

Advanced surveys of bats in woodland:
How representative are results from three
nights of trapping?



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Woodland is a greatly diminished habitat

	Total Woodland ¹⁾	Broadleaved Woodland ¹⁾	Semi-natural Woodland ²⁾
Great Britain	14.7%	7.2%	3.0%
England	10.1%	7.4%	3.2%

¹⁾ Forestry Commission, 2020. Provisional Woodland Statistics

²⁾ U.K. National Ecosystem Assessment, 2011. Technical Report

All of it is highly fragmented

Development can adversely affect woodland habitats for bats in various ways:

- Reduction in extent of habitat
- Fragmentation
- Increase in artificial light
- Noise
- Increase in recreational use

Establishing the importance of a woodland site for bats – What do we need to know?

In an ideal world....

- Complete inventory of bat species using the site
- Including data from all seasons
- For each species:
 - Whether commuting, foraging or roosting
 - Some measure of abundance
 - Males, females or both?
 - Reproductive condition of females

In the real world:

(Where resources are limited !!)

- Obtain a sample from short surveys
- Extrapolate from the sample to build an approximate picture of the whole
- Trapping surveys can be used :
 - to establish which species use a site,
 - to catch bats for radio-tracking,
 - or for both
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- This talk will focus on
- 



3rd edition

Trapping surveys for commercial projects use an approach based on BCT's Good Practice Guidelines

Advanced licence bat survey techniques

9.1 Introduction

Being small, nocturnal and with many species being morphologically and acoustically similar, bats remain one of the most challenging groups of species to study for the purposes of determining impacts from development, especially when working to the deadlines often associated with a commercial project. While research on the ecology of some bat species is widely available, there are still significant gaps in the knowledge about the basic ecological requirements of many species. Radio tagging and tracking surveys are therefore powerful survey tools to obtain information on bats and bat populations potentially affected by a proposed development. However, radio tagging and tracking surveys do involve significant levels of risk to bats, and therefore these guidelines have been written to take account of Eurobats Resolution 4.6, which provides guidance on the capture and study of captured wild bats.⁴⁵

This chapter provides guidelines on using ALBST and principally concerns the trapping of free-flying bats and, where required and appropriate, the subsequent attachment of radio transmitters. The techniques covered in this chapter need to be specifically licensed by the relevant licensing authority.

Deciding to use ALBST is a process of balancing the data requirements to meet the objectives of the survey with the level of potential impact on bats or bat populations from using the technique. The decision-making processes should also fully consider the potential level of impacts from the proposed development (see Section 2.2). More detailed information gained from ALBST is likely on projects with greater impacts on 'difficult to survey' bat species such as tree-roosting or quiet-

calling species; more sensitive bat populations, such as Annex II bat species generally; SACs or SSSIs designated for bats; or in particular habitats such as woodland. However, it should be recognised that using such techniques also poses a risk to sensitive bat populations.

A point of principle is that where the required information can be obtained using non-invasive techniques, these should be used first. However, while non-invasive methods of surveying bats such as bat activity surveys have dramatically improved data gathering for development-related projects, such techniques have limitations. In particular, confidence in identifying bat species such as *Myotis* bats (unless species-specific behaviour has been observed, as is the case with Daubenton's bats flying close to the surface of water) is extremely difficult (Parsons and Jones, 2000; Walters *et al.*, 2012). In addition, quiet echolocating species (or those that do not call while foraging) often go under-recorded and non-invasive survey methods are generally unable to confirm the sex, age class or breeding status of individual bats, especially away from the roost.

If the potential impact of development activities is unlikely to significantly affect bats or their habitats, this should be reflected in the survey design and the use of ALBST is unlikely to be necessary. Equally, projects or developments (of any scale, from small barn conversions through to major road schemes) that are likely to have high direct or indirect impacts on bats (particularly for rarer or uncommon species or at the landscape level where impacts may affect multiple bat species and populations) will be required to have much more detailed data sets, potentially justifying the use of ALBST. Box 3 provides an example of the effective use of ALBST.

Box 3 Example of effective use of ALBST.

A series of trapping and simultaneous full-spectrum bat detector surveys were undertaken in the same woodland habitat over six months during the bat active period of 2014. In total, 82 bats were captured and approximately 3500 bat recordings were made over 17 survey nights. Only six bat detector recordings could be assigned to long-eared bats whereas 41% of the bat captures were of brown long-eared bat. Furthermore, three Bechstein's bats, two of which were from a nearby newly discovered breeding population, were captured. These results highlight the significant under-recording of species that listen rather than echolocate and where trapping is often the most effective tool to confirm their presence. Given the scale of the housing development proposals (over 5000 units), the potential impact on the woodland from the development (lighting and increased recreational use), as well as the possible presence of rare species in the general area, the use of ALBST was appropriate and provided information to inform the EIA that other techniques could not achieve.

⁴⁵ Found at http://www.eurobats.org/sites/default/files/documents/pdf/Meeting_of_Parties/MoP4_Res.6_Issue_of_Permit.pdf and states that 'radio-telemetry should only be used for well-organised and authorised projects where essential data cannot be acquired with less-intrusive methods'.

Approach used for trapping surveys

For each site:

- Conduct three surveys corresponding to pre-maternity, maternity and post-maternity seasons
- In each survey: set three harp traps (or mist nets) with acoustic lures
- Run traps from around sunset to 2 or 3 am, checking every 20-30 minutes
- Record species, sex, age-class and reproductive condition of all bats caught
- Release bats as soon as possible somewhere close to where they were caught

Approach used for trapping surveys

- This approach has been used successfully on a great variety of development projects
- It would be useful to have an indication of how representative the results of this approach are of the bat communities at the woodlands surveyed
- Results of individual surveys will be influenced by various uncontrolled variables: *weather, type of lure, calls played on lure, setting of traps, experience of surveyor etc.*
- But it should be possible to assess the extent to which additional survey effort can increase the diversity of bats recorded

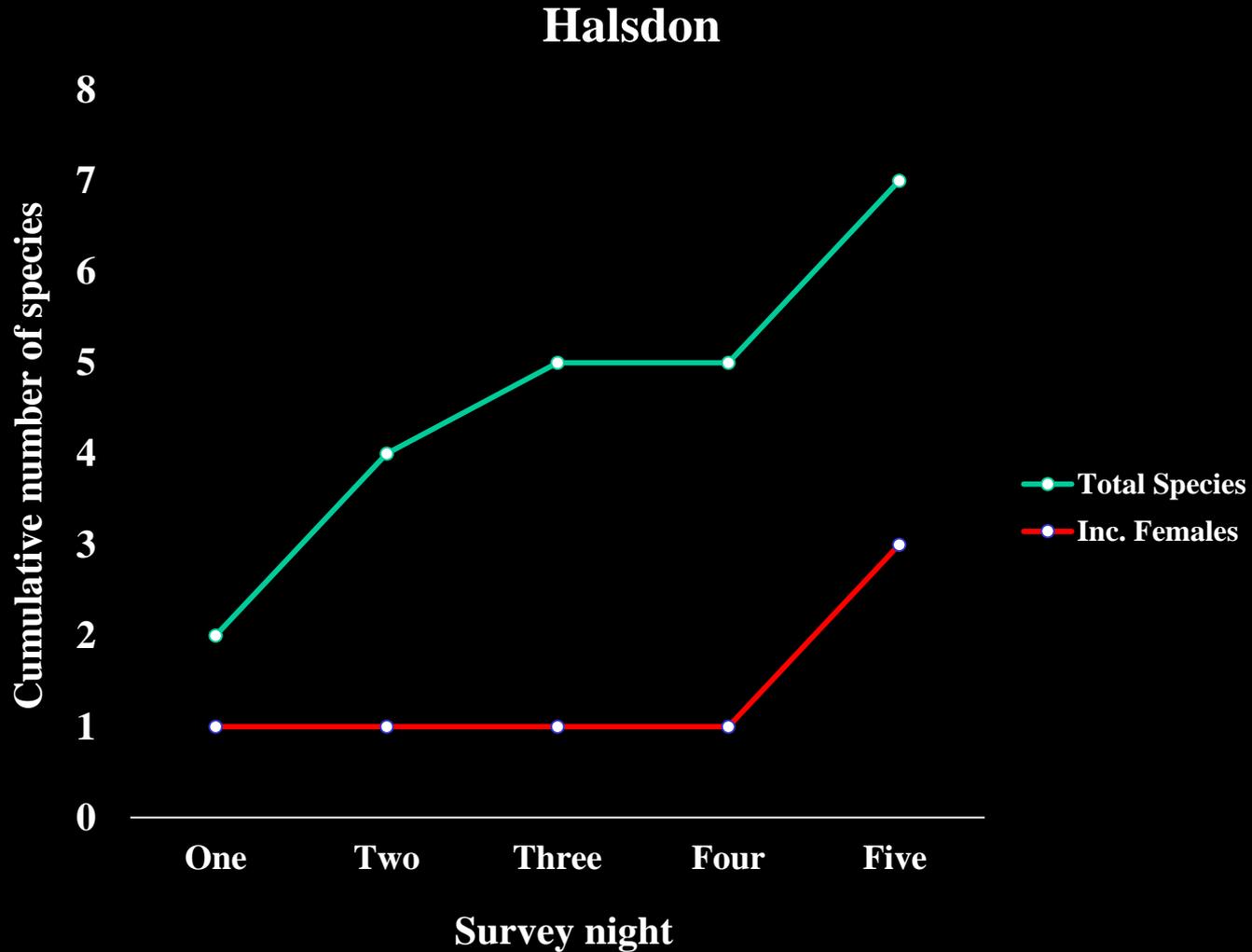
Preliminary data on the effects of increased survey effort

- Surveys at two Devon Wildlife Trust nature reserves: Halsdon Wood and Meeth Quarry
- Five nights of surveying at each (done as part of the Autobat optimisation experiment)
- Two sets of harp trap with an Autobat acoustic lure
- Ran traps for 3.5 hours about 20% of which was scheduled silence
- 8 different lure stimuli were played following a fixed order
- Caught bats every night and a range of different species at each site

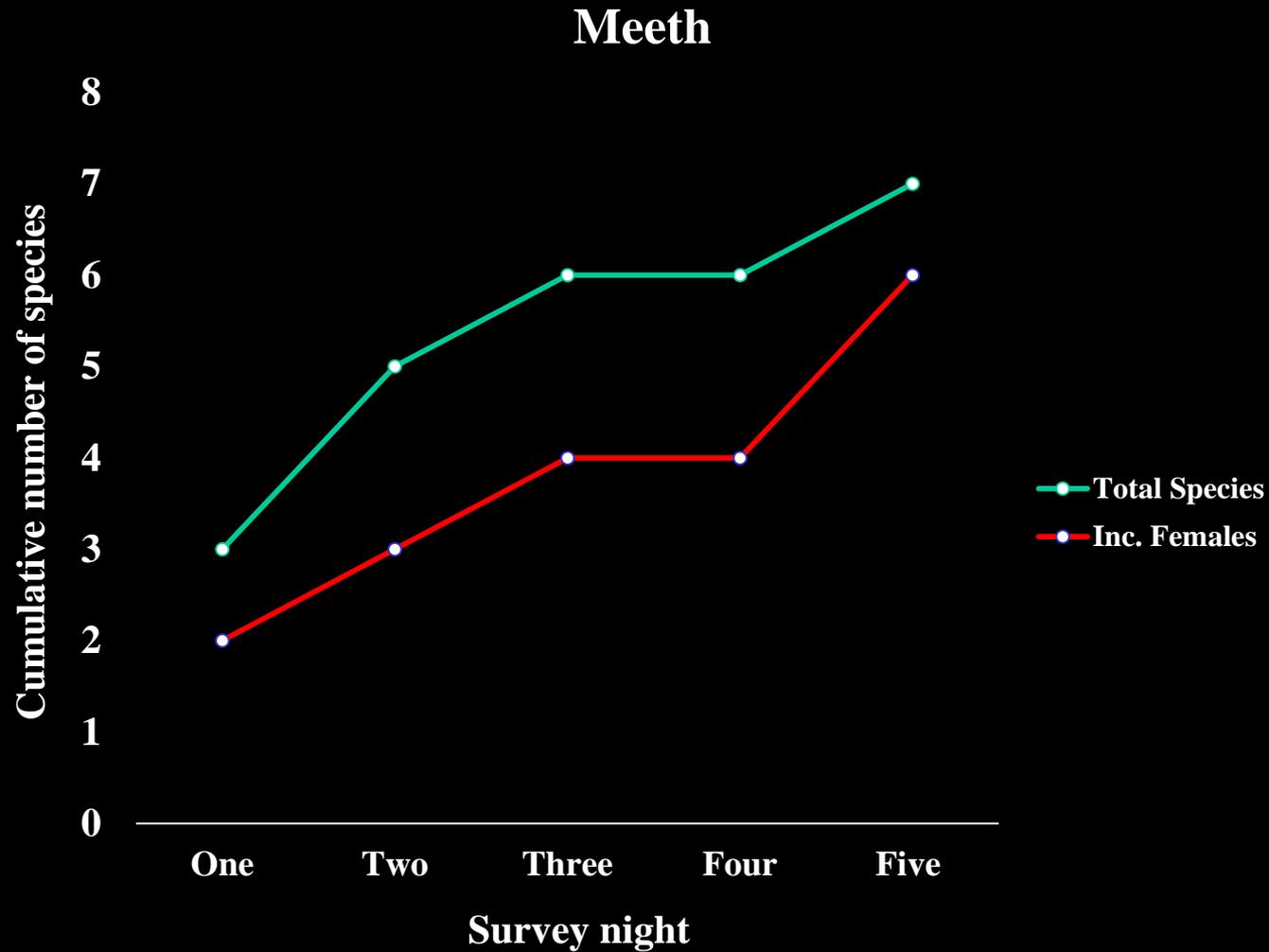
	HALSDON		MEETH QUARRY			
	Caught		Heard*	Caught		Heard*
Daubenton's	2	(2F)		1	(1F)	
Whiskered	2			2		
Whiskered/Brandt's				1	(1F)	
Natterer's	2			5	(4F)	
Noctule	1					YES
Common pipistrelle			YES	1		
Soprano pipistrelle	2			7	(1F)	
Brown long-eared	4	(2F)		8	(4F)	
Barbastelle	1	(1F)		2	(1F)	
Lesser horseshoe			YES			
Total bats caught	14			27		
Total species caught	7			7 (or 8)		
Total species recorded	9			8		

* Species that were heard but not caught

Effect of increased survey effort on number of bat species recorded



Effect of increased survey effort on number of bat species recorded



- My methods differed from the “standard” approach in several ways
- Nevertheless, for both sites an increase in survey effort resulted in:
 - a greater diversity of bat species recorded
 - more records of use by females
- There is a need to establish how representative a sample from 3 survey nights is likely to be

How could this be done?

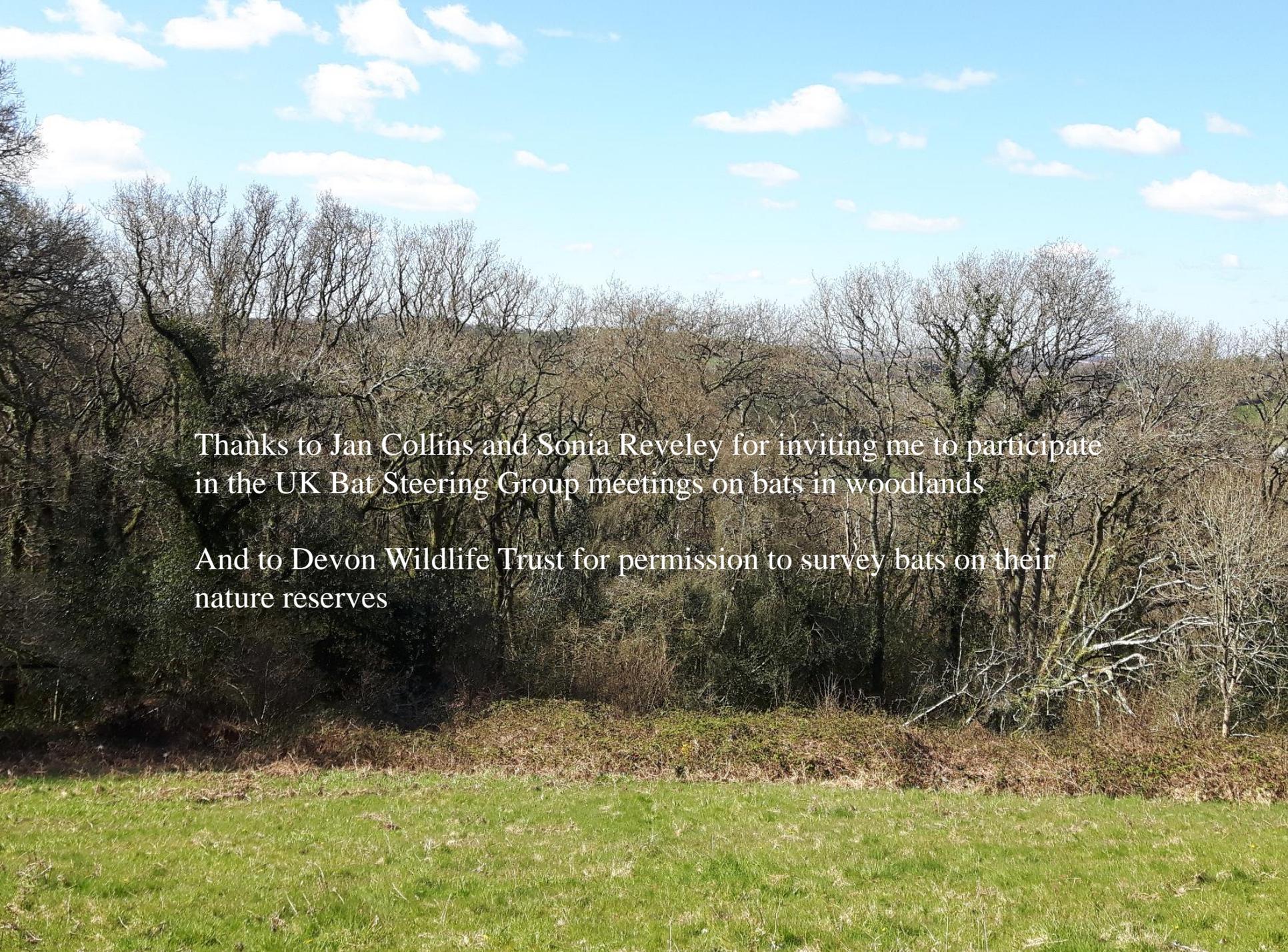
- Focus on woodland sites that have already been extensively surveyed, and for which there is likely to be a fairly comprehensive species list
- Survey these using the “standard” approach on three nights
 - For each site determine proportion of species present that have been recorded by the standard approach
 - Across the range of sites are any species repeatedly under-recorded?



- Some species, such as barbastelles and Bechstein's, may require specific siting of traps, or use of particular calls on the lures

Testing “good practice”

- Good practice guidelines are based on a combination of experience and common sense
- This is fine, but in most cases the recommended practices have not been tested in any systematic way
- **There is a need for research to assess the effectiveness of the recommended methods**
- This would show how representative a small sample (3 nights of survey) is likely to be of the actual bat diversity at a woodland site

A landscape photograph showing a dense woodland of bare trees in the background, with a grassy field in the foreground. The sky is blue with scattered white clouds. The text is overlaid in the center of the image.

Thanks to Jan Collins and Sonia Reveley for inviting me to participate
in the UK Bat Steering Group meetings on bats in woodlands

And to Devon Wildlife Trust for permission to survey bats on their
nature reserves