South Wonston's amazing bats

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Presentation to the South Wonston Sustainability Group

2 April 2023

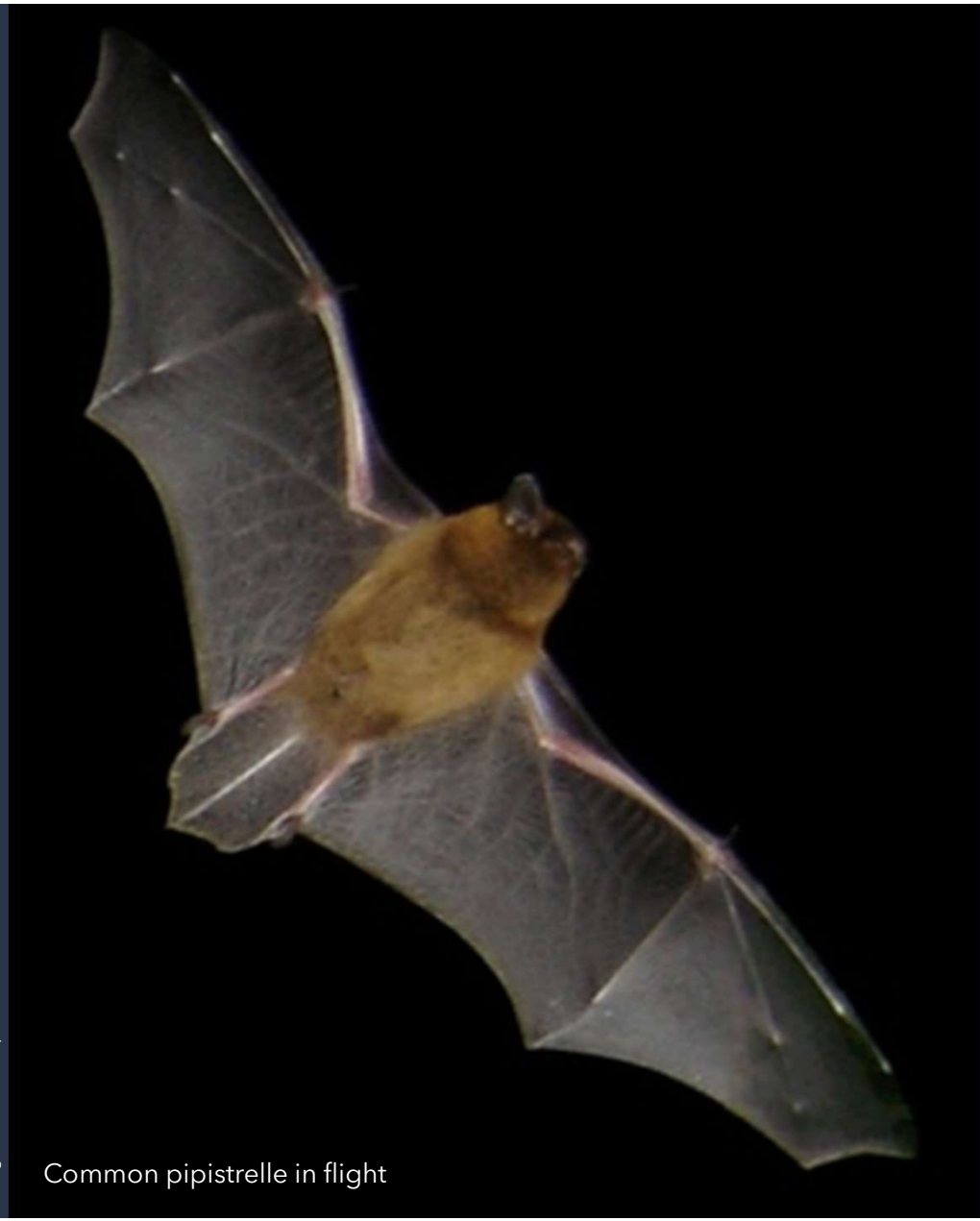


Image source: Wikipedia

Common pipistrelle in flight

Bats are amazing!

- Bats probably first arose around 63 million years ago
- Second largest order of mammals after rodents
- Comprise about 20% of all classified mammal species worldwide
  - Over 1,400 species
- Bats are found everywhere in the world apart from the Arctic, Antarctic, and a few isolated Oceanic islands.
- Only living mammals capable of sustained powered flight and sophisticated echolocation
- Range in size from flying foxes with wingspans of up to 2 metres and weighing 1.5 kg …
- … to the bumblebee bat (Kitti's hog-nosed bat) weighing only 2 grammes, the world's smallest mammal!

Female spectacled flying fox with pup

Wikipedia

Bumblebee bat

https://www.youtube.com/watch?v=jm841bYaOZI

UK bats

- 18 species of bat in the UK
  - 17 resident
  - 1vagrant (small number living in West Sussex)
- Occasionally other non-resident bat species get blown over from the continent
- All UK bats eat insects
  - A common pipistrelle can eat over 3,000 insects in a single night!

Image source: The Bat Conservation Trust

A year in the life of a bat

Source: Bat Conservation Trust https://www.bats.org.uk/about-bats/a-year-in-the-life-of-a-bat

Where do bats live?

- Bats do not make nests
- They can roost in houses, both new and old
  - In buildings they often shelter behind hanging tiles and boarding or in roof spaces.
- Some species prefer hollow trees, or caves
- For several weeks in the summer, female bats gather in a maternity roost
- During winter, bats will roost in a quiet place in which they can hibernate
- Bat boxes can provide artificial roosts to encourage bats into areas where there are few roosting sites
  - See the Bat Conservation Trust website for more information including where to site them

Lesser horseshoe bats

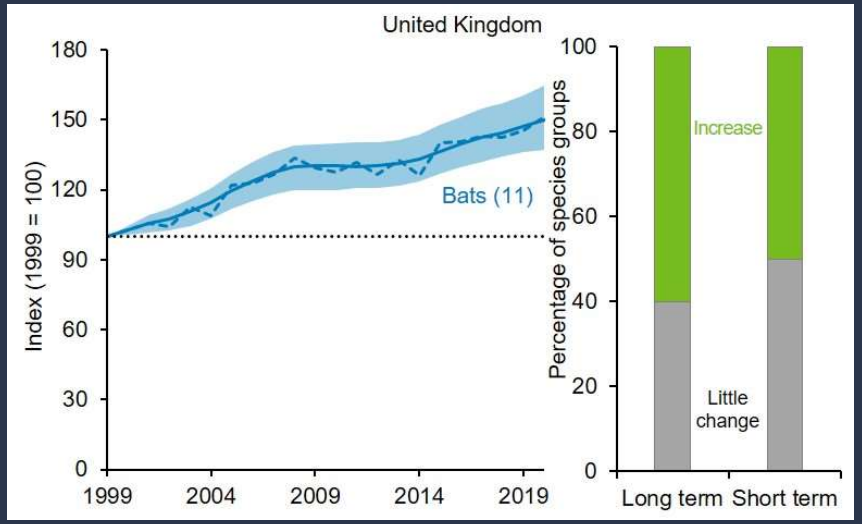
John Black/Bat Conservation Trust

Bat Conservation Trust

Bats as biodiversity indicators

- Being at the top of their food chain, bats are 'bioindicator species' that provide information about the quality of their habitat and environment
- During the 20th century, UK bats are believed to have suffered major population declines
- Since 2008 DEFRA has included bats in their set of 'indicator species'
- The 'bat index' is a composite of 10 bat species trends
  - Since 1999, six of the species have increased and four have shown little or no change
  - Overall, the index has increased by 47% between 1999 and 2019
  - Indicates that some bat species are starting to recover from the earlier population declines
- But we must not be complacent …

Trends in UK bat populations 1999 to 2020



Source: https://jncc.gov.uk/our-work/ukbi-c8-mammals-of-the-wider-countryside/

Threats to bat populations

- Pesticides and intensive farming practices have lead to a reduction in the abundance of insects which bats rely on as their only food source.
- Many bat species roost in buildings and are extremely vulnerable to the activities of humans
- Artificial lighting can be extremely disturbing to bats by delaying or preventing emergence from their roosts
- Road schemes can result in habitat destruction, degradation and fragmentation
- Domestic cat attacks are one of the most common causes of bat casualties

Loss of habitat

Development

Lighting

Roads

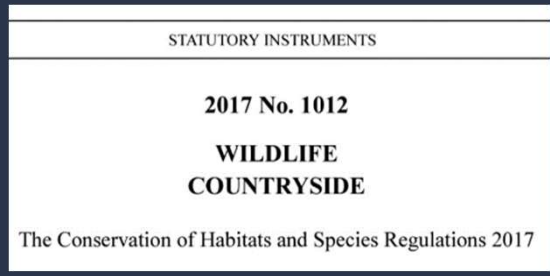
Images: Bat Conservation Trust

Bats and the Law

- All UK bats and their roosts are legally protected, by both domestic and international legislation
- A criminal offence could be committed if someone:
  - Deliberately takes, injures or kills a wild bat
  - Intentionally or recklessly disturbs a bat in its roost or deliberately disturbs a group of bats
  - Damages or destroys a place used by bats for breeding or resting (roosts) (even if bats are not occupying the roost at the time)
  - Possesses or advertises/sells/exchanges a bat of a species found in the wild in the EU (dead or alive) or any part of a bat
  - Intentionally or recklessly obstructs access to a bat roost
- People committing bat crimes can face six months imprisonment and/or unlimited fines
- Licences to permit illegal activities relating to bats and their roost sites can be issued for specific purposes
- So how can you legally (and easily) monitor bats without a bat licence?


Wildlife and Countryside Act 1981

1981 CHAPTER 69


STATUTORY INSTRUMENTS

2017 No. 1012

WILDLIFE
COUNTRYSIDE

The Conservation of Habitats and Species Regulations 2017

IUCN RED LIST©

UNEP EUROBATS

Bat echolocation

- Bats are not blind!
- At night their ears are more important than their eyes
- As they fly, they make sounds (calls) from their larynx (voice box)
- The returning echoes give the bats information about what is ahead of them, including the size and shape of an insect and which way it is going
- This system of finding prey is called echolocation, and is similar to that used in water by dolphins (and ships and submarines)

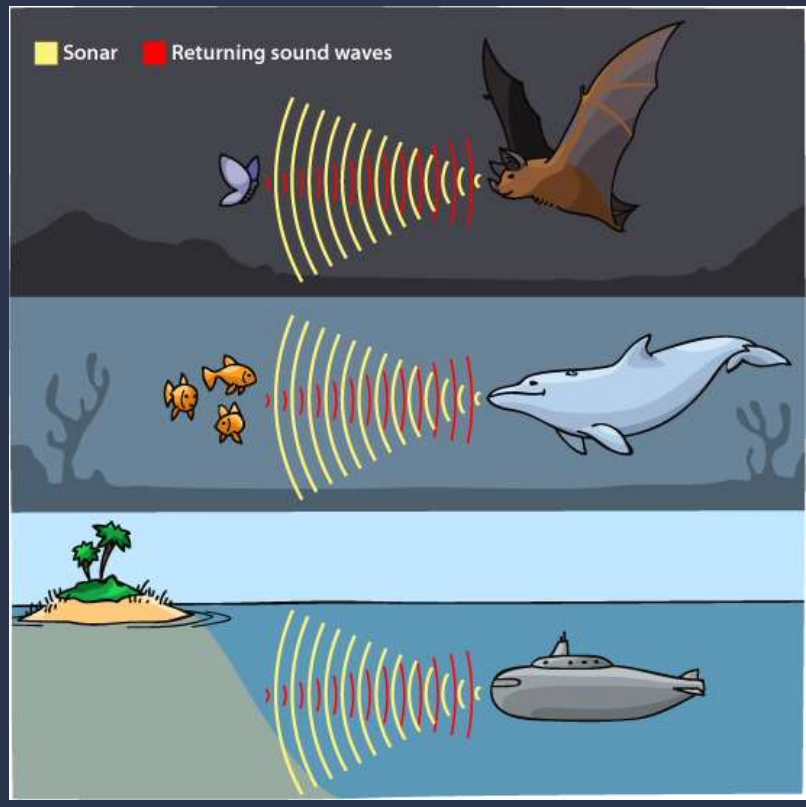
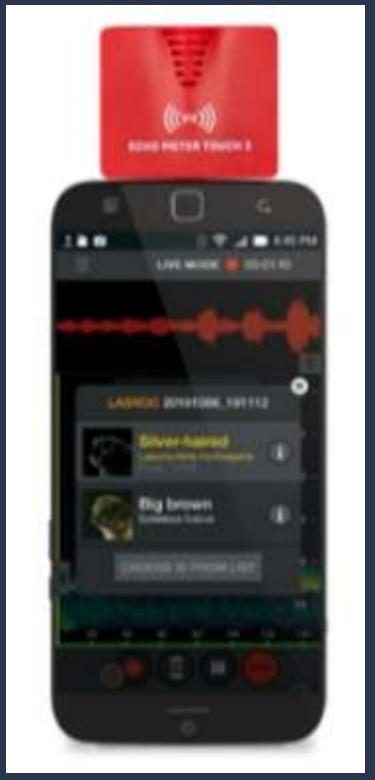


Image source:
https://askabiologist.asu.edu/echolocation

Detecting bat echolocation calls

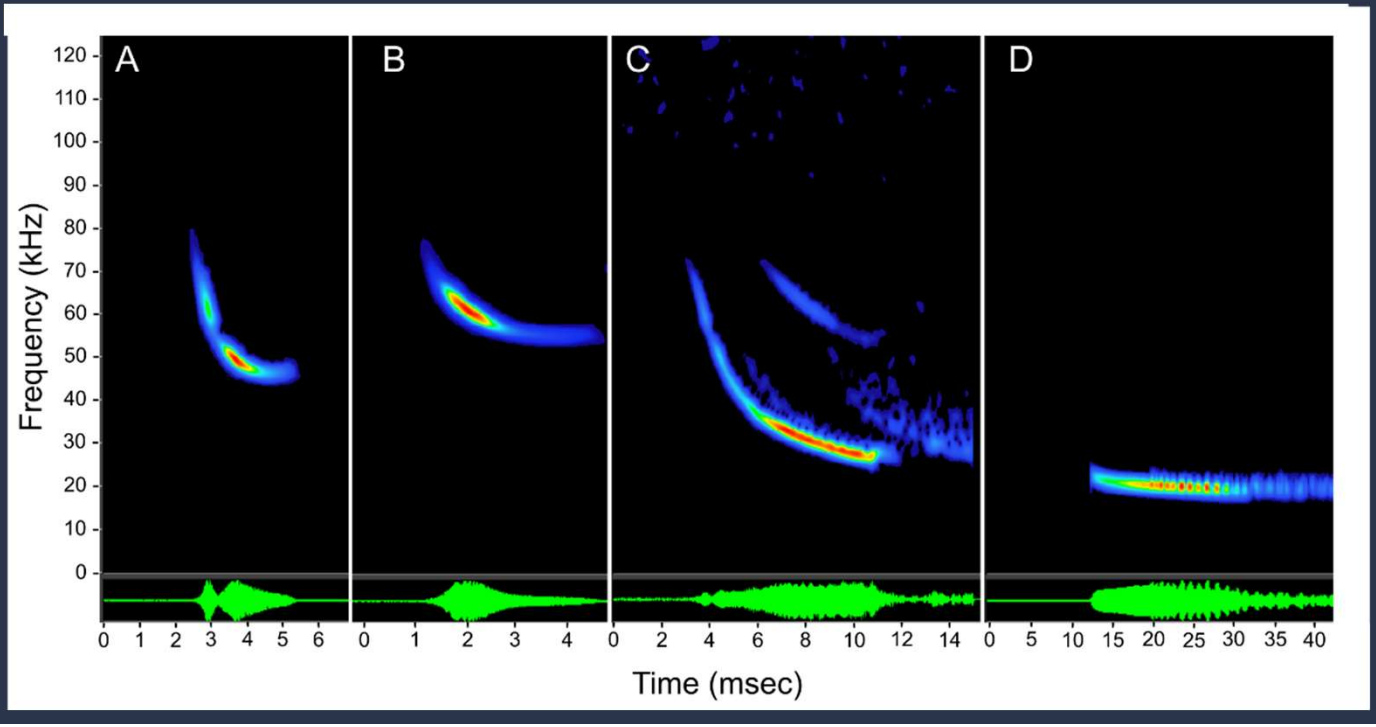
- Bat echolocation calls are usually pitched at too high a frequency for humans to hear naturally
  - Human adult hearing range: 20 Hz to 18 kHz
  - UK bat echolocation calls: 20 kHz to 110 kHz
- However, bat calls can be heard and/or recorded using a hand-held bat detector
- Different types are available and range in price from £75, to over £300 depending on their capabilities
  - E.g. the Echo Meter Touch records the locations of bat calls and provides an indication of their likely identification



Images: Magenta Electronics , Batbox, Wildlife Acoustics

Identifying bats from their calls

- Echolocation calls from most bat species have different characteristics and therefore sound different
- Analysis of sonograms of full-spectrum recordings can be used as a means of identification



Key characteristics to identify most calls to species level

- Call shape
- Peak frequency
- Start and end frequency
- Duration
- Interpulse interval

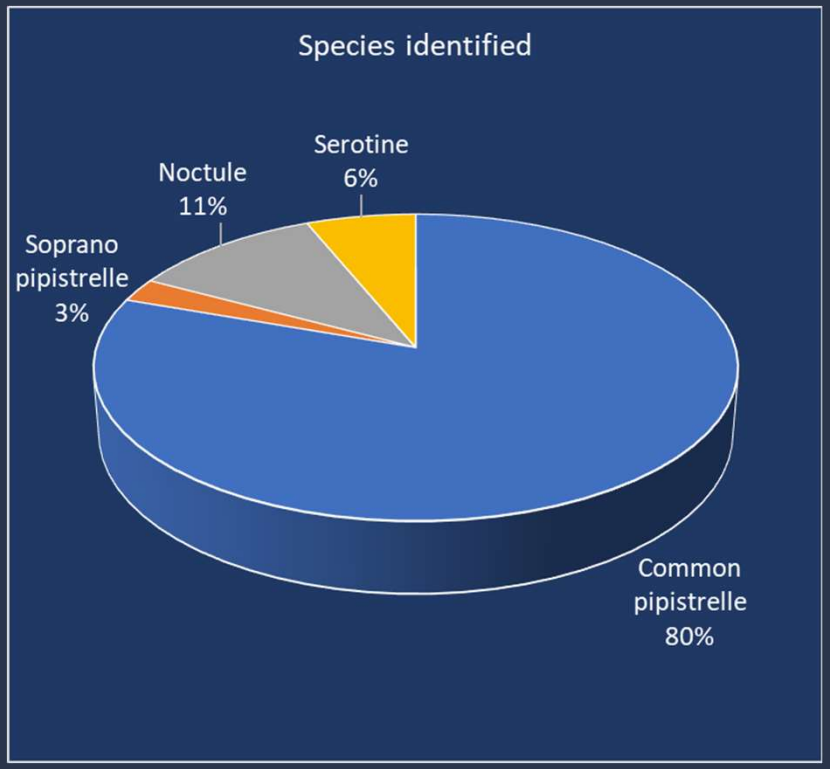
Example call shapes:
A. Common pipistrelle
B. Soprano pipistrelle
C. Serotine
D. Noctule

Bat activity survey - 2022

- Passive acoustic survey conducted between 25 May and 19 August 2022
- 19 transects were walked along roads and public footpaths around the village commencing around sunset
- Geo-referenced bat calls were recorded using a Wildlife Acoustics Echo Meter Touch 2 Ultrasonic Module attached to a smartphone
- Recordings were then analysed using SonoBat 30 and ArcGIS Online

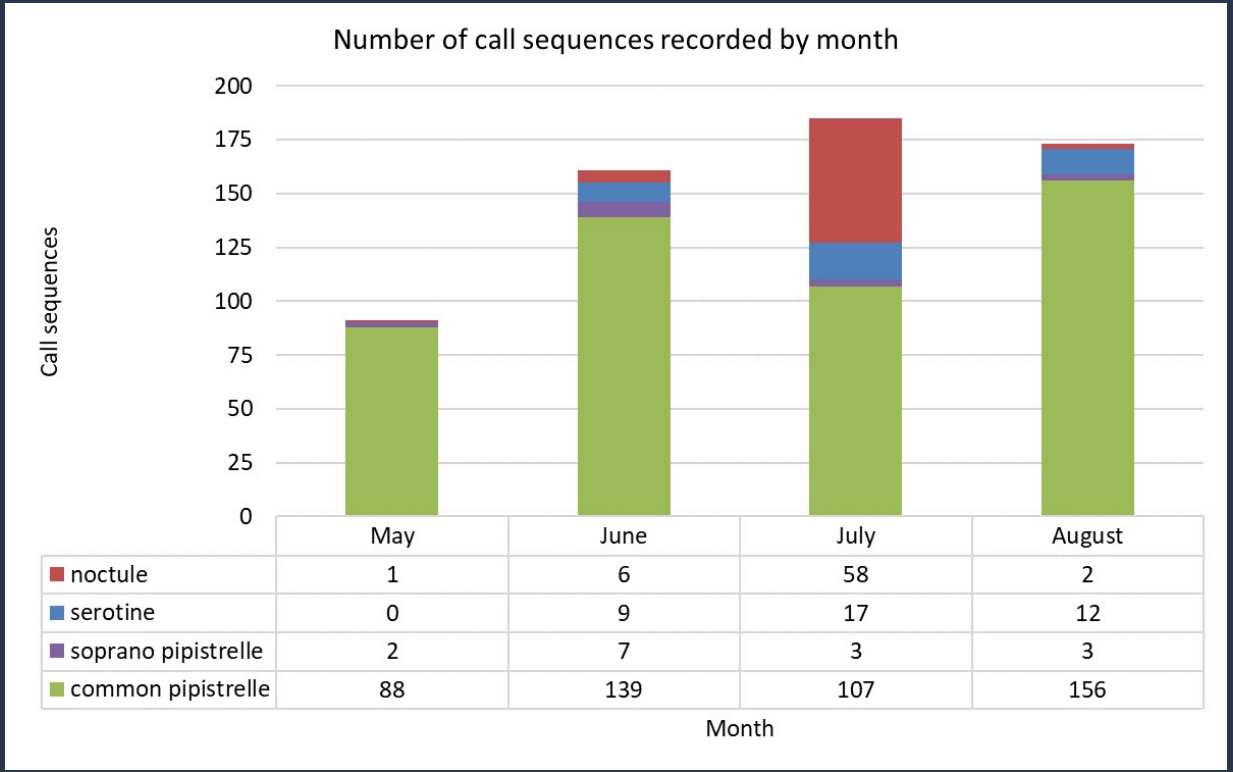
Species identified

- 610 high-quality call sequences were recorded corresponding to 4 species of bat:
  - Common pipistrelle (490 call sequences, 80.3%)
  - Soprano pipistrelle (15 call sequences, 2.5%)
  - Noctule (67 call sequences, 11.0%)
  - Serotine (38 call sequences, 6.2%)



Temporal variation of bat activity

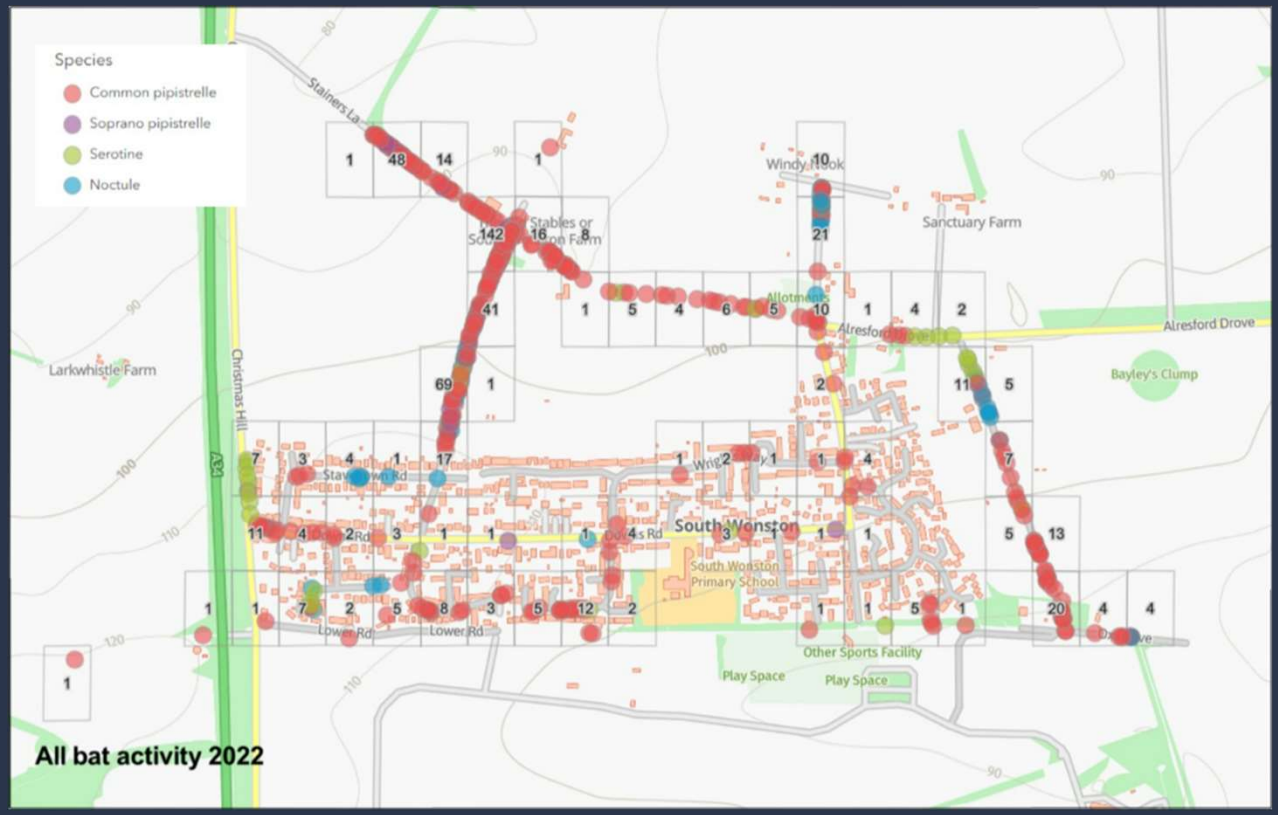
- Call sequences were recorded from all 4 species in the months of June to July
  - Only 2 transects were walked in late May = small sample size
- July saw an increase in the proportion of noctule calls recorded and a decrease in the proportion of common pipistrelle calls
- Significance of these changes is presently unknown

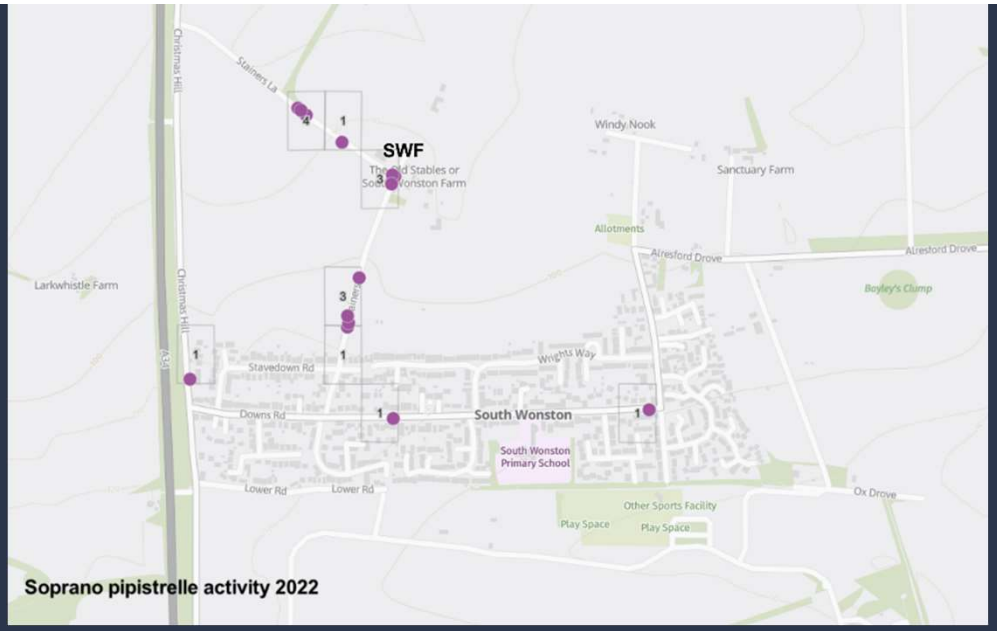


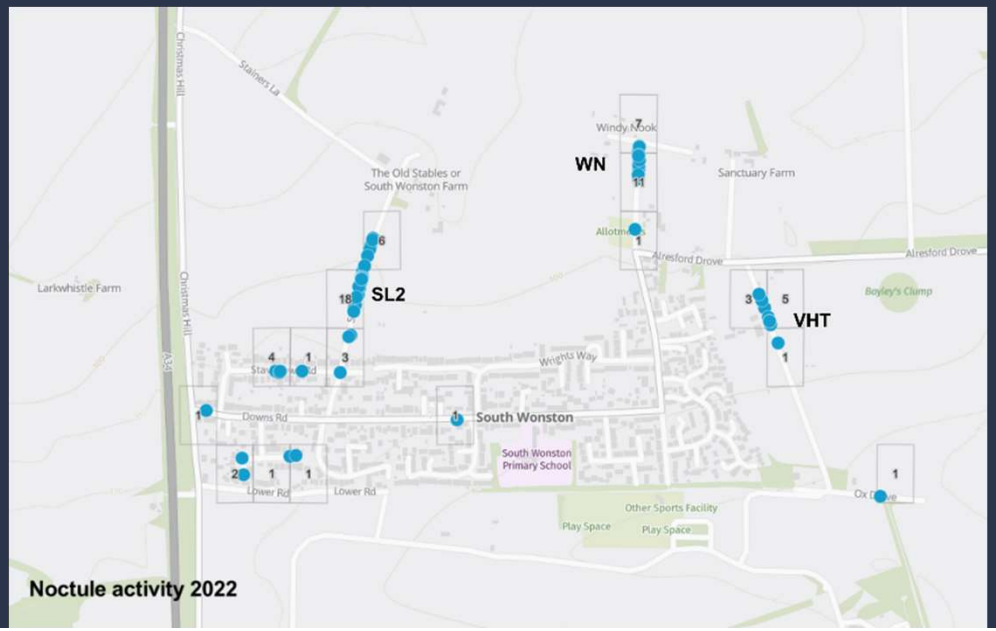
	May	June	July	August
noctule	1	6	58	2
serotine	0	9	17	12
soprano pipistrelle	2	7	3	3
common pipistrelle	88	139	107	156

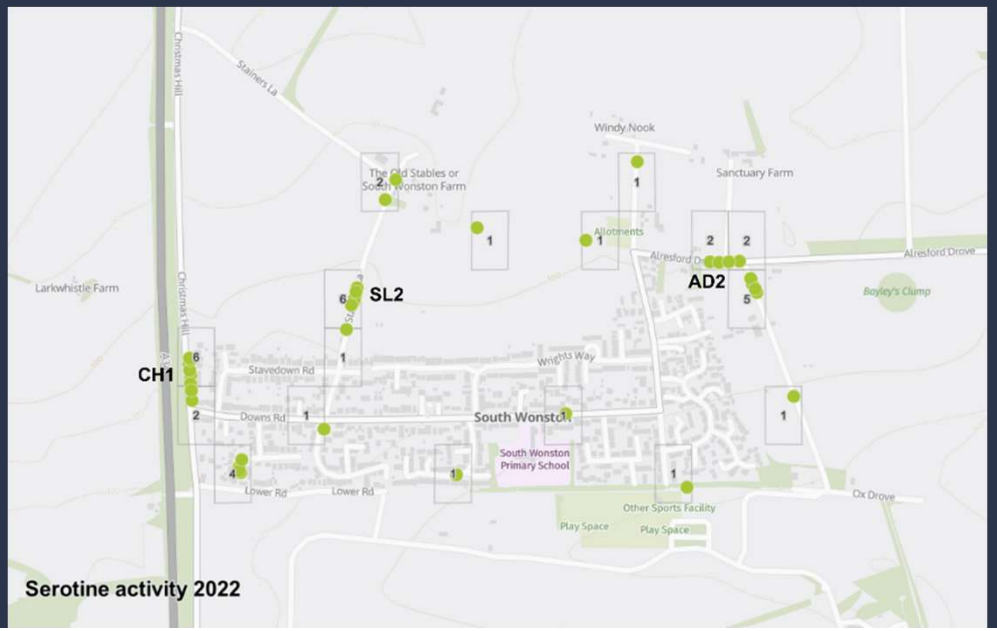
Spatial variation of bat activity

- From the geo-referenced call recordings, the distribution of bat activity around the village can be easily mapped
- Distribution reflects some bias towards places of previously known bat activity
- However, it is clear that bat activity is not uniform across the village with some areas being more busy than others









Conclusions from the survey

- Four species of bats have been identified from their echolocation calls:
  - Common pipistrelle
  - Soprano pipistrelle
  - Noctule
  - Serotine
- The survey suggests that the activities of the different species are not uniformly distributed around the village, with both temporal and spatial variations in their activity
- Further work is needed to address the limitations and biases that are inherent in the survey

Common pipistrelle

Soprano pipistrelle

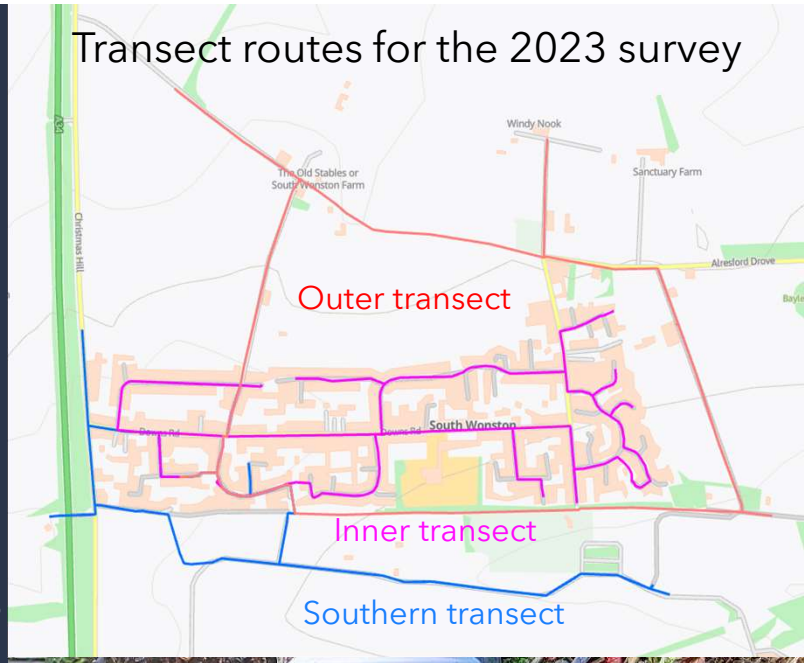
Noctule

Serotine

Images: https://ibats.org.uk/

Bat activity survey – 2023

- Repeat of the 2022 survey but with changes to address the limitations and biases of the original survey
  - Pre-defined transect routes around the village to reduce bias towards places of known bat activity
  - Transects to be walked 6 times a month between April and October
  - New static bat detector to provide continuous monitoring of nightly bat activity from mid March onwards



Results to date

- Still very early days but … a ‘new’ species of bat for the village was identified from static recordings made on 17, 18 & 19 March 2023
  - Leisler's bat (*Nyctalus leisleri*)
  - Similar to the noctule, but smaller with longer fur
- Work required to be done to confirm the Sonobat identification … but it does look very promising with multiple call sequences recorded

Bat Conservation Trust

Where to find out more

- The Bat Conservation Trust
  - The leading non-governmental organisation in the United Kingdom solely devoted to the conservation of bats and the landscapes on which they rely.
  - Runs the National Bat Helpline devoted to 'helping people, helping bats'
  - https://www.bats.org.uk/
  - Please consider joining the BCT if you are interested in supporting bats in the UK

Thank you!