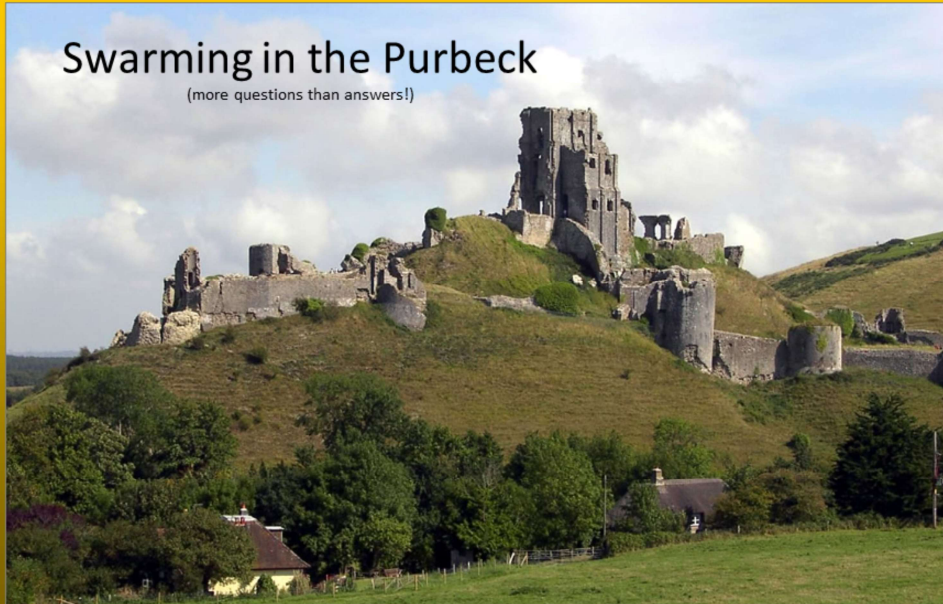




Swarming in the Purbeck

(more questions than answers!)

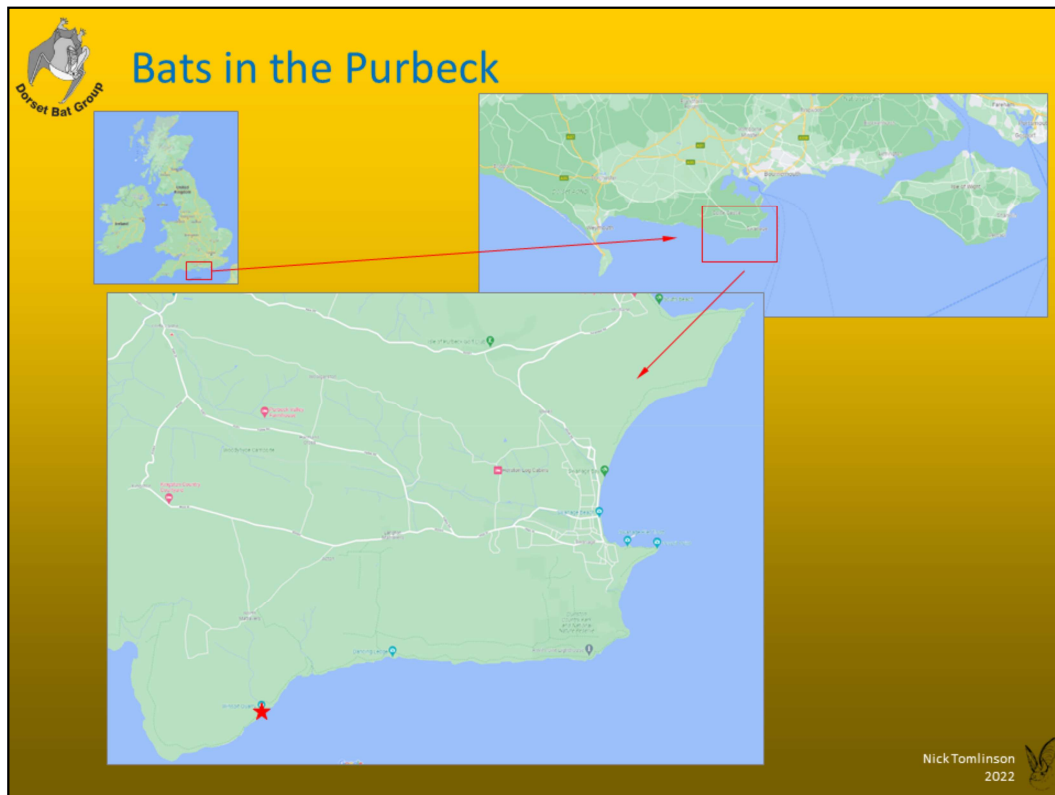


Picture copyright National Trust

Nick Tomlinson
2022



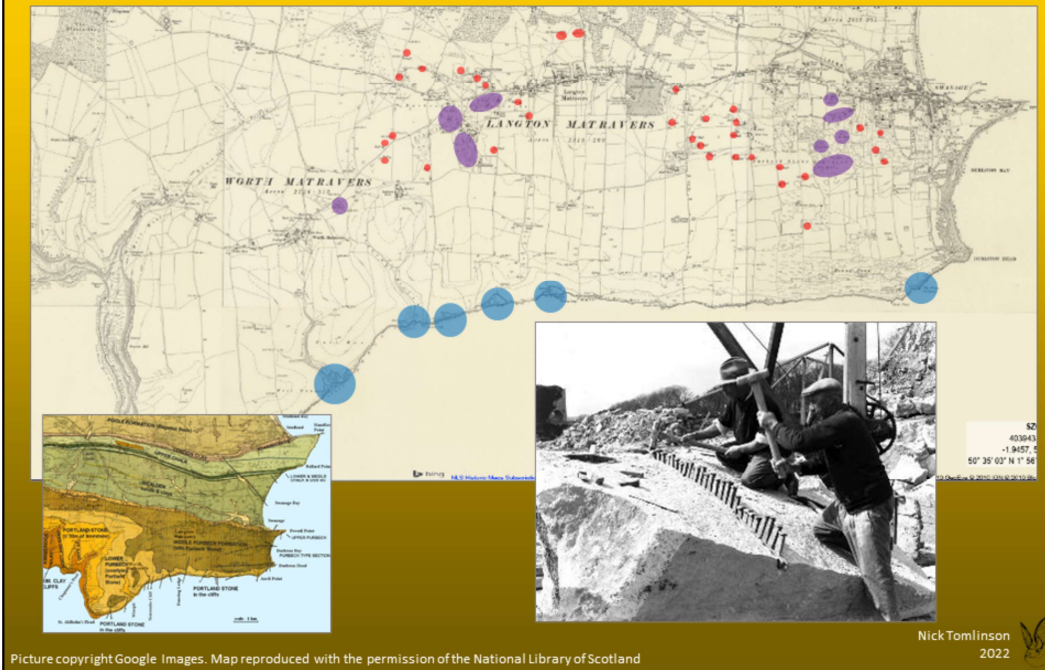
The data based on analysis from 8 years of swarming studies in the Purbeck



The red star shows the location of Winspit and puts the location in a national context



Bats in the Purbeck



Quarrying has taken place in the Isle of Purbeck since Roman times, but the landscape we are familiar with today began to take shape in the 17th and 18th centuries, when quarrying began on an industrial scale and the landscape became dotted with stone extraction sites.

The stone beds in Purbeck slope downwards moving inland from the coast, meaning that, moving northward, there is a need to go further underground to reach the same stone beds, so, while there are surface extraction sites (quarries) near the coast, these are increasingly replaced by shafts moving inland.

An Ordnance Survey map from 1926 notes over 200 shafts located in the area below the ridge on which Langton Matravers sits, and something like 50 quarries (which it is assumed are surface stone extraction sites).

The sites are split between the coastal quarries (*coloured in blue*) which were the prime sites for the extraction of the Portland Stone, single shaft sites (*coloured in red*) and multiple shaft sites (*coloured in purple*). Where shafts are near each other they may, and in some cases do, connect underground.



Bats in the Purbeck

Bats in the Purbeck Landscape

A summary of the last 70 years of studying bats in the Isle of Purbeck



Figure D2:
Example of shaft and quarry distribution in Purbeck (1926) with known sites mapped



Figure D3:
Example of shaft and quarry distribution in Purbeck (1926) with known sites mapped

Picture copyright Google Images. Map reproduced with the permission of the National Library of Scotland

Nick Tomlinson
2022

Over time, as the extraction stopped, many sites were closed and the entrances either deliberately filled in, or fenced off, to prevent livestock falling in. Some were also used as rubbish dumps.

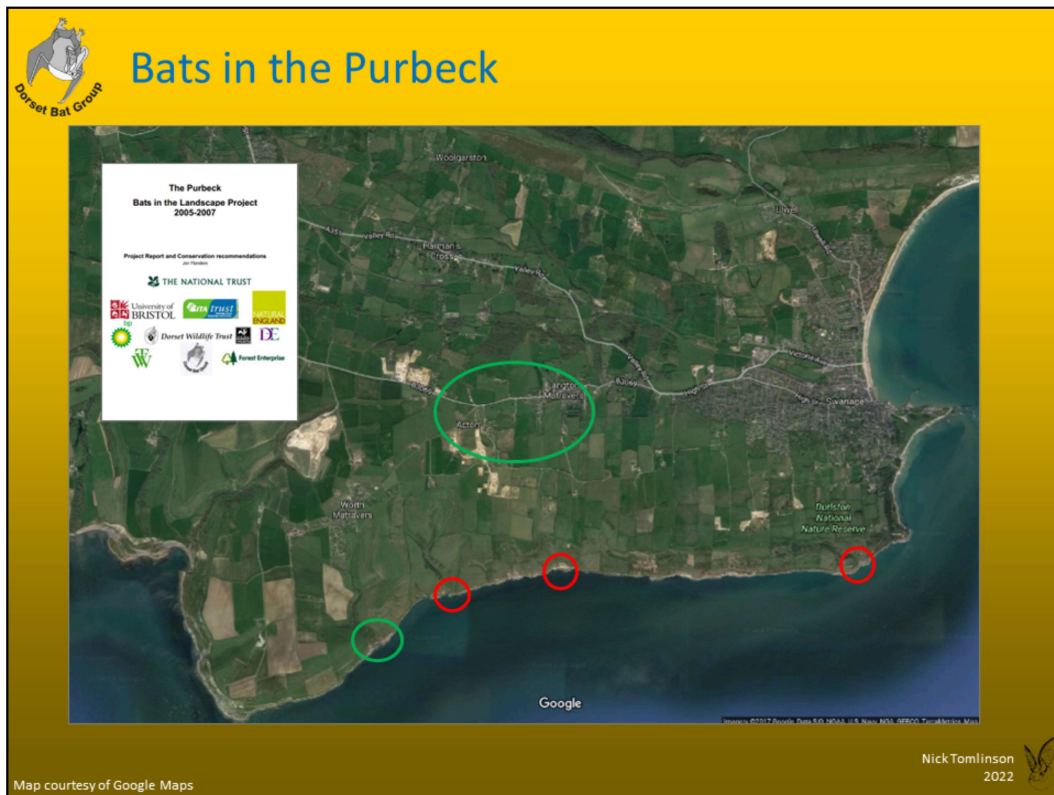
Where open quarries were fenced, the lack of disturbance, from humans, or grazing pressure from livestock, led to vegetation, such as shrubs and bushes, taking root around the entrance and growing freely.

The disturbance of the ground caused by the roots of this vegetation, when combined with natural slippage, due to weathering and drying out, sometimes leads to the collapse of the retaining walls or internal ceilings, resulting in many sites no longer being accessible.

It is, however, important to stress that, while some quarries might, as a result of the processes noted above, become inaccessible to humans, survey results, both historical and recent, show that even those quarries where the entrance can hardly be seen from the surface are still being regularly used by bats.

This loss of sites is demonstrated in the figures on the right (taken from the report on the left), where historical records can be clearly mapped onto existing sites (red circles), but others (or at least the entrances thereof) are now lost (green rectangles).

It is estimated that of the 200+ sites known in 1926 between two and three dozen remain today

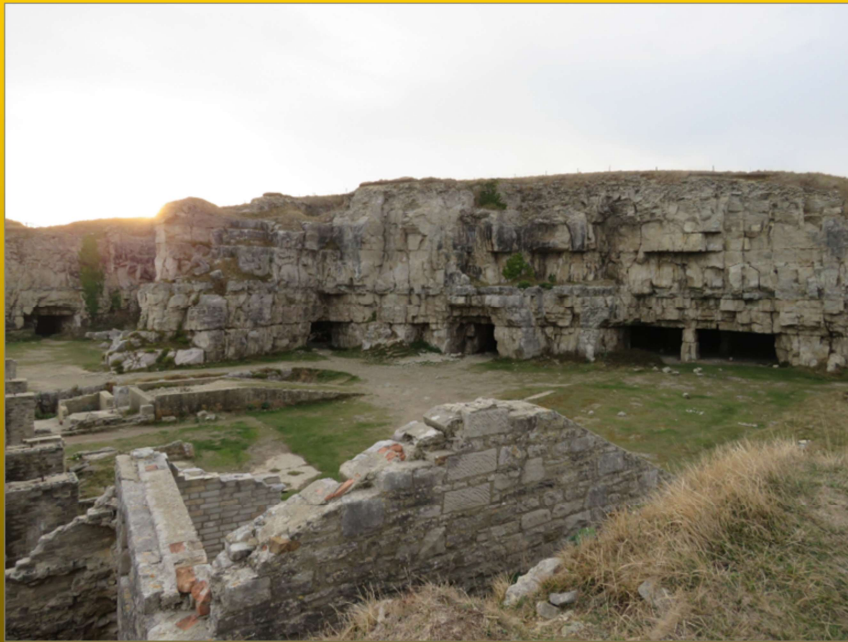


The first swarming studies in the Isle of Purbeck were undertaken by Jon Flanders as part of his PhD between 2005 and 2007. His work focussed on some of the inland quarries to the west of Langton Matravers, in the green oval and one coastal (Port Arthur) site at Winspit (within the green circle).

The Dorset Bat Groups work began at Winspit in 2011, at a site around 90m to the west of Port Arthur, but in the years leading up to Covid we have started to expand our work, involving some of the inland sites, including those at which Jon Flanders trapped, and also some of the coastal sites.



Bats in the Purbeck

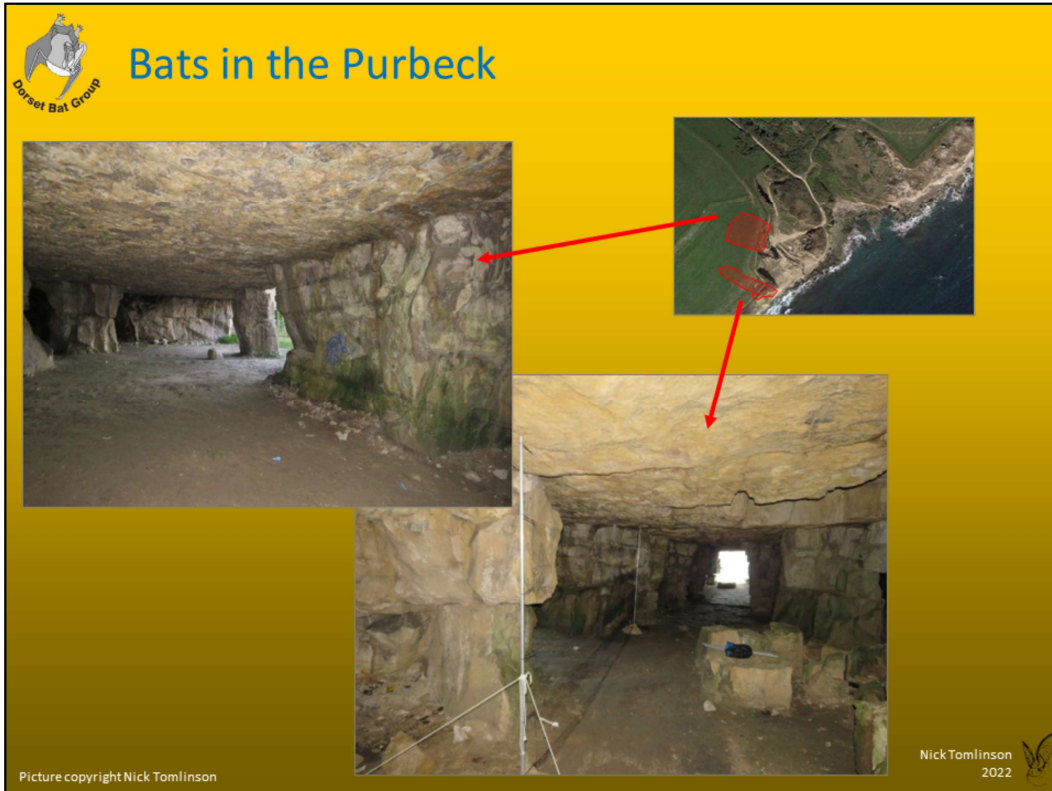


Picture copyright Nick Tomlinson

Nick Tomlinson
2022



Studies at Winspit have been focused on two quarries, one having two entrances (one with a stone pillar supporting the mid entrance, which can be seen on the right and a second, also with two openings, one of which can be seen on the left of the view



Mists nets are used to close on of the entrances in each quarry, with the second entrance being left open. In the second quarry a mist net is set inside the quarry as well.

Averaged over the eight years of the study each site catches around 50% of the total number of bats, and the two nets in the quarry nearer the sea each catch around 25% of the bats caught in that site.

We have been ringing bats for a few years and, although the retraps are few, around 75% of them have been in the same quarry the animal was caught in. While this cannot, in any way, be taken to 'prove' the two sites are separate swarming sites it does suggest there might at least be an element of bats favouring one quarry or the other.



Bats in the Purbeck



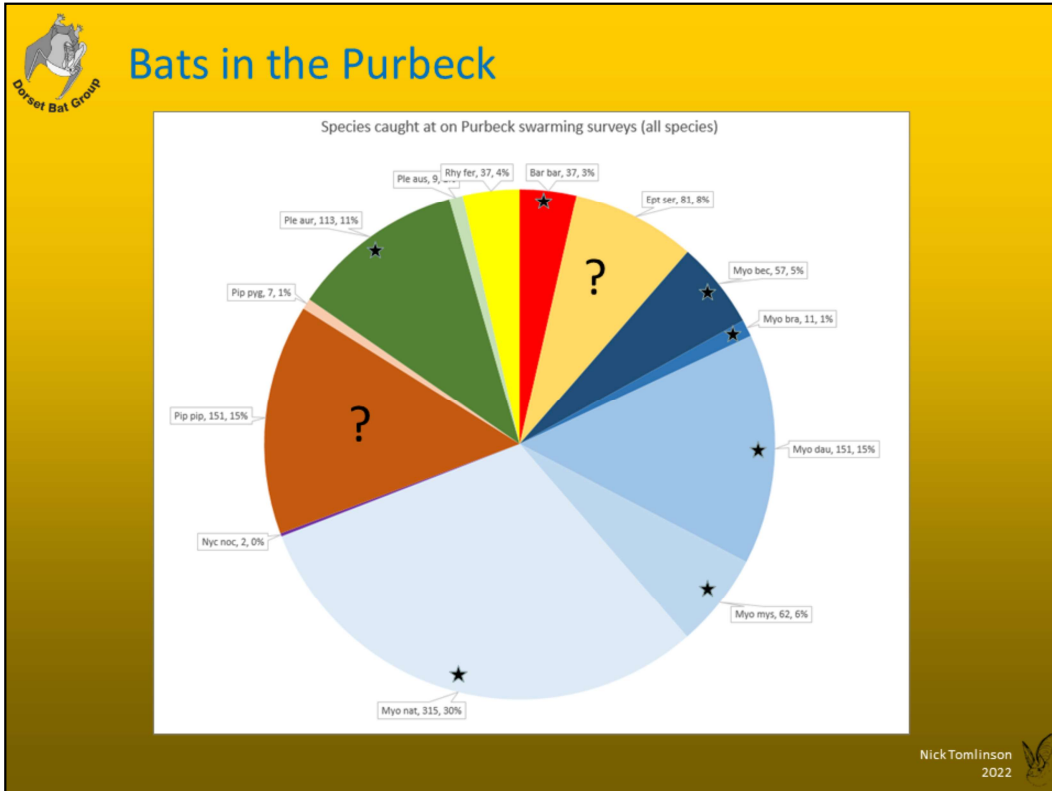
Pictures copyright Nick Tomlinson & Bat Conservation Trust

Nick Tomlinson
2022



We have caught 13 of the 18 UK species and recorded two others at Winspit

The only bats that we have not recorded there are Leisler's, Greater Mouse-eared (although prior to the colony becoming extinct in Dorset they were recorded in the area) and, knowingly, Alcaethoe.

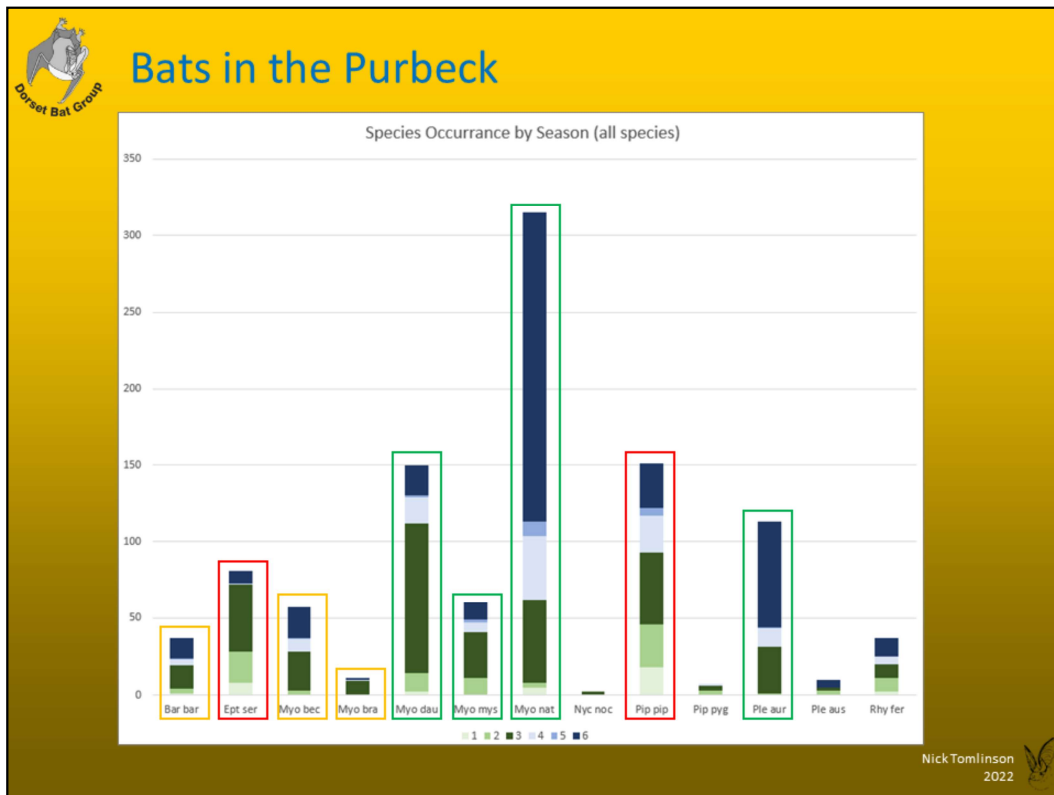


The graphs shows the numbers and percentages of species caught on site.

c75% is made up of the classic swarming species (Bbar, Paur and the Myotis group) but we do catch some others, in smaller numbers.

Key to this graph is, however, the fact that we catch the same number of Ppip as Mdau and more Eser then four of the classic swarming species (Bbar, Mbec, Mbra & Mmys)

So we looked at the data in more detail.....



First we looked at seasonality...

Mnat show a clear Sept peak – expected

Mdau show a clear Aug peak – expected

Mmys MAY show an August peak

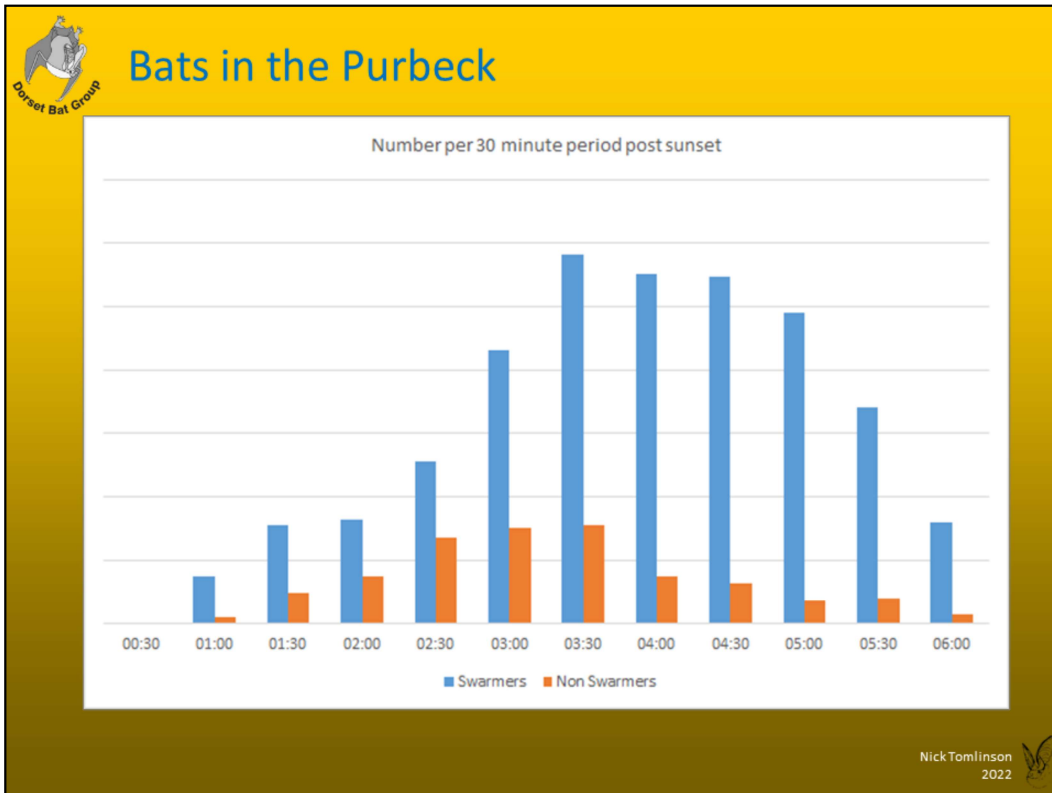
Paaur appears to show a September peak

There are too few Mbra records to form an opinion

Bbar & Mbec appear to be spread out over the year

Eser show a very clear August peak

Ppip hints at an August peak, but it is not as clear as Eser



Nest we looked at time of night the bats were caught

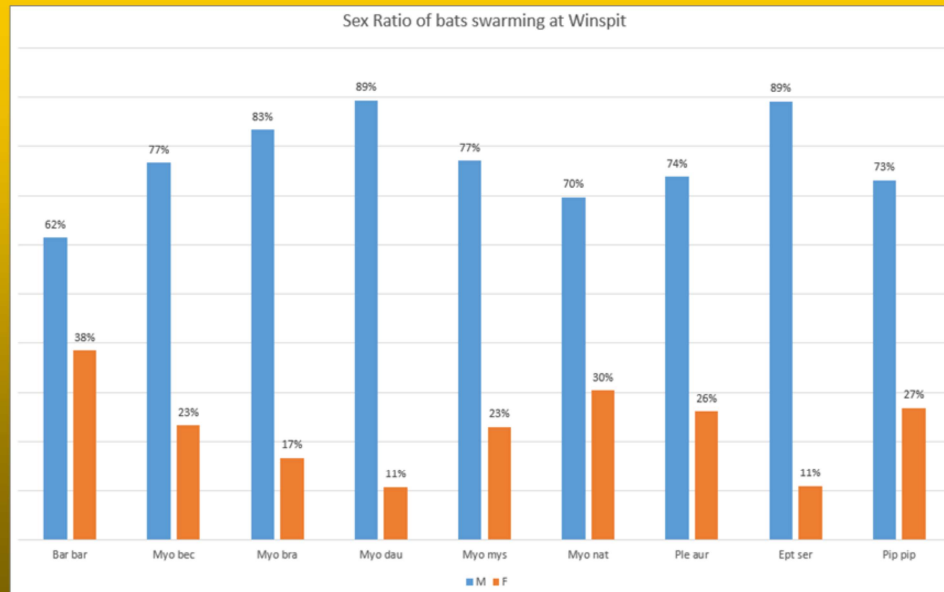
Blue bars are all classic swarming species

Orange bars are Eser and Ppip

Pattern very similar, with a lower peak and a more gentle decline but broadly similar patten to that showed by the classic swarming species



Bats in the Purbeck



Nick Tomlinson
2022

Sex ratio should be so around the 20% - 30%, ie one female for every three to five males (ish)

Cant explain the Bbar ratio

Same ratio for Mdau was found by Flanders

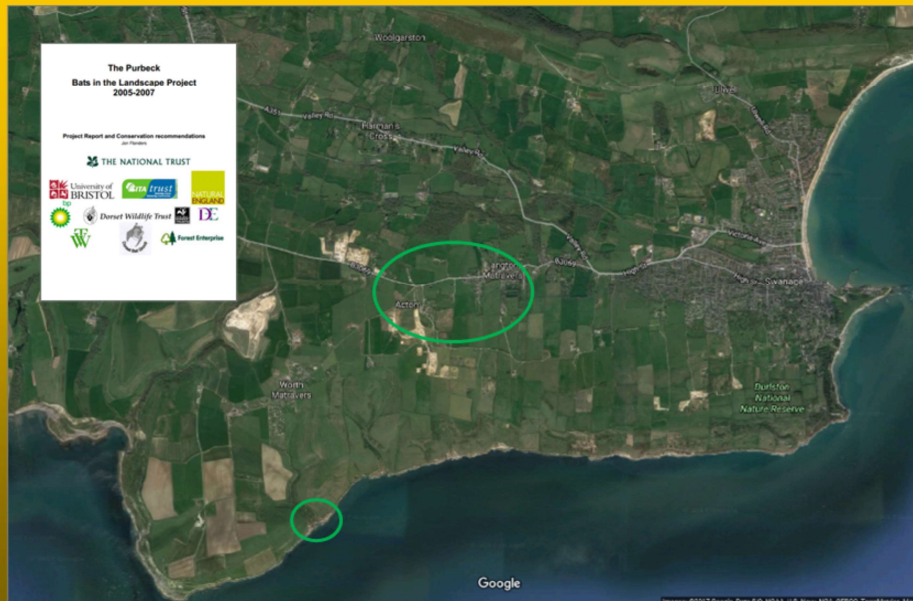
Eser = Mdau

Ppip = Paur

So, while it is not rigorous, the data suggests that Eser is a swarming species and Ppip may be (or at least they should be considered as species that use swarming as part of their breeding system)



Bats in the Purbeck

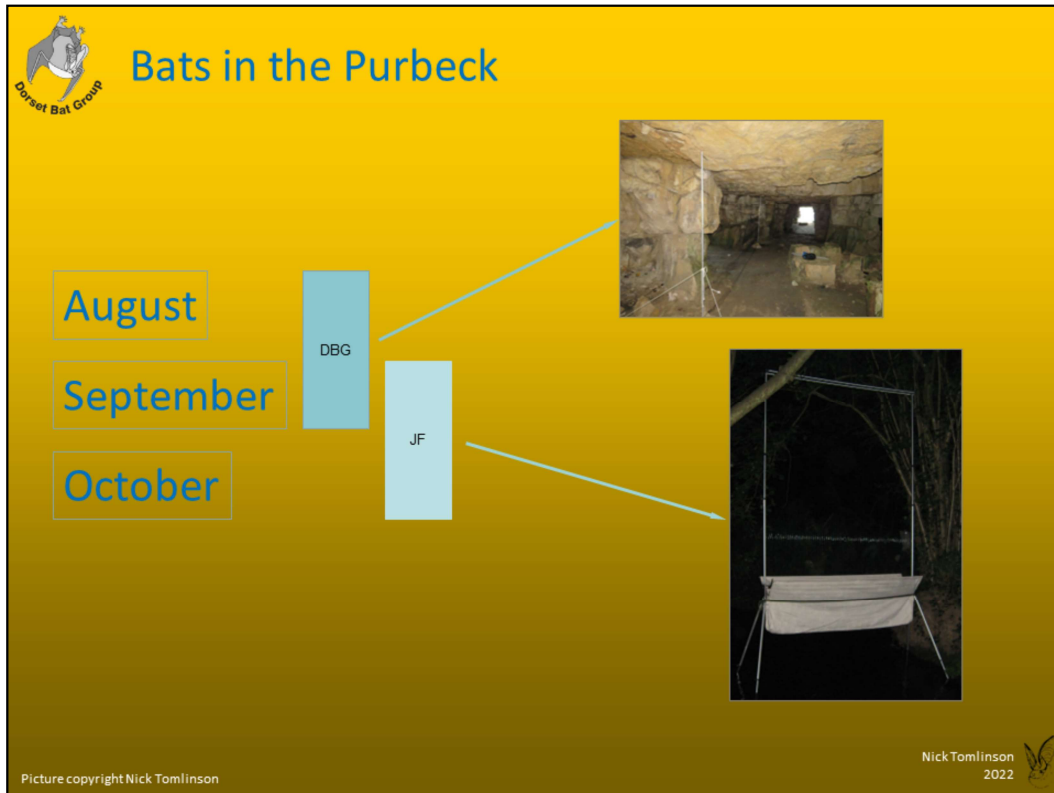


Map courtesy of Google Maps

Nick Tomlinson
2022

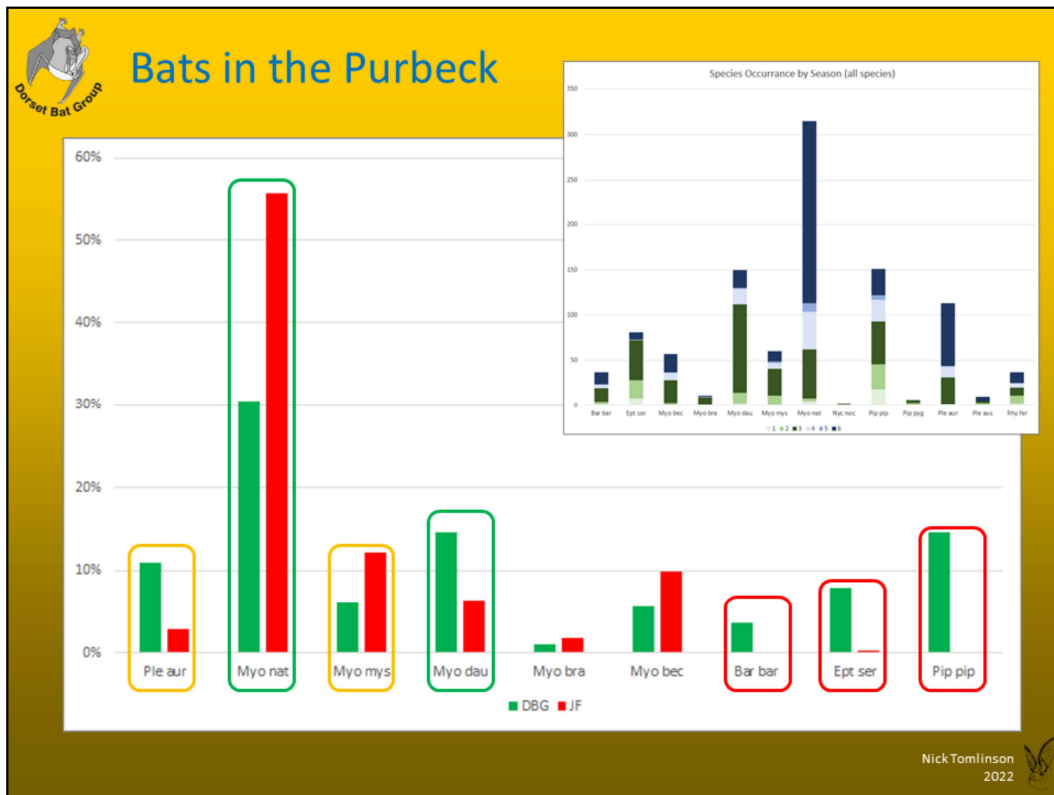


We thought it could be interesting to compare the data from our surveys with that from Flanders, to see if there was anything interesting



Two big differences to bear in mind:-

- (a) Flanders did most of his work in Sept and Oct, DBG did most of theirs in Aug/Sep – but we know there are seasonal differences in the peaks for some species so we should expect to see some differences relating to that
- (b) Flanders used harp traps, DBG used mist nets => a bigger and harder to see capture area



Differences re Mnat and Mdau as we expected

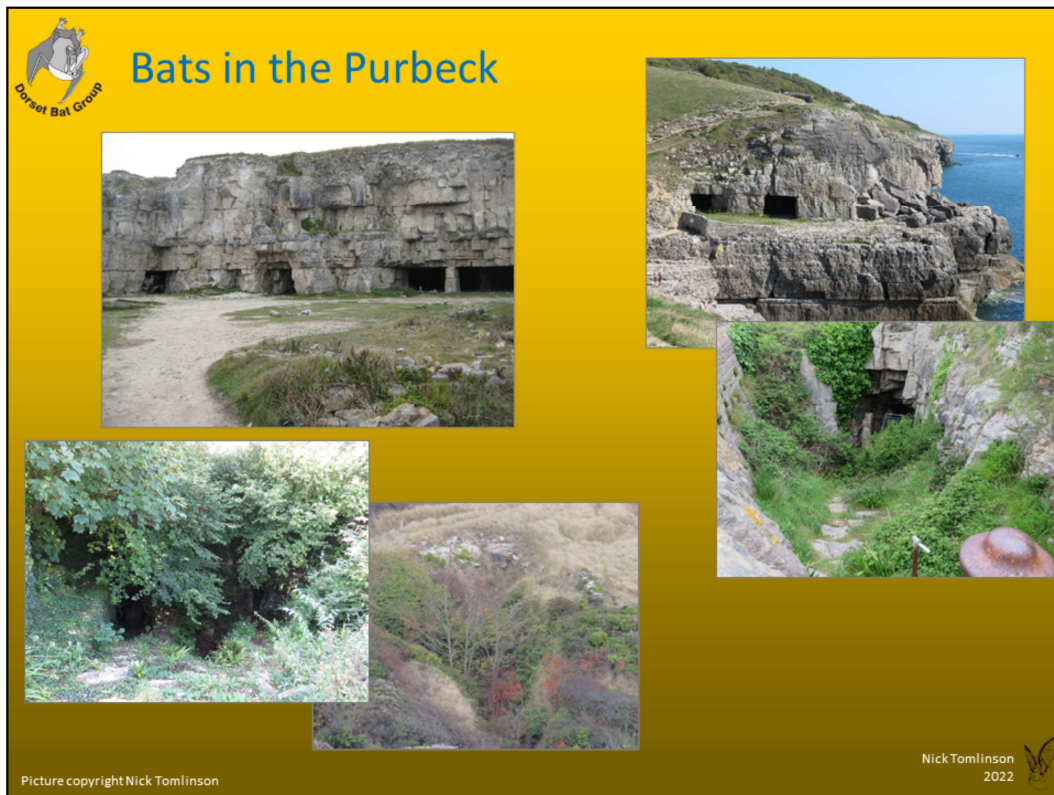
Paur and Mmys are the opposite to what we expect, cant really explain that

BIG differences are Bbar, Eser and Cpip

DBG caught ON AVERAGE, over 64 sessions, 3xPpip, 2xEser and 1xBbar

Flanders caught 0xPpip, 2xEser and 0xBbar IN TOTAL

Experience says these species are not better avoiding harp traps so perhaps there is something else



Left hand pictures show Winspit (top) and typical inland sites (bottom) – key aspect is Winspit is clear the inland sites are not

Looked around for other sites and trapped at Tilly Whim (right hand pictures). Very similar to Winspit, in size and structure – used mist net at upper entrances and harp trap at the lower.

Trapped there five times, caught Bbar on each session (including in harp trap), Ppip on each session (including in harp trap) and Eser once, in mist net

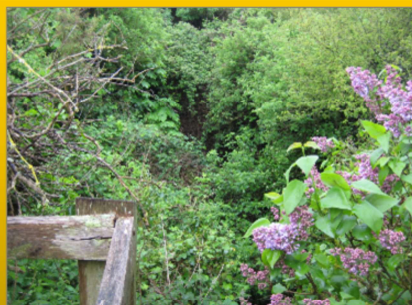
These trapping sessions were in September, when we know Eser is uncommon – average sept catch of Eser at Winspit is 1 in 4, so the 1 in 5 at Tilly Whim is comparable

These are the only two sites we know of where Eser, Bbar and Ppip have been caught during autumn swarming so what make them so important?

Is it because they are coastal (if so there are not many of them so they really need the highest protection possible) or is it because of the clutter?



Bats in the Purbeck



Pictures copyright Nick Tomlinson

Nick Tomlinson
2022



This is what the typical inland site looks like so, if it is clutter, that that has implications for the management of the inland sites.



Bats in the Purbeck

The effect of gates on cave entry by swarming bats

MIRIAM PUGH¹ and JOHN D. ALTRINGHAM^{1,2}

¹*Institute of Integrative and Comparative Biology, Faculty of Biological Sciences, University of Leeds, Leeds, LS2 9JT, United Kingdom*

²*Corresponding author: E-mail: J.D.Altringham@leeds.ac.uk*

Temperate bats make extensive use of caves and mines as nursery roosts, swarming sites and hibernacula. For a variety of reasons, the entrances to many sites have been modified in the past to restrict human access. Early barrier design often gave little regard to bats, leading to massive population declines in many nursery and hibernation sites. Free access to bats has become an increasingly important design feature, as the damaging effects of early gates were recognised. However, given the large number of gates that have been constructed, relatively few studies have looked at either the short or long-term effects of gates on bat behaviour and population sizes. Even fewer studies have examined specifically the effects of different gate designs. We have looked at the immediate effects of gates on the behaviour of swarming bats as they entered a natural cave. Three gates were tested, all with vertical grille spacings of 750 mm, but with horizontal spacings of 150, 130 or 100 mm. The gate with 150 mm spacings had no significant effect on the behaviour of the bats (predominantly *Myotis nattereri*). Gates with both 130 mm and 100 mm spacing caused a significant and substantial increase in the number of bats aborting their first and often subsequent attempts to enter the cave. The consequences to swarming behaviour and long-term use of the site by bats are unknown, but we suggest that following the precautionary principle, the minimum spacing between horizontal bars in gates should be 150 mm.

Nick Tomlinson
2022





Bats in the Purbeck

Thank you for listening

nick@elephantsears.org

Nick Tomlinson
2022

