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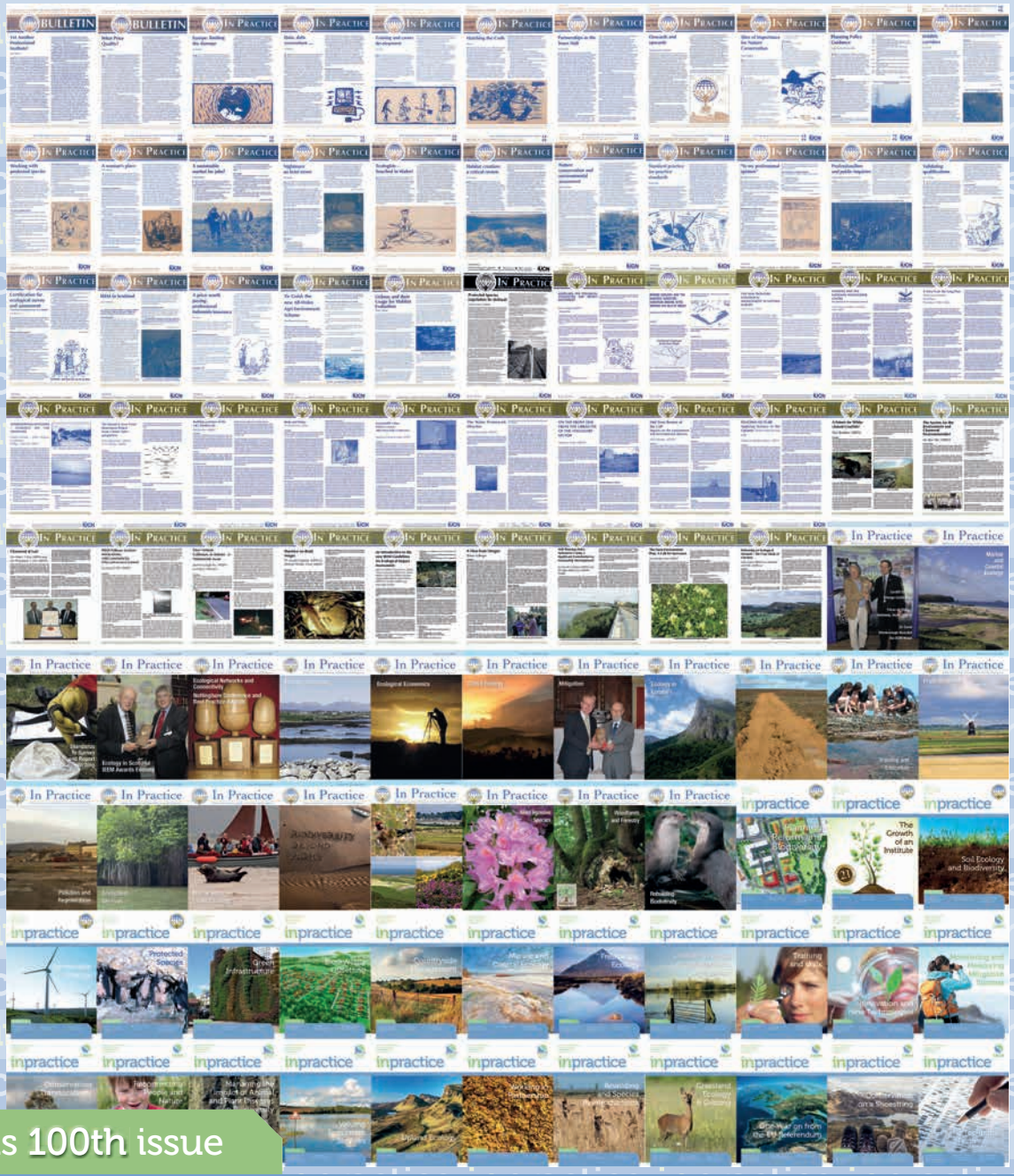

In this 100th issue

Do We Need More Evidence-Based Survey Guidance?

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As ecologists and environmental managers, we rely on good quality baseline information. However, the survey methods we currently employ are often unsupported by scientific testing and are not proven to provide high quality outputs. As a community of practitioners, we should seek to change this, taking on board new research and technological developments – and building more evidence explicitly into our survey guidance.

Introduction

As ecologists and environmental managers, the data we gather through survey and monitoring programmes is vitally important in all aspects of our work. It allows us to predict impacts with some level of confidence, track and anticipate trends in biodiversity, and assess whether our management interventions are working – or not. To generate good quality data though, we need good quality survey methods, which are developed, reviewed and updated in line with existing evidence, new scientific findings and technological developments (Figure 1).

Figure 1. GPS-enabled tablets allow accurate field recording, with forms that can be customised to different types of survey or sites, to allow standardised data collection. Photo credit Carlos Abrahams.

To an extent, we already have reasonable survey methods, which have provided much useful information in national monitoring programmes or in site-based assessments. We are lucky in the UK to have a well-developed history of voluntary and professional work in the conservation sector, and long established standards for surveying flora and fauna. However, if we consider the age of some extant survey guidance (such as the *Great Crested Newt Mitigation Guidelines,* English Nature 2001), against the pace of research and technological change, the need for ongoing updates becomes clear.

We all have a responsibility to ensure that our survey methods are fit for purpose. Both BS:42020 (BSI 2013) and the CIEEM *Code of Professional Conduct* require that methods used to undertake surveys should follow published good practice guidelines where they exist. However, if published guidance is out of date and/or better techniques have been developed, then we should take new innovative approaches where these could provide a better outcome. To make this type of judgment call we should be basing our decisions on *evidence* of what actually works best for our particular needs. However, in the first instance, how much of our established

Big Ideas: Do We Need More Evidence-Based Survey Guidance? (contd)

and published good practice guidance is based on evidence? How frequently has testing of methods been undertaken, allowing comparisons between different survey approaches? And how many of our methods have been developed for site-based assessments by professionals, rather than for national monitoring by citizen scientists? For example, why do we still apply the *Great Crested Newt Mitigation Guidelines* recommendation of four visits for presence/absence surveys and six for population size class assessment (English Nature 2001) when recent publications (Kropfli *et al*. 2010, Sewell *et al*. 2013) state that up to six visits may be required to accurately record presence/absence at some ponds, and seven to eight surveys are needed to consistently gauge population numbers (although the population size class can probably be determined at the majority of sites from only four visits, Wynn 2013)?

CIEEM and its contributing members have done a very useful job in recent years of compiling the *Sources of Survey Methods*, and following this up with *A Guide to Good Practice Guidance*, as highlighted by Sally Hayns in the December 2017 issue of *In Practice* (Hayns 2017). Both resources list a wide range of references, which form the canon of our professional practice as ecologists. In January 2016, CIEEM also produced the excellent *Principles of Preparing Good Guidance for Ecologists and Environmental Managers*. This states at PRINCIPLE IV that good guidance should be explicitly based on good evidence:

> *'All guidance should be evidence-based and should reference original sources, where available, that illustrate that the techniques recommended are appropriate…… Where guidance is based on existing good practice, but the scientific evidence supporting it is limited, this should be stated and there should be sufficient flexibility in the guidance to allow for individuals to innovate. Scientific testing, e.g. comparative studies of different techniques, is strongly recommended where new approaches are suggested and the results should be published widely.'*

This principle sets out an aspiration for our survey guidance that is not being regularly met in our current documentation. Any review of guidance drawn from a range of sources will show that the reasons being put forward for specific recommendations are often not clear or appropriately justified even though the actual methods may be set out in great detail. This omission is well demonstrated in some of our most commonly used publications.

Survey Methods

Bats: The Bat Conservation Trust's (BCT) *Bat Surveys for Professional Ecologists* (Collins 2016) is one of the best pieces of guidance that we have available, and has been repeatedly updated to its current third edition. However, some areas remain that could benefit from increased explanation and by reference to the scientific literature.

When conducting bat surveys, a critical first step in determining the level of survey effort to be employed at a site is a habitat quality assessment into low, medium or high categories. This translates into the number of surveys that should be undertaken, with 1-3 emergence surveys, or 3-12 transects being recommended. Although the guidance for this habitat assessment process has been improved in the third edition, it is still limited and qualitative, with no obvious basis in evidence. Furthermore, why does the guidance recommend one visit to low-potential roost features and three visits to high-potential features – and why this way round? Has this approach been tested to determine whether it will provide accurate information about roost presence or absence? If so, it would be very useful to see the underlying evidence. The inclusion of background research would serve to increase confidence in the method and would reassure bat surveyors that the recommendations will provide sound and valid data. However, the broad rules of thumb put forward as 'good practice' in the BCT guidance don't appear to be based on scientific studies that determine how much survey is appropriate, or how survey effort should be programmed through the season. Research that has carried out method testing should be incorporated into guidance, and could help to improve the protocols for assessing building roosts (Underhill-Day 2017), inform the levels of survey effort needed to detect common or rare species at sampling locations (Skalak *et al*. 2012), and identify which type of bat detector we should be using to capture call data (Figure 2) (Adams *et al*. 2012).

Birds: There are a number of recognised survey methods for birds, depending on the habitats and taxa being targeted (Gilbert *et al*. 1998). However, many of these are designed for national survey programmes by volunteers, rather than being optimised for the needs of smaller-scale site assessments, such as EcIA studies. A notable exception is the windfarm survey guidance produced by the statutory authorities, e.g. Scottish Natural Heritage (2014). For breeding bird studies, the majority of consultants will probably use a territory mapping approach, based on Common Birds Census (Marchant

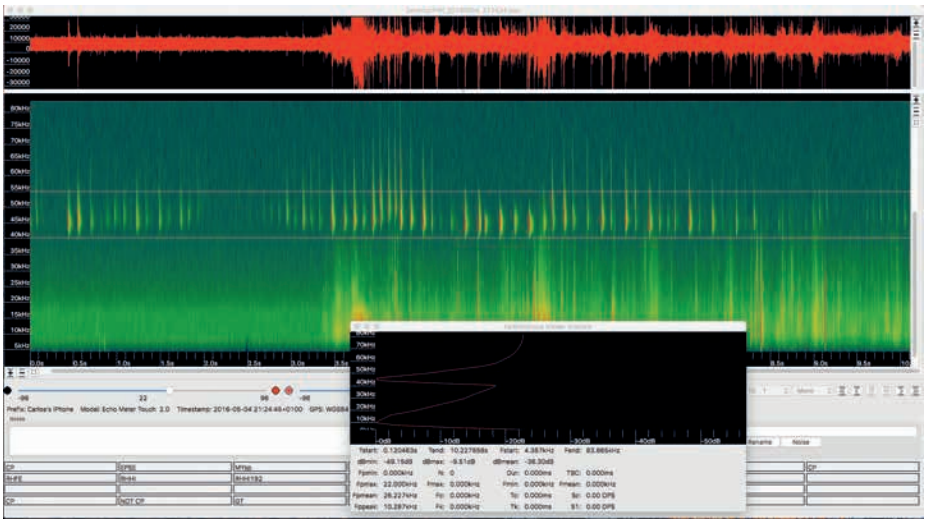

Figure 2. Full-spectrum audio recording allows high quality acoustic data to be collected from vocal species groups, such as bats and birds. Photo credit Carlos Abrahams.

Figure 3. The use of bioacoustics is common practice for bat surveyors, but could be used effectively by ecologists studying other groups of species. Here an acoustic recorder is deployed to record capercaillie *Tetrao urogallus* in north-east Scotland. Photo credit Carlos Abrahams.

Figure 4. The use of artificial cover objects (ACO) has long been the mainstay of reptile surveys. In the absence of rigorous scientific testing, there are still disagreements over the number, material and colour of ACOs that should be used. Photo credit Carlos Abrahams.

1983). This method is useful for providing detailed information on the distribution of bird territories, but is time-consuming, and difficult to apply and interpret. As there is no set number of site visits for this method when used by consultants, the number of surveys carried out within EcIA studies is often determined by the consultant's qualitative assessment of the site or their own established practice. The appropriate level of survey effort required to accurately assess the composition and species-richness of a bird assemblage in a particular location has not been determined in many cases (Calladine *et al*. 2009). In addition, territory mapping may not even be the best option for EcIA purposes: point counts, line transects or bioacoustic recording might provide equal or better quality data, and probably with less survey effort (Figure 3) (Abrahams and Denny 2018; Gregory *et al*. 2004).

Reptiles: Our current reptile survey guidance consists principally of Froglife's (1999) *'Advice Sheet 10: Reptile Surveys'*. There was an attempt to update this with Natural England's (2011) *Mitigation Guidelines (TIN102)*, which were rapidly withdrawn, and the more recent survey protocols from Sewell *et al*. (2013), which incorporated seasonal variations in detectability by species. This latter document was perhaps the first major advance in our approach to reptile survey in the past two decades, but remains unknown to many practising ecologists. The lack of scientific support for established methods and the need for improved approaches was recently highlighted in a review of reptile monitoring programmes (Nash 2018), which showed that new evidence is available to support the revision of survey protocols (Figure 4).

Using Evidence

We need to use science more to tell us the answers to two important questions: (i) which survey methods are best – or at least 'good', and (ii) how much survey effort is needed to generate a sound understanding of a study area? If we want to develop robust and accurate ecological baselines for Environmental Impact Assessments (and other purposes), then we should make sure that our methods are up to the job. It may be that the methods we currently employ are just fine, and incorporating referenced research into our existing guidance would allow us to demonstrate this. If so, we have no need for concern. However, if the methods we use have no demonstrable scientific basis then we need to recognise this as an industry and develop new protocols over time to promote the best practicable methods for data collection, clearly based on evidence. After all, this is the absolute bedrock of our day-to-day work, on which we base assessments, make recommendations and stake our reputations. How can we not take a more evidence-based approach to survey?

Creating survey guidance is a hard and thankless task. Building the content, gaining agreement from a range of professionals with their own views and experiences, and then getting organisations to approve the finished article will never be easy. Griffiths *et al*. (2015) note that *'The uptake of new methods by professional practice will..... be strongly influenced by cost, practicality and the explicit requirements of regulatory authorities'*. However, there is always room for developments in practice where these are supported by good argument and good evidence, so each of us as individuals – and as a community of practitioners – are free to pave new ways where they are needed. One could (correctly) argue that professional judgment should be applied by all ecologists when designing their surveys, and we should all be prepared and able to go beyond standard survey guidance. However, we don't always have time to keep up to date with technical developments in all the fields in which we might work. Accessing information on methodological advances can be difficult in itself, especially for those who aren't fortunate enough to have access to the scientific literature.

To help develop a better scientific context for our published guidance, there are a number of ways forward. Firstly, any new guidance that is produced should explicitly state the evidence on which it is based,

and provide appropriate references. Or, if it is only based on best-guess rules-of-thumb, this should be stated clearly. Secondly, consultants, consultees and regulators should all take a more flexible approach to survey methods, and concentrate more on the quality (and meaning) of outputs rather than whether standard protocol has been slavishly followed. Most importantly though, we would make a call for a 'Survey Evidence' initiative for ecologists, along similar lines to Conservation Evidence (www.conservationevidence.com). This would gather, assess and disseminate research findings to allow optimal survey and monitoring recommendations to be developed. This could be done within an organisational setting, or perhaps better, in a crowd-sourced, Wikipedia-style, online forum to which anyone interested could contribute. Such an approach would allow new research findings to be added regularly, allowing constant ongoing development of scientifically supported survey methods and technological innovations – and rapid communication of these across the sector, instead of waiting for irregular approval by a formal authority. It would be independent, authoritative and available to all, demonstrating good practice for our work and enabling us to make better, informed decisions on how we gather data. It would require us to examine our established, and often outdated, methods. In the end, it would raise the questions we should all be asking ourselves. Is our good practice guidance actually proven to be good enough? And if not, how can we all make it better?

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