

Bats' winter activity survey

22nd December 2018 – 21st March 2019

HIGHLIGHTS:

- Bats' winter activity has not been surveyed before on Alderney. Thus, bat activity was recorded over 54 nights between 22nd December 2018 and 21st March 2019 to get a general idea of the topic. Acoustic recorder was placed by the entrance of East Tunnel at Waterlane.
- Total of 2751 bat recordings were obtained during the survey period. 2709 were identified as common pipistrelle (*Pipistrellus pipistrellus*) and 17 as Nathusius' pipistrelle (*Pipistrellus nathusii*). Nathusius' pipistrelle has very similar echolocation calls than Kuhl's pipistrelle (*Pipistrellus kuhlii*), so there is a possibility that some of the Nathusius' pipistrelle recordings were in fact Kuhl's pipistrelle. However, Kuhl's pipistrelle presence on Alderney has never been confirmed. Also Myotis (*Myotis* sp.) and long-eared bat (*Plecotus* sp.) activity was recorded during the winter.
- Nathusius' pipistrelle is a migratory species. One goal for the summer survey 2019 is to see if Nathusius' pipistrelle activity is recorded between June and August to confirm whether Nathusius' pipistrelle is a year-round resident on Alderney.
- Due to the fact that 98% of the recordings were common pipistrelle recordings, the further analysis focused solely on common pipistrelle.
- Common pipistrelle activity was detected throughout the winter. The activity was lowest in January, when common pipistrelle activity was detected on 55% of the nights surveyed. In December common pipistrelle activity was detected on 80% of the nights surveyed, in February on 84% of the nights, and in March on 65% of the nights.
- On the nights, that common pipistrelle activity was detected, on average 8 recordings per night were recorded in January. In February, on average 70 recordings per night were recorded and in March 108 recordings.
- The studies done in similar climates have indicated that winter activity is most likely on warm and calm nights. In our survey, no bat activity was detected on evenings when the temperature at 6pm dropped below 7 celsius.
- The common pipistrelle winter activity focused strongly on the time right after sunset. 84% of the recordings were made within 3 hours of the sunset. 16% of the recordings were made in the middle of the night. There were only 4 recordings within 3 hours before sunrise. In the winter there seems to be virtually no common pipistrelle activity around dawn.
- No common pipistrelle social calls were recorded in January. In December only 3% of the recordings included social calls. In February 16% and in March 26% of the recordings included social calls.
- Recordings with feeding buzz were obtained throughout the winter.

DETAILED DESCRIPTION

In the past, most of the bat surveys conducted on Alderney have focused on the summer months. No surveys have been done on bats' winter activity. To get a general idea of the topic, bat activity was recorded over 54 nights between 22nd December 2018 and 21st March 2019. The acoustic recorder was placed by the entrance of East Tunnel at Waterlane. The recordings were analysed using Kaleidoscope Viewer. The original recordings can be found:

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Nathusius' pipistrelle is a migratory species. One goal for the summer survey 2019 is to see if Nathusius' pipistrelle activity is recorded between June and August to confirm whether Nathusius' pipistrelle is a year-round resident on Alderney.

Due to the fact that 98% of the recordings were common pipistrelle recordings, the further analysis focused solely on common pipistrelle. Common pipistrelle activity was detected throughout the winter (Table 1.). The activity was lowest in January, when common pipistrelle activity was detected on 55% of the nights surveyed. In December common pipistrelle activity was detected on 80% of the nights surveyed, in February on 84% of the nights, and in March on 65% of the nights. The weather conditions at the beginning of March were pretty bad, including heavy nighttime rainshowers and strong winds, which might explain the low percentage.

	Number of nights surveyed	Number of nights with Common pipistrelle activity	Monthly activity score
December	5	4	0,80 (247)
January	11	6	0,55 (47)
February	19	16	0,84 (1119)
March	19	12	0,63 (1296)

Table 1. Monthly bat activity. Monthly activity score is the percentage of nights when bat activity was detected (1=bat activity detected every night, 0=no bat activity detected during the month). Numbers in parenthesis are the total number of recordings in the month.

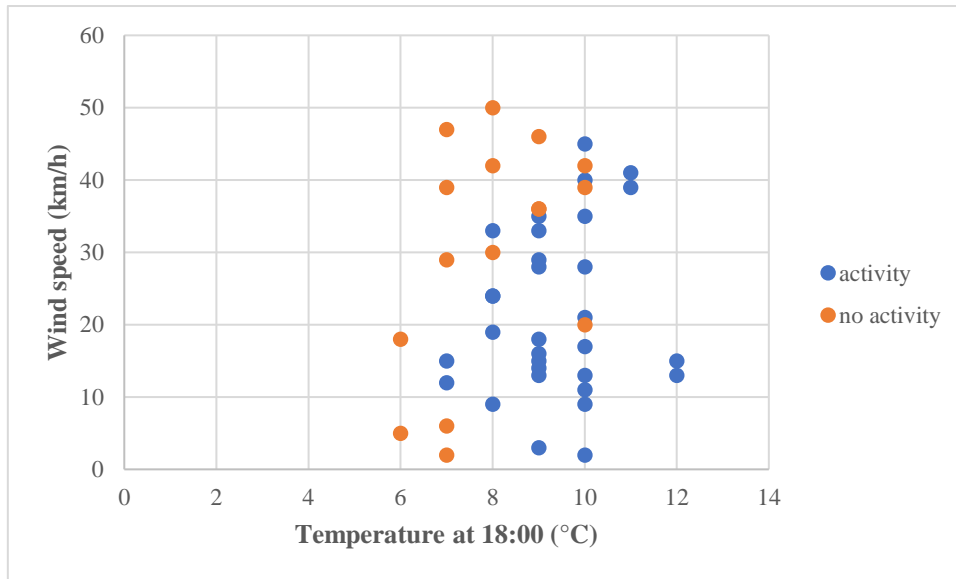
On the nights, that common pipistrelle activity was detected, on average 8 recordings per night were recorded in January. In February, on average 70 recordings per night were recorded and in March 108 recordings. With echolocation monitoring it is not possible to distinguish between a single individual of a species making several passes over a detector and several individuals each making a single pass. Thus, acoustic surveys cannot be used to quantify number of bats in an area. Echolocation monitoring data gives information about the relative bat activity, not about the abundance of bats (Kunz and Parsons 2009). The results discussed in this and in the previous paragraph show that the bat activity was significantly lower in January compared to the other winter months.

	Number of Common pipistrelle recordings	Number of nights with Common pipistrelle activity	Average number of recordings per night
December	247	4	62
January	47	6	8
February	1119	16	70
March	1296	12	108

Table 2. The average number of recordings per night.

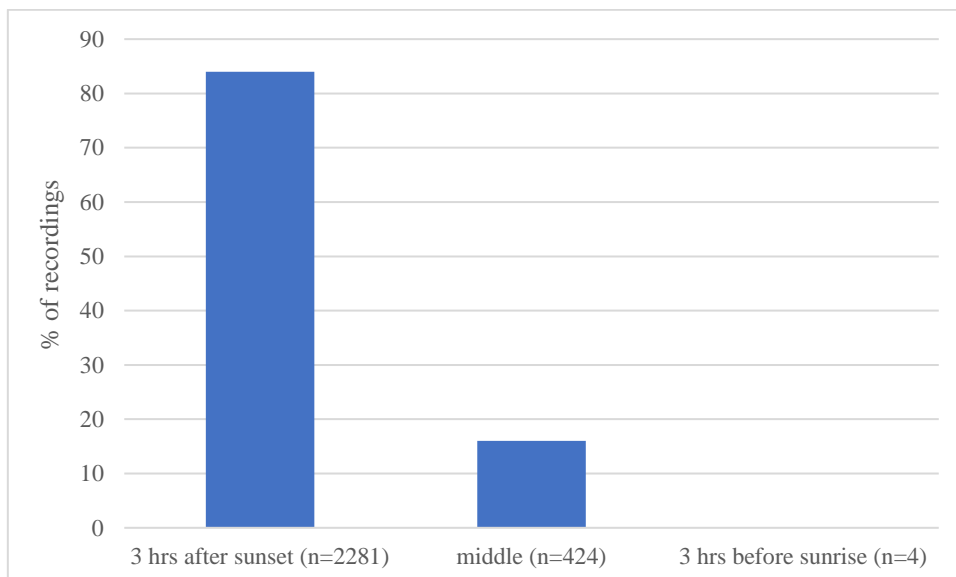
The results, that indicate that bats stay somewhat active throughout the winter, are in line with other studies done in similar temperate climates. The vesper and horseshoe bats in temperate regions use torpor to survive winter when temperatures are low and insects, their food source, are not available or are very scarce. Bats entering torpor allow their body temperature to fall below its active level to save energy. In torpor the fall in body temperature is controlled. The body temperature doesn't fluctuate freely with air temperature, instead it's maintained within narrow limits. Bats can arouse from torpor using their own energy, without an increase in air temperature. Hibernation is an extended form of torpor, lasting for days, weeks, or months. Several studies have shown that temperate bats don't usually spend the winter in continuous hibernation. The bats will go into torpor more often, and for longer periods in the winter. However, they will arouse to feed, to drink, and to move to another hibernation site. The time between arousals can vary from a day to many weeks. In maritime climates bats have been detected to be more or less active throughout mild winters (Altringham 2011). Recordings with feeding buzz were obtained throughout the winter, showing that bats arousing from torpor feed if insects are available.

The studies done in similar climates have indicated that winter activity is most likely on warm and calm nights. In our survey, no bat activity was detected on evenings when the temperature at 6pm dropped below 7 celsius (Picture 1.). The acoustic detector was located in a sheltered valley, so the actual wind speeds encountered by the bats would have been much lower than the ones described in the graph.



Picture 1. The response of bat activity to temperature at 6pm and wind speed.

The common pipistrelle recordings were divided into three categories, depending on when they were recorded, to see how the common pipistrelle activity varies during the night in the winter. The categories used were 3 hours after sunset, middle of the night, and 3 hours before sunrise. In our survey common pipistrelle winter activity focused strongly on the time right after sunset (Picture 2.). 84% of the recordings (n=2281) were made within 3 hours of the sunset. 16% of the recordings (n=424) were made in the middle of the night. There were only 4 recordings within 3 hours before sunrise. In the winter there seems to be virtually no common pipistrelle activity around dawn.



Picture 2. The variation of common pipistrelle activity throughout the night.

In addition to echolocation, bats use vocal communication (social calls) for a variety of reasons, including mate attraction, territorial defence, female/infant interaction, aggression and distress. Social calls are more complex and of a lower frequency than echolocation calls in order that they can be heard over longer distances. No common pipistrelle social calls were recorded in January (Table 3.). In December only 3% of the recordings included social calls. In February 16% and in March 26% of the recordings included social calls. A study carried out in Scotland (Middleton 2006) measured the emission rate of *Pipistrellus* spp. social calls. According to that study there seems to be two peak seasons within the bat active season when social calls are more regularly encountered: one between April and May, and one in September. The study was carried out from February to September in Scotland. Due to the more southern location and milder climate, the spring peak of social calls is likely to occur earlier on Alderney. The high percentage of recordings with social calls in March indicates that.

	Total number of recordings	Number of recordings with social calls	% of recordings with social calls
December	247	7	3 %
January	47	0	0 %
February	1119	174	16 %
March	1296	337	26 %

Table 3. The percentage of recordings with social calls.

References:

- Altringham, J. D. (2011). Bats from evolution to conservation. Second edition. Oxford University Press.
- Kunz, T. H. and Parsons, S. (2009). Ecological and behavioral methods for the study of bats. Second edition. The Johns Hopkins University Press.
- Middleton, N. E. (2006). A study of the emission of social calls by *Pipistrellus* spp. within central Scotland; including a description of their typical social call structure. BaTML Publications: 3, 23-28, Scotland.