularly which has been demonstrated by bats found on oil-platforms and ships. As evidenced by recent findings a connection of populations on the British Isles and the Continent exists.

Central European summer habitats are used as stopover sites during migration. Females leaving stopovers earlier than males is a common phenomenon, resulting in territorial males being the last recorded animals in summer habitats.

The minimum migratory speed has been estimated at ca. 50-60 km/day and energetic demands of continuous flights are fulfilled using a 'mixed-fuel strategy', based on a combination of directly metabolised dietary proteins from insects preyed while flying and fatty acids from body reserves.

Acoustic surveys on ultrasound calls indicates that Nathusius' pipistrelles are crossing even the highest altitudes in the Alps (1100 - 3100 m above sea level) and thus, do not depend on rivers as necessary leading landscape structures.

Parts of the migrating populations are hibernating at the foothills of the Alps. Individuals are regularly found in piles of wood, trees or cellars, typically in larger cities and along rivers. However, with increasing frequency hibernating bats are found at more northern latitudes.

After hibernation, spring migration in Central Europe appears to be a rapid large-scale (2-3 weeks) movement with a mostly north-eastern direction towards summer habitats.

### ***Threats***

Unusual hot summers/autumns, and related decrease in insect prey abundance may alter the abundance of the species at traditional migration sites on a regional scale. Females in particular avoid these areas during migration. Nathusius' pipistrelles are a famous example for their response to this kind of phenomena as part of the contemporary climate change. They evidentially reacted with an expansion of range due to the increasing minimum temperature. Furthermore, the time span between first and last observations of bats in summer habitats has extended by four weeks since the 1980s.

The species is especially vulnerable to increased mortality at on and off shore wind turbines. Nathusius' pipistrelles are even at the top of the wind farm casualties' statistics. Due to a lack of experience sub-adults are particularly at risk. Since first-year bats are already part of the reproducing population, this becomes even more problematic. Stable isotope analysis revealed that individuals found dead at German wind farms likely

originated from northern Baltic countries and Russia demonstrating the wide-scale impact of wind farms for the species.

Nathusius' pipistrelles often roosts in tree holes or crevices in trees. Thus, recultivation of old forests and city parks and felling of old trees can seriously decrease the roost availability for this species.

### ***Conservation***

Nathusius' pipistrelle is considered to be vulnerable in the European context and is protected under the 'EU Habitats Directive 92/43/CEE (Annexes II and IV). Furthermore, this species is listed in the United Nations convention on the 'Conservation of Migratory Species of Wild Animals' (Bonn, 1979) via the EUROBATS agreement (London, 1991).

Due to a lack of any detectable genetic structure in European populations, usual conservation management measures based on more or less precisely defined subpopulations are hard to establish. The migratory nature of the species therefore requires careful monitoring throughout the species' range.

Fortunately, these elusive long-distance migrants make use of artificial roosts (bat boxes) which are established by bat workers throughout the European range. This makes a monitoring programme feasible. Even Pine monocultures may become suitable habitats, if larger water bodies are located in the surrounding area and roosting opportunities are provided.

For effective species protection, establishment of wind farms in forests, at key migration corridors and coastal crossing points should be studiously avoided.

In ongoing projects Nathusius' pipistrelles are marked with aluminium rings. Any observation of a bat carrying a ring is very important and should be reported to local bat workers or ringing agencies.



Fig. 4: Research and conservation projects in the UK and Central Europe focus on Nathusius' pipistrelle. © Nigel Milbourne