

Bat Conservation Trust

Mitigation Case Studies Forum

Tuesday 24 January 2017



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Mitigation Case Studies Forum 2017

PROGRAMME

Tuesday 24th January 2017

Arup – 8 Fitzroy Street, London W1T 4BQ

Welcome and introduction: Julia Hanmer,
Joint CEO, Bat Conservation Trust (BCT)

Key note speaker: Dr. Claire Wordley,
Conservation Evidence

Session 1 introduction. Martin Ballard,
Willmott Dixon (Chair)

Topic 1 – Residential and Public Buildings:

- Dr Charlotte Packman, Wild Frontier Ecology: *Mitigation to Reduce the Impact of Bats on Churches*
- Paola Reason, Arcadis: *‘Training’ Bats to use a New Access Point – and Humans how to Design One*
- Nick Jones, EDP: *Bat Cave Linking to Grade II Listed House*
- Q&A

BREAK

Topic 2 introduction. Peter Johnson, Kier Group (Chair)

Topic 2 – Other Structures:

- Victoria Burrows, ERAP Ltd: *Bat House at Boot Station, Ravenglass and Eskdale Railway, Cumbria*
- Rachel Bover, Jacobs: *Enhanced Concrete Pipe as Replacement Roost for Horseshoe Bats*
- Dr Stephanie Murphy, Arbeco Ltd: *Diversion of River Culm to Undertake Demolition of Culvert Containing Daubenton’s Bat Maternity Roost*
- Q&A

LUNCH

Session 2 introduction: Mike Oxford,
Association of Local Government Ecologists (ALGE) (Chair)

Topic 3 – Roads:

- Chris Kerfoot, Jacobs: *Badger and Bat Mitigation Duplex*
- Hattie Spray WSP & Sam Bower, Balfour Beatty: *Lessons Learnt from Monitoring Bat Mitigation on a Road Widening Scheme*
- Jon Davies, Arcadis: *Monitoring the Effectiveness of Mitigation for Horseshoe Bats Associated with a New Road in Wales*
- Q&A

BREAK

Topic 4 – An International Perspective on Bat Mitigation:

- Marcel Schillemans and Eric Jansen, Dutch Mammal Society
- Q&A

Topic 5 – Research and Upcoming Mitigation Projects:

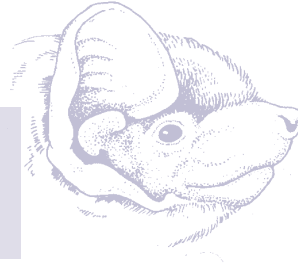
- Lisa Worledge, BCT: *European Bat Box Database*
- Jan Collins, BCT: *Bearing Witness for Wildlife: BCT’s New Investigations and Mitigation Project*
- Paul Lintott, University of Exeter: *CIEEM Reviewing the Evidence on Mitigation Strategies for Bats*
- Q&A

Keynote Speaker

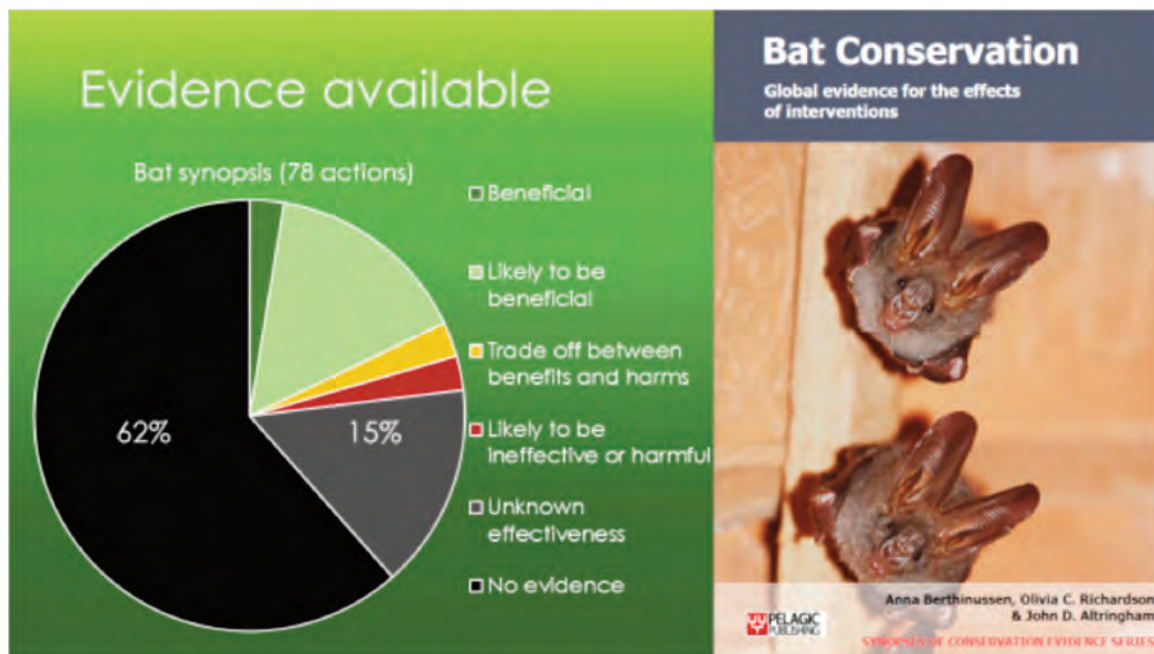
Dr Claire Wordley

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Conservation Evidence



Conservation, mitigation and enhancement work is routinely undertaken for bats. But how much of it actually works, and how well? In 2013, Conservation Evidence collected together the evidence for 78 different actions that people might take for the conservation of bats; unfortunately, for many, little evidence was available, even for many interventions that are routinely undertaken such as integrating bat bricks into buildings or altering the access points for roosts. In order to address these knowledge gaps, monitoring of interventions for bat conservation needs to be more question driven and rigorous, and the results published so that they can be shared with the wider conservation community. Conservation Evidence has a free, open-access journal where practitioners can publish the results of studies directly and quantitatively testing conservation interventions.



What can we do?

- ▶ We need to conduct question orientated monitoring to assess the effectiveness of mitigation
- ▶ We need to have trials to compare methods – e.g. bat brick vs. bat box vs. heated bat box
- ▶ We need to share data as a matter of course e.g. EcoBat, European Bat Box Monitoring Scheme.
- ▶ We need to write papers and publish the evidence where possible, e.g. in the Conservation Evidence Journal.
- ▶ We need to routinely compare the effectiveness of different mitigation measures.



What constitutes good monitoring?

- ▶ What is the **question**?
- ▶ Develop a clear question that you are trying to answer, rather than just monitoring 'to see what happens'.
- ▶ Questions must be **SMART: Specific, Measurable, Achievable, Relevant, Time-bound**
- ▶ For example...

"We aim to monitor the impact of the development on bats"

*"We aim to monitor changes in **overall bat activity** and **species diversity** within the survey area to determine the impact of the development"*

*"Do **overall bat activity**, **individual species activity** and **species diversity** change in the **first five years** after development and if so, **by how much**? Are the changes **statistically significant**?"*



What constitutes good monitoring?

- ▶ Questions also need to be **meaningful**.
- ▶ E.g. Use versus effectiveness.
- ▶ Question one: do bats use bat gantries?
 - ▶ If even a handful of bats fly near the gantry, you can claim that bats use them.
- ▶ Question two: Are bat gantries effective in reducing the number of bats flying at traffic height?
 - ▶ You need to look at the **PROPORTION** of bats using gantries versus crossing below 5 m (HGV height).



All reports should:

- ▶ Check the **evidence base** for mitigation measures
- ▶ Ask a clear, answerable **question**.
- ▶ State what you are **measuring**, and do it **consistently**.
- ▶ Use appropriate **methods and equipment**.
- ▶ Implement **methodology consistently**.
- ▶ Ensure **adequate length** of study and **number of repeats**.
- ▶ Have pre-mitigation surveys that report **sufficient information** so that post-mitigation surveys can actually be of some use!



Topic 1

Residential and Public Buildings

Dr Charlotte Packman

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Mitigation to Reduce the Impact of Bats on Churches

The ecological receptor

Maternity roost of soprano pipistrelle bats inside a church.

The predicted impacts

(Partial) exclusion of the maternity roost from the interior of the church.



© Hugh Clark, Brown long-eared bat
Simon Mickleburgh

The mitigation / compensation measures applied

Provision of a large artificial roost built into the church interior:

- original bat access route to interior retained
- new roosting space provided, which also blocked access to the rest of the church interior
- access route on cold north side, original roost on warm south side, so temperature difference compensated for with a heat mat in the artificial roost (temperature gradient created)
- range of different niches provided within the artificial roost, mimicking those of the original roost site (horizontal slots, vertical slots, forward & backward-facing 'wedges', loft space)
- box 'seeded' with powdered droppings from the church roost
- artificial roost installed after emergence in early May (pre-maternity period)

Provision of a large heated bat box on the exterior of the building, next to bat access point into the building (installed one year prior to exclusion, box 'seeded' with droppings).

Increased roost provision along main commuting route (bat boxes of a variety of designs, installed one year prior to exclusion).

The monitoring regime

c.10% of the colony (adult females) radio-tagged prior to artificial roost installation and exclusion from the church interior – radio-tracked to locate day roosts for up to 12 days (until tags failed/detached).

Static detectors to monitor any bat activity inside the church (along with checks for droppings, 'chattering' etc).

Emergence counts at linked roosts (located from radio-tagged bats).

Tiny 'no glow' infrared cameras inside artificial roost and at roost entrance.

Temperature loggers inside interior and exterior bat roosts.

Bat box checks.

What worked / went as expected?

Maternity roost excluded from church interior (despite very ‘bat-porous’ building).

Soprano pipistrelles readily adopted linked established roosts as maternity roosts.

Retaining original roost access meant bats quickly found way into the artificial roost.

Started to visit/investigate the artificial roost, then night-roosting, then small numbers day-roosting, encouraging early signs (only the first season, usually takes several seasons for artificial roosts to be adopted fully).

Four out of seven bat boxes along commuting route used by pipistrelles (Soprano).

What didn’t work / was unexpected?

‘Forced introduction’ to exterior large bat box wasn’t in the early season (bats not catchable at dawn) – exterior roost not yet discovered/used.

Even very minor alterations to access points can prevent bats from exiting/entering the roost (initially at least); the ‘invisible barrier’.

Infrared (IR) monitoring cameras at internal artificial roost revealed interesting insights into how bats behave under exclusion/new roost provision situations:

- initial dawn swarming – bats would not enter roost, some roosted at entrance
- extreme caution of bats as they slowly familiarised themselves with the new roost
- several months from first tentative, brief entry into artificial roost to regular day-roosting
- olfactory cues appear to be very important (many hours of footage of bats sniffing the roost entrance!) – rarely considered in mitigation
- other roost visitors – brown long-eared bats, Natterer’s bats, blue tits and wrens

Small numbers of individuals still enter church interior (brown long-eared bats and both pipistrelle species recorded on static detectors) – but minimal activity and few droppings, not currently a problem.

Soprano pipistrelles have extensive network of linked roosts (more than expected/has previously been reported), unicolonial polydomy/fission-fusion.

Large pre-maternity tree colony roost (unusual for this species).

What lessons were learnt / did the monitoring reveal?

Soprano pipistrelles have a complex network of linked roosts, including alternative maternity roost sites

Post-exclusion they readily re-locate to alternative maternity roost sites.

The above two points may well be species-specific and location-specific – need to know what alternative/linked roosts are present at a given site and for a given species.

Exclusion and monitoring a little early in the season? Likely to be better for the bats but may have limited identification of all linked maternity roosts.

Bats are extremely cautious in their exploration and uptake of new roosts; it takes time.

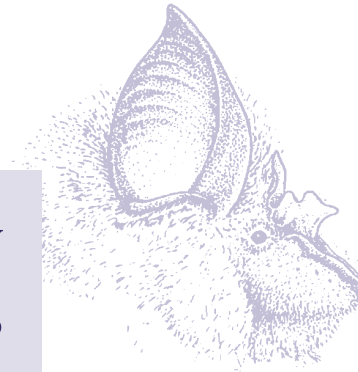
Favourable Conservation Status (FCS) is very problematic to determine without difficult-to-obtain data on survival and productivity – yet it is the basis for the NE licencing system (relying instead on proxies).

In future ringing would be useful to determine with certainty if the individuals from the excluded roost are the same ones using artificial roosts/bat boxes and for longer-term monitoring (radio-tracking is a powerful tool but the data obtained is very short-term).

Paola Reason

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‘Training’ Bats to use a New Access Point – and Humans how to Design One

The ecological receptor

A small roost of lesser horseshoe bats (~35 adults and young) that had previously been monitored by the local bat group.

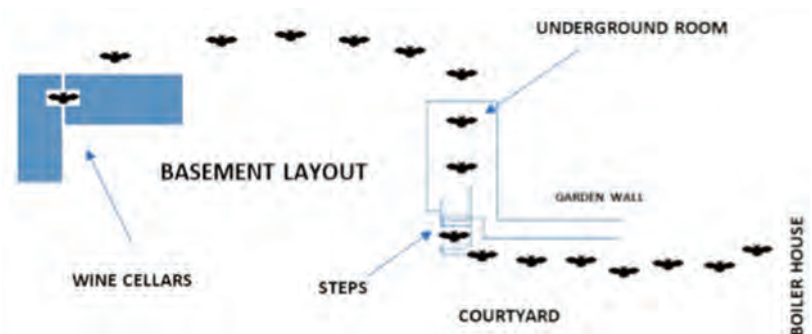
The predicted impacts

The bats were using a basement that they accessed through an external door and utility ducts. Conversion of the building would result in the loss of the access point through enclosure of the external access within an extension to the kitchens, as well as general construction disturbance.

There was also the potential for a reduction in roost temperature through changes to the heating regime, and operational lighting and human disturbance.

Existing situation (pre-2000)

Bats were located within two adjoining former wine cellars (shaded) and in a separate small boiler house roof. To exit the roost, they flew along ducts within the basement, into a small rectangular underground room, up steps, over the top of a cut-down door into a large courtyard, turned left to fly along the adjacent garden wall, entered the boiler house roof via its eaves, and exited the other side into garden/woodland.

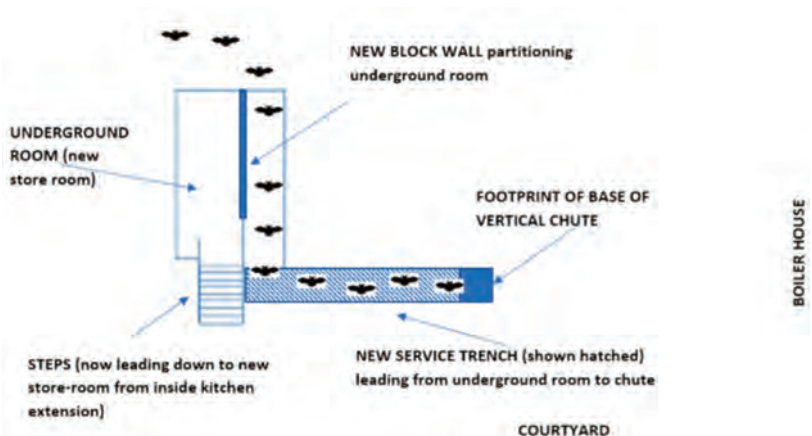


The mitigation measures applied

A new access point was required, and also diversion of the underground flight route to reach that access point. Normal construction and operation restrictions (noise, lighting etc.) were also applied.

Amended flight path (post 2000)

This diagram shows the amended flight-path of the bats, diverted around the now-divided underground room. This no longer leads up the steps, but alongside them in a separate ‘compartment’. Once emerged from the chute, the bats would, in theory, continue to fly along the garden wall to enter the boiler house roof via its eaves, exiting the other side



into garden/woodland. Note that there were initially two 90° turns in this flight-path; one at each end of the service trench. One is a gradient, as the bats turn to enter the service trench from the basement; the other as the bats make a vertical ascent into the chute from the service trench.

The monitoring regime

There was repeated testing of alternative access designs during construction before the old access route was closed.

During operation (and for over a decade now) the roost is monitored through:

- Biannual inspections when heaters are turned on in spring and off in autumn.
- Biennial emergence surveys twice/year to monitor the colony pre-post juvenile flight.

Initial inherited chute design

The bats were able to leave their roost via this access, but refused to re-enter, often instead clustering by their existing temporarily-blocked entrance even as daylight approached.

In 2001, when the roost access point was modified so that there was a direct 'line-of-sight' through the structure, bats again readily used this new chute to emerge. They were still not seen to return via the new chute during this first year; nonetheless, in contrast to the previous year, bats no longer clustered around the former access point during pre-dawn surveys (i.e. they were no longer attempting to use the previous route when temporarily blocked). This was the case even when the existing access point was left blocked between the dusk and pre-dawn surveys.



Initial inherited chute design

Although bats are not monitored at dawn any longer, they can be seen flying in and out of the new access point as they prepare to leave the roost in the evening.

What worked / went as expected?

Bats diminished in number during construction but enough stayed faithful to the roost to maintain it. Detailed notes of each survey (counts, locations, and observations of the bats' behaviour) during the trials were kept, which led to the successful design.

What didn't work / was unexpected?

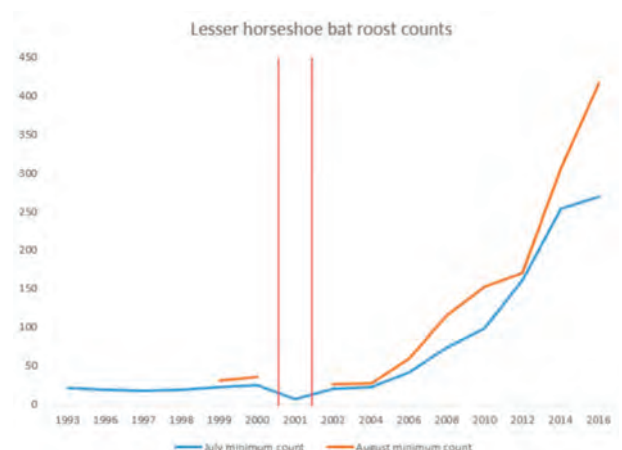
The shape of initial design (it wasn't ours) was unsuccessful. The contractors did not follow instructions for the construction of the new flight-path; greater direct supervision was required.

What lessons were learnt / did the monitoring reveal?

- The final design was successful.
- We believe the colony benefits from different micro-climates.
- Regular monitoring has enabled early issues with security lighting to be addressed.
- The colony not only stayed in situ but has increased significantly.



Final chute design showing gradual slope of flight-path and 'line-of-sight' between access point and basement entrance



Lesser horseshoe bat roost counts. For the earliest counts (1993-2000), the maximum count recorded in the period May-July is plotted. Red lines show period of intervention.

Nicholas Jones

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Note: EDP project; however, as per the delegate list, Nicholas has subsequently moved to ACD Environmental, so please ask for Charlotte Bell regarding this project going forward.



Bat Cave Linking to Grade II* Listed House

The ecological receptor

The site is at an undisclosed location in England and comprises an 18th Century Grade II* listed house, outbuildings and grounds. The works are to renovate the house including the cellar and roof.

Buildings at the site support bat roosts of the following species: common pipistrelle, brown long-eared bat, barbastelle, lesser horseshoe and greater horseshoe bat.

The 'bat cave' project relates to a nationally significant population of lesser horseshoe bats in the cellar with a maximum count of 104 bats. In addition, an individual greater horseshoe bat appeared within the cellar during the course of the works.

EDP have also been monitoring/advising on a maternity roost of lesser horseshoe bats within the roof void to the house with a maximum count of 150 bats, which already had mitigation in place as a result of work undertaken by Enzygo.



Importance of looking high...



...and low. Lesser horseshoe bats roosting within sections of the original cellar.

The predicted impacts

In the absence of suitable mitigation, the predicted impacts at a national level would be high given the status of the bat roosts. However, suitable mitigation allows the bat roosts to be retained and provides suitable long-term roosting opportunities. This is predicted to have a positive impact on roosting bats in the long-term given that the house was on English Heritage's 'At Risk' register and in need of restoration. The consequences of doing nothing would therefore result in the decline of the house and bat roosts therein.



Construction of the cave...



... and tunnels.

The mitigation measures applied

The mitigation provides a balance between the socio-economic requirements and the legal and planning policy requirements pertaining to protected species, which has been implemented through an EPS licence as follows:

- Sections of the cellar are allocated entirely for human use whilst two sections (including one of the wine stores) are allocated entirely for bat use;
- The works include a landscaped terrace to the rear of the house and a bespoke bat cave and tunnels have been installed to utilise the subterranean area beneath the terrace and link to the bat sections of the cellar via two open doorways;
- The cave comprises a concrete plinth, which leads to steps down to a series of rooms; and
- This in turn leads to two concrete tunnels, which opens out to the valley beyond and provides landscape connectivity.

The mitigation replicates the opportunities that are currently available and is considered proportional to the national scale of the roost. This has been achievable only through close collaboration with the clients and project team, and a shared commitment to realise the same vision.

The monitoring regime

Monitoring of mitigation and roosts during the works each year between 2014 and 2018. The bat cave became operational in November 2015; however, works are ongoing at the site.

What worked / went as expected?

Expected - bat cave: anticipated that significant structural works would be required given the age of the building. This worked out well from a bat's point of view as the concrete plinth significantly increased the area available for roosting bats.

Worked - roof void: screens erected to create human and bat zones to allow works to proceed whilst maintaining the roost. One bat zone created a niche behind the screen and became the most favoured roosting location and was therefore left *in-situ*.

What didn't work / was unexpected?

Unexpected - bat cave: two windows into the cellar were originally closed and proposed to be blocked over. However, the openings started to be used as access points and therefore one window opening was left open with a modified grill.

Unexpected - roof void: on one occasion the boarding to the light column had been removed making the interior of the roof void light. EDP advised for this to be re-instated and maximum count of lesser horseshoe bats went from 3 to 60. The light column is now rendered so a long-term solution is in place.

What lessons were learnt / did the monitoring reveal?

It was vital to be solution-focused and adaptable to realise a complex bat mitigation project.

Early signs are positive and lesser horseshoe bats have utilised the mitigation despite the ongoing renovation works with associated noise. The maximum counts post-mitigation are 16 within the subterranean provision (cellar and cave) and 99 within the roof void. Success will be determined through long-term monitoring; however, we remain confident the mitigation will continue to offer suitable roosting opportunities.



Lesser horseshoe bats using a bat section of the cellar (left) and the new cave (right).

Topic 2

Other Structures

Victoria Burrows

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Bat House at Boot Station, Ravenglass and Eskdale Railway, Cumbria



The ecological receptor

Common pipistrelle maternity roost. 47 bats emerged from beneath the eaves at the obsolete café building in May 2005. Building scheduled for demolition as a new station building and cafe had been constructed.

The predicted impacts

In the absence of mitigation, the scheduled and approved demolition would destroy the maternity roost and cause a high impact in accordance with Table 6.1 of the Bat Mitigation Guidelines (English Nature, 2004).



© ERAP Ltd

All other factors, such as the quality of the surrounding vegetation, limited artificial illumination and the level of human activity would remain the same; no other impacts were expected.

The mitigation measures applied

The mitigation strategy had a number of requirements to satisfy:

1. The bats and the requirements of a maternity roost
2. Natural England (defra at the time) via European Protected Species Mitigation (EPSM) licensing
3. Lake District National Park Authority (LDNPA) in terms of appearance as any replacement structure would need planning permission and
4. Ravenglass and Eskdale Railway in terms of aesthetics, position / location and cost.

The objectives of the mitigation and compensation were:

- a. Demolish the old station building when the bats unlikely to be present (i.e. between November and February when the café is closed)
- b. Ensure the compensatory roost is constructed and available prior to the next maternity season to ensure no net loss of roost opportunity
- c. Replicate the conditions, particularly in terms of roost access position, position within the surroundings, roost access size, temperature etc. and
- d. Satisfy the requirements of the Railway and the LDNPA in terms of appearance.

Solution was the ‘Bat Tower’ with a roost access in exactly the same position as the previous access beneath the eaves of the old cafe building and an internal low voltage heater. The tower is a hollow box with baffles (like three American-style bat boxes facing each other and one wall for the heater).

The monitoring regime

Construction completed in January 2007. Mandatory monitoring for two years post-construction under licence. Tinytag temperature and humidity datalogger installed inside from 6th June 2007. Average temperature between June and late August 2007 = 24.4°C (min of 12.2°C and max of 31°C).

First Year: No evidence of use in June or August 2007.

Second Year: c.10 bat droppings on the sills around the exterior. Single pipistrelle bat behind fascia at eaves in May 2008.

February 2010: 100s of droppings inside the tower and a few dead pups indicating use as a maternity roost. Cleared droppings away.

February 2011: 100s of droppings present.

March 2014: Similar conditions and evidence of use as a maternity roost.



What worked / went as expected?

The construction of the tower including the installation of the low voltage heater was relatively straight forward as the site and platform was already serviced. The tower was colonised by a maternity roost relatively quickly (within two and a half to three years) but outside the two year post-construction monitoring required under the EPSM licence.



What didn't work / was unexpected?

Unfortunately a blue tit entered the tower and become trapped. The blue tit died inside the tower but it may have also harmed bats?

What lessons were learnt / did the monitoring reveal?

Perhaps a longer mandatory post-licence monitoring period would be valuable in determining success or otherwise of uptake?

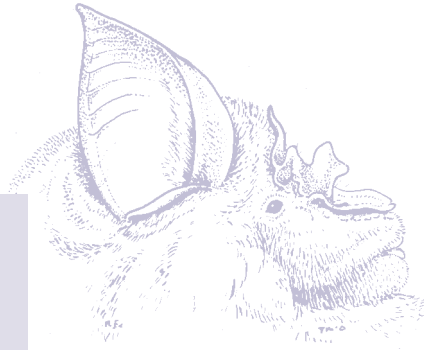
With the exception of checking on the presence of the compensation and its conditions perhaps monitoring for bat use in the first year after completion is less useful than delaying the monitoring until two and three years post-construction.



Photos © ERAP Ltd

Rachel Bover

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Enhanced Concrete Pipe as Replacement Roost for Horseshoe Bats

The ecological receptor

A roost of lesser horseshoe and greater horseshoe bats was discovered beneath a partially infilled disused railway bridge close to a Special Area of Conservation (SAC) for these species. The bridge was being fully infilled due to structural concerns. Lesser horseshoe bats were present in low numbers throughout the year with greater horseshoe bats present in low numbers in August.



© Jacobs UK Ltd

The predicted impacts

Complete infilling of the bridge was required to provide structural support to the minor road which it carried. The infilling would destroy the roost with no means to retain any part of it. Other repair options would also destroy the roost.

The mitigation measures applied

Debris netting was used to exclude the existing roost. The netting was fitted around the arches and then raised at night to allow the bats to leave, then lowered to prevent re-entry. Static recorders and night vision cameras were used to ensure that there were no bats remaining. A replacement roost was designed



© Jacobs UK Ltd



© Jacobs UK Ltd

to provide equivalent year round opportunities. A 1.5m diameter horseshoe-shape concrete pipe was buried next to the bridge to keep the roost entry in the same orientation and height as the original roost. Enhancements made to the pipe to make it more suitable for roosting bats included rough render applied throughout, a light baffle, a small cool tower and soil substrate to retain moisture. The soil bank burying the pipe was planted with shrub species to provide cover and reduce solar gain. A new hedge was also planted to provide the bats with cover next to the roost.

The monitoring regime

Five years post construction monitoring comprises of a two-week deployment of static detectors in March and August each year from 2016-2020. A temperature and humidity probe is also deployed to record the internal environmental conditions.

What worked / went as expected?

Monitoring in March 2016 showed evidence of lesser horseshoe bats entering into the new roost but not roosting. In August approx. 50 LHS droppings were seen and acoustic data confirmed night and day roosting. Temperature and humidity levels have remained suitable throughout 2016.

What didn't work / was unexpected?

The concrete pipe caused transport and handling issues for the contractor due to its size and weight and the presence of overhead lines. Installing monitoring equipment was difficult as the roost was not designed to be entered.

What lessons were learnt / did the monitoring reveal?

We will consider using a rendered plastic pipe instead of concrete for similar future schemes, as the covering earth bank buffers the internal temperature. Locating the replacement roost close to the original with the same orientation of roost entrance is thought to speed up colonisation as it is assumed the bats are familiar with how to approach and use the structure.



© Jacobs UK Ltd

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Diversion of River Culm to Undertake Demolition of Culvert Containing Daubenton's Bat Maternity Roost

The ecological receptor

A Daubenton's bat maternity roost of at least 100 individuals was recorded within a culvert beneath a redundant and derelict paper mill near Killerton in Devon in 2014. Historic records from 1992 – 1999 reported up to 200 individuals using the roost making it one of the largest of its type known in the UK. The culvert, through which the River Culm flows, and the buildings comprising the paper mill, were scheduled for demolition with the aim of restoration to full riparian habitat following over 100 years of industry at the site.



Daubenton's bats in culvert 2014

© Arbeco Ltd

The predicted impacts

In the absence of mitigation, the predicted impact was complete loss of the Daubenton's bat maternity roost from the site.

The mitigation measures applied

Retention of a 60m long section of the 200m long culvert was proposed to retain the bat roost at the site. High levels of soil contamination and complicated demolition methodology required the temporary diversion of the River Culm into an adjacent channel to facilitate demolition of the remaining culvert section and paper mill buildings. The retained section of culvert was sealed off at one end with a temporary 'bat curtain' made from strips of flexible high-density polyethylene which allowed the diverted river to continue flowing whilst restricting bats flying into the demolition area.



River diversion

© Arbeco Ltd



Diamond saw cut through slab

© Arbeco Ltd

The monitoring regime

A comprehensive monitoring strategy comprising emergence/re-entry surveys, automated bat detector surveys and visual internal inspection surveys of the retained culvert section was undertaken in 2015 with repeated monitoring scheduled for 2017 and 2019. Initial monitoring surveys in 2015 have indicated that Daubenton's bats are roosting within the retained culvert section following demolition of the remaining culvert and paper mill buildings in 2014/2015.

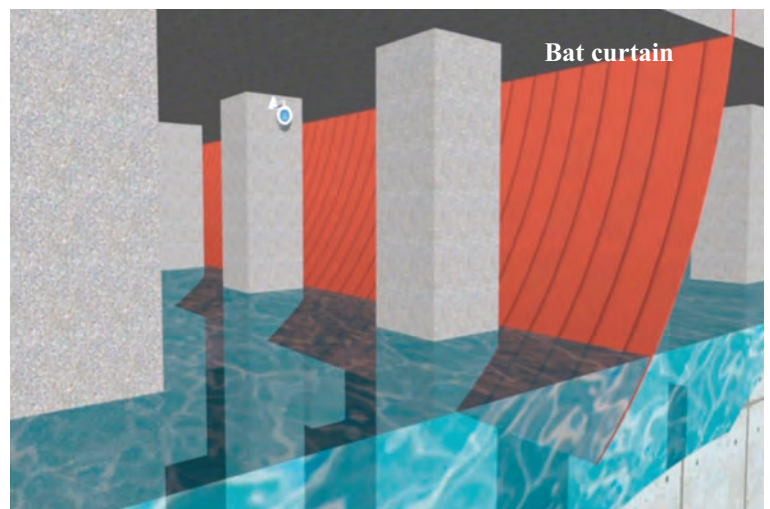
What worked / went as expected?

The installation of the bat curtain was relatively straightforward and was deemed fit for purpose.

The bat curtain adequately sealed off the demolition area from the 60m section of retained culvert therefore protecting the bat roost area.

What didn't work / was unexpected?

The instability of the exposed overlying culvert slab was unexpected.



© Arbeco Ltd

Environment Agency restricted works in River Culm and to the culvert until April 2014 due to salmon spawning season.

However, the solution of diverting the river proved to be a much better way of demolishing the culvert slab and allowing decontamination works to the soil.

This alternative method did not affect the mitigation strategy of retaining a section of the culvert sealed off by the bat curtain but did cause significant delays and costs.

What lessons were learnt / did the monitoring reveal?

The visual inspection of the culvert undertaken in mid-August 2015 did not reveal any bats roosting within the culvert. It was not possible to inspect prior due to high river levels.

The next visual inspection of the culvert due in 2017 will therefore be undertaken earlier in the season before the roost disperses, providing water levels are safe.

Dr Stephanie Murphy – Diversion of River Culm to Undertake Demolition of Culvert Containing Daubenton's Bat Maternity Roost

Topic 3

Roads

Chris Kerfoot

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Badger and Bat Mitigation Duplex

The ecological receptor

Working on a new 5km section of road in the south-west, a historic limekiln structure was present on the scheme. The structure was in disrepair and surrounded by mature trees and scrub. A main badger sett was located amongst the scrub immediately behind the kilns and a year-round roost (non-maternity) of lesser horseshoe bat and Natterer's bat was present within the structure. The Natterer's bats were present in a missing stone and the lesser horseshoe bat were roosting in a debris-filled chamber accessed through a small hole at the back of the kiln arches.



© Jacobs UK Ltd

The predicted impacts

The kilns were to be the centrepiece of a new roundabout junction. This would result in all vegetation being lost, major earth works destroying the sett and the kilns being dismantled and repaired removing all bat roost features. During operation, the kilns would be isolated, disturbed and lit resulting in all functional habitat for bats or badgers being lost.

The mitigation measures applied

A badger licence was obtained and the sett was gated and excluded. Chain link fencing was used across the entire area to prevent badgers digging back in. A bat licence was obtained and the bats were excluded using one way valves on crevice features and a curtain of debris netting over the arch that would allow the lesser horseshoe bats to leave when raised and prevent them re-entering when lowered. As mitigation we needed to provide a



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buried new roost suitable for hibernation (a 5m x 2m concrete pipe separated into chambers and enhanced inside) and create an earth mound to construct a new badger sett. Due to spatial constraints we combined the two so the sett was constructed into the earth slopes of the mound burying the new roost.

The monitoring regime

Bat roost monitoring comprised of manual inspections and remote recording over two-week periods in October 2015, then January, May and August 2016-2019. The new and existing badger setts were monitored regularly for the duration of the exclusion. The status of the new sett was checked on each subsequent bat monitoring visit.

What worked / went as expected?

Badgers occupied the new sett immediately, and it has been in constant use since 2015 with significant re-working and new entrances dug. A greater horseshoe bat was recorded on two nights within the new roost in October 2015 and long-eared bat and Natterer's bat-like droppings were found inside bat bricks on the roost in May 2016. Combining the two structures was a success in terms of maximising space on site and reducing contractor handling time.

What didn't work / was unexpected?

Bats haven't been confirmed back inside the new roost since the two nights in October 2015. This is thought to be due to the building of the new road over this period, and a delay in the completion of mature planting around the roost that was designed to provide shelter and foraging.

What lessons were learnt / did the monitoring reveal?

Future sett designs will better allow for natural expansion of tunnels by badgers. The landscape planting should be completed as soon as possible to help embed new roosts in the landscape, which is particularly important where, in cases like this, the new roost is in a novel location.

May 2017 Update. All planting has been completed and a torpid lesser horseshoe bat confirmed inside the new roost.

Sam Bower

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Hattie Spray

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Lessons Learnt from Monitoring Bat Mitigation on a Road Widening Scheme



The ecological receptor

The A21 Tonbridge to Pembury scheme, Kent, is to convert a 4km single-lane carriageway into a dual-lane. The road widening increased the distance between woodland habitat either side of the road, and therefore had potential to fragment bat populations. Baseline surveys confirmed that at least eight species of bat were active in the immediate vicinity of the road, and a proportion of species, notably pipistrelle species, *Myotis* species and long-eared bats may be affected by the change in habitat connectivity.

Hop-overs were deployed to mitigate potential impacts of fatalities and flight path disruption from the scheme on bat species. The hop-overs were either side of the widened road, and comprised welded mesh material supported on wooden posts approximately 6m in height. The designs also include planting, comprising heavy standards and shrub planting to supplement retained vegetation.

The monitoring regime

The monitoring regime comprised six surveys during 2015 (before and after hop-over installation) and again in 2016 between May and September, using manual detector surveys supplemented by automated detector monitoring.

What worked / went as expected?

Using a combination of automated and manual detectors to capture information about general activity levels and activity during the manual surveys (shorter duration); the combined approach was useful in interpreting data.

Increasing survey duration to improve reliability of comparison between data; light levels (strongly influenced by weather conditions) influenced results and bias was reduced by surveying over a longer duration (i.e. above the standard 60 minute crossing point survey duration).

Targeted visual monitoring; the monitoring area comprises open habitat and sightlines meant that this was an effective method (compared to other situations where reduced light levels / poor sightlines may require other methods).

Tracking individual bats between surveyor's points, with communication aided by radios.

Using existing structures and vegetation of known height to gauge flight height and direction (rather than installing specific lights or features for this purpose).

What didn't work / was unexpected?

Multiple monitoring visits were undertaken during 2015 and 2016, throughout this period the monitoring area was part of the live construction zone and construction activities will have influenced bat behaviour.

Communication with the construction team reduced potential bias in the monitoring results as visits were timed to avoid particularly disturbing activities, but vibration, noise and lighting elsewhere in the construction zone cannot be fully controlled. The results are representative of bat activity during construction and influences need to be taken into account when interpreting data, and comparing it to activity recorded pre- and post-construction.

What lessons were learnt / did the monitoring reveal?

Adapting methods to ensure that data will answer key monitoring aims require careful thought and may require adjustments to standard methods contained in guidelines.

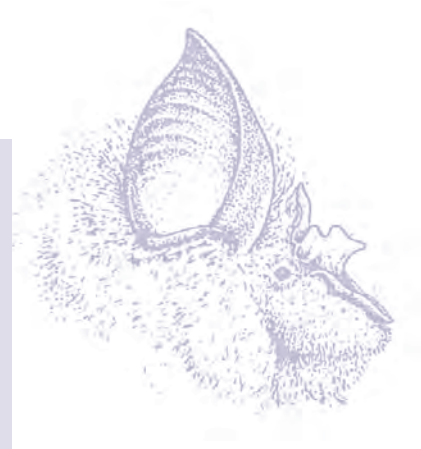
Combining monitoring methods and trialling additional locations / timing to confirm that monitoring methods are yielding full information.

Tailor methods to species being monitored.

Ensure surveyors completing the monitoring are appropriately experienced and familiar with working together.

Jon Davies

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Monitoring the Effectiveness of Mitigation for Horseshoe Bats Associated with a New Road in Wales

The ecological receptor

Greater and lesser horseshoe bats (primarily greater) associated with the Slebech Park roost of the Pembrokeshire Bat Sites Special Area of Conservation (SAC) (the roost is approximately 3km from the scheme).

The predicted impacts

Potential loss of foraging habitat, fragmentation and road traffic accidents caused by the construction and operation of a new road close to the SAC.

The mitigation measures applied

Safe Crossings

Two open-span bridges, two 3500x4000mm equestrian underpasses, a cattle underpass, and a number of over-sized drainage culverts (varying in size from a 750mm pipe to a 1800x3000mm box culvert) were included in the scheme design, significantly increasing the availability of 'safe' crossings for horseshoe bats (and other species).



Canaston Bridge



Western Underpass 3.5 x 4.0m



Toch Bridge Box Culvert 1.8 x 3.0m



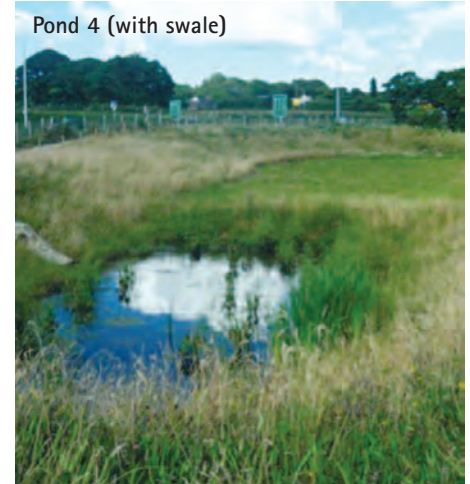
Sunnyside Underpass 2.7 x 2.4m

Other features

Four ‘essential mitigation areas’ (EMAs) were also created to provide replacement foraging habitat, and hedgebanks and landscape planting were introduced along the scheme to guide the bats into the mitigation.

The monitoring regime

Monthly monitoring at crossing-points and in foraging habitat areas from April to October for the duration of the five-year Aftercare and Maintenance Period. Anabats were deployed within and above the crossings, with surveyors observing bat behaviour (latterly using night-vision goggles) and recording calls on Pettersson detectors.



What worked / went as expected?

The culverts/ underpasses worked very well, with the monitoring showing high success rates (see below). We consider this to be due to the size of the features, their positioning (on known flight-lines) and the use of hedgebanks/planting to guide bats to the mitigation.

We employed the local Wildlife Trust to manage the EMAs, which had at least three benefits: (1) it was more cost-effective than normal landscape contractors; (2) it brought money into the Trust; and (3) it meant that those doing the managing had a particular interest in doing a good job for biodiversity.

What didn't work / was unexpected?

The night-vision kit was not as helpful as hoped, although it did help us to observe the flight behaviour of a proportion of the bats crossing the carriageway, and thus helped provide more context to the results. Whilst we certainly did make the road much more ‘permeable’ to bats than the existing A40, we could have over-sized even more of the scheme’s culverts during design to make it even more resilient (although this does cost money).

What lessons were learnt / did the monitoring reveal?

The monitoring showed a very clear relationship between the cross-sectional area of the crossing and its effectiveness (measured as the proportion of bats encountering the scheme that crossed safely). This varied from 15% for the 750mm culvert to > 85% for the cattle and equestrian underpasses (one of the latter was 97%) as well as the 1800x3000mm box culvert. The position of the feature within the landscape (including proximity to known flight routes) was also described to provide further context to the success rates.

Jon Davies – Monitoring the Effectiveness of Mitigation for Horseshoe Bats Associated with a New Road in Wales

Topic 4

An International Perspective on Bat Mitigation

Eric Jansen

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Can Bats be Moved to a New Hibernation Site?

The ecological receptor

Hibernation sites for brown long-eared bat, Daubenton's bat and greater mouse-eared bat in man-made structures.

The predicted impacts

Loss of local population of 6-18 bats from alterations to hibernation roost structures.

The mitigation measures applied

Smaller new build roost, mostly < 10m from the original site.

The monitoring regime

Between one to six years pre-development, with one hibernation count a year.

Between three to six years after development, with one hibernation count a year.

We call a mitigation effort successful when all species are present in the new site (within three years for hibernation) and the population is 75-100% of original population.



What worked / went as expected?

Summary

Site	Altering period	Year	"Population" size	Species composition	Time	Possible reasons for failure
Sterrenberg 1 New built	Winter	1992	m	m	X	too dry
Galganberg New built	Late summer, spring	2007	V	V	m	
Sterrenberg 2 Move	Late summer	2007	V+	V+	V	
Soesterberg Move	Summer	2013	V	V	V	
Kromhout New built	2x winter + summer	2012	X	X	X	altered landscape ample Artificial lighting
Lunetten New built	Late summer	2013-2016	V	V+	V+	
Vuren New built	2x winter + summer	2014	m	X	X?	too warm?, too dry!

V+ = larger than before alteration
 V = same size as before alteration
 m = smaller than before alteration
 X = total failure

Designs with a semi-permeable roof structure and multiple crevices (> 200) worked well.

Construction of the new hibernation site before the swarming season.

What didn't work / was unexpected?

Building a new hibernation site in strongly altered landscape did not work.

Building a new hibernation site / creating disturbance in winter did not work.

What lessons were learnt / did the monitoring reveal?

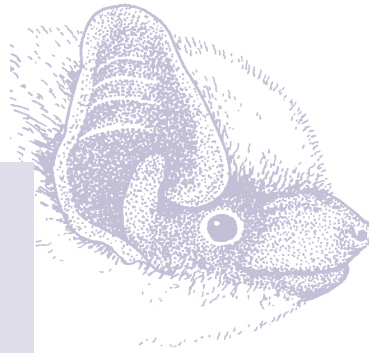
Time to make modifications (tweak designs) is needed to achieve success, ideally an extra winter before the original roost is removed.

No strong landscape changes around the roost site.

Bat populations are being recorded staying away from the known roost for a couple of years after works so a local alternative bat roost should be made available during this time.

Marcel Schillemans

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Mitigation at Three Former Military Complexes Baarle-Nausseau –B-, Schaijk –S- and Heesch –H-

The ecological receptor

Common pipistrelle (*Pipistrellus pipistrellus*) and brown long-eared-bat (*Plecotus auritus*). Focus on *Pipistrellus pipistrellus* summer usage.

The predicted impacts

Loss of maternity (♀), mating (♂) and summer (sum) roosts during renovation and demolition of a number of buildings on all sites. Also impact on hibernation roosts.

The mitigation measures applied

Keep one building at sites H and S and upgrade them with cantboards, bat boxes inside, extra inner wall to create wall cavities, large maternity box outside. Create a bat tower to replace a building at site B and addition of bat boxes on all three sites.

Pre-development research

- **Visual inspection 2008 and early 2009**
Common pipistrelle
Brown long-eared bat (BLE)



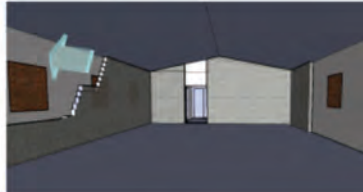
- Followed by **fieldwork with bat detectors**
 - 2 visits in maternity season
 - 2 visits in mating season
 - 1-2 visits in mating season for BLE



Measures

- Buildings were not well suited for bats (no wall cavity)
- Buildings were suited to keep people out and orientation was ok for bats
- Optimise buildings:
 - Walls instead of windows
 - Inner 'second wall': wall cavity, hollow stones
 - Internal bat boxes





Bat tower

- Inner wall hollow bricks
- Outer wall dark bricks
- Wall cavity 3-4 cm
- Internal spaces to hide in
- Black roof
- 'Double' cantboard




- Baarle-nassau (B): 40 batboxes
- Heesch (H) & Schaijk (S): 35 batboxes plus maternity box on building





The monitoring regime

- 2010-2014: two monitoring regimes (summer regime shown below).
- Dataloggers.
- Batboxes and cantboards: approx. every two weeks!
- > 2014: only volunteers.

What worked / went as expected?

The goal of the compensation measure (column one) for each type of roost (maternity (♀), mating (♂) and summer (sum)) is monitored from 2011 - 2014 (subsequent columns) and broken down into type (interior building, exterior building and bat boxes on trees) in the first column and shown in the peach, orange and green rows respectively.

The cantboards and large bat box used at site H and external measures on the bat tower were used as expected by 2014. Bat boxes on trees also showed the expected usage by 2014.

**Results monitoring: usage of measures
(Ppip, not winter)**

Measure	Goal measure:			Usage 2011			Usage 2012			Usage 2013			Usage 2014		
	♀	sum	♂	♀	sum	♂	♀	sum	♂	♀	sum	♂	♀	sum	♂
V-building interior Heesch	X				X	-		X	-	X	-			X	-
V-building interior Schaijk	X	X			X			X		X				X	
Bat tower interior Baarle - Nassau	X				X					X				X	
V-gebouw outside Heesch (cantboards and large batbox)	X	X	X		X	X		X	X	X	X	X	X	X	X
V-gebouw outside Schaijk (cantboards and large batbox)	X	X	X		X			X	?		X				
Bat tower Outside Baarle - Nassau	X	X	X	X	X			X	X?	X	X?		X	X	X
Batboxes on trees Heesch		X	X		X	X		X	X		X	X		X	X
Batboxes on trees Schaijk			X		X	X		X	X		X	X		X	X
Batboxes on trees Baarle-Nassau		X	X		X	X		X	X		X	X		X	X

What didn't work / was unexpected?

The large maternity batbox at site S was shaded and not used by 2014, after removal of a tree it was used by bats in 2016 (shown in red above).

Also the cantboards at site S weren't used by 2014 as a maternity roost, the walls were found to be too smooth. After adapting the walls by making them rougher, the cantboards were subsequently used in 2016 (shown in red).

Interior of the buildings at H and S were not used as maternity roosts (shown in red), is this because it is too cold due to the extra inner wall that was built?

What lessons were learnt / did the monitoring reveal?

- 1) Monitoring with volunteers works well
- 2) Usage of replacement maternity roosts take time (up to five years)
- 3) Long term monitoring revealed need for adaptation, however this wasn't picked up in the original timetable that was proposed (up to 2014)
- 4) Monitoring in the first year is not very useful to check on usage (but can be very useful to engage volunteers)

Marcel Schillemans – Mitigation at Three Former Military Complexes (Baarle-Nassau –B-, Schaijk –S- and Heesch –H-)

Topic 5

Research and Upcoming Mitigation Projects

Lisa Worledge

Bat Conservation Trust
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European Bat Box Database

Installation of bat boxes has seen a huge increase in recent years. Not only among bat groups and for research purposes but also as a compensation tool. Where they are used for compensation, monitoring the effectiveness of the boxes, including integrated bat boxes built into new buildings, is often not carried out due to issues such as: funding constraints, costs not being agreed up front, access permissions for sites, or sites changing hands.

To improve communication when checking boxes with a group, or to find volunteers to check boxes installed by consultancies, an open data, open source, online database has been established in the Netherlands for use across Europe.

The database allows for systematic entry of observations per cluster of boxes, and has an option to blur locations or put embargos on sensitive locations or species. An initial English translation of the database is now available but work on further enhancements is ongoing, including a bulk data upload facility and enhanced visualisation tools. By collecting and analysing data from bat boxes internationally in many situations and of many box designs, it is hoped better mitigation can be achieved in the future.



© Renée van Assema

We will promote the database and the website via BCT bulletins in due course.

<http://app.vleermuiskasten.nl/database>

Jan Collins

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Bearing Witness for Wildlife: BCT's New Investigations and Mitigation Project

It's vital that we emphasise to decision makers that: (a) our species protection legislation is essential; (b) we're working across sectors to improve implementation of it; and (c) bats are not a hindrance to development when developers/ecologists follow best practice based on good evidence.

The portfolio of projects in the Biodiversity Team at BCT is focused around better implementation of the legislation, including the Built Environment, Investigations and Partnership for Biodiversity in Planning Projects. However, the efficacy of bat roost mitigation is a major evidence gap, so we were delighted that last year the Esmée Fairbairn Foundation funded our Bearing Witness for Wildlife Project. The project covers mitigation and wildlife crime; this presentation is about the former.

Studies carried out to date suggest that specifications for mitigation design can lack the necessary detail; mitigation is not always implemented as intended; monitoring is not always carried out; and mitigation can be ineffective in some cases. Most recently, a Scottish Natural Heritage project found that only 18% of 28 sites studied were successful for maternity colonies of bats. This highlights the need to collect evidence in the other devolved nations of the UK and for industry guidance to be updated.

Deliverables within the Bearing Witness for Wildlife Bat Roost Mitigation Project are this Mitigation Case Studies Forum (to share good practice across sectors), a new Roost website (to share case studies) and award (to incentivise good practice) and research into the implementation and effectiveness of bat roost mitigation through fieldwork.





The project will cover England and Wales only; cases involving damage or destruction of breeding sites or resting places of bats; common and soprano pipistrelle and brown long-eared bat (*Myotis* species have now also been added); and licences that expired in the period 2006 to 2014.

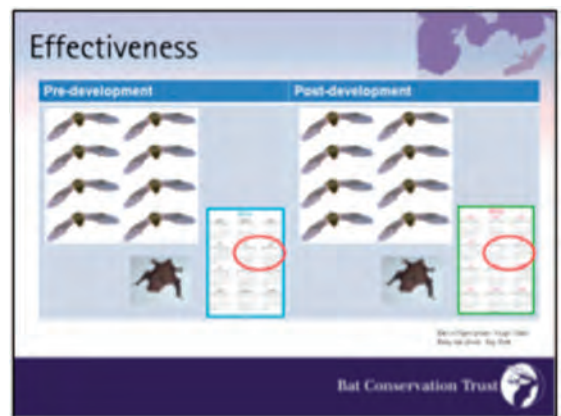
We want to understand the extent and reasons for poor implementation (e.g. how often are bat boxes installed the wrong way up and inappropriate construction materials used) and also effectiveness.



Effectiveness is defined as the same species of bat returning post development in the same numbers and for the same roosting purpose. 'Use' and 'effectiveness' are very different.

We think that gathering data on mitigation cases and getting access to sites are going to be our biggest challenges and we'd appreciate any help you can give us if you have projects that fit the criteria described above. This is free monitoring with no strings attached and it will be reported on anonymously. Also, participation is key to the success of this project, which is an important part of the future of bat conservation!

The Chartered Institute of Ecology and Environmental Management (CIEEM) and the University of Exeter (UoE) are also working on a mitigation project that is separate but complementary. The CIEEM/UoE project is a desk-based meta analysis of mitigation data from the UK and Ireland and will be carried out during 2017. The project relies on follow-up monitoring carried out by consultants. In contrast, the BCT project aims to collect monitoring data through fieldwork in England and Wales, and will continue into autumn 2018. The project relies on gaining site access.



The two projects will work together to collect the data needed to avoid approaching ecological consultants, the Statutory Nature Conservation Bodies (SNCBs) or Local Planning Authority (LPAs) independently to ask for the same information. Collectively, the projects are working on a questionnaire for consultants that will be publicised through BCT, CIEEM and UoE channels our websites, bulletins and social media so please keep an eye out for it. Your contribution will help two very important research projects.



If you have any questions please do not hesitate to get in touch: BWWM@bats.org.uk



Dr Paul Lintott

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Reviewing the Evidence on Mitigation Strategies for Bats: informing best-practice for policy makers and practitioners



Key Objectives

There is currently a lack of evidence on the effectiveness of bat mitigation interventions. Given that mitigation and compensation strategies can be extremely costly and can cause delays to construction, it is imperative that any mitigation employed is effective and proportionate. Our key objectives are:

- i) To evaluate the effectiveness and cost-efficiency of strategies currently undertaken for bat mitigation, focusing on four key areas.
- ii) To document the range of approaches used to address these broad categories of mitigation, and assess the extent to which they are deployed.
- iii) Determine the quality and quantity of evidence that currently exists that may be used to assess the extent to which mitigation strategies are implemented as anticipated in licence and/or planning applications.
- iv) Produce an evidence document outlining our findings including future best-practice for developers, ecologists and policy makers, and highlighting data gaps.

Mitigation techniques

We will assess the effectiveness of four broad types of bat mitigation for buildings. They have been selected on the basis of being common strategies affecting species across GB and Ireland. They are:

- i) *Minimisation and avoidance of light pollution*
- ii) *The installation of bat boxes*
- iii) *The creation of new or modified roosting space*
- iv) *Adaptations to roost entrances*

Initially we will be assessing the effectiveness of mitigation techniques completed between 2006 and 2014 for *Myotis* spp., *Pipistrellus pipistrellus*, *P. pygmaeus*, and *Plecotus auritus*.

A meta-analysis using consultancy data will be conducted to assess the effectiveness of a variety of mitigation techniques. **The robustness of this method is therefore reliant on us receiving case studies where post-development monitoring has been conducted.** Working alongside BCT we have a designed an easy and secure method of uploading reports to contribute to the project.

To find out more details and to start uploading case studies please visit:

<http://www.surveygizmo.com/s3/3356395/Bat-roost-mitigation-for-buildings-upload-reports>

Any questions please contact Dr Paul Lintott via email: batmitigationresearch@cieem.net

Poll Everywhere

Summary of Poll Everywhere Live Polling Results

INTRODUCTION

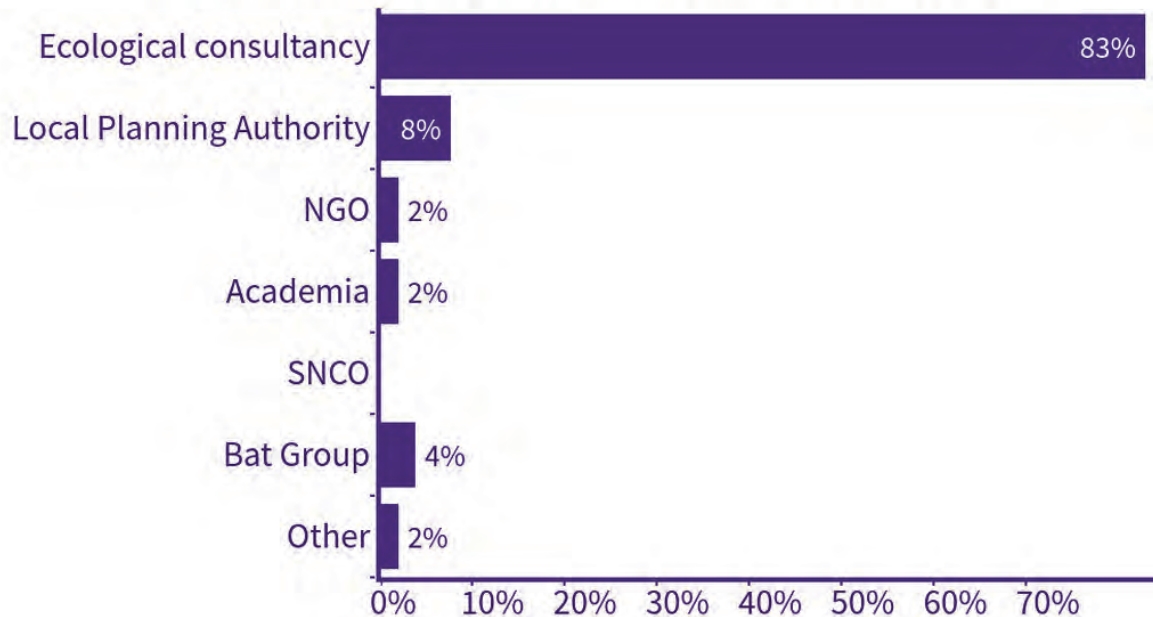
What best describes your primary industry / affiliation?



When poll is active, respond at **PolleEv.com/joannafergus596**



Text **JOANNAFERGUS596** to **020 3322 5822** once to join

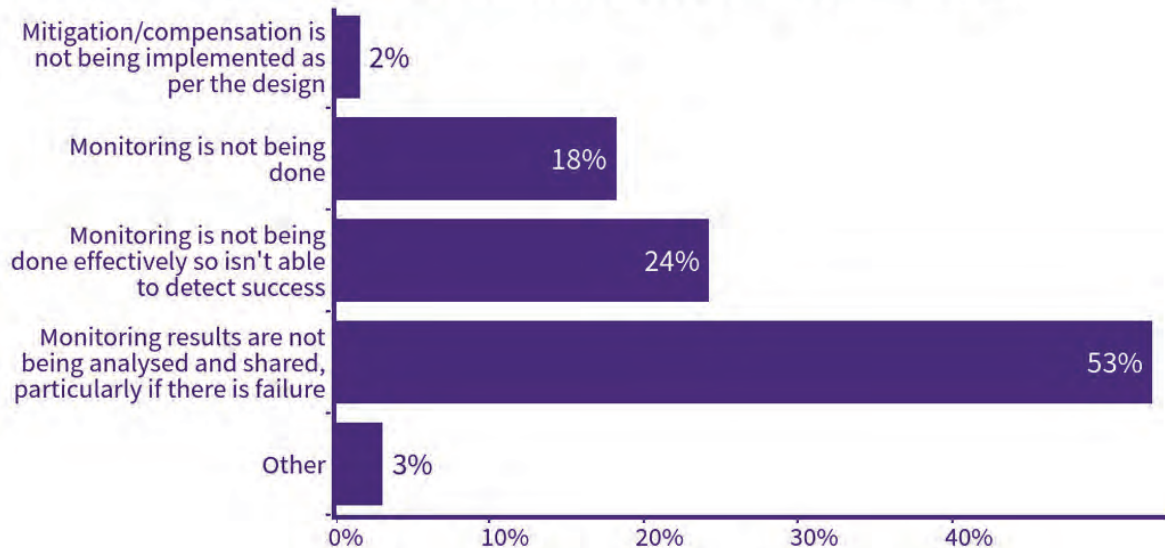


KEY NOTE

What is the most significant reason for us not knowing what works and what doesn't with respect to bat mitigation / compensation?

When poll is active, respond at [PolleEv.com/joannafergus596](https://www.polleverywhere.com/joannafergus596)

Text **JOANNAFERGUS596** to **020 3322 5822** once to join

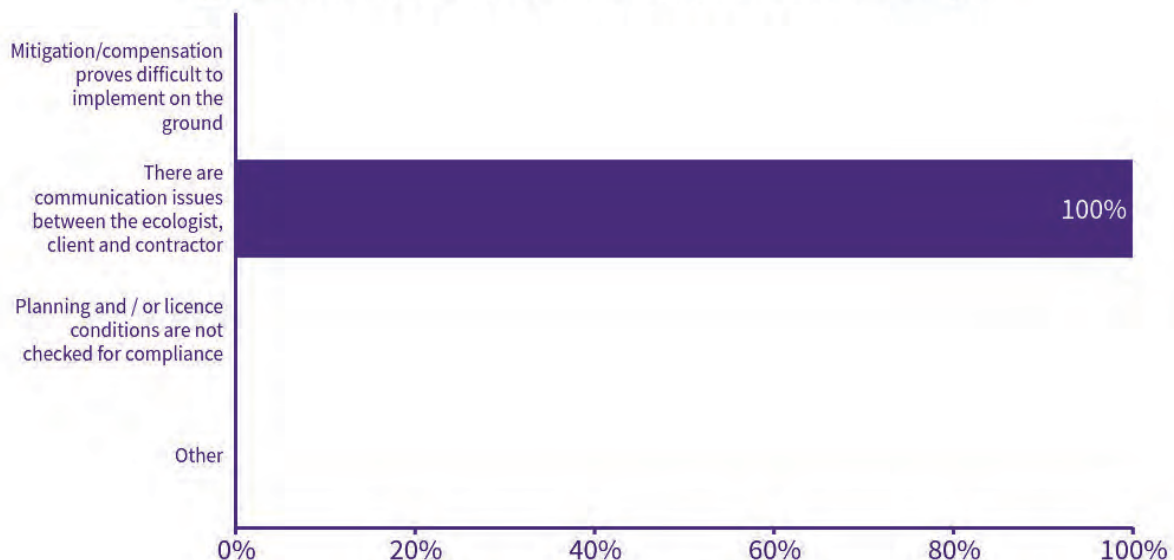


SESSION 1 INTRO

What is the most significant barrier to successful implementation of bat mitigation/compensation?

When poll is active, respond at [PolleEv.com/joannafergus596](https://www.polleverywhere.com/joannafergus596)

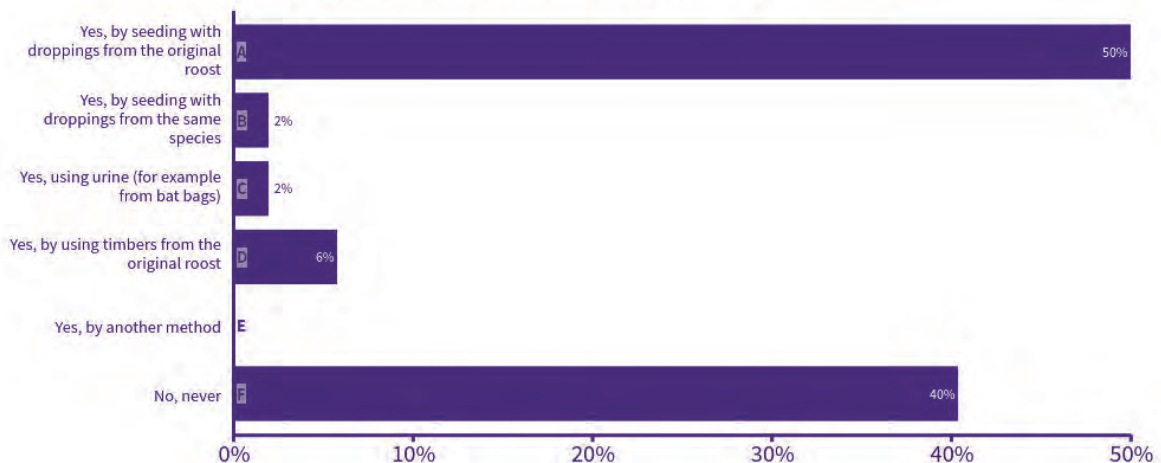
Text **JOANNAFERGUS596** to **020 3322 5822** once to join



Mitigation to Reduce the Impact of Bats on Churches

In your work have you ever encountered bat scent being used to attract bats into mitigation/compensation roosts, or used this as a method yourself?

i Poll is full and no longer accepting responses

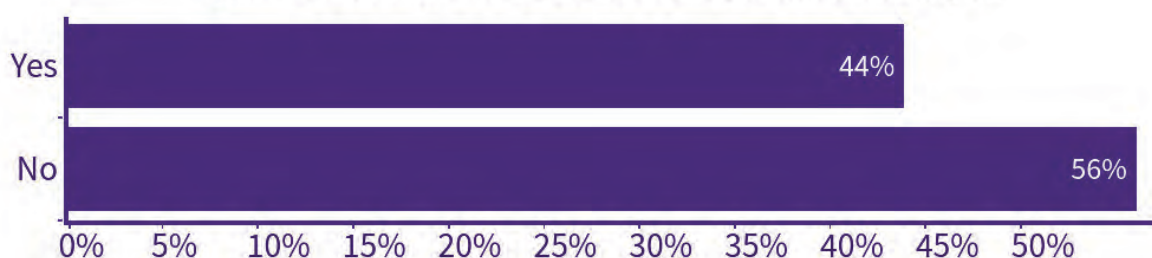


‘Training’ bats to use a new access point – and humans how to design one

When thinking about monitoring bat mitigation/compensation measures, have you ever been involved in a situation where results indicated remedial measures were necessary, and you or another party were able to direct, oversee and/or implement iterative design amendments to ensure success?

 When poll is active, respond at [PollEv.com/joannafergus596](https://www.poll-ev.com/joannafergus596)

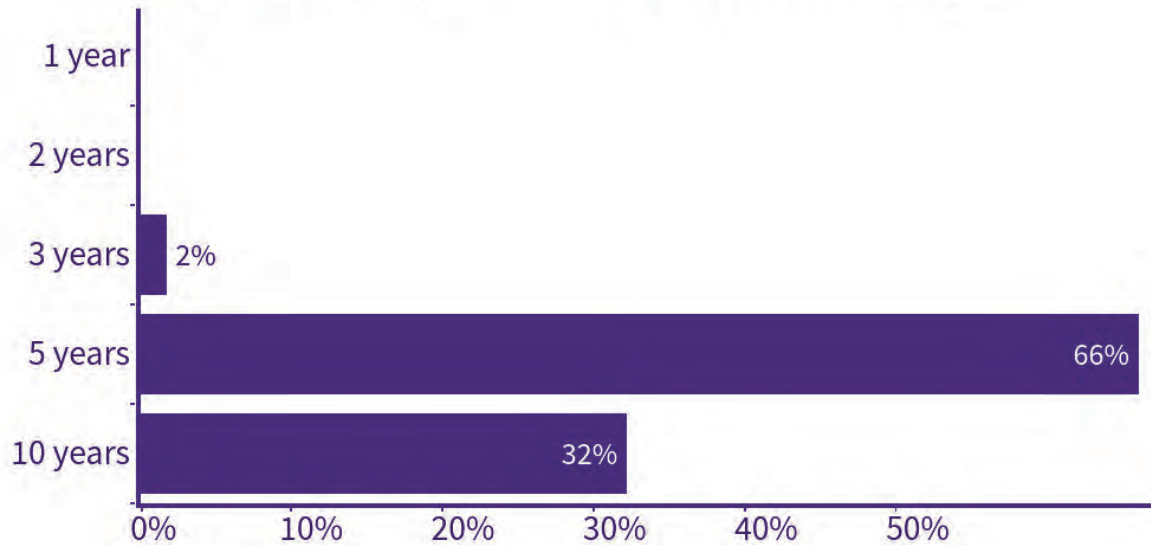
 Text **JOANNAFERGUS596** to **020 3322 5822** once to join



Bat Cave Linking to Grade II Listed House

How long should compensatory bat hibernation sites be monitored for to establish whether or not they are successful?

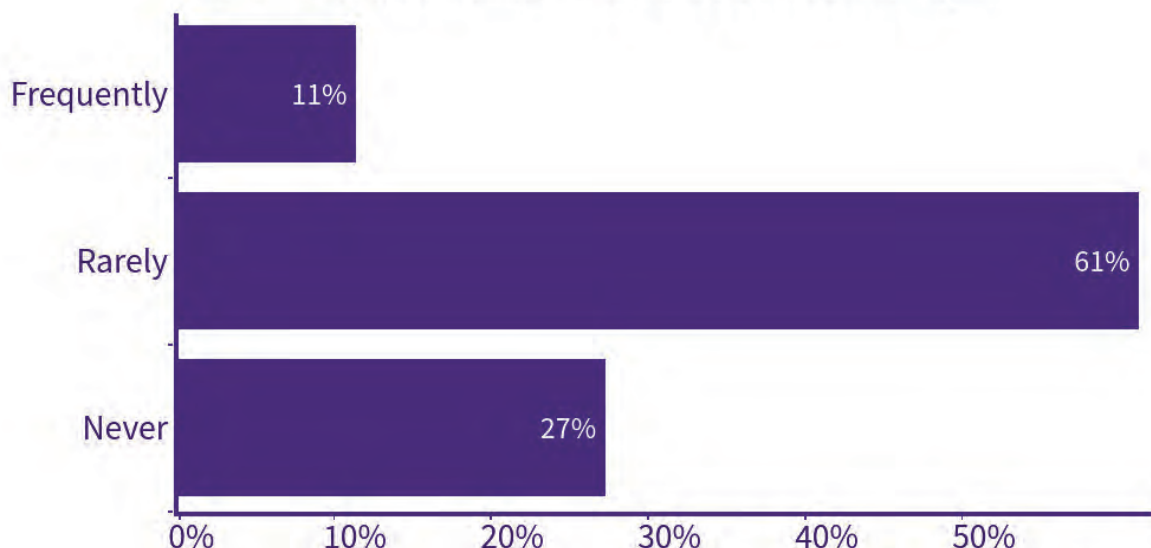
When poll is active, respond at [PollEv.com/joannafergus596](https://poll-ev.com/joannafergus596)
Text **JOANNAFERGUS596** to **020 3322 5822** once to join



Replacement Common Pipistrelle Maternity Roost

Do you encounter heating being used in artificial/replacement maternity roosts or use this as a method yourself?

When poll is active, respond at [PollEv.com/joannafergus596](https://poll-ev.com/joannafergus596)
Text **JOANNAFERGUS596** to **020 3322 5822** once to join



Enhanced Concrete Pipe as Replacement Roost for Horseshoe Bats

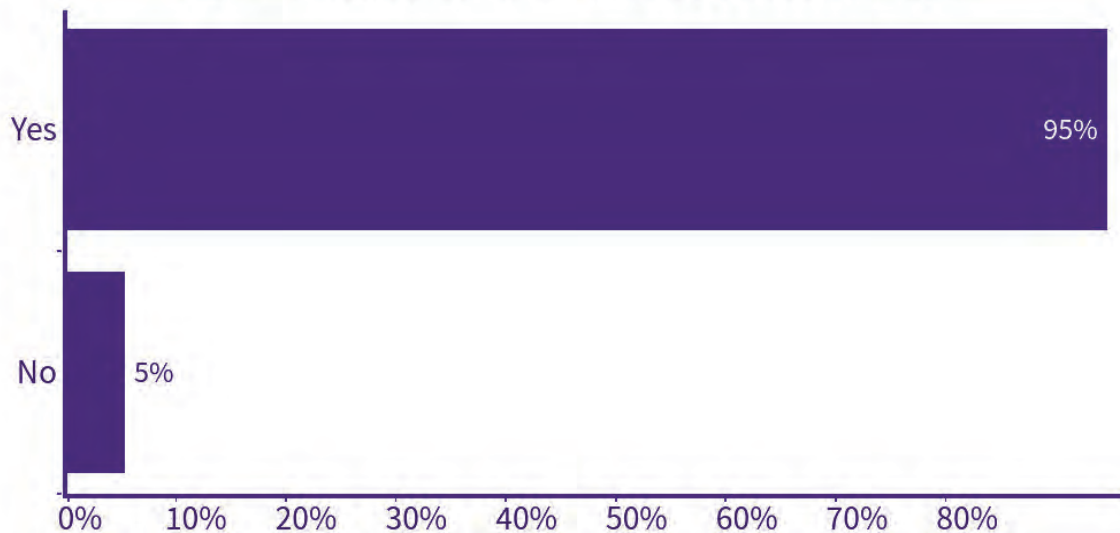
Have you ever encountered practical issues when contractors start to construct the mitigation/compensation measures?



When poll is active, respond at [Pollev.com/joannafergus596](https://pollev.com/joannafergus596)



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Diversion of River Culm to Undertake Demolition of Culvert Containing Daubenton's Bat Maternity Roost

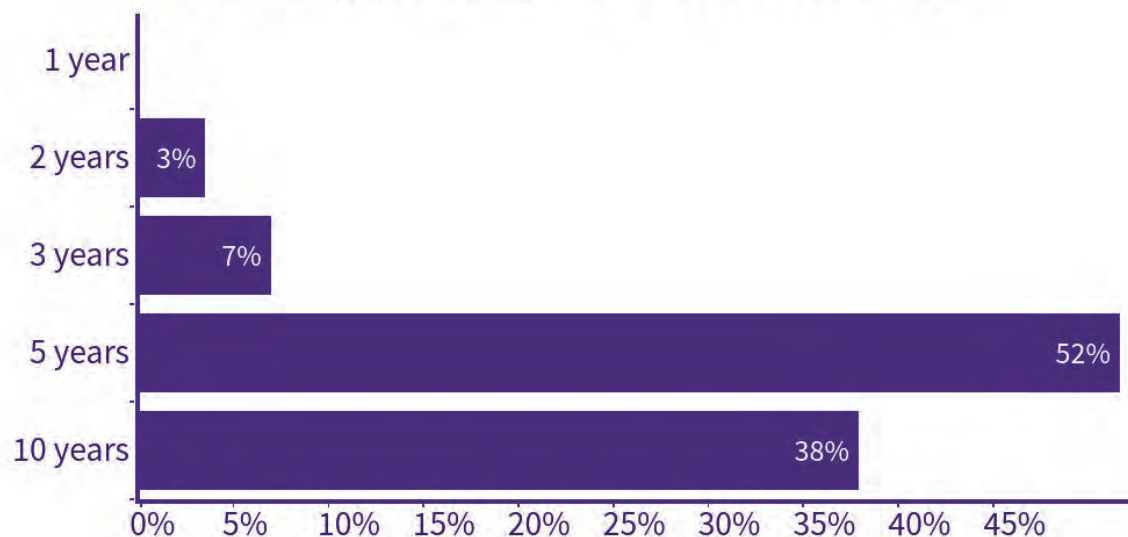
How long should compensatory roosts for maternity colonies be monitored for, to establish whether or not they are successful?



When poll is active, respond at [Pollev.com/joannafergus596](https://pollev.com/joannafergus596)



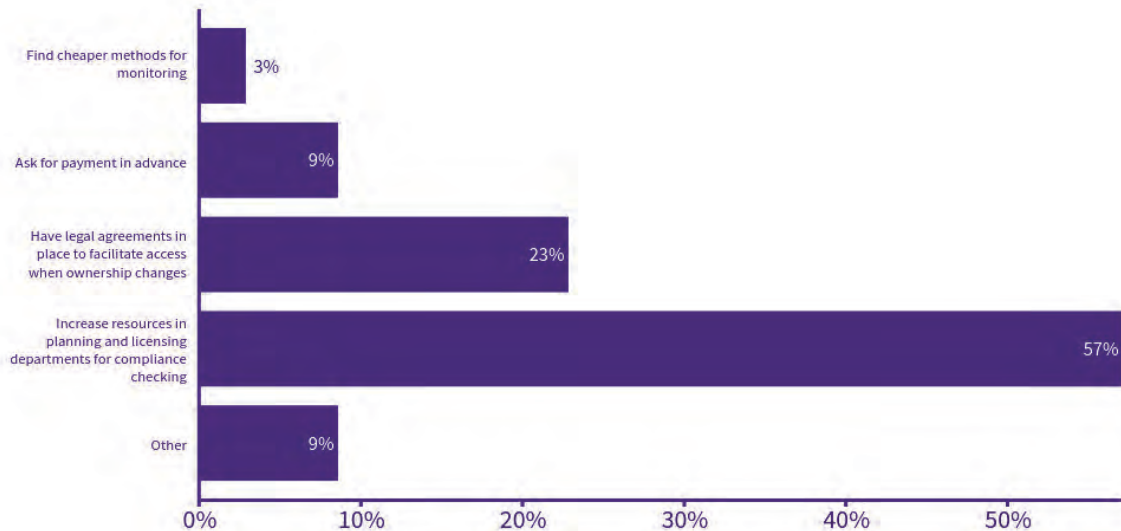
Text **JOANNAFERGUS596** to **020 3322 5822** once to join



SESSION 2 INTRO

What action would make the most difference with respects to getting monitoring of bat mitigation/compensation done?

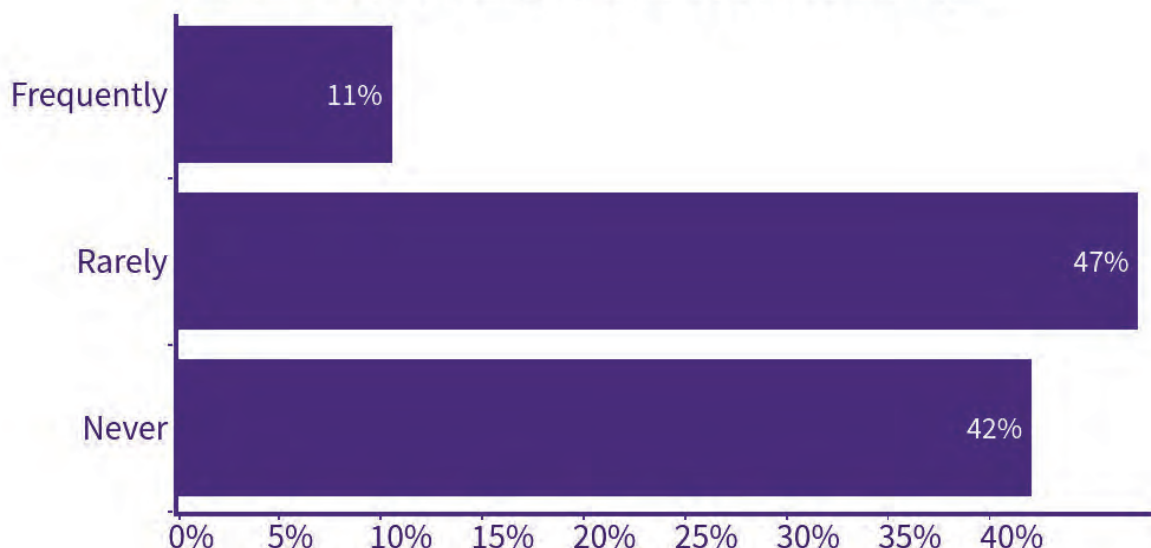
i Poll is full and no longer accepting responses



Badger and Bat Mitigation Duplex

Do you encounter mitigation for bats combined with mitigation for other species, or have you done this yourself?

 When poll is active, respond at **PollEv.com/joannafergus596**
 Text **JOANNAFERGUS596** to **020 3322 5822** once to join



Lessons Learnt from Monitoring Bat Mitigation on a Road Widening Scheme

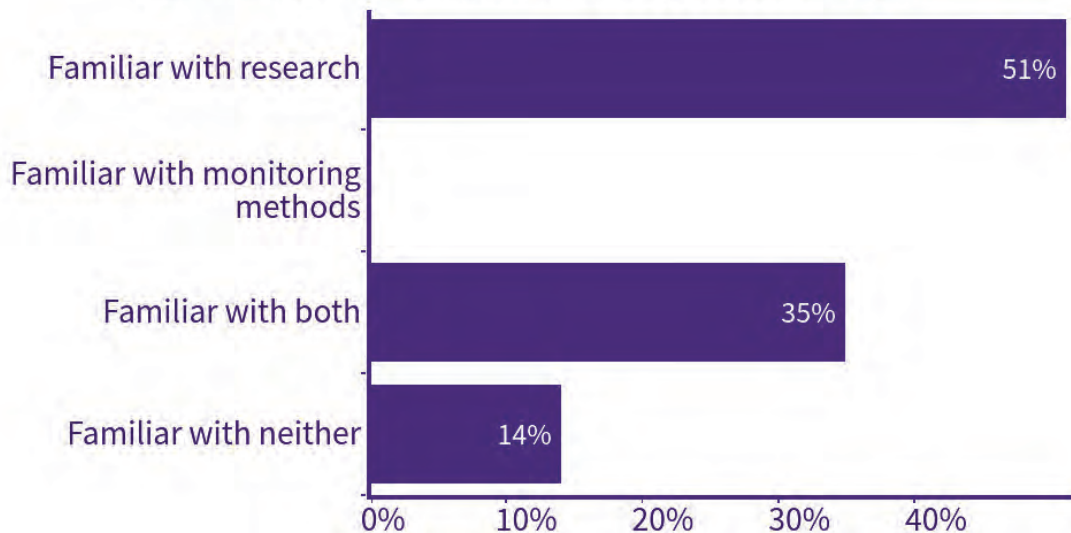
Are you familiar with John Altringham's research on the relative success/failure of road crossings for bats and suggested monitoring methodologies?



When poll is active, respond at [PollEv.com/joannafergus596](https://poll-ev.com/joannafergus596)



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Monitoring the effectiveness of mitigation for horseshoe bats associated with a new road in Wales

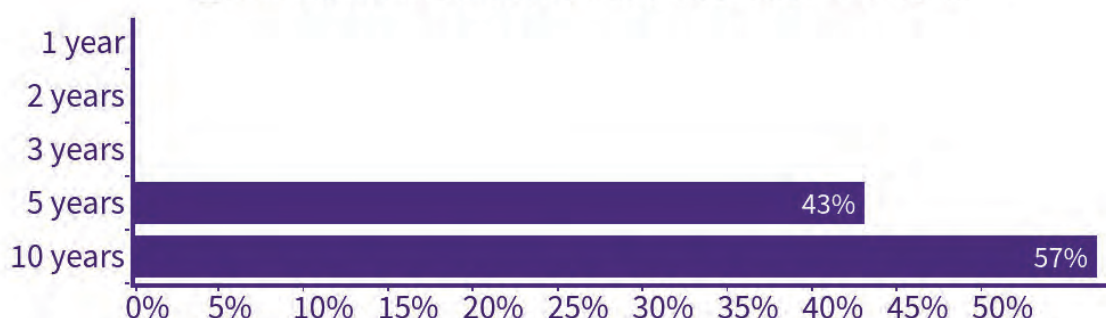
How long should newly constructed bat crossing points (such as underpasses, culverts, green bridges, hop-overs and gantries) be monitored for post construction (if they were installed to provide compensation for the severance of a significant bat commuting route)?



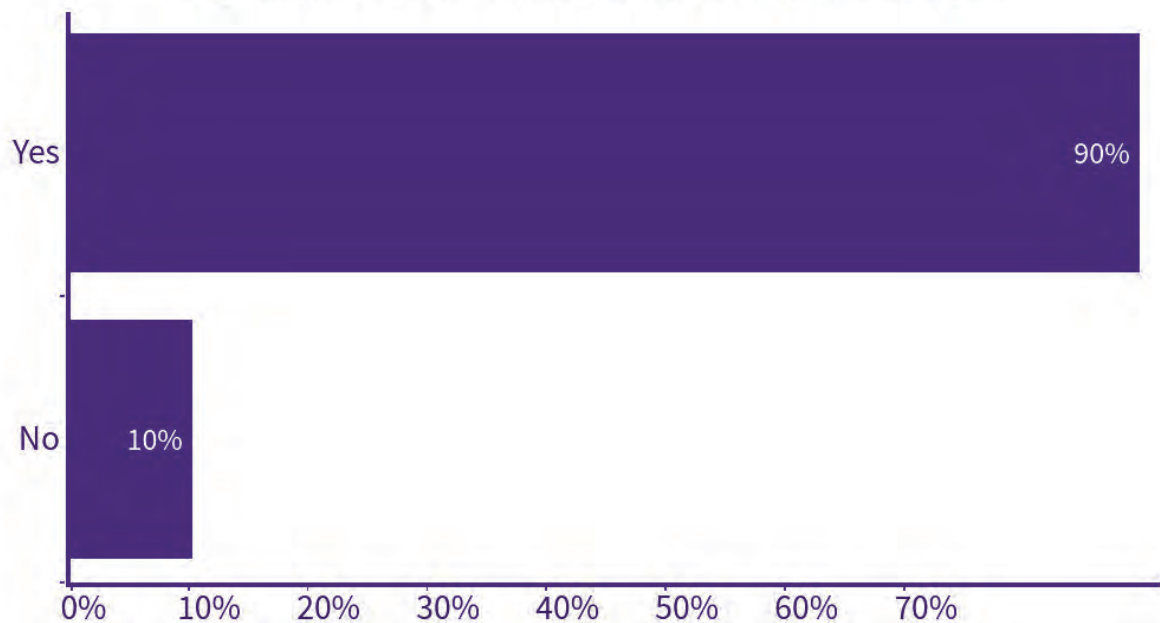
When poll is active, respond at [PollEv.com/joannafergus596](https://poll-ev.com/joannafergus596)



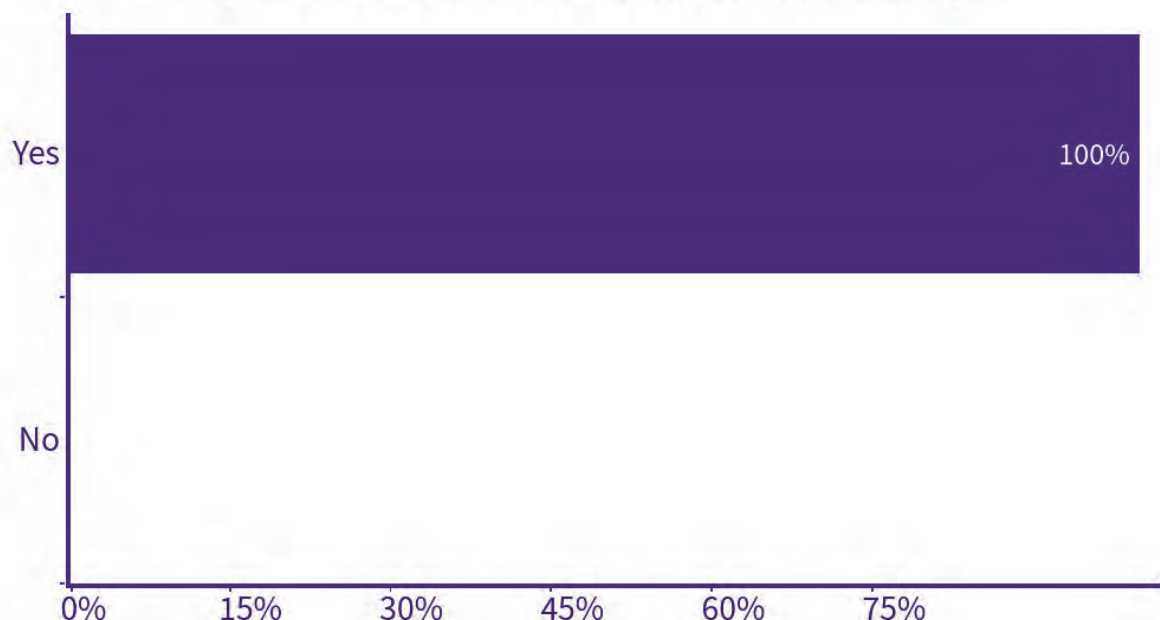
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An international perspective on bat mitigation

Would Europe-wide guidance on bat mitigation methods and monitoring be useful?When poll is active, respond at [PollEv.com/joannafergus596](https://poll-ev.com/joannafergus596)Text **JOANNAFERGUS596** to **020 3322 5822** once to join

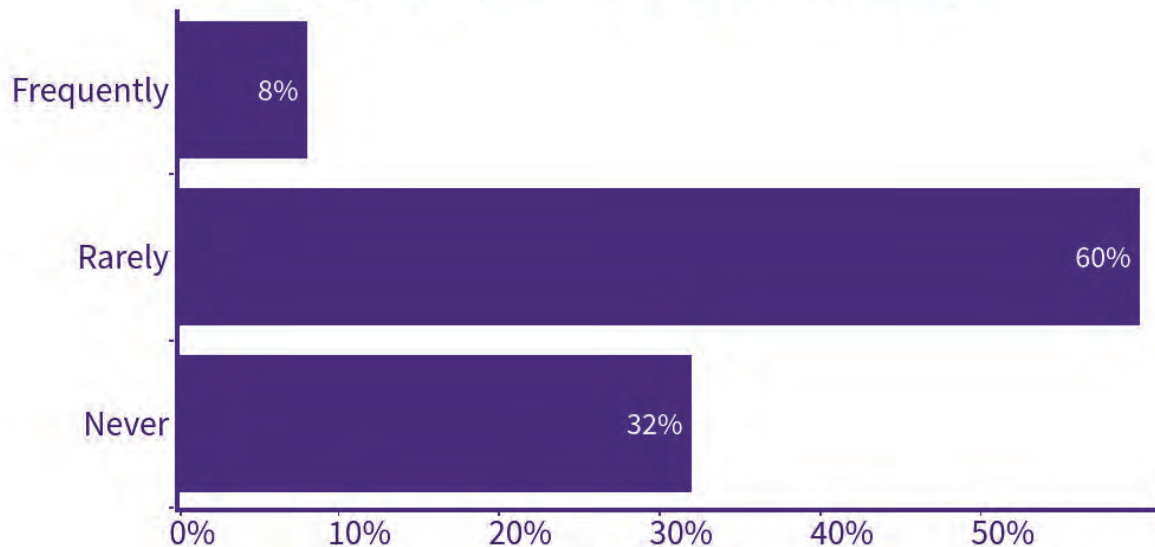
European Bat Box database

Would you contribute your data or encourage others to submit data to this kind of initiative?When poll is active, respond at [PollEv.com/joannafergus596](https://poll-ev.com/joannafergus596)Text **JOANNAFERGUS596** to **020 3322 5822** once to join

Bearing Witness for Wildlife: BCT's new investigations and mitigation project

In your experience, how often do licensing bodies chase up monitoring data in bat mitigation/compensation cases?

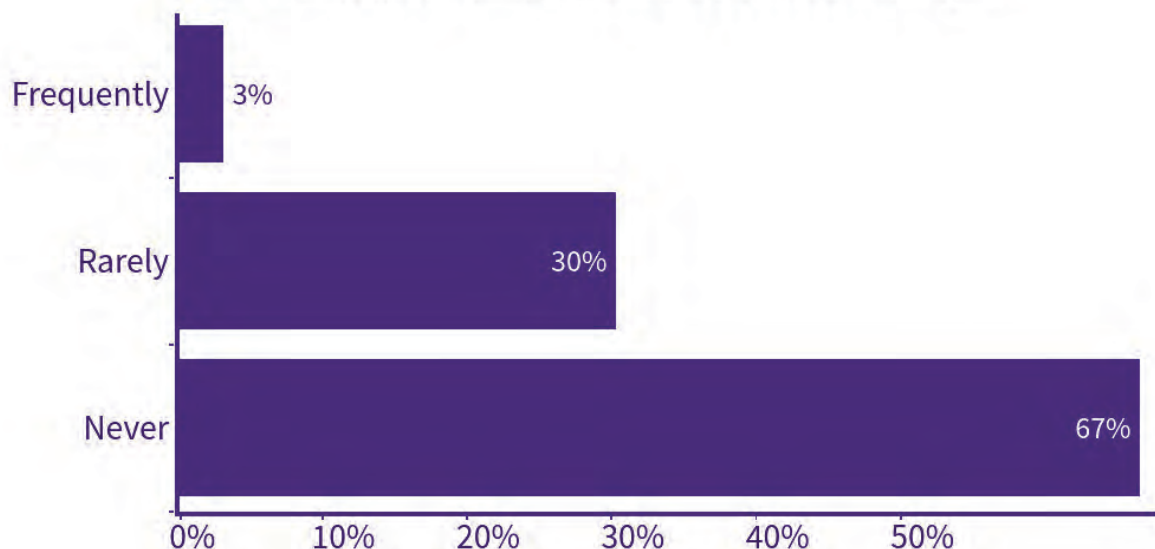
When poll is active, respond at [PollEv.com/joannafergus596](https://www.poll-ev.com/joannafergus596)
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CIEEM project to review of the evidence on mitigation strategies for bats

In your experience, how often do Local Planning Authority's chase up monitoring data in bat mitigation/compensation cases?

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TAKE HOME MESSAGE

What word best describes the main challenge we need to overcome to secure the best outcomes for bat conservation through mitigation methods?



When poll is active, respond at **PollEv.com/joannafergus596**



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distractions-from-polling



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