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# In Practice

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## Rebuilding Biodiversity

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# Editorial

## Rebuilding Biodiversity: An Iconoclastic View

At the beginning of November we enjoyed an interesting conference in Liverpool on the theme of 'Rebuilding Biodiversity'. There was a smorgasbord of presentations, although I am not sure that all of the presentations were about rebuilding biodiversity, they illustrated a range of concerns around biodiversity.

The meeting left me evermore convinced that when we talk about biodiversity we are not all talking about the same thing. So if we are confused, then we pass on that confusion to policy-makers. The CBD definition of biodiversity covers everything from genes to ecosystems in hierarchical communion; yet often when we talk about biodiversity we appear to be talking only about species! Biodiversity was a great concept when it was coined in 1986 but perhaps it is now becoming more difficult to maintain its utility. A meeting I was at just after Liverpool had a senior government adviser talking about 'bird biodiversity' – he meant birds, nothing more, nothing less! So as IEEM is a key part of the 'biodiversity' community this is something that we need to keep thinking about and working on.

The issue of language is important. At Liverpool we heard mention of 'natural capital' a couple of times and numerous references to 'ecosystem services'. Now I don't think that economists know what they are doing, but perhaps we don't always either. So how far should we go in linking ecology and economics, since both derive from the same Greek word οἰκοσ? I think the answer is we must link up and continue the conversations started as a result of the TEEB report, but we need to be careful.

But is biodiversity an ecosystem service, as was mentioned several times? As it's the fabric of delivering those services, I don't think so – so there is much woolly thinking abroad! 'Nature conservation' is also a term that we have stopped using but we should really use it more. It is actually a very good term, partly because it is fuzzy and our move to using (apparently) more precise terms has caused difficulties and confusion. I am still not sure what is meant by 'wildlife', except perhaps an angry ferret!

The different country agencies' presentations to the conference each had a slightly different emphasis – demonstrating the organisational diversity within the UK. That organisational diversity is great, but we do need to make sure that these differences of opinion and activity do join across the edges - a role that JNCC especially plays - but all of us, IEEM, practitioners, academics, NGOs, have a role to ensure that we really are joined up.

I am not convinced that the world will achieve the CBD 2020 targets, and the fact that the audience to a person were not hopeful about that either was salutary. So where should we put the effort in trying to achieve 'no net loss'? Coupling this with climate change gives us a lot to think about, and rebuilding biodiversity has to be, as one speaker said, "another arrow in our quiver". There is not enough space or time to do the things that we want to do; and so we have to invoke triage. Which means making serious choices about where we put the limited resources we collectively have to conserve, or help understand, biodiversity. One talk showed that even if we think we have 'saved' a species we may lose important genetic components; and that is almost the same as losing the species. There are thus many conundrums in the choices confronting us.

And what about protected areas? In the 1960s they were set up to protect areas *from* human activities, but now perhaps they should seen as places for biodiversity to flourish, change and adapt. The *Making Space for Nature* report proposed the mantra '*more, bigger, better, joined*', but is this really what we need? I am not convinced. I think these three words: *'better, managed, joined'* are actually key. If we can achieve 'better' and 'managed' with 'joined', then we can really contribute to rebuilding biodiversity in our lands and seas.

*Peter Bridgewater CEnv FIEEM*
*Chair, Joint Nature Conservation Committee*

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Cover image: The Eurasian otter *Lutra lutra* underwent large declines in the UK in the 1950s and 1960s but is now beginning to consolidate and expand its range again.

Photography: Scottish Natural Heritage

Artwork on the cover will normally illustrate an article in, or the theme of, the current issue. The Editor would be pleased to consider any such material from authors.

# Floodplain Meadows in Great Britain

## Building the Evidence Base for Restoration

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**Floodplain meadows are a rare and threatened habitat. Their distribution is currently disparate, but appropriate restoration could deliver much more contiguous systems. Current nature conservation policy aims to expand the extent and connectivity of high-value habitats through landscape-scale restoration and re-creation. As part of this policy, the restoration and re-creation of floodplain meadows is considered a high priority.**

The meadows are one of the most species-rich, agriculturally productive and sustainable semi-natural habitats. However, the management of existing sites and the creation of new ones can be challenging. This article examines the current threats and management challenges, and suggests ways of helping to improve the chances of restoration success by pre-project planning, data collection and post-project monitoring.

## Introduction

Floodplain meadows are generally species-rich habitats found adjacent to rivers and streams. The typical plant community is the rare MG4 *Alopecurus pratensis – Sanguisorba officinalis* grassland (Rodwell 1992), although other related communities, such as MG8 (*Cynosurus cristatus-Caltha palustris* water meadow) and MG7C (*Lolium perenne – Alopecurus pratensis – Festuca pratensis* grassland) often coexist with it. Typical species are meadow foxtail *Alopecurus pratensis* and great burnet *Sanguisorba officinalis*, along with a wide range of grasses (up to 18 different species on a single site). They can contain as many as 40 plant species within a 1 $m^2$ quadrat, making them one of the richest plant communities in the UK.

There have been a number of estimates of the total remaining UK resource ranging from 1,000 to 1,500 ha (Jefferson and Pinches 2009). Sites are found predominantly in the floodplains of the large lowland rivers in central, southern and eastern Britain.

During the 20th century, the floodplain meadow community was almost eliminated through agricultural intensification, urban development and mineral extraction (Gowing *et al.* 2004). Remaining sites are now mostly designated, but may still be at risk from adverse impacts including management changes.

These plant communities have arisen as a result of the hay meadow management regime, with hay cut in midsummer followed by aftermath grazing, often continuous for many hundreds of years. Many key species are intolerant of grazing during the spring and early summer, but seem to benefit from grazing in autumn and early winter. The historical pattern of cutting hay in strips and communal grazing is still in practise on a few sites today (see for example Brian 1993), and therefore the sites are of great cultural interest. Archive data available for some sites can tell us a great deal about how meadows became so species-rich and the patterns of rural life over centuries.

## Current Targets and Policy Objectives

The MG4 community is protected by European law as an Annex 1 habitat under the European Habitats Directive and five sites have been designated as Special Areas of Conservation (SAC). In addition, many are Sites of Special Scientific Interest (SSSI) or County Wildlife Sites (Jefferson and Pinches 2009). They fall under the Lowland Meadows priority habitat within the UK Biodiversity Action Plan (BAP) and are often not regarded as wetlands at all, even though they are dependent on a specific hydrological regime.

Around 70% by area of the MG4 SSSI sites in England are in favourable condition (see Jefferson *et al.* 2009). However, a survey of 100 lowland meadows outside SSSIs revealed that 88% were unfavourable (Hewins *et al.* 2005). Therefore, appropriate management of existing sites as well as restoration is a priority to ensure that a network of biodiversity 'hotspots' are conserved, to retain habitats for insects and to provide sources of seed for restoration programmes.

Recent new legislation and strategy is clear about the need to deliver landscape-scale habitat management, restoration and ecosystem services. The Lawton Review *Making Space for Nature* (2010), The Natural Environment White Paper (2011) and the England Biodiversity Strategy (2011) all have, at their core, objectives to maintain and restore priority habitats and to ensure ecosystems are functioning effectively to provide ecosystem services. The restoration of functioning floodplain meadows is also key to achieving the objectives of the Water Framework Directive and its requirement for good ecological status.

As a priority habitat, floodplain meadows offer potential for restoration, offering a sustainable farming system that delivers flood management, carbon storage, habitat for pollinators, nutrient cycling and great potential for human recreation and involvement.

Higher Level Stewardship (HLS) is currently the main delivery mechanism for restoration, and there are capital payments for the purchase of seed or green hay.

## Floodplain Meadows Partnership - Background, Aims and Objectives

Academic research carried out over many years has now been drawn together by the Floodplain Meadows Partnership (FMP), hosted by the Open University, resulting in an extensive

***Image 1. A species-rich floodplain meadow***
***Photo: Mike Dodd***

dataset of botanical, hydrological, edaphic and management data about the MG4 community. Long-term monitoring plots are in place on each of the five SAC sites (Lower Derwent Valley, Yorks; Oxford Meadows, Oxon; Mottey Meadows, Staffs; North Meadow and Clattinger Farm, Wilts; and Portholme Meadow, Cambs). Data have also been collected on many other MG4 meadows. Botanical data are always collected in 1 x 1 $m^2$ quadrats. The resultant 'Meadows Database' contains >17,000 botanical samples from 68 sites, including full NVC surveys of 40 sites (of a total of 168 known sites, including MG8 localities). There are hydrological data from more than 25 sites, and data from over 600 soil samples.

Some of the botanical plots have been monitored continuously for 15 years. Hydrological data from North Meadow (Wiltshire) has been recorded for over 30 years. This has enabled a detailed understanding of how the grassland community responds to hydrological events, and knowledge continues to develop, with the FMP supporting five PhD students working on aspects of the ecology and management of floodplain meadows.

The FMP was established in 2007 through grants from the Garfield Weston and Esmée Fairbairn Foundations, and over the first four years has enabled a programme of long-term monitoring to become established, new sites to be investigated, and the production of a range of information made available (leaflets, website, conference, site visits, workshops and guided walks). The project aims to help interpret others' data against this long-term dataset in order to give some context to local sites, and has been working on defining subcommunity types for MG4. The project has received grants from the Esmée Fairbairn Foundation and the 29th May 1961 Charitable Trust to support its second phase (2011-2013) which will focus on monitoring restoration projects and ultimately on the production of a technical handbook.

## Meadow Restoration

Floodplain areas near existing species-rich sites are the best places to restore. These have a local source of seed or green hay, and are also likely to be in a suitable hydrological regime for the community. The web map (http://www.floodplainmeadows.org.uk/content/meadows ) shows current sites for both MG4 and some MG8 and local environmental record centres may also hold relevant data.

Additionally, archival research could identify where meadows were. Tracing land ownership patterns through old Ordnance Survey maps, tithe maps and others and interpretation of place names (Ings, marsh, mead *etc.*), will all help to indicate previous land use. A more detailed description of where to search in the archives, along with some historic case studies can be found at http://www.floodplainmeadows.org.uk/files/floodplain/FPMP%20Unearthing%20the%20past.pdf.

The MG4 community requires specific soil properties, nutrient availability, and hydrological conditions, so alongside historic data, current information should also be collected about the site.

## Pre-Project Data Collection: What, Why and How?

### Soils: The Importance of Good Structure

MG4 is typically found on fine-textured, but highly structured soils. Good structure makes soils permeable to both water and oxygen, two critical requirements for plant roots. Poor structure will not enable the range of plant species to survive. Waterlogged, anoxic soils will eliminate species not adapted to such conditions. If the soil is compacted it is unlikely to have the drainage characteristics to support the MG4 community. So it is of paramount importance before entering into a restoration project, to know the soil structure.

A soil auger can be used to give a 'rough and ready' assessment of the soil texture and profile. Additionally, working out the area's typical soil-moisture deficit from meteorological data (that is the amount of water needed to bring the soil moisture content back to field capacity, which is the amount of water a soil can hold against gravity) will indicate how reliant the site might be on an external water supply.

Soil structure can be assessed by digging a pit, or by the removal of small undisturbed cores to determine porosity of the upper soil layer, which is less invasive. Laboratory equipment is needed to describe porosity, but any local soil laboratory should have this facility.

### Hydrological Requirements

The MG4 community typically occurs on sites underlain by river-terrace deposits of sand or gravel. Rapid drainage of the surface water **and** a reliable supply of soil moisture are required at particular times of year. A good soil structure can help provide these factors, and the presence of sands or gravels to supply water during the summer months by sub-irrigation and facilitate sub-surface drainage in winter are also helpful. The community needs an aerated root zone during the growing season, but an adequate water supply in early summer to prevent water limiting growth.

Over many hundreds of years, farmers have maintained floodplain meadows by ensuring sufficient drainage during the growing season. Drainage infrastructure is typically composed of small 'foot drains' connecting to deeper ditches, which then join the main river downstream. These features are not designed to drain the soil profile, but merely to prevent soil anoxia in the root zone by allowing surface water to be removed quickly.

Flooding can be critical for delivery of nutrients to the system and it may be this requirement that restricts the MG4 community to floodplains. However, summer floods can have a devastating effect on the plant community where it leads to oxygen deprivation (Gowing *et al.* 2002).

The hydrology of a site is influenced by a range of factors including soil structure, local geology, meteorology and existing drainage infrastructure. It is clear that whilst the community is part of a suite of wetland communities, it is often reliant on 'water management' to ensure appropriate hydrological conditions for it to thrive.

Therefore, assessment of the existing hydrological regime of a potential site is essential. If the site becomes too dry in summer or too wet in spring, the target community may not be sustainable and the seed source could be wasted. The installation of simple soil dipwells (see http://www.floodplainmeadows.org.uk/files/floodplain/HydrologicalMonitoringProtocolFinal.pdf) should give sufficient information to decide whether the water regime is suitable. Ideally, this should be collected over five years to give a long-term picture. It is possible to get an indication of the long-term regime from a single year by taking account of the rainfall pattern during the period monitoring was undertaken and correcting it in line with the long-term rainfall rate (available from the Met Office). The advice of a hydrologist may be helpful in this context.

The FMP can provide a spreadsheet that allows soil water monitoring data to be entered. This will then inform the user if the hydrological regime is suitable for the establishment of MG4 grassland.

It is also possible to obtain an initial idea of soil-water level suitability through soil augering (above) and vegetation analysis (below). Any available data on historic land-use or from past surveys may help to provide an understanding of what species the site is capable of supporting. However, beware that conditions on the site may have changed (dereliction of drainage infrastructure may have altered flooding and soil-water regimes, for example).

## Nutrients

Floodplain meadows represent a productive system because regular flooding provides an input of phosphorus and other minerals, replacing those removed in the hay crop. Before the introduction of artificial fertilisers, these meadows were the most valuable of all agricultural land types and their productivity was sometimes supplemented by the addition of manure if the floods failed. The addition of nutrients in some form is essential to maintain the community from both agricultural and biodiversity perspectives. The 'Hay Cycle' shows how the basic nutrient and hydrology cycle operates on floodplain meadows (http://www.floodplainmeadows.org.uk/content/hay-cutting-and-grazing).

***Image 2. Snake's head fritillairy* Fritillaria meleagris**
***Photo: Mike Dodd***

Understanding the cycle of nutrients in floodplain meadows is a very important factor in understanding how the plant community can be modified to meet biodiversity objectives. For example, regular late cutting may result in a decline in species richness as nutrients are not being removed from the system as they would be when the hay is cut at its maximum nutrient value (usually late June). There is more information about cutting times on floodplain meadows at http://www.floodplainmeadows.org.uk/files/floodplain/Cutting%20Article.pdf.

Available phosphorus, measured using Olsen's P method, in soils supporting MG4 is normally 5-15 mg/kg of dry soil (P index 0 or 1). P index 2 (16-25 mg/kg) and 3 (26-45 mg/kg) have been less strongly associated with the community and are less likely to provide the right conditions for restoration. However, even at higher levels, there may be scope to reduce the amount of phosphorus in the soil over time so it may still be worth considering.

The Meadows Database holds 600 floodplain meadow soil samples from 33 sites across the UK and the FMP is currently enabling a PhD student to assess the availability of soil nutrients as a determinant of plant community composition in floodplain meadows. Updates on this project (and other PhD studies in the team) are made available through the newsletter and website.

Soil nutrient status can be analysed by collecting samples using a soil corer and undertaking analysis in a lab (using Olsen's P method for assessing available phosphorus).

## pH

The pH of most sites is close to 6.0 and is maintained by the delivery of base-rich silt to the floodplain through overland flooding. Alternatively, where there is a base-rich groundwater supply, the site may not need an alternative overland flood to get the basic cations ($Ca^{2+}$, $Mg^{2+}$, $K^{+}$) required to maintain surface pH. Laboratory analysis will also tell you the pH of the soil.

## Floristic Composition

On sites that are currently species poor, existing plant communities and component species are good indicators of the soil-water regime, soil structure and nutrient status. Species such as meadowsweet *Filipendula ulmaria* and meadow foxtail *Alopecurus pratensis* if found together would indicate that soil water levels are appropriate for floodplain meadow restoration. Species such as marsh foxtail *Alopecurus geniculatus* and cocksfoot *Dactylis glomerata* indicate that the site might be too wet or too dry respectively; while species such as perennial rye-grass *Lolium perenne*, thistles *Cirsium* spp. and docks *Rumex* spp. indicate the soil may be too fertile.

The Field Studies Council (FSC) *Guide to Floodplain Meadows* distils some of this information into an accessible format. Alternatively, further information on the hydrological requirements of individual species and the research behind the FSC guide is available at http://www.floodplainmeadows.org.uk/content/research-papers-and-documents.

***Image 3. Hilary Wallace, the Partnership botanist, helping staff from the Herefordshire Nature Trust set up a repeatable fixed point monitoring transect that they can carry out themselves in the future***
***Photo: Emma Rothero***

On ex-arable sites, data and information on hydrology, soil structure and nutrient status is helpful to establish suitability for re-creation. Based on information collected, an appropriate plant community should be identified from which to obtain seed or green hay. This should be as close as possible to the restoration site.

See Natural England Technical Information Notes 61-65 (http://naturalengland.etraderstores.com/NaturalEnglandShop/publications/evidence%20and%20analysis-technical%20information%20notes%20(tin)) and http://www.floodplainmeadows.org.uk/content/how-start-restoration-project for more information on practical methods for restoration. The most cost effective method is likely to be spreading green hay, but seed collection or purchase of seed are alternatives.

There are a number of case studies on the website, where restoration and changes in management are being trialled and monitored. Broad Meadow and Middle Park, a HLS scheme in Northamptonshire is a good example, and this is described in more detail in Robin Field and Sarah Still's article on page 8.

## Post Project Monitoring

The FMP are currently carrying out monitoring on a number of restoration projects. Post-restoration monitoring will enable progress to be measured against the original objectives and to decide whether adjustments to management are required. It is also to be encouraged so that others can learn from the experiences. Monitoring that uses fixed point, 1 x 1 $m^2$ quadrats is ideal so that data can be compared directly to the Meadows database. The FMP is happy to compare data to the database and provide some interpretation. The suggested botanical monitoring method is available on the website http://www.floodplainmeadows.org.uk/files/floodplain/BotanicalMonitoringProtocolFinal.pdf and FMP can help advise on specific sites as to the level and arrangement of monitoring quadrats and dipwell locations, if requested.

## Acknowledgements

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# Species-Rich Grassland Restoration on the River Nene, Northamptonshire, UK

*Robin Field MIEEM and Sarah Still*
*Revital-ISE Project, River Nene Regional Park CIC*

**Nationally, as well as locally, the area of unimproved species-rich grassland has reduced dramatically over the last 100 years. Figures of up to 97% loss have been suggested. Northamptonshire reflects this figure with many of the riverside meadows either converted to improved grassland, lost to arable production or quarried for sand and gravel. The aim of the project was to re-create areas of species-rich grassland using Natural England's Environmental Stewardship Higher Level Scheme (HLS). The first meadows (13.5 ha) were re-created at Dovecote Farm, Upper Heyford in 2008 and form the basis of the case study with others re-created during the autumn and spring of 2010-11. Sites at Great Doddington (80 ha) and Stoke Doyle (25 ha) have been sown, while further grassland sites on the River Ise have been restored under HLS. Several of the areas have been identified as restoration and re-creation sites on the Nene Catchment Partnership (River Nene Regional Park, Natural England, Environment Agency) catchment sensitive farming (CSF) visits.**

## Dovecote Farm, Upper Heyford, Northamptonshire Case Study

This restoration project was set in Northamptonshire (NGR SP661 592) near to junction 16 of the M1 motorway in almost the centre of the country. The project objectives were to re-create the riverside meadows along the River Nene, reduce run off into the river from arable fields, increase the amount of species-rich grassland in Northamptonshire, recreate the mixture of arable and pasture land which was characteristic of the area and return the area to its previous state.

The re-creation site at Upper Heyford was historically a meadow but was converted in the 1970s to arable production. This is in line with major losses of species-rich grassland across the country. Funding was secured from Natural England's Higher Level Scheme for the re-creation of 13.5 ha of wildflower meadow and pasture. Using seed from a native source was the only alternative in Northamptonshire as there are no sites large enough nearby to provide either seed or green hay in any quantity.

The site was next to the River Nene at Upper Heyford and has the Nene Way passing through it. A raised causeway runs across the site to allow the passage of carts to the mill on the other side of the river. The upper part of the site has the historic remains of a medieval settlement including a manor house and associated boundaries. The rest of the upper part of the field was ridge and furrow until ploughed out and adjoins remaining ridge and furrow. An historic ox-hovel (pre-1720) was adjacent to the site and was used to house cattle when the meadow was grazed. Originally the site was a species-rich meadow up until the 1970s when the farmer gave up dairy farming and converted it to arable. The fields were used for arable production until 2007 when the last crop of oilseed rape was harvested.

The lower half of the site floods from the river, often several times a year (Figure 1). Within the floodplain area and away from the river, there is a lower natural scrape area that wells up with water during high rainfall. One major problem in this area is the chemical Metaldehyde (slug pellets) entering the drinking water. With about 6 ha of this field prone to flooding the likelihood of large amounts of Metaldehyde being washed into the river was great, so conversion to species-rich grassland was an option under the CSF.

A hedgerow of mixed native tree and hedgerow species was replanted to link two old ash trees and a lost boundary. A hedgerow wildflower seed mixture from Emorsgate seeds was sown for half a metre under either side of the newly planted hedgerow. All other surrounding hedgerows were restored either by hedgelaying or gapping up. A 400 m permissive path was created to link the Nene Way with a byway via a pleasant riverside walk. In a quiet corner of the site an otter holt was built near the location of where otters had previously been recorded. The fields were both fenced to allow grazing and mains water and troughs were also provided.

## Methods

The soils of the site were analysed in August 2007. The results confirmed that the nutrient levels were on the edge of the expected range for the MG4 community *Alopecurus pratensis-Sanguisorba officinalis* floodplain meadow (Phosphorus 16 mg/

***Figure 1. Field flooded in January 2008 prior to re-creation as a meadow***

kg (2), Potassium 96 mg/kg (1), Magnesium 129 mg/kg (3), pH 6.3). The expected range for P for MG4 is between 0 and 20 mg/kg. The seed type was chosen to suit the soil fertility and condition, and was from native UK origin. This was supplied by Emorsgate Seeds and was a meadow mixture for wetlands containing 17 wildflowers and seven grasses (EM8). This was chosen for the floodplain area in the lower half of the field (Broadmeadow) and Emorsgate basic general purpose meadow mixture containing 11 wildflowers and four grasses (EM1) was selected for the upper dry half of the field (Middle Park). The seed was sown at 3 g/m$^2$ in April 2008 after a seed bed had been prepared.

The meadows were cut four times during the first six months and the upper, dry half (Middle Park) was sheep grazed from October 2008 to April 2009. This was then grazed by Hereford cattle from May to July 2009, topped mid-July and grazed by sheep from August onwards. The cattle returned in May 2010 and continued to graze during the summer. Sheep grazed Middle Park in the autumn of 2010 and the spring of 2011 and were finally removed in mid May 2011 and the meadow shut for a hay crop.

No grazing took place on the cut part of the meadow (Broadmeadow) in 2009 and this was cut for hay on 30 June 2009. Hay was made three days later. The hay was cut early to remove the maximum amount of nutrient and approximately 242 large bales were made from the 7 ha. Broadmeadow was grazed by sheep during the autumn and winter of 2009 and then grazed by cattle for two weeks in May 2010. It was then shut and a crop of hay was taken during late July. There was a reduced hay crop in 2010. This was in line with most other grass fields but it still produced about 33% more than equivalent improved grassland. Broadmeadow was aftermath grazed by first Hereford cattle and in the autumn by sheep. No sheep were grazed in spring 2011 and the meadow (Figure 2) was shut for a hay crop to be taken.

Quadrat surveys were carried out in June 2009, July 2010 and July 2011 by surveyors from the Northamptonshire Wildlife Trust, Moulton College and the River Nene Regional Park. The methodology was as specified by the Floodplain Meadows Partnership (FMP). This was ten 1 x 1 m quadrats, 15 m apart in a straight line in both Broadmeadow and Middle Park. Species richness and percentage cover were recorded.

A butterfly transect (Pollard and Yates 1993) was walked by the landowner in 2009, 2010 and 2011. The sections included the grazed pasture, hay meadow, improved grassland and raised walkway of the Nene Way.

***Figure 2. Meadows in July 2011 (212 – 8216)***

A series of dipwells (six) were dug in Broadmeadow during the late summer of 2010 and these were recorded on a weekly basis until June 2011. Once again this followed the FMP guidelines for hydrological recording. By listing out all of the dipwell measurements over the course of a year it is possible to calculate how many weeks the water table was shallower than a soil-specific aeration threshold and how many weeks the water table was deeper than a drying threshold.

For the type of alluvial clay loam at Upper Heyford, the aeration threshold should be set at 27 cm and the drying threshold set at 75 cm based on soils at similar sites. By calculating the number of weeks in each category it will be possible to interpret the water regime in terms of the plant grid on the Floodplain Meadow Partnership website (www.floodplainmeadow.org.uk/content/plant-communities).

## Results

After three years of monitoring vegetation on Broadmeadow, most of the species sown in the EM8 mixture have been recorded. The main species not recorded so far include pepper saxifrage *Silaum silaus* and meadowsweet *Filipendula ulmaria*. In 2010 great burnet *Sanguisorba officinalis* was recorded for the first time in a wetter area of the site. Quaking grass *Briza media* was recorded from all 10 of the quadrats in 2011, five of the 10 quadrats in 2010 and only recorded in one of the 10 in 2009. Cowslip *Primula veris* appeared for the first time in 2011, as did the unsown cuckooflower *Caradmine pratensis*. The level of weed species was very low with only very occasional dock and thistle species present.

The drier mixture EM1 used on Middle Park has also taken well with only hoary plantain *Plantago media* and red campion *Silene diocia* not recorded in any of the 10 quadrats in 2010 but found in two of the ten quadrats in 2011. Great knapweed *Centaurea scabiosa*, oxeye daisy *Chrysanthemum leucanthemum*, common sorrel *Rumex acetosa*, lady's bedstraw *Galium verum*, yarrow *Achillea millefolium* and ribwort plantain *Plantago lanceolata* were found in every quadrat in 2011 and selfheal, wild carrot and salad burnet were recorded in six to eight of the quadrats. Once again weed burden was low with few thistles, but docks had been a problem and a programme of spot spraying had helped to reduce them down to such a level that they were recorded in none of the 10 quadrats in 2011.

In 2009 and 2010, up to 14 species of butterflies were recorded including good numbers of small copper *Lycaena phlaeas* and common blue *Polyommatus icarus*. In both years significantly greater abundance and species richness of butterflies were recorded on the meadow as opposed to surrounding improved grassland fields. The butterfly transect survey has continued again in 2011.

The Big Butterfly Count, a Butterfly Conservation project, was conducted on a section of the site which had not been cut for hay in August of 2010. Over 90 butterflies were recorded in the 15 minute session with over 50 common blue and 25 small copper seen. Large numbers of bees were observed using the site during June and July 2010 and 2011.

During the winters of 2009-10 and 2010-11 large flocks of redwing *Turdus iliacus* and fieldfare *Turdus pilaris* were using Middle Park (drier pasture) immediately after the stock were removed. There was little activity of ground nesting birds. With several public footpaths crossing both fields, disturbance from dogs has been too great.

The dipwells were recorded every week during the period 19 October 2010 until 10 June 2011 and by assessing the water levels over that period the most likely National Vegetation Classification (NVC) will be MG5 *Cynosurus cristatus – Centaurea nigra* grassland (Table 1).

***Table 1. Dipwell data from Broadmeadow***

| | Weeks below 27 cm | Weeks above 75 cm | Predicted NVC classification |
|---|---|---|---|
| Broadmeadow dipwells | 30 | 3 | MG5 |

## Discussion

The level of botanical colonisation has been good at both sites. When compared with the communities of the NVC (Rodwell 1998) both areas are moving in the right direction. A comparison of their similarity scores with neutral grassland communities demonstrates that they both support vegetation referable to the *Cynosurus cristatus – Centaurea nigra* grassland type (MG5) and that on Broadmeadow the vegetation may approach MG4. In 2009 several key species sown on Broadmeadow such as great burnet *S. officinalis*, meadowsweet *F. ulmaria* and pepper saxifrage *S. silaus* were not recorded. In 2010 and 2011 great burnet *S. officinalis* has been recorded on the wettest part of the site and it is hoped that the other species will appear in the future.

In Broadmeadow upwards of 20 plant species not in the original seed mixture have now been recorded but this was to be expected as common species are not included within the mixtures as it was presumed that they will arrive by themselves. The level of weed infestation is now low but dock spp. have needed to be spot treated fairly extensively on Middle Park in 2010 and 2011 and Broadmeadow in 2011. One particular section of Broadmeadow also suffers from excessive flooding and seeds from several agricultural cultivar of grasses have taken hold and will need to be intensively managed over the next couple of years to clear them.

The invertebrate fauna recorded has been of particular interest with butterflies and bees now recorded in great numbers. Butterflies have been recorded on the transect sections of the meadow in significantly greater abundance and species richness than adjoining improved grassland. It is hoped that marbled white *Melanargia galathea* and several of the skipper species *Thymelicus* and *Ochlodes* will soon be recorded on the site.

On comparison of the data collected from the dipwells with national records from the Floodplain Meadows Partnership it was likely the plant composition would be MG5. Although, interesting, the dipwell data collected needs to be judged in the light of one of the driest springs in 100 years and if there had been two wet months the results could have pointed towards MG4, the predicted classification. Further years of data will be required before any firm conclusions can be drawn.

***Figure 3. Guided walk through the meadows in June 2010***

The site has caused large amounts of local interest with extra visits by the general public to see the meadows and use the newly created circular walks. The biodiversity of the area has increased dramatically with species not recorded for 30 years returning to the site. The problems of sediment and Metaldehyde washing into the river have disappeared. The landowners are delighted with the meadows and have a useful addition to the farm in these hay and grazing meadows.

The data collected from this site will be used to inform future restoration projects. The site now meets the criteria for a Local Wildlife Site and several visits and two farm walks (Figure 3) have been conducted with interested parties. The information gathered has been shared with the Floodplain Meadow Partnership in the form of a case study. The early data was also presented at several international conferences in 2010 and a paper has been published in the *Journal of the Northamptonshire Natural History Society*.

### Further Reading

There have been various articles in *British Wildlife* over the years regarding meadow restoration and re-creation and further information can also be found on the Floodplain Meadow Partnership website (www.floodplainmeadow.org.uk). The meadow re-creation at Upper Heyford is featured as one of their case studies. More information and images can also be found on the River Nene Regional Park website (www.rnrp.org).

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# A Model to Predict Wildlife Site Sensitivity to Visitor Pressure

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## Introduction

Like many areas around Britain, Bedfordshire faces intense growth pressure. Housing demand is high, as is demand for open space and natural areas. People want quality places in which to explore, relax and commune with nature. Nature faces new policy pressure from the Natural Environment White Paper, which aims to increase public access to natural areas, in part in the interest of public health. Natural England's Access to Natural Greenspace Standards (ANGSt) recommend the size and proximity of natural areas to development for public benefit.

While it is recognised that access to nature has public benefits there has not been any parallel recognition that sites might have serious constraints to such access. With increased growth, Bedfordshire's natural areas are expected to face increasing visitor pressure. However, natural areas have an inherent degree of sensitivity and many of Bedfordshire's wildlife sites are believed to be suffering already. Being able to predict the degree of, and reasons for, this sensitivity could help inform site management. This article presents a model being used to predict the sensitivity of wildlife sites in Bedfordshire.

## Impacts of Recreation on Sites of Importance to Nature Conservation

The effects of recreation on wildlife are many and varied. They depend on the features of both the ecology itself and of the recreation. The relatively new field of recreation ecology is the study of such effects, and volumes have been written on the impacts of various activities on different habitats and species. In general, recreational impacts on wildlife can consist of:

- Trampling, which causes floristic changes, vegetation loss, soil compaction and erosion.
- Eutrophication, which leads to localised proliferation of weeds and alters the soil ecology.
- Disturbance, which causes animal 'fight or flight' behaviours, site abandonment, and can lead to long-term reduced fecundity.

***Figure 1. Soil erosion on desire lines at Blow's Down SSSI, Dunstable***
***Photo: Katharine Banham, The Wildlife Trust***

***Figure 2. Pasque flower* Pulsatilla vulgaris*, a species with special needs not met by standard conservation management***
***Photo: Katharine Banham, The Wildlife Trust***

- Management interference, conflicts between recreational use and site management (*e.g.* sheep worrying, fence cutting, use of 'public-friendly' but suboptimal grazing stock breeds).

## Factors Related to Site Sensitivity

In this exercise, 'sensitivity' was interpreted as both inherent sensitivity and vulnerability. Healthy, diverse sites may exhibit low 'sensitivity', as diversity correlates with habitat resilience to disturbance. However, such sites are also extremely vulnerable as their destruction would have a much greater biodiversity impact than the loss of less natural, diverse sites. Therefore some of the factors below relate to 'true' sensitivity (*e.g.* size, slope, presence of sensitive species) while others (*e.g.* rarity, establishment time) are perhaps better indicators of vulnerability.

Biotic factors:

- Rarity: of plant and animal communities and species.
- Size and connectivity: including degree of isolation from similar habitat.
- Representativity/typicalness: the degree to which plant and animal communities correspond to the 'ideal' for their type.
- Vegetation type: dictates physical structure and species composition.
- Establishment time: length of time needed to re-create the habitat were the site to be destroyed.
- Number of species: relates to the site size and habitat type.
- Presence of 'sensitive' species: those whose needs cannot be met through standard habitat management.

Abiotic factors:

- Soil type and texture: dictate vegetation type and indicate resilience to compaction and erosion.
- Topography: indicates resistance to soil erosion.
- Degree of flooding/wetness: relate to soil erodibility.

## Developing a Model to Predict Site Sensitivity

The model presented here relates to the sensitivity of a site based on its ecological features. It incorporates a range of biotic and abiotic factors including those listed above. Factors related to the amount and type of recreation faced by wildlife sites are not considered.

The model is based on work by Denyse Lajeunesse and colleagues from the Jardin botanique de Montréal (Table 1) (Lajeunesse *et al.* 1995). Their criteria and scoring system have been adopted, however the indicators have been modified to use local and, in some cases, national data sets and indices. Quantitative indicators have been used where possible in an attempt to reduce bias and subjectivity.

***Table 1. Criteria for evaluating the sensitivity of Bedfordshire's wildlife sites to visitor pressure***

| Criterion | Maximum score |
|---|---|
| **Biotic value: vegetation** | |
| Uniqueness of plant community type | 5 |
| Representativity | 5 |
| Succession-disturbance degree | 5 |
| Rarity (number of rare species) | 5 |
| Richness (total number of species) | 5 |
| **Biotic value: avifauna** | |
| Uniqueness of wildlife habitat type | 5 |
| Representativity | 5 |
| Rarity (number of rare species) | 5 |
| Importance for wildlife | 5 |
| **Maximum total** | **45** |
| Abiotic value | |
| Drainage | 6 |
| Submersibility | 6 |
| Texture | 6 |
| Slope | 3 |
| **Maximum total** | **21** |

Many natural areas include a mix of habitat types. In some cases it will make sense to 'split' a site and calculate sensitivity indices for the different compartments. In others a single index will suffice.

## Biotic Value Calculation: Vegetation

### 1. Uniqueness of plant community type (5 pts)

The term 'uniqueness' reflects a combination of habitat scarcity and restriction to certain soil types or moisture regimes. Precise national and county National Vegetation Community (NVC) inventories were not available. Instead the model uses the distribution of UK Biodiversity Action Plan (BAP) habitats, each of which can include several NVCs.

Scores consider both national and local rarity: habitats which are both nationally and locally rare score higher than those which are locally rare but nationally more common. Habitats which are restricted to particular soil types or moisture regimes (*e.g.* lowland calcareous grassland) also score higher than those which can occur anywhere (*e.g.* mixed deciduous woodland).

### 2. Representativity (5 pts)

This criterion compares a site's plant species community to a 'typical' plant community. It therefore reflects how closely the habitat approaches a 'textbook' example of its type.

***Figure 3. Totternhoe Quarry Nature Reserve with fences cut by visitors***
***Photo: John Comont, The Wildlife Trust***

Representativity is difficult to define yet is often included in designated site selection criteria, including those for Sites of Special Scientific Interest (SSSI) and Bedfordshire's County Wildlife Sites. The score is therefore based on a site's highest conservation designation, which serves as a proxy for representativity. The highest scoring sites are Special Areas of Conservation, which are important at a European scale. The lowest scoring sites are those with no designation at all.

### 3. Succession-disturbance degree (5 pts)

This criterion relates to a site's response to various types of disturbance. It includes habitat-specific factors (*i.e.* establishment time, potential to harbour rare species, need for grazing) and site-specific factors (*i.e.* records of species with narrow ecological tolerance, presence of ancient soils). The scoring system allocates up to a point for each of these factors.

### 4. Rarity (5 pts)

The rarity score reflects the number of rare plant species recorded on a site. Rare (and threatened and declining, *i.e.* potentially rare) species can be represented by the UK BAP Priority Species list, which in addition to rarity considers decline, degree of threat and other factors. It therefore offers a useful proxy for a rare species list.

Scoring is based on the percentage of possible rare species which have been recorded on a site. It is unrealistic to expect a single site to harbour all possible rare species. Instead the scoring system uses the '80/20 rule', such that a site which has at least 80% of the expected rare species scores a full 5/5.

### 5. Richness (5 pts)

Species richness relates to the total number of plant species as predicted by the species-area relationship

$$S = cA^z$$

Where S = species richness (no. of species)

A = area

c and z are constants (MacArthur and Wilson 1967).

These figures can be used to estimate a theoretical species richness, to which the actual number of recorded species can be compared. The theoretical maximum will of course be limited by the total number of species found locally.

Values for c and z have over the years been calculated by many investigators and for a range of habitats. In the 1980s botanist John Dony calculated c and z values specifically for Bedfordshire's habitats (Dony, date unknown). These were extremely useful, having been derived for local conditions, and gave much better results than figures from the wider literature.

Again, scoring for this criterion uses the '80/20 rule', whereby sites exhibiting 80% of the expected species richness are afforded 5/5.

## Biotic Value Calculation: Avian Fauna

### 1. Uniqueness of wildlife habitat type (5 pts)

'Uniqueness' in this context refers to the importance of a site relative to the surrounding matrix. Many wildlife sites are 'islands of green'; habitat patches within a human-dominated matrix. As such they are important residential or stepping-stone habitat for many bird species. Moving between patches carries a variety of costs, which relate to among other things the distance between patches, the quality of the patches themselves and the quality of the intervening matrix. A high quality matrix will have feeding and resting opportunities; poor quality land cover will not. As a result, crossing poorer quality matrix habitat will incur higher costs. 'Unique' habitat is considered to be those patches surrounded by the most costly matrix. 'Landscape resistance values' of the dominant land uses within 2 km of a site are used to derive the avian uniqueness score (Nikolakaki 2004).

### 2. Representativity (5 pts)

This criterion is similar to floristic representativity above in that it relates to the degree to which a site's avian community reflects a reference community. The British Trust for Ornithology set of Wild Bird Indicators includes farmland, woodland and wintering waterfowl species 'reference communities'. By comparing the list of species recorded to the lists of indicator species one can determine how closely a local avian community approaches the 'ideal' community for the habitat.

### 3. Rarity (5 pts)

Avian species rarity is evaluated in the same way as plant species rarity, and also employs the UK BAP Priority Species list as a proxy for rare species.

### 4. Importance for wildlife (5 pts)

This score reflects whether a site has areas, structure or habitat critical to a species' life cycle. In general these are features to which a species returns year after year. Examples of important areas for wildlife include leks, communal nesting sites, brood-rearing areas for waterfowl and nests of large raptors. The score is determined by the current RSPB conservation status (*i.e.* red, amber, green) of the species concerned.

## Abiotic Value Calculation

### 1. Drainage (6 pts)

Drainage scores are based on the natural drainage type as determined by the National Soil Resources Institute (NSRI). Soils are classed as having 'good to moderate', 'imperfect' or 'poor or very poor' drainage. Drainage classes are assigned a point value based on soil fragility.

### 2. Submersibility (6 pts)

Submersibility relates to the probability of a site flooding. Sites are assigned to one of three classes: never submerged, easily flooded or regularly submerged. Sites which are never or always submerged are easy to identify, using a combination of local knowledge and topographical and water table information. 'Easily flooded' sites could be more difficult to identify. For the purposes of this study easily flooded sites constitute those in the floodplain for which the Environment Agency has identified a 'significant' (*i.e.* greater than 1/75; 1.3%) flood risk.

### 3. Texture (6 pts)

Scores are based on the relative percentages of sand, silt and clay in the soil, as determined by the NSRI. Soil texture provides an indication of resilience to compaction. Soils with fine, uniformly sized particles (*e.g.* silts, clays) are at greater compaction risk than sandy soils or loams, which have large or unevenly sized particles.

### 4. Slope (3 pts)

Even topographically 'simple' sites do not have 'one' slope but many. The steeper the slope, the more risk of soil erosion from natural or anthropogenic processes. The simplest way to evaluate this criterion is to measure a site's steepest slope. This can be done with GIS using a simple 'rise over run' calculation. Scores are based on risk categories in the Higher Level Stewardship Farm Environment Plan (FEP) Manual (Natural England 2010).

## Ecological Sensitivity Values and Classes

Total scores for vegetation, avian and abiotic sensitivities determine into which sensitivity class a site falls (Table 2). Overall sensitivity is the highest of a site's three classes.

***Table 2. Bedfordshire and Luton wildlife site sensitivity class scores and thresholds***

| | Sensitivity class | | | |
|---|---|---|---|---|
| | **Very high** | **High** | **Low** | **Very low** |
| Vegetation sensitivity (/25) | ≥20 | 15-19 | 10-14 | <10 |
| Avian sensitivity (/20) | ≥16 | 12-15 | 8-12 | <8 |
| Abiotic sensitivity (/21) | ≥12 | 6-11 | 3-5 | <3 |

## Case Study: Blow's Down Site of Special Scientific Interest

Blow's Down is a large area of lowland calcareous grassland on the southern edge of Dunstable. It lies within a half mile of the M1, A5 and A505, and is less than two miles from Luton town centre. A large housing estate forms the northern boundary of the site, which is owned by the Wildlife Trust. Blow's Down is heavily used by dog walkers, naturalists, local youth and others, and management for nature conservation value is a constant challenge.

Size: 33.1 ha/331,000 $m^2$

Vegetation type(s): calcareous grassland

### Vegetation

Uniqueness of plant community type: Score: 5/5

Nationally it is estimated that 38,687 ha of lowland calcareous grassland exist in England, representing 2.2% of the country's BAP habitat. As it comprises <5% of the national BAP habitat area, chalk grassland has been classed as 'uncommon' at a national scale.

***Figure 4. Blow's Down SSSI, Dunstable. Stock used to graze urban sites must be able to coexist with humans and their dogs.***
***Photo: Graham Bellamy, The Wildlife Trust***

The 2007 Bedfordshire chalk grassland mapping project revealed 318 ha of lowland calcareous grassland in the county. This represents 4.77% of county BAP habitat, and 0.8% of the national chalk grassland total. The county habitat area can therefore also be considered as 'uncommon', and a representative proportion of the national total. Additionally, chalk grassland is restricted to calcareous soil types. This would normally yield a score of 3/5; however chalk grassland represents such a large proportion of Bedfordshire's BAP habitats it has been given a score of 5 for its local importance.

Representativity: Score: 3/5

As a SSSI, Blow's Down scores a 3 on this scale.

Succession-disturbance degree: Score: 3/5

Chalk grassland scores 3 habitat points for its restoration time (1 point), number of associated rare species (1 point) and need for grazing (1 point).

No 'sensitive' BAP species have been recorded at Blow's Down. The site has evidence of medieval agricultural terracing, and parts of its grassland have in the past been improved; it therefore is not believed to have an ancient soil ecology.

Rarity: Score: 0.4/5

One UK BAP vascular plant species has been recorded at Blow's Down. This represents 6.7% of UK BAP chalk grassland plant species found in Bedfordshire. Under the proposed scoring system, a site with 80% of possible BAP plant species scores the full 5 points. Therefore all scores must be converted to a figure /80 and then to the appropriate number of points.

Richness: Score: 5/5

Two hundred vascular plant species have been recorded at Blow's Down. John Dony's values of c (17.62) and z (0.181) for Bedfordshire's chalk grassland habitats were used in the species-area calculation, which yields a theoretical species richness of 186 vascular plant species for the site. Therefore more than the maximum theoretical number of species have been recorded at Blow's Down, resulting in a score of 5.

### Avifauna

Uniqueness of wildlife habitat: Score: 4.1/5

The 2 km radius around Blow's Down is a mix of mainly cultivated crops (approximately 35%) and developed area (*i.e.* the town of Dunstable). In this case a weighted average has been taken of the two landscape cost values (cultivated crops: 10 and developed: 20). The result has been converted to a score out of five.

Representativity: Score: 5/5

While Blow's Down is primary chalk grassland and surrounded by development, many of the BTO indicator species recorded on the site are in fact woodland birds. Records for the site include 23 of the 27 woodland indicator species used in reporting for the East of England, and 16 of the 19 farmland indicator species. Converted to scores out of 5 (where 80% of the indicator species results in a full 5 points), these woodland and farmland scores would be 5 and 5 respectively. The site is obviously very important for its avian fauna.

Rarity: Score: 5/5

Sixteen BAP bird species have been recorded at Blow's Down. Of the 42 UK BAP bird species found in Bedfordshire, 18 are likely to be found in or around grassland habitats. The species recorded at Blow's Down therefore represent 89% of the potential BAP species for the site. As with some of the other measures, a site with 80% of the potential species range scores full marks. All scores must therefore include this calculation; in this case the result is 5.

Importance for wildlife: Score: 5/5

Blow's Down is a well-known staging area for several migratory bird species, including the Red-Listed ring ouzel *Turdus torquatus*.

### Abiotic Sensitivity

Drainage: Score: 0/6

Blow's Down lies on 'shallow lime-rich soils over chalk or limestone', which are classed by the NSRI as 'freely draining'.

Submersibility: Score: 0/6

Blow's Down lies well outside a floodplain and accordingly is likely not to be flooded, or according to Lajeunesse *et al.* 'never submerged'.

Texture: Score: 3/6

Shallow lime-rich soils over chalk or limestone are classified by the NSRI as 'loamy'.

Slope: Score: 2/3

The steepest slope recorded at Blow's Down is 32% on the ancient cultivation terraces. Loamy soils with a slope >12% have been classified in the FEP manual as being at 'high' risk of erosion, yielding a score of 2.

***Table 3. Vegetation, avian and abiotic sensitivity of Blow's Down Site of Special Scientific Interest, Bedfordshire***

| Criterion | Blow's Down |
|---|---|
| **Vegetation** | |
| Uniqueness of plant community type | 5 |
| Representativity: species composition vs a reference plant community type | 3 |
| Succession-disturbance degree | 3 |
| Rarity: number of rare species | 0.4 |
| Richness: total number of species | 5 |
| **Total vegetation value (/25)** | **16.4** |
| **Vegetation sensitivity rating** | **High** |
| **Avifauna** | |
| Uniqueness of wildlife habitat: importance relative to surrounding habitat | 4.1 |
| Representativity (5 pts): bird community composition vs a reference bird community type | 5 |
| Rarity: number of rare species | 5 |
| Importance for wildlife: critical areas for life cycle | 5 |
| **Total avifauna value (/20)** | **19.1** |
| **Avifauna sensitivity rating** | **Very high** |
| Soil and land characteristics | |
| Drainage (6 pts) | 0 |
| Submersibility (6 pts) | 0 |
| Texture (6 pts) | 3 |
| Slope (3) | 2 |
| **Total abiotic value (/21)** | **5** |
| **Abiotic sensitivity rating** | **Low** |
| **OVERALL SENSITIVITY RATING** | **Very high** |

## Using This Model

The model requires a robust body of precise species records; this is most likely to be available from the Local Record Centre. The scores presented above were calculated using an Excel workbook. A database would have been more appropriate for this application however Microsoft Access was not available for use at the time. Setting up an automated system can take several days, and requires county vascular plant and bird lists, with each species



***Figure 5 (left). Eutrophication can come from a range of sources, including pet faeces***
***Figure 6 (right). Sheep worrying is a particular issue in southern Bedfordshire's large peri-urban wildlife sites***
***Both photos: Laura Downton, The Wildlife Trust***

assigned to its appropriate habitat types. Locally specific c and z values are laborious to calculate but will also give much more accurate species richness scores than generic figures found in the literature. Once completed however, the workbook was able to perform most of the calculations with limited user input. With a little practice analysis of a single-unit site can be completed in approximately 20-30 minutes.

The model can be used to influence local policy, inform decision-making and make a stronger case for site protection. The assumption among planning authorities often appears to be that sites in the private domain can happily accept unlimited visitors. Local conservationists often know intuitively where and which sites are most vulnerable to this pressure. The model provides an objective means to illustrate where and why this might be the case. For example the model can inform:

- Greenspace/PPG17 studies: a great deal of effort has in recent years gone into calculating greenspace needs for local communities in the face of development, most notably through PPG17 studies. Informed analyses require objective information about each site. Protecting sensitive sites designated primarily for nature conservation could mean removing them from ANGSt calculations. Where greenspace demand is high this could help planning authorities make a case for funding for new accessible sites like country parks.
- Green Infrastructure (GI) planning: GI planning can help protect sensitive sites by identifying where publicly accessible greenspace and routes should be located for best conservation value. It can also show where providing new greenspace can help buffer sensitive sites.
- Site management planning: site sensitivity analysis can inform proposals to provide or improve access to the countryside. By showing where the most sensitive areas are, the model can help site planners steer visitors away from the most fragile areas towards other areas which are more robust but still interesting. The model is now being used for this purpose by the Bedfordshire Wildlife Trust in their site management plans.

Visitor impacts on natural areas result from a combination of inherent ecological sensitivity and the features of the visitor pressure (*e.g.* intensity, duration, seasonality, type of recreation). The model presented here offers an objective way to predict inherent sensitivity. It is not without its weaknesses, for example:

- Site-specific data are limited by recording effort, which may be lower in very rural or less-known sites.
- 'Common' species are often not recorded, which can impact representativity scores in particular.
- Because of their mobility, bird species are not limited to specific habitats or even habitat types like farmland, woodland or wetland.
- Many species records are at tetrad or 1 $km^2$ resolution only, making them insufficient for use with small sites or those that, due to habitat complexity, one would otherwise want to 'split' into smaller units.

For a complete picture of visitor impacts on site ecology, results should be evaluated together with those of visitor impact studies.

It must also be noted that site sensitivity is not the same as ecological value or importance. Sites of 'low sensitivity' still have ecological value, and visitor impact studies should be done to ensure that increased visitor pressure does not damage important ecological features.

## Conclusions

As Bedfordshire continues to grow, local wildlife sites will face increasing visitor pressure. This model offers an objective way to predict site sensitivity irrespective of the amount and type of pressure. It will help identify sites which:

- Are highly sensitive and likely cannot cope with current or predicted visitor numbers.
- Are sensitive but whose impacts might be mitigated with appropriate management and resourcing.
- Might be able to accommodate more visitors.

To date the model has been applied to all SSSIs and approximately 20 non-SSSI test sites in Bedfordshire. Funding is now being sought to apply it to all Bedfordshire wildlife sites. Work is currently focusing on peri-urban sites in the growth areas of southern Bedfordshire and Luton.

The full report and methodology are available at www.bedslife.org.uk/publications.htm. Most of the data for this study came from the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (www.bedsbionet.org.uk). Soils information was from the National Soil Resources Institute's Soilscapes Viewer (www.landis.org.uk/soilscapes).

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# Ecologists as Farm Advisors: Using Knowledge and Skills Gained on the Job

*Amy Proctor, Jeremy Phillipson, Philip Lowe and Andrew Donaldson*
*Newcastle University*

**Field advisors play a key role in enhancing the skills and development of tens of thousands of farming and land management businesses. Applied ecologists have become increasingly prominent in the provision of advice to farmers, yet they face complex and ever changing calls on their expertise. How do they keep their knowledge up to date in practice and how might they act as intermediaries between science and the farm? Research carried out at Newcastle University has shown that farm advisors, including ecologists, broker a range of different types of knowledge, besides formal science, as well as generating knowledge themselves 'on-the-job'. Advisors also learn from other professionals and share expertise, operating as part of complex multi-professional networks. The research considers the implications for professional training to better equip field ecologists for the work they do and prepare them for the changing landscape within which they operate.**

## Changing Skill and Knowledge Requirements

The recent publication of IEEM's report *Ecological Skills: Shaping the Profession for the 21st Century* (IEEM 2011) signals a more reflective approach by the profession to understanding the knowledge and skills that ecologists and environmental managers will need in the future. It is certainly the case that over recent decades the management of land and rural resources has had to adapt to altered priorities for rural development and environmental conservation as well as new institutional and regulatory frameworks. Advisors, including those working within applied ecology and environmental management therefore need to constantly develop their skills and knowledge in order to meet the needs of land managers.

Working across the public, private and third sectors, applied ecologists have become increasingly prominent in advising land managers in improving existing practices, adopting new approaches and diversifying into new areas. They play a key role in selecting and safeguarding legally protected sites, as well as carrying out practical countryside management, conducting monitoring, impact assessments and field surveys, and are vital in developing stewardship agreements. Yet the make-up of their expertise and the role that applied ecologists play in linking science and practice has been little explored.

This article reports on research which investigated the changing role of advisory expertise in the rural economy and considered three groups of specialist advisors – veterinarians, land agents/surveyors and applied ecologists. The empirical work included 60 in-depth interviews and work shadowing with advisors, their professional associations and land managers. The research explored in detail the composition of field expertise, the extent to which advisors act as knowledge brokers, and the skills they might need to operate within the contemporary advisory landscape.

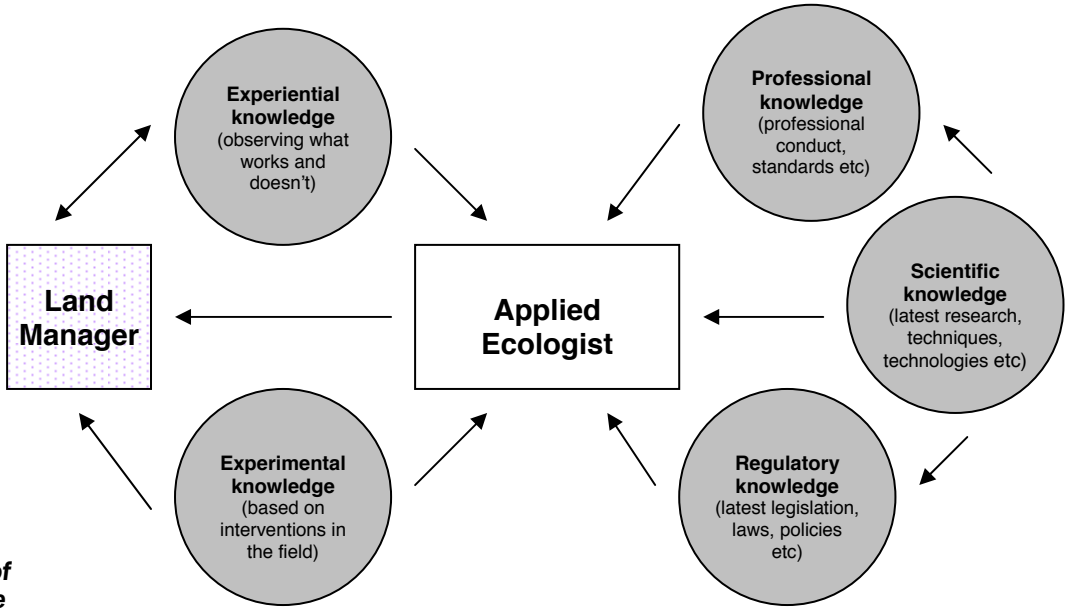



***Figure 1. The composition of field expertise***

## The Composition of Field Expertise

Our research reveals the complexity of field advisors' knowledge sources. Professional associations and bodies are an important source, through programmed Continuing Professional Development (CPD), training, websites, publications and meetings of specialist divisions. Government agencies such as Natural England and organisations such as the Field Studies Council, RSPB and FWAG also provide training and information. Advisors also update their knowledge through other channels, including in-house training, the internet/intranet, books, journals, magazines and circulars. The research findings revealed these self-directed approaches to knowledge maintenance and renewal to be particularly prominent amongst applied ecology professionals. They tend to relate as much to regulatory knowledge (*e.g.* policy or guidance documents, new legislation, *etc.*) as to scientific knowledge (Figure 1).

Ecologists highlight a number of key barriers which prevent them from refreshing their scientific knowledge. They said that:

- they lack time for professional development;
- scientific output is often not relevant or applicable to what they do; and
- published science is inaccessible to them.

The apparent gulf between conservation science and practice and how this might be bridged has been considered by others in the literature (see for example Sagoff 2011 and the various contributions to the special issue on this topic in *Biotropica* 2009). Indeed, the importance and availability of accessible, evidence-based research to practitioners has been highlighted previously in this journal (see Bayliss and Randall 2011 and Dicks and Sutherland 2011). Crucially, our research showed that advisors expect their professional organisations to filter out and synthesise what scientific developments are relevant to their work.

## Ecologists as Knowledge Intermediaries

Farmers are busy people with little time or inclination to read up on the latest scientific research. But keeping abreast is increasingly important in an era of climate change as pressures on our land and food supply increase. The research has shown that field advisors undoubtedly act as intermediaries, bridging science and the farm, but they are not simply conduits of formal science. Advisors broker different types of knowledge and generate their own, to create their own field knowledge.

Farmers look to their advisors to absorb complex, ambivalent messages from diverse sources, including technical, commercial and legislative developments, and 'translate' them into terms that they can understand and act upon. In conveying advice, advisors will also take into consideration factors such as local geography, the social context and aspirations of the land manager, their technical capabilities and the commercial objectives of the farm:

*"It's tailoring your advice, not just to the site and the issues on the site, but also to the client's background and the client's interest and level of knowledge and trying to do it in a way that's encouraging and supportive…for me, that's important, whether I'm working for farmers or whether I'm working for a housing developer. Every client has got a different agenda and a different reason for needing my input and I have to show that I'm sensitive to those reasons."* (Ecologist, private consultant)

Advisors are therefore not simply transferors of knowledge from other experts, but combine and repackage information, and draw on their own accumulated field knowledge to tailor it to the circumstances of the client.

## Learning in the Field

The research findings reveal the significance of field-generated knowledge, gleaned on the job. Advisors talked about the ways in which they develop their own expertise in the field, building experiential and experimental knowledge. Experiential knowledge involves advisors learning through observation of what works and doesn't work, learning from mistakes and sharing best practice. It is expertise derived from application and refinement and developed though replication and adaptations case by case. It is seen by practitioners as essential to the formation and renewal of field expertise:

*"You can have a lot of good theoretical knowledge, but sometimes, it's having the confidence that you've seen it practically in the field and you can make up your own mind when you're talking to farmers, you actually have a lot more conviction."* (Ecologist, Natural England)

*"You need field experience just to know how things look at different times of the year."* (Ecologist, AONB)

This experiential knowledge also derives from interactions with other professionals. Field advisors emphasise the importance of learning from colleagues' experience via formal mentoring or through informal discussion back at the office:

*"…most of it probably comes from field experience and from current field experience of colleagues, and learning from colleagues and sharing best practice."* (Ecologist, National Trust)

*"I find it most useful talking to other people, having discussions with other practitioners."* (Ecologist, Wildlife Trust)

It may also be derived from interactions with land managers. This knowledge is vital in helping advisors to understand the practical and commercial context into which their technical advice must fit and was acknowledged by all of the field professionals we observed.

Some field advisors also distinguished a different source of field knowledge – experimental knowledge, generated through deliberate interventions in the field. It includes trial and error but also conducting field experiments, systematically trying out different approaches. Though there are limits to how far experimentation can go (*e.g.* regulations, costs, client's attitude), it is seen as valuable in extending knowledge, testing skills and finding novel solutions. This was mentioned most by vets, who had the most experimental outlook, followed by ecologists. It was not a concept popular with land agents, who expressed anxiety about the idea of experimenting in practice. These findings have led us to think about 'the field' as a space for knowledge production, where field-based experts are not only engaged in knowledge transfer, but also take an active role in translating and creating knowledge.

## Re-Thinking Ecological Field Expertise

IEEM's report identifies a range of transferable skill gaps facing the profession. Crucially, the report notes that influencing skills and the ability to engage with stakeholders (*e.g.* policy-makers, the public, developers or other professionals) are skills which will be 'increasingly in demand' (IEEM 2011, p.42). The report states that ecologists need to improve their skills in working on a par with other professionals in multidisciplinary teams. Our findings support this.

A key point to emerge from our research was the importance of knowledge obtained from and the skills needed to negotiate and inter-professional working. Advisors said that they learned a lot from working with people from other professions and sharing expertise. We found ecologists were playing an increasingly important role in these extended networks. For example, in

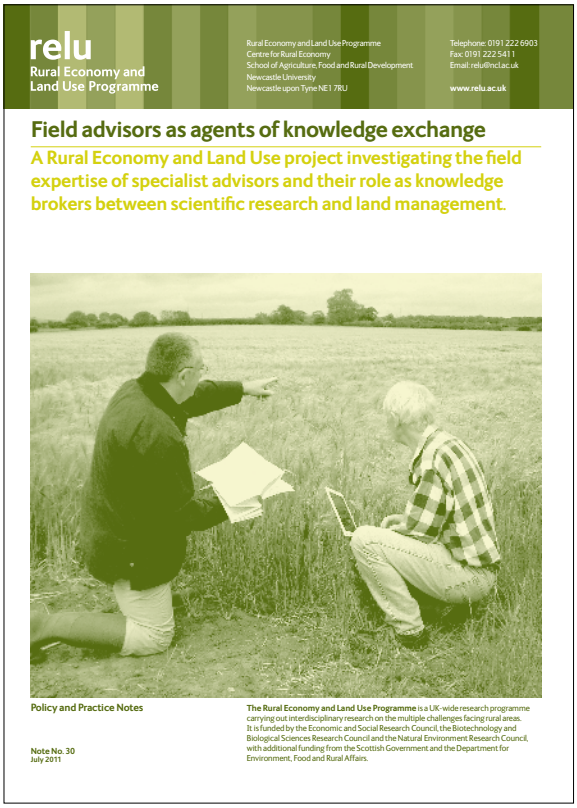
developing environmental stewardship agreements, Natural England case officers are involved in consulting with a range of professionals including land agents, other ecological specialists, but also historic environment advisors and advisors on rights of way. Farmers and their land agents also contract-in the services of ecologists as Farm Environment Planners (FEP-ers) or as specialist consultants to conduct species and habitat surveys.

New advisors in particular need to understand the broader professional landscape within which they are expected to operate and develop the skills required for inter-professional networking. This will be especially vital as the profession looks to further consolidate its place within the contemporary advisory landscape.

## Implications of Research

There are some useful lessons that we can draw from the research. The scale of experiential and experimental learning that we uncovered in the field and the importance of inter-professional working to knowledge maintenance and renewal suggest that professional organisations such as IEEM, as well as universities, colleges and other training providers may need to reconsider the type of skills that field-based advisors require. A key issue relates to the importance of preparing field professionals to be effective lifelong learners and practical experimentalists and to equip them for navigating and negotiating the inter-professional networks that they will find themselves increasingly operating within.

It is also evident that research institutions, programmes and projects need to be better informed about the knowledge practices of field advisors and their potential role in the design and execution of research. This calls for improved links between research organisations and professional bodies, as the key knowledge source for advisors, to maximise knowledge exchange opportunities between research and practice. Individual researchers or research projects should also look to benefit much more from the field knowledge of advisors, which we found to be a crucial yet undervalued source.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Field advisors as agents of knowledge exchange

A Rural Economy and Land Use project investigating the field expertise of specialist advisors and their role as knowledge brokers between scientific research and land management.

Policy and Practice Notes

Note No. 30
July 2011

The Rural Economy and Land Use Programme is a UK-wide research programme carrying out interdisciplinary research on the multiple challenges facing rural areas. It is funded by the Economic and Social Research Council, the Biotechnology and Biological Sciences Research Council and the Natural Environment Research Council, with additional funding from the Scottish Government and the Department for Environment, Food and Rural Affairs.

***Figure 2. Policy and Practice Note reporting on the key findings of the 'Science in the Field' research project***

### Further Information

'Science in the Field', the project referred to in this article, is funded as part of the UK Research Councils' Rural Economy and Land Use Programme (Award RES-229-25-0025), a collaboration between the Economic and Social Research Council, the Natural Environment Research Council and the Biotechnology and Biological Sciences Research Council, with additional funding from Defra and the Scottish Government.

More information on the 'Science in the Field' project can be found at http://research.ncl.ac.uk/scienceinthefield/index.php.

A Policy and Practice Note reporting on the key findings of this research project has been published (Figure 2). The publication is free to download from: http://www.relu.ac.uk/news/policy%20and%20practice%20notes/Proctor%2030/PPN30%20Proctor.pdf.

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# Monitoring the Use of Badger Tunnels on Highways Agency Schemes

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**It has become standard practice over the last 20 years to incorporate badger tunnels into major road schemes to mitigate the effects of habitat severance on badger populations. In order to investigate the effectiveness in terms of use by mammals (primarily badger), as well as review the tunnel design advice provided by the Highways Agency, a monitoring scheme was undertaken in 2010 on nine Highways Agency road schemes.**

## Background

In the UK, the Highways Agency routinely evaluates the efficacy of conservation initiatives to assess the extent to which objectives have been met. In 2010, the Post Opening Project Evaluation identified badger tunnels (culverts installed under roads to allow safe passage) as an intervention that merited further investigation to establish a) the effectiveness in terms of use by mammals (primarily European badger *Meles meles*), as well as b) the efficacy of tunnel design advice provided within the Highway Agency's *Design Manual for Roads and Bridges* (DMRB) (Highways Agency 2001).

The primary reason for incorporating tunnels beneath highways during construction is to reduce the effects of habitat fragmentation on mammals and to minimise the risk of road traffic accidents caused by animals attempting to cross a road. When installing badger tunnels, the DMRB recommends a number of design features to guide mammals through culverts or overpasses to prevent them from directly crossing a road (Highways Agency 2001). Badger tunnels should be made using 600 mm diameter concrete pipes. Appropriate landscape planting should be carried out to soften the approach to the tunnel, while fencing should be installed to direct mammals to the tunnel entrance and prevent them from accessing the road. The location of badger crossings is crucial to success; it is preferable if a crossing can be located on, or as near as possible to, the site of an active badger path. The DMRB does not provide guidance on the optimal or maximum length of a badger tunnel (Highways Agency 2001).

As badgers are one of the species most commonly killed on roads in the UK, this study focuses primarily upon the use of tunnels by badgers, although other mammal species are also considered.

The monitoring methodology used in this study is based upon that developed previously for mammal underpasses by Baker, Knowles and Latham (2007). This involved monitoring the use of a mammal underpass using clay mats to record the imprint of mammal tracks; a simple and low-cost technique. The present study had two aims, firstly to establish whether badgers use crossings, and secondly, to identify any specific problems or factors associated with tunnel design that reduce or increase the likelihood of use by mammals.

***Table 1. Road scheme and tunnel design summary***

| Scheme name and location | Scheme type and length | Mammal tunnels | Known design issues |
|---|---|---|---|
| A590 High and Low Newton Bypass (northwest England) | 3.8 km 2-lane dual carriageway | 4 badger tunnels; 1 tunnel proposed for use by both badger and otter | 1 tunnel less than the 600 mm advised by DMRB (450 mm) |
| A66 Temple Sowerby (northwest England) | 5 km 2-lane dual carriageway | 1 badger tunnel | Tunnel 60 m long |
| A1(M) Wetherby to Walshford, North Yorkshire (northeast England) | 5.3 km 3-lane motorway | 1 badger tunnel | Tunnel 60 m long and with a plank bridge crossing needed to access the tunnel |
| A63 Selby Bypass, North Yorkshire (northeast England) | 10 km single carriageway | 3 badger tunnels | 1 tunnel less than the 600 mm advised by DMRB (300 mm) |
| A5 Nesscliffe Bypass, West Midlands (central England) | 4.5 km 2-lane dual carriageway | 4 badger tunnels | 2 tunnels larger than the 600 mm advised by DMRB (*i.e.* 700 mm and 1000 mm); 1 tunnel 70 m long |
| A6 Rothwell Bypass East Midlands (central England) | 6 km single carriageway | 13 badger tunnels | Some tunnels deep beneath carriageway, therefore possibility of restricted air flow<br>Close to public footpaths |
| A428 Caxton to Hardwick (eastern England) | 7.7 km 2-lane dual carriageway | 4 badger tunnels | 1 tunnel known to suffer from poor drainage |
| A120 Stansted to Braintree, (Essex, southeast England) | 14 km 2-lane dual carriageway | 6 badger tunnels | 3 tunnels 70 m long |
| A34/M34 Chieveley Junction South (Berkshire, southern England) | Junction | 1 badger tunnel | Tunnel 120 m long |

### Site Selection

Nine major road schemes (dual carriageway or motorway) throughout England were chosen for study. These roads incorporated 38 mammal tunnels installed between 2003 and 2007 (Table 1). The tunnels varied in design in terms of materials, width and length but were straight on plan. The 38 tunnels included both concrete and corrugated iron tunnels and were an average length of 44 m (max 120 m to min 20 m). Tunnel diameters were either 300 mm, 450 mm, 600 mm, 700 mm or 1,000 mm, with the most common diameter being 600 mm.

### Monitoring Methodology

Monitoring was undertaken from 24 August to 26 October 2010. The autumn was chosen as a suitable time for undertaking monitoring (as in the 2007 study) since the substrate used in the clay mats would remain moist and soft enough to record mammal footprints over about a week's duration. It is also the time when mammal activity levels tend to be high (post-breeding dispersal of young animals). At each study tunnel, a clay mat (45 x 45 cm x 0.5 cm thick) was placed just inside the tunnel entrance in late August (Figure 1). Notes were made on aspects of tunnel design (diameter, construction material), drainage conditions around the tunnel entrance and the condition of the associated fencing. The amount of vegetation cover around the tunnel entrance and habitat connectivity was recorded, by describing how the tunnel entrance tied into adjacent habitat features such as hedges and highway planting.

The mats were checked weekly during the trial period. Any evidence of animal tracks was recorded and species identified (Bullion, Strachan and Troughton 2001). The clay mat was then thoroughly wetted and smoothed over, leaving a clean surface to record future tracks.

***Figure 1. A clay mat installed at the entrance of a badger tunnel to monitor use by mammals***

***Figure 2. Badger prints on a clay mat within a badger tunnel***

In addition to clay mats, passive infra-red motion activated cameras were set up at two tunnel entrances (A5 Nesscliffe Bypass and A590 High and Low Newton Bypass) for one week to further assess suitability of monitoring using clay mats and to highlight any unexpected limitations associated with this technique.

## Results

### Mammal use

Overall, 35 of the 38 tunnels (92%) were used by mammals, with 89% used by badgers during the autumn 2010 monitoring period. Species recorded were badger, Eurasian otter *Lutra lutra*, red fox *Vulpes vulpes*, European hedgehog *Erinaceus europaeus*, brown rat *Rattus rattus*, domestic cat *Felis catus* and domestic dog *Canis lupus familiaris*. Use of the tunnels by badgers was greater than by any other species.

In terms of the regularity of use, 37% of the tunnels were used frequently by badgers (*i.e.* footprints recorded on 7 or 8 of the 8 monitoring visits), 29% showed moderate levels of use (*i.e.* prints recorded on 4-6 monitoring visits) and 23% were used infrequently (*i.e.* prints recorded on only 1-3 monitoring visits). Figure 2 shows prints on one of the clay mats. These results indicate that the tunnels installed under both dual carriageways and motorways are being used on a regular basis.

### Design

The results of this study emphasise the importance of some elements of tunnel design, which may encourage use by badgers. The key design features that appear to be associated with more frequent use were:

- Good habitat connectivity with existing landscape features such as hedges and ditches. Figure 3 shows that good and moderate connectivity is more likely to result in a tunnel being used than poor connectivity.
- Good vegetation cover around the tunnel entrance. Figure 4 shows that tunnels with good cover are most frequently used by badgers.
- Good drainage; tunnels with poor drainage were never used or infrequently used.
- A tunnel width of at least 600 mm – the two tunnels narrower than the standard 600 mm (300 and 450 mm) were never used or infrequently used by badgers, although the small sample size precludes a definitive conclusion. Tunnels wider than 600 mm were regularly used, but there was no evidence that tunnels more than 600 mm were used more or less often than the 600 mm tunnels.

The results also indicate that use of the tunnels by badgers is not significantly influenced by tunnel construction material (concrete or corrugated steel), whether the whole of the tunnel had some degree of illumination by daylight, or tunnel length. The lack of a clear relationship between use by badgers and tunnel length was surprising (there is anecdotal evidence that badgers tend not to use very long tunnels). This is illustrated in Figure 5.

### Effectiveness of Clay Mats as a Monitoring Method

The use of clay mats proved effective both in terms of cost and as a means of monitoring mammal tracks. The technique does have its limitations, which include drying out and cracking in hot weather, or water logging. Where water-logging occurred there was evidence that badgers tried to avoid walking on the mats (partial prints on mat edges suggested that badgers had tried to walk around them). A few simple measures could be taken to reduce these limitations, such as the use of larger clay mats (thus animals cannot pass without

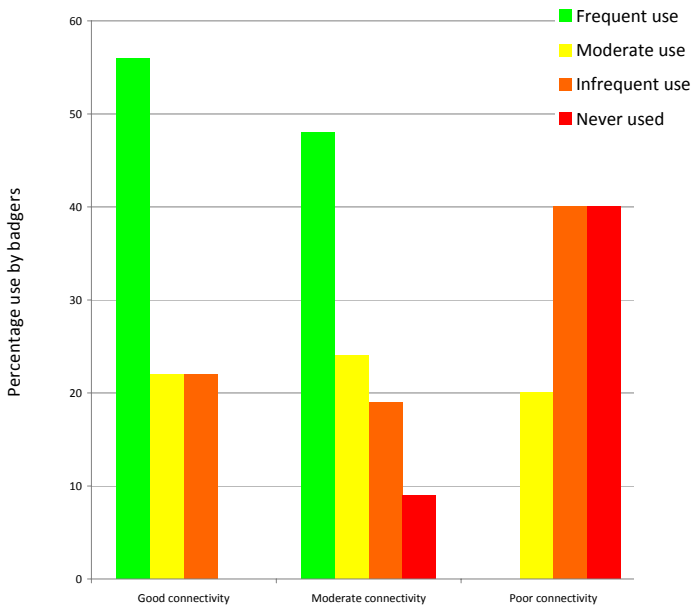


***Figure 3. Tunnel use by badger in relation to habitat connectivity***

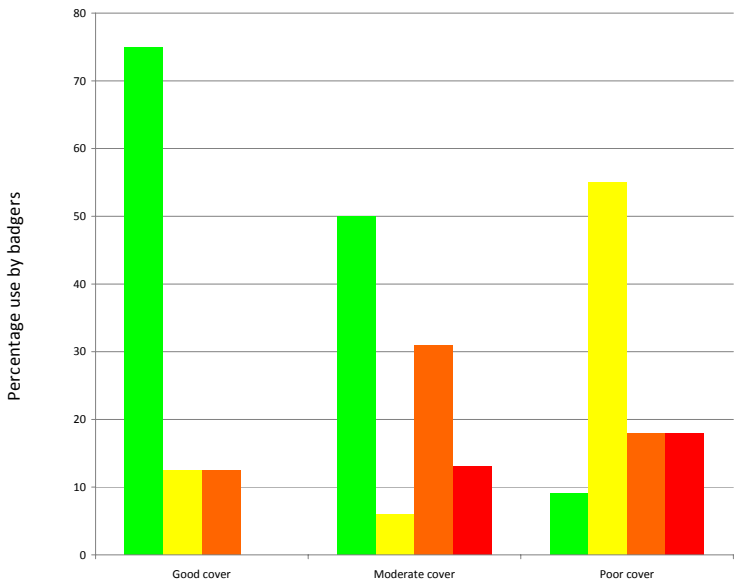


***Figure 4. Tunnel use by badger in relation to vegetation cover at tunnel entrance***

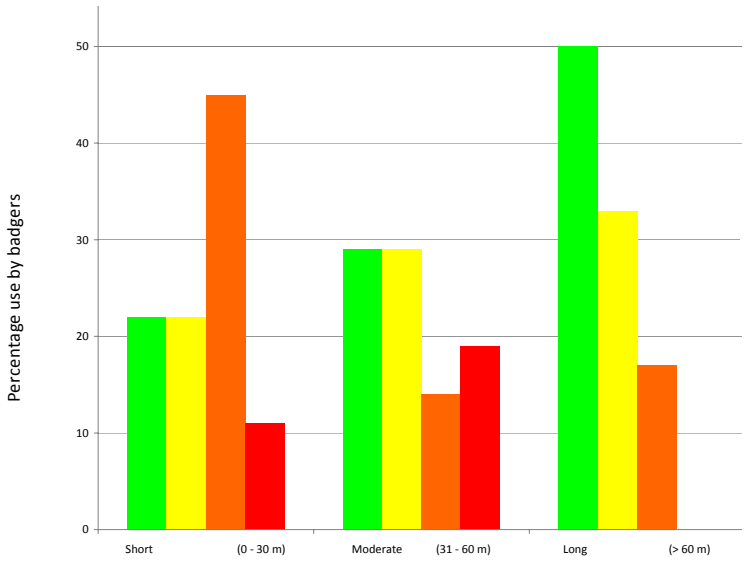


***Figure 5. Tunnel use by badger in relation to tunnel length; no correlation between tunnel length and badger use was apparent***

treading on them, placing mats further in the tunnel entrance (out of direct sunlight or rain), making drainage holes and more regular monitoring (every 3-5 days instead of every seven days).

The use of motion-activated cameras at two sites did not identify any additional species than those identified by the clay mats. There were occasions when a camera did not pick up mammal activity, through malfunction. However, the camera did provide some excellent images of badger and otter using the tunnels (Figures 6, 7 and 8).

### Other Observations

A number of other interesting observations were made. In some tunnels, prints were sometimes recorded in one direction only. This suggests that badgers use tunnels to access feeding grounds, subsidiary or outlier setts; consequently, they may not return the same night (or for several nights). Alternatively, badgers may be using other means of returning, such as other tunnels or bridges, or directly over the road.

At three of the tunnels (on the A5 and A6), badgers had pulled bedding into the tunnels. This suggests they use tunnels as resting sites as well as underpasses. In one case, the tunnel was blocked at one end by a large boulder making it impassable to badgers, but prints were recorded regularly at the open end of the tunnel and badgers appeared to be using the tunnel as a sett.

## Conclusions

The results indicate that badgers used tunnels installed under the study roads. Therefore, tunnels help mitigate the effects of habitat fragmentation resulting from new road developments. Tunnels provide safe passage across roads for several mammal species, particularly badgers: 89% of tunnels monitored were used by badgers and 92% were used by a wider range of mammals.

Clay mats are an efficient and cost-effective means of monitoring mammal use of tunnels. This monitoring method has some limitations. For example, it cannot be used to assess the actual number of individuals using a tunnel over a given time period nor take account of changes in tunnel usage due to seasonal differences in the use of different foraging areas.

In terms of the efficacy of tunnel design advice (Highways Agency 2001), the results suggest that to maximise the likelihood of use by badgers, the tunnel should incorporate adequate drainage and the tunnel diameter should be at least 600 mm; a tunnel of smaller diameter is less likely to be used and poor drainage greatly reduces tunnel usage. Tunnel material does not appear to affect use – there were no differences in the regularity of use between concrete and corrugated iron. Tunnels should ideally be located where existing habitat connectivity is good, with vegetation providing some cover around tunnel entrances, in order to increase their suitability for use by badgers and other mammals as underpass structures. Although not investigated here, it is likely that a tunnel located on or close to an existing well-used badger pathway is more likely to be used by badgers.

The results do not indicate that the current guidance for badger tunnels within the DMRB (Highways Agency 2001) should be amended. However, the results emphasise the importance of some elements of the design of these structures. Good mammal tunnel design should optimise the factors that have been shown to be important in this study in order to maximise the suitability of tunnels under roads for use by badgers and other mammals and to increase the likelihood of their success as a mitigation measure for habitat severance by road schemes.

***Figure 6. Motion-activated infra-red camera pictures of badger using a tunnel on the A5 Nesscliffe Bypass from motion-activated cameras***

***Figure 7. Motion-activated infra-red camera pictures of badger using a tunnel on the A5 Nesscliffe Bypass from motion-activated cameras***

***Figure 8. Motion activated infra-red camera pictures of otters (bitch with two cubs) using a tunnel on the A590 High and Low Newton Bypass***

## Acknowledgements

This study was undertaken by Atkins Ltd. as part of the Highways Agency contract number 514917. We thank Sheena Crombie of the Highways Agency, Atkins colleagues for undertaking the field monitoring and John Box CEnv FIEEM for providing a critical review of the script. A version of this paper was originally published in *Conservation Evidence* 2011, **8**: 53-57 (www.ConservationEvidence.com) and their permission for publication here is gratefully acknowledged.

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# Accessing Biodiversity Data for Desk Studies

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*Data Access Officer, NBN Trust*

**The National Biodiversity Network is a partnership of organisations committed to developing tools and standards for the collection, collation and exchange of the UK's wildlife information and to improving public access to it. The NBN Gateway is a powerful resource, providing access to an ever increasing amount of data on the distribution of species, habitats and protected sites. While use of the Gateway is free, the information shared is owned by the data providers and its use is governed by Terms and Conditions and may be restricted by access controls. These necessary restrictions can impede use of the Gateway by ecological consultants as a source of data for desk studies, but innovative use of new technology by local record centres is ensuring that consultants and their clients benefit from full access to the biodiversity data shared through the Network.**

Since its foundation in 2000, the NBN partnership has been particularly successful at improving access to wildlife records. The NBN Gateway now facilitates access to over 67 million species records including over 14.5 million records of protected and BAP species, as well as 94 geographic datasets comprising habitat and site boundaries that can be used to contextualise and filter species records. These data are supplied, administered and regularly updated by over 130 data providers, who include local record centres, national recording schemes and Government agencies.

Building on the achievements of the past decade, the NBN Trust has launched a strategy for the development of the Network over the next 10 years. This strategy focuses on increasing the use made of the NBN and its data at a national and local level for operational nature conservation delivery, strategic assessment of biodiversity trends and threats, regulatory control and spatial planning[1].

The sharing of data through the NBN Gateway is based on mutual trust and underpinned by the NBN Data Exchange Principles, which state that biodiversity data should be made available to support not-for-profit decision-making, education, research and other public benefit purposes. However, although many species records are collected by highly dedicated volunteer recorders, these records are not 'free' because considerable investment is required to maintain the infrastructure that supports biological recording effort and makes this valuable data resource available for wider use. The Data Exchange Principles therefore also acknowledge that data users should contribute financially or in kind to sustaining the provision of biodiversity data, and that data providers should arrange resourcing to cover their operational costs and ensure that charges for commercial use are realistic and do not prevent the use of biodiversity data.

Local records centres play a vital role in the NBN by supporting and guiding local biological recording effort, managing and quality controlling species and habitat records and ensuring that biodiversity data are used to inform local decision-making. Local record centres are run on a not-for-profit basis and rely on income from data provision to maintain the services that they offer to data users and data providers. Most data providers are not under any obligation to share data via the Gateway and if they believe that doing so could result in environmental damage or undermine their ability to fund their operations, they are likely to withhold or withdraw data.

For this reason, it is a fundamental feature of the NBN that data providers retain ownership and control of their data. The NBN Gateway Data Access Controls and Terms and Conditions have been crucial to developing the Network and encouraging data sharing over the last 10 years. Their role in sustaining data provision is likely to become even more important in the future, as new technologies facilitate


***Figure 1. GiGL's planning portal which enables users to screen planning applications against biodiversity information held in GiGL's database and the NBN Gateway***

innovative data use for non-profit and commercial purposes, in accordance with the NBN Trust's strategic aim to increase the use of biodiversity data.

Unfortunately, from a consultant's point of view, the Data Access Controls and Terms and Conditions mean that the NBN Gateway is not as useful a resource as it could be. Key points for environmental consultants to note regarding use of data from the NBN Gateway include:

- You cannot use data from the NBN Gateway for commercial purposes, such as in a desk study for a client, without first obtaining written permission from all the data providers.
- You must credit all data providers if you use data from the NBN Gateway in any printed or electronic document, such as a survey report for a client.
- The majority of species records on the Gateway are available to the public at 'blurred' resolution. For example, a record captured at 100 m resolution might be shown at 10 km resolution, which is not precise enough to support development control decisions and might not be sufficient to demonstrate the requirement for a survey. Users can apply to each data provider for access to their data at higher resolution.
- Important attribute data, such as the number of individuals recorded or the habitat in which they were found, might not be made publicly available on the Gateway. Again, users can apply to each data provider for access to this information.
- The NBN Gateway does not provide access to all the available species records for a given area, so it is not acceptable to reference a Gateway data search in a report as evidence for absence of a species.
- Although the NBN Gateway is updated every month, many data providers update their datasets on the Gateway only once a year or less frequently.

Using the NBN Gateway at public access level as the sole source of evidence in a desk study therefore not only contravenes the Terms and Conditions unless written permission has been obtained, it is not ecologically sound practice and could expose your client to litigation. The NBN Trust is making every effort to clarify the Terms and Conditions and to raise awareness of the implications of the Data Access Controls. Improved

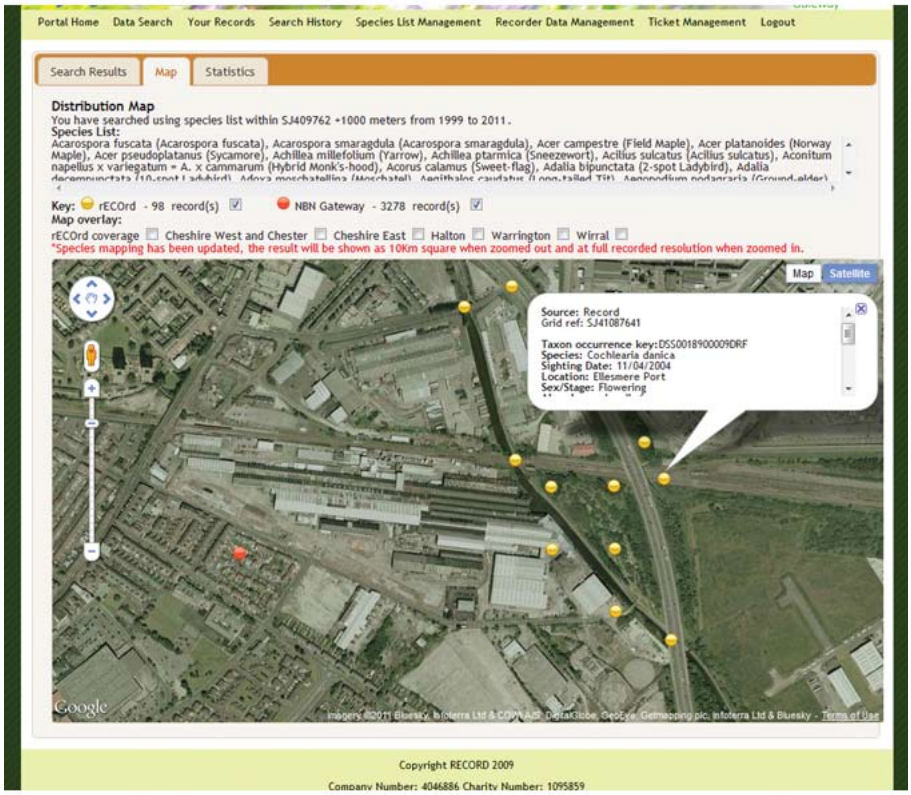


***Figure 2. RECORD's Data Portal, showing species records from the NBN Gateway as red points and those from RECORD's database as yellow points***

'signposting' and *caveats* for data users have been added to the Gateway, while guidance and case studies on commercial use of Gateway data are available on the new NBN website. The NBN Trust and ALERC (Association of Local Environmental Record Centres) are working to develop a training course on biodiversity data access and use for inclusion in IEEM's Continuing Professional Development programme in winter 2012-13.

But if the Terms and Conditions are adhered to, can the Gateway ever be more than just a 'reconnaissance tool' for consultants? Yes! The good news is that key user groups have developed decision-making tools 'powered by NBN' which use NBN Web Services to stream live data from the Gateway into their systems so that the records can be applied to particular uses[2]. The following examples illustrate the innovative use of Web Services by local record centres to enhance the data services they provide to clients.

## Data Searches

*The **North and East Yorkshire Ecological Data Centre (NEYEDC)** has already implemented the technology to incorporate Gateway data into their standard data search product. This service has been developed in partnership with the **Yorkshire and Humber Environmental Data Network (YHEDN)**. They are now working on incorporating this functionality into their automated MapInfo-based data search tool for use by data centre staff.*

*A key factor in this process is putting appropriate administrative systems in place to ensure that NEYEDC has documented permission from the relevant NBN contributors, and copyright holders of the source data, to pass the queried data on to third parties for use in commercial practices.*

***RECORD**, the Local Biological Records Centre serving Cheshire, Halton, Warrington and Wirral, also use NBN Web Services in a data portal which enables users to interrogate their database alongside data from the Gateway. The inclusion of Gateway-derived data contextualises and complements the RECORD dataset, creating a true 'one-stop-shop' for biodiversity data in the Cheshire region. RECORD staff provide users with a log-in account, which enables them to access the data and to view statistics on their account usage and search history. Users can define a search area by entering a grid reference and adding a buffer if required, or they can search the entire dataset for a single species or for a group of species, such as bats, invasive non-native species or species*

*of conservation concern. The search results can be filtered by date range to ensure that only recent records are captured. The data are provided in tabulated form, showing RECORD data and Gateway-derived data in separate tables. The user can view one or all of the records on an interactive map, with the points colour-coded to show which data source they originate from. RECORD continue to develop and improve their portal in response to user feedback. The next big development will be to enable online verification by local experts, ensuring that RECORD hold the highest standard of data possible.*

*In neighbouring Liverpool,* ***Merseyside BioBank*** *have carried out considerable work over the last 18 months to improve the quality of the data services that they provide to consultants, including standardising their search procedures and where possible automating them. They now have a high quality product that integrates the habitat, species and second tier sites data that they hold; their next step is to integrate data from sources other than those that they manage and curate locally, most notably species data from the NBN Gateway. They aim to do this by incorporating NBN Web Services into their own data request tools which are written in VB.Net. Merseyside BioBank have secured permission from a number of major data providers to use their data in this way and will continue to seek permission from others. Having successfully tested their ability to use Web Services during a recent project for the collation of marine data, Merseyside BioBank are now pressing ahead with the development work to incorporate Gateway data into all data searches and aim to complete this by Spring 2012.*

## Local Wildlife Sites Data Management and Reporting

***Yorkshire and Humber Environmental Data Network*** *is working in conjunction with statutory agencies, local record centres and local sites partnerships to facilitate the standardisation of key aspects of the second tier site systems.*

*Second Site is a flexible database framework developed by the YHEDN to manage data on second tier sites and can be customised or extended to manage many other types of spatial and ecological data. Second Site will be made available free to download 'as is' without support. If there is sufficient demand, YHEDN will look into putting appropriate support mechanisms in place.*

*NBN Gateway species data can be queried from within Second Site, allowing designating authorities to assess sites according to all widely available data. This will allow users to produce citations based on the point in time when the site was designated as well as reports based on current information. This should help to provide a picture of the condition of the site over time.*

## Planning Application Screening

*Working in partnership with Natural England,* ***GiGL (Greenspace Information for Greater London)*** *developed a tool to enable Local Authority planners and ecologists to screen planning applications for biodiversity interests, highlighting those which require further ecological surveys. The tool is based on the Association of Local Government Ecologists' guidelines for screening planning applications for biodiversity and geodiversity conservation. It uses NBN Web Services to access data from the Gateway alongside data from GiGL's in-house database, ensuring that all applications are screened against the best available information on species, habitats and local wildlife sites. The tool uses this information to provide the user with case-specific guidance on their statutory duties and signposting to further relevant advice or survey requirements.*

The NBN Gateway development team recently released a suite of Web Mapping Services (WMS) which enable local record centres to bring NBN Gateway data directly into their GIS for analysis alongside information from their own database. Both Web Services and WMS allow users to benefit from any improved access agreements they have negotiated with the data providers, enabling them to view and use more detailed and higher resolution records than are available to the general public. This is an important point, because negotiating with local and national data providers for authorisation to access and use their records and maintaining documented policies and procedures for data use are key areas of local record centres' work.


***Figure 3. Record of European adder*** **Vipera berus** ***supplied to the NBN Gateway by the Environmental Record Centre for Cornwall and the Isles of Scilly (www.erccis.org.uk). The record is shown on the NBN Gateway Interactive Map at the public access level of a 10 km square.***


***Figure 4. The same adder record from Figure 3 shown at full resolution on the NBN Gateway interactive map. In order to see the record at this level of resolution, the data user would need to apply to the data provider (ERCCIS) for better access.***

The case studies above are just a few examples of how local record centres are pioneering the use of NBN Web Services to ensure that local decisions about land use change and land management are based on the most complete, up-to-date and precise biodiversity data available. In the past, these types of solutions were often developed in isolation. Now, thanks to ALERC, technical innovations are being shared more widely throughout the local record centre community.

Defra recently issued a new contract for the development of the NBN over the next three years to 2014. It is a priority under this contract to improve data exchange between local and national data managers via the Gateway and to help local record centres use Web Services to incorporate Gateway data into data searches for clients, alongside species, habitat and site data from their own database. As well as providing a more standardised and comprehensive data service to consultants, the use of Web Services can also help local record centres to fulfil important criteria under the new ALERC accreditation system, which states that local record centres 'need to demonstrate that they can generate comprehensive data products and services to meet user needs... the innovative use of Web Services and similar arrangements will be encouraged'[3].

The NBN is still a relatively new concept and the relationships, business models and technologies within it are evolving rapidly. Ecological consultants have a key role to play in the NBN as data users and, increasingly, as data providers. We appreciate that more needs to be done to facilitate consultants' engagement in this data sharing matrix, and the NBN Trust is working with IEEM and ALERC to achieve this.

The NBN vision is to make all biological records freely and easily available to everyone and the partnership is striving to achieve a funding model that could make this possible. In the meantime, existing business models must not be undermined as this could jeopardise the very future of the NBN. Local record centres are an integral part of the National Biodiversity Network; they represent the local delivery of the NBN vision[4]. The NBN Gateway is not a substitute for the data services provided by local record centres, but it can enhance these services ensuring that ecological consultants benefit fully from the achievements of the NBN and helping to achieve the NBN's strategic objective of increasing the use of biodiversity data.

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## Author

As Data Access Officer for the NBN Trust, **Paula Lightfoot** provides best practice advice on policy, standards and tools to help organisations throughout the UK to share and use biodiversity information.

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# The Importance of Data Sharing… A Consultant's View

*Lisa Kerslake CEnv MIEEM*
*Swift Ecology*

**Paula's article is timely, and it is good at last to see the improvements that are being made in this field. IEEM is playing a key role in this through working with the main parties, including NBN and ALERC. A preliminary meeting (convened and chaired by IEEM) was held in May 2011, and further meetings are planned.**

Nevertheless, problems remain. Last week, for the third time in two years, I received a Local Records Centre (LRC) data search that consisted exclusively of data I had previously provided to the LRC, returned to me in tabular form, for which privilege I was charged the standard fee. The next day two further data searches for other sites in the same LRC area came back with no data at all, in each case with the same fee payable.

Now, before I get any irate correspondence in response to this, I should point out that I used to run a record centre; I fully understand that the charge is for the staff time and not the data; but it is difficult enough persuading a client to pay for the data search in the first place (which is usually at least 15% and sometimes as much as 40% on top of the fee for a simple initial bat survey) – and then you tell them that they have just paid for nothing. Try doing this time and time again and not becoming just a little jaded.

Frustrating as this is, I found myself wondering, and not for the first time, how on Earth the LRC can hold so little data in an area where I could reel off the names of 20 local ecological consultancy companies without even having to think about it? I know that we are not the only consultancy to have done surveys in this area in the last few years – so why has none of the data collected been made available to the LRC?

The most common excuses given by consultants for not passing on data to record centres are:

### 1) The client won't agree to it.

This is demonstrably incorrect in the majority of cases. Many consultancies put a clause in their Terms and Conditions (or in their fee proposals if there are company T&Cs that can't be easily altered) that clearly states they give their records to the LRC and if the client has any objection to this then to let them know (a suggested clause is given in the new *Professional Guidance Series no. 7 – Model Service Agreements*, which is available in the members' section of the IEEM website). In the case of my own company, in nearly five years of operation on this basis only one client has objected, and then only until planning permission was granted, after which he was happy for the data to be released. If this is not already standard practice in your company then it should be; you have nothing to lose. If clients do object you are still giving them the chance to do so, but I guarantee that many – probably the majority – will not. There should be a presumption of data being made available to the LRC unless the client specifies otherwise.

### 2) It's too time consuming as there is no simple or standard way of doing so.

It is recognised that this can be a problem, and there are developments in the pipeline that should make the practicalities of passing on data a lot easier in the future. In the meantime, in my experience most LRCs are pleased to receive data in almost any format (although it is best to check with them first), and sending in data is a good job for those quieter winter months; no-one is suggesting the records must be passed on the minute the survey is complete.

Consultants are fond of bemoaning the failings and inconsistencies of LRCs, whether this is in relation to charges (especially for cross-boundary searches or where all data is not held in one place), time delays, lack of data or poor quality of data, and the absence (in most cases) of any means for those consultants who do supply data to receive something in return. These are all valid concerns that must be addressed. However, in terms of poor quality or lack of data, we really have no basis for complaint if we are not helping to improve the situation by providing good quality data ourselves; the LRC cannot supply it if they don't have it.

Finally, remember that it is stated in our *Code of Professional Conduct* that we should make data available to the relevant bodies wherever possible – that alone should be sufficient incentive!

*These views are my own and not those of Swift Ecology.*

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# Bats and Hedgerows – Are Bat Surveyors on the Right Track?

*Phil Richardson*
*Bat consultant and conservationist*

**There is a general belief that bats are closely linked to hedgerows when foraging and traversing the countryside, which, although sometimes true, is certainly not always true and can lead to incomplete surveys and poor mitigation.**

I am asked by a number of local planning authorities to comment on applications where bat surveys are involved, so have read a large number of survey reports. These have given me a good insight into a number of misconceptions about bats across the profession. My own experience of bats is based on extensive fieldwork on bats for many decades, especially in the UK.

In the UK we have at least 17 species of bats and each has a different lifestyle. I have been studying one, the Daubenton's bat, in depth since 1980 and am still discovering new twists to its complex and little understood life. It seems to take a lifetime to really understand one species. There has been a huge upsurge in the number of ecologists carrying out bat surveys for developers, especially in the last 10 years, so their experience of any one species is bound to be limited, yet they are trying to survey for 17 different species, of which a number of ecologists have limited or no experience. To be fair, I have read some excellent survey reports, but some others are truly wanting. In most cases no-one will ever be the wiser – the client reading the report will not know, and bat experts are few and far between within council planning offices or even in a number of Statutory Nature Conservation Organisation (SNCO) offices (the latter have to deal with all Protected Species, so are never going to be experts on all). Sadly this also means that the surveyor or the contracting company is no wiser of the mistakes, either. Too many ecologists work in isolation and rarely have the time or resources to meet others and expand their knowledge. The IEEM does a great job trying to alleviate this problem through its newsletters and conferences, so I am pleased to have this opportunity to make bat surveyors think a little differently about what they do. My concern is for the bats, as a poor report and unsuitable mitigation is another nail in the coffin of bat populations locally or nationally. This article looks at just one widely propagated misunderstanding – bats follow hedges.

Bats **are** attracted to hedgerows… but by a varying amount by different species, at different times of the night, at different periods of the year and for very different reasons. Unfortunately it has become a belief that hedges are the way by which all bats traverse all countryside, and where they all feed. Experience of working with many species in many habitats in all areas of the UK and using many different tracking methods has shown me that bats roam freely across the landscape. Nevertheless there are reasons why bats may sometimes be found along hedgerows.

## Foraging

UK bats feed principally at night on flying insects, although some glean them from surfaces or pounce on them on the ground.

### Hedgerows as a Food Source

Hedges are a good source of insects so important for a number of wildlife species. It makes sense, at face value, that hedges would be important for bats, too. A little thought and the flaw in the assumption becomes apparent. Firstly, a large number of creatures that eat the insects associated with hedgerows do so before the insect matures. Tits and warblers, for instance, will feed on insect larvae taken from the underside of leaves. Wrens and shrews will forage for ground insects in the hedge bottom. When it comes to bats the link is less clear cut. Once insects have matured to the flying stage many are far from fixed to the hedge, and it is the adult insects that are preyed upon by bats. It is true that some flying insects may be found resting on leaves, flying just above the hedge or on the lea-ward side, so some bats of some species will forage by a hedge. Insect dispersal does occur, however, and is often wind and heat assisted. Insects that have started life in the hedge may be found many kilometres away depending on the wind speed, temperature and topography. In many cases the insects have little choice, and are picked up and deposited by the air movements.

### Actual Foraging Sites for Bats

Judging an area of land as being good or bad for bat foraging by looking at the habitat present is, therefore, not as straightforward as it would be when judging it for many other wildlife types. The food supply for bats may originate from a hedgerow… or woodland or lake upwind, but the bats' foraging grounds may not have any of the traditionally accepted features of 'good habitat'.

We now know, for instance, that some of the greatest numbers and concentrations of flying insects are to be found drifting over in a thick band 200 m or more up above the ground – and they are all a long way from their origins, concentrated by temperature conditions and moved by prevailing winds[1]. At ground level, transient features can produce concentrations of insects - dung heaps, grazing animals, freshly spread manure, a freshly cut hay field. Topography can produce foraging surprises, such as a depression in a ploughed field that affects the air currents and concentrates the airborne insects, or the sheltered side of a ridge above a crop that has little relevance to the insects. When did you last survey and record the topography of the land as part of your bat survey? To me, one of the most telling studies that shows we have to change the way we think about bats' foraging areas was carried out in Scandinavia where bats of 10 different species were observed foraging on flying terrestrial insects

(and spiders) up to 10 km out over open sea. The insects had drifted out there on the breeze, and the bats had followed to feed[2].

It may give a little insight into where the flying insects occur if we watch birds that prey on flying insects. Swallows and house martins are usually found 3-30 m up over fields, swooping down low to ground level when feeding over grazed pastures. No link there to hedgerows. Note how their height of flight changes with weather conditions, too. Can we assume that the same occurs with bats? Swifts feed even higher. It is amongst swifts that noctules have been regularly seen at sunset, joining in the same aerial feast with no apparent link to the specific habitat below, so may be over cities, fields, moorland or the coast. Doubtless they are still up there foraging when it becomes too dark to see them.

### Wind Shelters

Hedges can provide good shelters from a breeze, and insects can then build up in numbers (with the insects perhaps coming from an up-wind crop, water body or woodland). This can produce concentrated foraging for bats. Some hedgerows are better than others at producing the shelter effect and this links to the shrub species present, and the density, height and width. There are other shelters that can be just as effective, such as buildings and structures, woodlands and deep valleys. When surveying, try to distinguish those hedges that are acting principally as shelters, rather than food sources, which may relate to their alignment, the surrounding land use and topography. Remember, too, that some species of bats are less interested in swarms, more in catching single, large insects.

### 17 Bat Species, 17 Different Ways of Foraging

Some bats **do** forage over and around hedgerows, but not at the exclusion of all else, and it varies with the species as well as the time of year with plenty of examples in the literature of bats feeding away from hedgerows. High-flying species such as Leisler's bat *Nyctalus leisleri* and noctule *N. noctula* have rarely been shown to have an interest in hedgerows. Serotines *Eptesicus serotinus* often feed out in open areas over meadows and pastures. We know that greater horseshoe bats *Rhinolophus ferrumequinum* feed on dung beetles out in open pastures at some times of the year, and lesser horseshoe bats *R. hipposideros* have been seen feeding on insects around the heads of cattle in open fields. Daubenton's bats *Myotis daubentonii* feed principally on insects taken near or from the surface of water, but have been seen foraging over fields downwind of a water body. Natterer's bats *M. nattereri* may hunt low over meadows, and brown long-eared bats *Plecotus auritus* forage in parkland and orchards. Recently I have heard of two radio-tracked Bechstein's bats *M. bechsteinii*, a species that is supposed to restrict its foraging to areas close to its roosts in woodland, flying around in open countryside with barely a hint of a hedgerow. Why bat surveyors forget about the multitude of similar examples of bats feeding away from hedgerows is hard to understand.

### Summary

To discover foraging areas for bats in a landscape then unbiased transects are required. Too often I see in survey reports every transect following a hedge line. The surveyors' results will certainly reinforce the idea that bats were only found by the hedgerows… since they didn't look anywhere else. The hedgerows are just one possible foraging area, others may be found if the surveyor can have the insight to look elsewhere, perhaps taking note of sheltered areas created by the land shape, other sources of insects up-wind and the possibility of the many transient sources and attractions for insects at different times in the year.

## Commuting Route Markers

Bats navigate their way around an amazingly large area of countryside at night using many skills and senses. Confusion occurs amongst some bat surveyors because bats are known to echolocate and so there is an assumption that echolocation is their principle navigational method. Bats' echolocation is, however, distance-limited, with some species only able to use it effectively over a few metres, others up to perhaps 5 or 10 m. This is good for insect-locating, but not much use for navigating many kilometres across the countryside. Some ecologists seem to believe that bats follow hedgerows at night because they can 'see' these with their echolocation, so follow them to navigate by, rather like trains on a track. The outcome of such weird reasoning results is some rather odd bat survey reports and suggested mitigation. For example, at one potential wind farm site bats commuted right across the site and would have been at risk from the turbines. The mitigation suggested was simple: since bats follow hedgerows, plant a hedgerow in a curve around the wind farm site, so leading the bats away from harm! Experience shows this is not how bats work. By radio-tracking and light-marking bats one quickly sees that they travel anywhere across the countryside, and hedgerows are not always the primary route.

Also it is important to ensure it is the hedge the bats are following. Sometimes the route used by bats may happen to have a hedge along it, but may be the most direct path, following a contour or some other factor unrelated to the hedge.

### Bat Navigation

So how do bats navigate? And those Scandinavian bats way out at sea discussed earlier[2] – how did they find their way? Well, at least we can forget about echolocation and hedgerows in that example!

Eyesight is a much overlooked sense, but bats use it to determine height above ground, position of large objects around them, location of and routes to favourite places, and also to guide them across the countryside by seeing distant landmarks that stand out at night such as a church spire, a tree in the middle of a field, a telegraph pole on a hill… or a wind turbine on a ridge.

Recent work on greater mouse-eared bats *Myotis myotis* in Germany has shown that they have magnetite in their brains and can orientate themselves with the Earth's magnetic field, with local adjustments made by noting the position where the sun sets in the sky[3]. This is likely to be present in other bats species, too. Navigation by magnetism isn't just useful for long-distance migration: the Earth's magnetic field strength has local variations on the surface due to different underlying geology, and so can be used as a precise local navigation aid when coupled with eyesight and the long-lived memories of bats.

### 17 Bat Species, 17 Different Behaviours

Some species, particularly the horseshoe bats, do follow hedges (or other linear features across the landscape) especially when they first emerge from their day-roosts whereas some other species have almost no links, such as noctules. Never assume that all species do the same or that behaviour doesn't change during the night and during the season.

## Summary

Bats may appear to follow hedgerows at night as they traverse the countryside, but they also cross open areas. Some bats that are apparently following a hedge may be just choosing the shortest route or heading to a distinctive tree in the hedgerow used as a navigation aid. Different species follow hedgerows by different degrees and at different times of the night and year. A proper commuting survey needs to be carried out to determine if a hedgerow is really part of the route.

One final point here - gaps in hedgerows. There has been much academic discussion about how big a gap can exist before the bats can no longer cross. Some have even set down recommended distances. Just spend more time out in the field watching bats and realise the nonsense of this for most species for much of the night.


## Territory Markers

Bats, like all other mammals, do have territories, but they are very difficult to determine and to categorise, more so than terrestrial mammals. They may link to a foraging area, to males and their mating areas or strategy, to a roosting site or to a colony boundary, or to other, as yet unrecognised, functions. Watching flying bats one soon recognises certain landscape features that bats use to mark a turning point when foraging or flying territorially. These may be an isolated tree or a telegraph pole protruding from a hedge, the gap in the hedge, a hedge junction or some other feature that is visually apparent at night.

My plea, then, is for deeper thought about bats and hedgerows when surveying. Discover if, how and when the hedge is used, and by which species, and by what degree, and do not forget about all those other features in the landscape that influence bats.

One final point is the difficulty with suggesting suitable bat mitigation or enhancement at development sites. Hedgerows may seem a great idea as they are not too expensive to plant, and good for other wildlife too. It looks like you (and the SNCOs monitoring the application or issuing licences) are doing something for bats, but is such mitigation really helping bats if bats are not as fixated with hedgerows as bat surveyors?

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***Pipistrelle bat*** ***Photo: Nick Jackson***

# IEEM Autumn Conference 2011: Rebuilding Biodiversity

*Becky May AIEEM*
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**The IEEM Rebuilding Biodiversity Conference was a timely event, given the significance of 2011 for new government publications on the natural environment such as the Natural Environment White Paper for England, the England Biodiversity Strategy, the Welsh Natural Environment Framework *A Living Wales* and the UK National Ecosystem Assessment. The wide range of presentations enabled attendees to reflect on the opportunities and challenges emerging from these, and other recent publications such as *The Economics of Ecosystems and Biodiversity* (TEEB) report, the *Making Space for Nature* review and the Localism Bill. With all this change being set against a difficult economic climate and an uncertain future of planning policy, these are challenging times for our sector, and many important issues were tackled throughout the conference.**

The conference took place in Liverpool on 2-3 November 2011 and attracted more than 230 delegates. The conference addressed important questions for our profession, such as how to derive positive outcomes for biodiversity despite a noticeable shift of government emphasis away from protection of the natural environment and towards development and economic recovery.

IEEM were pleased to welcome **Hugh Laxton** from the UK Nature and Landscape Office, Brussels, to start off the conference on Wednesday. Hugh provided a European context for the current changes in biodiversity policy by outlining the key principles of the European Biodiversity Strategy, which was published in May 2011. Hugh described how the success of the EU Biodiversity Strategy will depend on its targets being fully integrated with the objectives and measures of the EU policies. Similarly, he warned that the financial resources required to deliver the Strategy will need to be found from budgetary allocations, to be agreed as part of the next EU Multi-Annual Financial Framework, commencing in 2014. Therefore the next two years will be a critical period for the nature conservation community to ensure that both the measures and necessary funding are in place to ensure that the EU Biodiversity Strategy can be achieved.

After Hugh's presentation, there then followed a Statutory Agencies Panel Presentation and Discussion session. Representatives from Natural England (NE), the Countryside Council for Wales (CCW), Scottish Natural Heritage (SNH) and the Northern Ireland Environment Agency (NIEA) were all given the floor for a 10-minute presentation to outline their respective approaches towards implementing new nature conservation policies and delivering biodiversity gains. There then followed a panel discussion, with questions from the floor. First to present was **Pete Brotherton**, who provided an overview of the recent changes to biodiversity policy in England from the Natural England perspective. Pete stated that the priority actions that are required to save biodiversity are to take proper account of the value of the natural environment in all decisions and to establish coherent ecological networks, both terrestrial and marine. The key provisions that will be required to meet delivery outcomes will be utilising a more integrated landscape-scale approach, establishing Nature Improvement Areas (the competitions to decide on the final twelve is currently underway) and to identify new markets for ecosystem services.

Second to present from the panel was **David Parker** from CCW, who began by reminding the audience that, although the individual government agencies were each presenting their own approach, the agencies were also working together to deliver biodiversity outcomes. David then went on to explain Wales' approach to delivering the outcomes of the Welsh Natural Environment Framework, 'A Living Wales'. Like other agencies, CCW is taking an ecosystem approach. David stated the importance of having a reliable body of evidence in place – also known as 'biodiversity mapping'. Wales is fortunate to have a complete Phase 1 habitat survey of its land, as well as a complete inter-tidal survey. David explained that the whole ecosystem resource first needs to mapped in this way, then this information used to highlight priority areas for conservation and then to determine from these areas the most critical areas (where significant biodiversity loss requires immediate attention). David also highlighted that marine survey work is significantly behind terrestrial survey information.

***Figure 1. Delegates at the conference dinner***

Next to speak was **Roddy Fairley** from SNH. Roddy explained that SNH has not yet published its biodiversity strategy for Scotland, but work is underway. Nevertheless, Scotland is moving to deliver on the EU 2020 targets and is focusing on natural capital as a means to do so, for which the government has started created an index. Ecosystem health and adaptive management will underpin the forthcoming strategy. The strategy will focus on areas such as mainstreaming of land-use policy, forest expansion, a wildlife management framework utilising a triage approach, citizen science and surveillance (creating an evidence base). In the meantime, existing documents are still being used such as the National Planning Framework, the Marine Act (2010), the Climate Change Act and the recent Wildlife and Natural Environment Act (2011).

Finally, **Mike Meharg** from NIEA took the stage to highlight Northern Ireland's current approach to delivering biodiversity gains. Mike admitted that Northern Ireland is playing catch-up with the rest of the UK in terms of its nature conservation policies. Its existing Biodiversity Strategy is fixed until 2015, although it lacks information on climate change and marine areas, and is in need of improvement. Mike highlighted that a lot of cross-border nature conservation work is carried out with southern Ireland, especially where site designations and species or habitat action plans cross the border. Mike also stated that Northern Ireland wants to improve its treatment of marine areas by setting up a marine unit within the agency. The NIEA is investigating using an ecosystem approach and is reviewing its wildlife legislation through the Wildlife and Natural Environment Act (2011). Mike also highlighted the challenge of particularly tight budgets in Ireland, which causes additional challenges to Ireland's abilities to meet targets.

A lively panel discussion then ensued, covering topics such as whether the increased devolution of powers affects the ability of cross-agency working, and the need for there to be a renaissance in soil science, as soils underpin all biodiversity.

The panel discussion was followed by the summaries of the finalists of the IEEM Tony Bradshaw Best Practice Awards. Please see pages 35-37 for more information.

The Institute's Annual General Meeting took place before lunch. Please see Institute News on page 44 for more information.

In the afternoon, conference delegates had the option of going on one of four outdoor excursions in the local area, or staying in the hotel to enjoy any of the three alternative indoor seminars. Outdoor excursions included a very popular trip to the **National Wildflower Centre**, which was led by **Richard Scott** of Landlife. Other delegates attended a tour of the **Bold Forest Park** at St Helens, led by **Rick Rogers**, Countryside Development Officer for St. Helens Council, which included the opportunity to view a piece of public art of international renown, 'Dream', at close quarters. A tour of the **Liverpool Museum** was also offered, where delegates were shown round the entomology and botany departments by **Ian Wallace**, Curator of Molluscs and Aquatic Invertebrates. Finally, a number of delegates enjoyed an entertaining **cultural walking tour of Liverpool's famous sites**, led by passionate Liverpudlian, **Paul Rooney** from Liverpool Hope University.

Meanwhile, at the hotel, delegates were able to listen to talks by **Claire Costello** and **Susannah Kenny**, from the London 2012 Organising Committee, on integrating biodiversity into the Olympic Park and other associated sites. This was followed by a talk from **Liz Charter**, from the Isle of Man Government, on the challenges of protecting and enhancing biodiversity in the UK Overseas Territories. Finally, a careers forum saw local representatives from ecological consultancy (**Jon Huckle** from Atmos Consulting), local government (**Alun Evans** from Chester West and Cheshire Council), a non-governmental organisation (**John Lamb** from Lancashire Wildlife Trust), a statutory agency (**Sue Slamon** from the Environment Agency) and academia (**Rob Marrs** from Liverpool University) providing a snapshot of their work and the career path they took to get there.

During the evening delegates were invited to the President's Wine Reception, kindly sponsored by Crex Group, after which the main conference dinner took place. After dinner the results of the IEEM Tony Bradshaw Best Practice Awards were announced (please see pages 35-37 for more details) and then attendees were treated to an entertaining after-dinner speech by **Sir John Lawton**, who described his thoughts on ecological networks and the principle of 'more, bigger, better, joined', which form the basis for his 2010 *Making Space for Nature* report.

The second day of the conference began with a lively talk by **Simon Marsh** from the Royal Society for the Protection of Birds (RSPB). Simon acted as an advisor to the Planning Minister during the period that has seen the formulation of the National Planning Policy Framework (NPPF) and the Localism Bill. He therefore offered a unique perspective to highlight the opportunities and threats that arise from this new policy and legislation. Simon highlighted the main political priorities of new policy, including the Big Society and localism, economic recovery and housebuilding, and being the 'greenest government ever'. Clearly the latter two priorities are in direct opposition, which creates huge challenges. Simon then went on to highlight the key issues within the NPPF, namely its focus on sustainable development, despite inconsistent definitions of this throughout the document, and its presumption in favour of development. Simon concluded by saying there are both opportunities and threats from the policy reform, but the situation is complicated by the challenging economic climate. In order to benefit from the opportunities presented by working at a landscape-scale, there will be an increased need for collaborative working between stakeholders.

Next to speak was **Jo Treweek**, who sits on the advisory group for the Business and Biodiversity Offsetting Programme (BBOP). Jo provided a fascinating insight into global biodiversity offsetting practices, which began with clarifying the definition of biodiversity offsetting as 'measurable conservation outcomes' that need to

***Figure 2. Paul Rooney leading his highly entertaining and interesting cultural tour of Liverpool***

***Figure 3. Sir John Lawton with IEEM President, Penny Anderson***

demonstrate a minimum of no-net-loss of biodiversity, and ideally biodiversity gain. Jo higlighted that, although a useful tool, there are certain situations where biodiversity offsetting is not appropriate, such as when the biodiversity being lost cannot be replaced and the impacts of loss are too severe to offset. Jo argued that biodiversity offsetting is of increasing significance as new efforts are required to meet the CBD COP10 Aichi Targets to halt biodiversity loss by 2020. Much work is happening at the international level through BBOP to set global standards for biodiversity offsetting. The UK lags behind other European and international countries by not having a regulation scheme in place for offsetting, but the principle is being increasingly suupported, for example through references to 'no net loss' found within the Lawton report and the recent White Paper, and in the forthcoming NPPF. Jo argued that biodiversity offsetting should help to restore and expand ecological networks but will be difficult to establish without the aid of regional planning policy and the cessation of biodiversity opportunity mapping.

The next speaker was **Andrew Clark**, Head of Policy Services for the National Farmers Union (NFU). Andrew gave the NFU's perspective on the recent Common Agricultural Policy (CAP) reform. The reform is compromised by uncertainty over the EU budget and by its complex political context, as the member states involved have previously utilised different rates of payment. There is more flexibility under the reformed CAP to redress the imbalances in payment between the member states. The change in the reform most relevant to the conference attendees is that some payments are now dependent on 'greening' measures. Greening measures include crop diversification, maintaining permanent grassland and maintaining an ecological focus area (*e.g.* fallow land, buffer strips and landscape features). There are concerns that the greening measures will not actually deliver useful biodiversity gains and Andrew concluded that there is considerable uncertainty over the future impacts of the CAP reform.

**John Box**, an Associate Consultant with Atkins Ltd and the new IEEM President-Elect, concluded the first session by speaking about how the role of translocation needs to be re-evaluated as it can be used as a useful tool to help deliver a 'no net loss' of biodiversity and help to create ecological networks and deliver ecosystem services; all relevant under the recent policy reform. John argued that habitat creation alone cannot produce mature habitats fast enough to replace those habitats lost and instead, habitat translocation can, in many cases, preserve the mature habitat. John also highlighted some important considerations to ensure success, such as making sure that the receptor site has the same environmental context as the donor site, carrying out the work in as short a time-scale as possible (*e.g.* avoiding overnight storage of materials), using experienced contractors, doing the work at the appropriate time of year and building in a monitoring period afterwards. Additional benefits of translocation include having a smaller carbon footprint than the equivalent habitat creation and ensuring that native species of local provenance continue to be used.

The second morning session had a research-based focus. First to speak was **Paul Dolman** from the University of East Anglia, who presented the findings of his and **Hannah Mossman**'s research into devising an evidence base for conservation priorities. Paul argued that, for conservation action to be valuable, it is essential to know the full scope of the species present and their ecology. A lack of this knowledge leads to generic conservation prescriptions that fail to preserve biodiversity at a site. He and Hannah have coined the integration of species-specific needs into conservation priorities as the 'Biodiversity Audit Approach', which they believe to be a cost-effective means of delivering multiple ecosystem services, not just biodiversity. Paul argued that thinking in terms of 'habitats' actually constrains us, and it is better to think in terms of species-specific requirements. Their research has been able to demonstrate this through investigating the full species requirements of different habitats at The Broads. The results have shown that it is not always the wetland habitats that are most in need of conservation, as is often assumed; rather some dry habitats are also of high priority. Paul and Hannah have worked to create groups of species that have shared management needs (they have called these 'Management Guilds'), and this should provide a framework for delivering conservation actions.

**Miklós Bálint**, from the Biodiversity and Climate Research Centre in Frankfurt, then presented the findings of his research on species distribution models (SDMs) and the effects of species' latitudinal range shifts on genetic diversity in the European montane region. His research has found that these shifts in range reduce the genetic diversity and ability to adapt of the species undergoing the shift. When part a population leaves an area they may take much of their genetic diversity with them, especially as it is the older, less genetically diverse, individuals that tend to remain. Latitudinal range shifts will be compressed due to climate change therefore Miklós argues that climate change will considerably threaten intraspecific genetic diversity. Projections of climate scenarios to 2080 show that European montane species are only likely to be able to survive in higher mountain areas such as the Alps and Fennoscandia, therefore these areas will play a key role in the conservation of European genetic diversity.

Following the research element of the conference, **David Stubbs**, Head of Sustainability for the London 2012 Organising Committee for the Olympic Games and Paralympic Games, then began the case study section of the conference, by presenting his experience of integrating sustainable development, including biodiversity, into the London 2012 Olympic Games. London 2012 aims to be the first sustainable games and biodiversity is one of five key themes that will help to deliver this aim. The other themes are climate change, waste, inclusion and healthy living. David provided an inspiring account of all of the means by which sustainability has been put at the forefront of the project planning and implementation, including wide-ranging elements such as procurement, building design, recycling and landscaping. Biodiverse areas such as river banks have been enhanced, and new habitats have been created, such as reedbed and woodland areas.

Starting off the afternoon session, **Roger Morris**, who runs Bright Angel Coastal Consultants, then presented his new thinking on how managed realignment needs to be considered as a means of delivering sustainable coastal defences and flood management, as well as a nature conservation tool. He explained the issues of loss of sediment into deep water as a result of coastal erosion, and highlighted the negative effects that this loss has on our economy. For example, loss of sediment away from the coast leads to the sea having a higher energy effect, and therefore the requirement for more expensive coastal flood defences. In order to address

this loss, he argued that a new approach is required to improve sediment management by creating sediment sinks through managed realignment schemes. He urged the audience to 'think big' (at least 1,000 hectares per project) and to take a 'whole system' approach to combat the threat of losing more of our finite resources of sediment. However, he finished by warning that landscape-scale projects are expensive and suffer from negative public perceptions, therefore it is a challenging way forward.

**Penny Anderson**, who runs Penny Anderson Associates consultancy and is the current IEEM President, then outlined her experience of running the Sustainable Catchment Management Programme (SCaMP) in partnership with RSPB and United Utilities (UU) in upland areas in the Peak District and Bowland Estates. The project arose out of the need to protect the SSSIs that the UU catchments incorporate, as well as to improve water quality. The project uses catchment management techniques, such as grip/gulley blocking, bare peat restoration, stock changes and upland grassland and woodland management to improve water quality, rather than treatment processes. The project has seen significant success, with reduced Dissolved Organic Carbon, raised water tables with lower perturbations and better bog vegetation on grip-blocked blanket bog, reduced sediment loading after bare peat restoration, enhanced vegetation after reduced sheep grazing and early signs of enhanced dwarf shrub heath after restoration measures. The approach is now being rolled out to new catchments.

This was followed by another encouraging case-study of biodiversity gain, presented by **Martin Davies** and **Jess Tyler** of the National Trust. Martin described the Peatlands for the Future project, which aims to restore 3,370 ha of globally important UK peatlands over a period of three years in the areas of Malham Tarn, Abergwesyn, Kinder Scout and Upper Wharfedale. Martin highlighted the measures being taken at Malham Tarn and Kinder Scout to raise water levels and restore natural bog vegetation, including gulley blocking, cotton grass planting and installing timber dams. Jess then recounted the measures being taken at Abergwesyn, including cattle grazing and cutting of *Molinia*. Jess emphasised how gaining support from commons graziers has been essential to the success of the project.

**Chris Gerrard**, from Bedfordshire, Cambridgeshire and Northhamptonshire Wildlife Trust, finished off the conference with a suitably uplifting presentation, whereby he outlined the progress of the Great Fen Project in Cambridgeshire. Chris outlined some of the project's aims, such as developing knowledge of the ecohydrology of the project area. He also highlighted some of the challenges that the project faces, including planning a long-term vision whilst not having all of the land under full ownership, managing land in partnership with farmers, and overcoming public resistance, for example, through addressing misconceptions such as concerns regarding malaria and food security.

**Peter Bridgewater**, Chair of the Joint Nature Conservation Committee, closed the conference with a short summing up. Read his editorial on page 3 for more.

The presentations from this conference are now available on the IEEM website. I would like to thank Atkins for their generous sponsorship of the conference and Crex Group for their kind sponsorship of the President's Wine Reception. I would also like to thank all of the speakers for their time and presentations and hope that the delegates found it a useful and interesting two days.

IEEM's next conference is taking place on 21 March 2012 in Birmingham, and will cover the topic of Biodiversity and Planning Reform, in the light of the new National Planning Policy Framework and other changes affecting planning. Further details below and on the IEEM website.

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# IEEM Tony Bradshaw Best Practice Awards 2011

*Jason Reeves AIEEM*
*IEEM Policy and Information Officer*

**The IEEM Tony Bradshaw Best Practice Awards are an annual competition for projects displaying best practice in the fields of ecology and environmental management. The awards are named in memory of the Institute's first President, the late Professor Tony Bradshaw FRS.**

Entries that demonstrated best practice whilst contributing to the four objectives set out below were welcomed from all sectors of the ecology profession including the public, voluntary and consultancy sectors. Projects of all sizes were submitted and considered.

***Objective 1. Project displays high standards of professionalism***

- *Project displays a sound evidence base to inform and support its aims and objectives*
- *Project has/had a well-conceived plan, staff schedule and budget, with appropriate risk assessment*
- *Project is/was well managed and is meeting/did meet its objectives*

***Objective 2. Enhances biodiversity, ecosystem functioning and sustainable development***

- *Contributes towards conservation and enhancement of biodiversity*
- *Enhances ecosystem functioning and services*
- *Embodies principles of sustainable development*

***Objective 3. Contributes to profession of ecology and environmental management***

- *Displays innovation in its approach, methodology or outcome*
- *Extent to which project is replicable and can advance best practice within the profession*
- *Demonstrates the role of ecologists and environmental managers in delivering sustainable benefits for society*

***Objective 4. Contribution to knowledge exchange, training and education within ecology and environmental management***

- *Successfully communicates its objectives, approaches and findings to both project stakeholders and a wider audience*
- *Has potential to influence research and policy agendas favouring best practice in ecology and environmental management*
- *Promotes opportunities for training and education*

The three finalists in this year's awards were:

- Broadland Environmental Services Ltd - Broadland Flood Alleviation Project
- Landlife - Soil Inversion Project
- South Cambridgeshire District Council and Accent Nene Ltd - Saving the Fulbourn Swifts

The Fulbourn Swifts entry was voted as the overall winner by delegates at the 2011 IEEM Annual Conference, this year held in Liverpool.

The 2012 awards will open for entries early next year.

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## Broadland Flood Alleviation Project

The Broadland Flood Alleviation Project is a 20-year programme of flood defence improvements, maintenance and emergency response services within the tidal river system of the Norfolk and Suffolk Broads. The area, one of the UK's finest and most extensive wetlands, has a status equivalent to a National Park and is important to the region's tourism and farming sectors. The flood defences protect sensitive freshwater habitats from inundation by nutrient-rich river water that can also have high salinity levels.

The Project is being delivered by Broadland Environmental Services Limited (BESL), a joint venture between Halcrow Group and contractors BAM Nuttall, and was procured by Defra and the Environment Agency as a Public Private Partnership scheme in 2001. BESL is responsible for providing a range of services during the contract, the most significant of which is major capital works to improve over 250 km of floodbank during the first 10 years.

The IEEM Tony Bradshaw
BEST PRACTICE AWARDS
2011 FINALIST

Due to the scale of the work in such a sensitive area a team of five environmental staff (three ecologists) are employed full-time on the Project. They are supported by local specialist sub-consultants and students during the construction phase when help is required with mitigation work. One of the main benefits of full-time staff is that they are involved throughout the lifespan of the individual schemes: baseline surveys; design; pre-application consultation; production of Environmental Statements; Environmental Clerk of Works; and post-construction monitoring (up to three years). It also enables them to build up a thorough working knowledge of the area and establish good relationships with landowners, user groups and statutory organisations.

There are many challenges with undertaking up to 25 km of construction works each year, notably the need to minimise the impacts on habitats and species. Consequently, standard mitigation techniques for water voles and reptiles have been adapted with their effectiveness tested through research projects. This includes ensuring that better quality habitat is re-instated so that species can recolonise at the earliest opportunity.

As well as the mitigation work, the Project has invested a lot of time and resources in delivering enhancements including large-scale wetland creation schemes in partnership with Natural England, the Broads Authority, RSPB and the Norfolk and Suffolk Wildlife Trusts.

Thousands of biological records have been generated and passed to the two Local Records Centres as well as national recording schemes. The data has been particularly useful for the Biodiversity Action Plan process as it covers key species such as water voles and some of the important aquatic plants and invertebrates that otherwise are poorly recorded in the area.

The Project has developed some first class, innovative working methods and achieved large gains for biodiversity, the wider environment and the local economy. The overall benefits are far in excess of what is required or was anticipated under the contract. This has been possible due to the knowledge, skills and application of all the staff involved and their willingness to engage with local stakeholders. Good systems and procedures are important but ultimately you are dependant upon dedicated people for their successful implementation.

Further information on the project can be found at www.bfap.org or by contacting Jeremy Halls (hallsjm@halcrow.com).

***Figure 1. Left to right are Christian Whiting, Paul Mitchelmore, Jeremy Halls and IEEM President, Penny Anderson***

## Landlife's Soil Inversion Technique

Landlife's *Soil Inversion* involves a simple intervention – totally inverting a metre of soil. It is a unique technique that uses some of the largest traction units in the country and specialist commissioned ploughs. It has resulted in a proven new sustainable forestry and ecological restoration methodology that addresses climate change impacts.

Work is targeted on land of low ecological value in lowland Britain. By getting the starting point right we allow sites to evolve into new habitats.

This project is highly significant because it:

- creates suitable conditions for new woods to adapt to climate change by holding moisture at depth and promoting deeper rooting;
- reduces annual herbicide usage by burying weed seed banks;
- buries carbon, reducing its release from weathering organic matter;
- results in significantly improved tree growth and survival rates;
- creates low nutrient biodiverse habitat on eutrophicated land; and
- creates stunning floristic meadows that excite and enthuse people.

Apart from woodland projects, soil inversion has been used to create habitat to save the silver studded blue and marsh fritillary butterflies. It has also rejuvenated the asparagus industry on Merseyside and restored dunes in North Wales.

Independent surveys show subsoil sites gaining 60 new flora species in a decade, whilst bird data confirms impressive gains for Biodiversity Action Plan species. Keynote species include dramatic displays of devilsbit scabious *Succisa pratensis* and eyebright *Euphrasia officinalis*, with other older meadow indicators such as great burnet *Sanquisorba major*.

The IEEM Tony Bradshaw
BEST PRACTICE AWARDS
2011 FINALIST

This creative conservation work is hugely popular with local communities who have posted videos, paintings, and poems about the sites on the web.

Government funded experimental trials were initiated in 2003 and independently monitored by Manchester Metropolitan University. Landlife has subsequently inverted over 46 sites with 17 partners across Britain, on 170 hectares of land, generating income of £500,000 for the organisation. The project was selected by the European Commission Directorate General

***Figure 2. IEEM Patron, Professor David Goode (left), presented the awards, here to Richard Scott from Landlife***

(DG REGIO) and cited in the UK's response to the Global Plant Strategy in 2004, as an example of best practice for addressing the problem of eutrophied soils.

The technique has been documented in Landlife's publication *Soil Inversion Works – breaking new ground in creative conservation*, which was awarded a UNESCO Award for Excellence in 2008.

Landlife developed the National Wildflower Centre in Knowsley, which opened in 2000 and is the national centre of excellence for creative conservation practice. Merseyside has a growing reputation for ecological restoration and best practice. Tony Bradshaw himself witnessed the plough on its first outing and visited the dramatic results at Alvanley in Cheshire, and he was fascinated as always in the opportunities for nature created by subsoil. On a drive with Tony down the A30 in Cornwall he was able to point out where the topsoil had been used, and where the subsoil had been left to great biodiversity benefit. The benefit of the plough is buying time for wildflowers to get the best starting point. Last summer we took a drive around the majority of the sites now completed and were greatly heartened by how successful they all were, it is this kind of longevity that is the real test for habitat creation, and gives us great confidence in its future.

For more information please visit www.landlife.org.uk or contact Richard Scott (rscott@landlife.org.uk).

## Saving the Fulbourn Swifts

The IEEM Tony Bradshaw
BEST PRACTICE AWARDS
2011 WINNER

Redevelopment of a 1960s housing estate in Fulbourn, South Cambridgeshire, presented serious risk to a very large swift colony. 164 properties were due to be replaced by 276. This presented an opportunity for enhancement and over 300 swift nest sites are to be provided across the site. Phased redevelopment is important for swifts as it enables a proportion of nests to be retained whilst other birds are displaced.

During the initial stages of the project two different designs of boxes were trialled – the Schwegler No.17 and the Zeist box. Neither of the boxes were used by swifts.

Discussions were held between architects and experts at Swift Conservation. It was believed that the swifts were seeking crevices within the walls as they had done on older parts of the estate and consequently were not adapting to externally mounted boxes.

This resulted in the design of the internal box which was similar to a wooden shoe box fitted with a roughened drainage pipe. The box was built into the cavity wall of the loft space, with the drainage pipe extending through the studwork of the building's construction. The studwork and pipe combination were then bricked-in and fitted with a special swift cavity panel.

To maximise the nesting opportunities available to swifts another form of nest box was used (Schwegler 1MF double chamber). This model of box is expensive at ~£90 per unit (but provides two nest sites). The cost of the internal nest box was ~£45, thus the two forms of boxes are comparable when considered in terms of available nest sites. It will be interesting to observe which box gives better return for outlay and which turns out to be the most durable.

***Figure 3. Rob Mungovan (left) with IEEM President, Penny Anderson***

Monitoring in 2009 showed swifts across the site with birds starting to colonise the first phase of boxes. In 2011 monitoring showed a small increase in the numbers of birds in the new boxes, no birds where redevelopment was in progress and many birds still retained in the undeveloped part of the site.

***Table 1. Notable observations***

| 2009 | 2010 | 2011 |
|---|---|---|
| 72+ pairs | 57 pairs | Min 33 pairs |
| no use of Zeist boxes | 2 1MF boxes used | 1 1MF box used |
| 2 1MF boxes used within months! | 6 internal boxes used | 9 internal boxes in use |
| | ~100 swifts seen on 8 June | Swifts had ousted starlings and sparrows |

Table 1 shows that swifts are taking to the new boxes, with internal boxes proving to be most desirable. Not all boxes are 'open for business' so some birds are still without sites. Swift colonies are notoriously hard to establish so the use of nesting calls was deployed with success.

The project is best practice because it:

- has ecological input;
- responds to public interest;
- demonstrates sustainable development;
- increases knowledge about swifts;
- provides a case study;
- is cost-effective;
- is delivering results; and
- can be replicated.

The estate has now been renamed *The Swifts*.

For more information please contact Rob Mungovan (rob.mungovan@scambs.gov.uk).

# Five Year Review of the Institute's Disciplinary Process

*Linda Yost CEnv MIEEM[a] and Mick Hall CEnv MIEEM[b]*
*[a] IEEM Deputy Chief Executive Officer*
*[b] Chair, IEEM Professional Affairs Committee*

**As the Institute has grown so has recognition of its role as a regulator of its members (with a small 'r' – our profession is not regulated). IEEM has had a *Code of Professional Conduct* (CPC) since its inception and originally a procedure for 'Malpractice Adjudication'. The current Disciplinary Regulations to regulate members' adherence to the CPC were introduced in March 2006 along with a layman's guide to the Complaint's Procedures. Since their publication IEEM has been contacted on quite a number of occasions regarding the CPC; these enquiries have though translated into a much lower number of formal complaints. The number of formal complaints is increasing: 8 in 2010 and 11 to date in 2011.**

*…your covering letter does not clarify either the context of the report, that is, whether it has been carried out on behalf of the developer or the local authority, or whether it has been undertaken in an official or unofficial capacity. The report though, has been used in relation to a planning application therefore there are concerns as to the absence of particular information in the report as follows:*

*We would advise you to read the Professional Guidance Series, in particular Guidelines for Ecological Report Writing and Model Service Agreements, and refer to these when agreeing contracts and preparing reports. We also feel that when complete, the Bat Conservation Trust Professional Training Standards would be useful to you and recommend that you follow their development and attend as appropriate training that is provided in the standards.*

The Institute can only assess a complaint if it relates to a member's 'competence'. It cannot deal with complaints relating to issues such as contractual matters or payment of fees. It will also only undertake the investigation of an alleged breach of the CPC where the complainant has identified themselves to the subject[1]. This is because IEEM is acting in a 'quasi-judicial' role, making a judgement regarding an individual's competence; it is 'natural justice'.

Since the publication of the complaints procedure, there have been a total of 42 complaints. These have covered a wide range of topics: provision of advice; mammal survey standards and reporting – bats and badgers; reptiles' survey standards and reporting; misleading advertising/web information; membership – false claims of membership, misuse of post-nominals; employment details.

*…Survey limitations*

*As a result of the alterations noted in 2 above, the limitations to the survey did not appear in the ES. This is a contravention of 5.2. of the Code of Professional Conduct*

*5.2. Identify the limitations to the interpretation of information which is utilised in reports or advice…*

The first stage of the process is usually receipt of a formal written complaint form (although on occasions it may be vigilance in spotting erroneous information in the public domain). The Institute investigates ***all*** formal written complaints, and in certain cases, it seeks evidence in its own right to inform these investigations.

Formal complaints comprise the majority and most often relate to a perceived failure in the observance of best practice in undertaking species survey, *i.e.* using the relevant species best practice guidance, the quality of the resultant report and the clarity of the recommendations.

*…To assist members in continuing to raise their professional standards, the PAC may note how 'best practice' could be achieved. In this case it was felt that the correct procedures had been followed and as the situation developed was handled in an appropriate manner…*

In the case of material in the public domain, this is usually the mis-use of the IEEM trademark (logo and name) in company advertising; using the trademark to imply company/staff endorsement, in particular companies that state they 'employ IEEM contractors'. This is 'appropriating the goodwill associated with membership of the Institute' and 'misrepresentation'; it has the potential to mislead clients as to the skills, experience, competence and professionalism of the ecologist and may mean that the client does not have recourse to IEEM's Complaints Process.

*…The Board does, however, have concerns about some aspects of your work, and considers that it must remind you of your obligations to uphold the Institute's Code of Professional Conduct (CPC) at all times.*

*The following are the issues of concern about which you need to take note, with the relevant paragraph from the CPC:*

*4.1. 'Ensure that no action on their part is inconsistent with or harmful to the objects of the Institute in the Memorandum of Association of the Institute and listed in Section 3.1. above or brings the Institute into disrepute…'*

*In reviewing the evidence it is considered that there was no genuine intention to present advice 'to break the law' but what has been demonstrated is a lack of foresight, professional care and diligence in expressing views. A more appropriate approach would have been to simply state the options for the client. To suggest or encourage in any way an activity whereby a third party could break the law, brings the Institute into disrepute…*

The Institute is rigorous in assessing complaints and it is the role of the Professional Affairs Committee (PAC) in the first instance to decide whether there is a 'case to answer'. PAC reviews the material provided against best practice standards and guidance and where it considers there has been a breach of the CPC then the complaint is referred to a Disciplinary Board. The Disciplinary Board considers the case and, if it sees fit, can convene a hearing.

The findings of the assessment of a complaint are set out in a letter to the subject and, if appropriate, will clearly identifying the subject's specific failings in maintaining the standards expected as a member of the Institute. Examples of the types of advice can be seen in the boxes.

Where PAC's assessment of a complaint does not result in the alleged complaint being upheld (*i.e.* it is considered that there is 'not a case to answer'), PAC may nevertheless be concerned at

*Members are expected to conform to the objects of the Institute's Code of Professional Conduct at all times and most relevant to your membership category are:*

*4.3. Not claim a class of membership other than that approved by the Council; and*

*4.5. Act honestly in their dealings with others during the discharge of their professional duties*

*The following was advised to members through our E-Newsletter and will appear in the next In Practice:*

*Using Your IEEM Post Nominals: As members the Institute, Fellow, Full and Associate members are entitled and encouraged to use their post nominal FIEEM, MIEEM and AIEEM respectively after their name: this is your endorsement as a professional ecologist or environmental manager. We would like to see this as a standard in the sector wherever possible. Where your name appears on the web in a professional capacity, e.g. company website it should clearly state your category of membership; there are no other membership categories, and statements such as 'Professional' Member of IEEM are not recognised and should not be used.*

the standard of the material reviewed. PAC will write to the subject pointing out to them where report writing, analysis, and/or advice could be improved. Of all the complaints assessed to date all bar one have resulted in a letter setting out areas for improvement.

A frequent and continuing cause for concern is the standard of report writing, as it is the quality of the reports that usually leads to misunderstanding. IEEM published *Ecological Report Writing* in the Professional Guidance Series to help ensure reports by members are prepared to an acceptable standard.

Despite the level of complaints involving the quality of reports, it is interesting to note that, in the response to the recent Training Survey, members did ***not*** identify report writing as an important area of training need!

*During the initial assessment of the complaint IEEM would have expected the names, qualifications and any licensing requirements of those undertaking any ecological work to be clearly noted in the paperwork and set out in the report. This is in accordance with the Code of Professional Conduct paragraph 5.1. 'Report correctly, truthfully, clearly...' and 4.2. 'Maintain high standards of awareness of new developments in ecology…' and with best practice as noted in publication number 13 in the Professional Guidance Series: Guidance for Ecological Report Writing.*

Communication, particularly in writing, is a skill and we are constantly being told that scientists are not understood and need to learn to understand their audience. Learning and/or refreshing report writing skill is important; it enables understanding and moreover reduces misunderstanding with clients and the public.

IEEM will be organising training in Ecological Report Writing and very much encourages members to attend to learn or refresh their skills in this crucial area. It will expect some members who have been scrutinised through the complaints procedures to attend.

*You are not a current member of the Institute and have never been a member in the past. By stating that you are a member of the Institute you are appropriating the goodwill associated with membership of the Institute. This false claim of membership may amount to:*

*1. 'passing off' based upon the principle of 'false endorsement'; and/or*

*2. misrepresentation.*

*Furthermore, IEEM is not the authority for licensing bat workers. We have therefore contacted Natural England's Wildlife Licensing Unit and it has been confirmed that you do not hold a licence to undertake any form of bat work.*

In September 2011, IEEM published *Competencies for Species Survey*, which set out a minimum standard (knowledge, skills and practical experience) that would be expected of an individual undertaking professional survey. It is preparing a Professional Development Strategy, which will include the provision of new *accredited* training courses and a means for members to become accredited in particular areas (*e.g.* survey skills). The knowledge and skills framework (Ecological Skills Project 2011[2]) is also being further developed. All of the above will assist in addressing poor performance - raising the standards of individuals and hence the standards of the profession.

The five year review, being undertaken by a sub-group of PAC, commenced in May 2011 and will report to Council in spring 2012. The remit of the review group is to examine the procedure and determine if it can be improved in any way to provide a better service to members and to the public. It is examining the following aspects:

1. Process: including the possibility to reduce the time taken to assess complaints.
2. Audit: should there be an annual, external audit of cases assessed?
3. Conclusion Letters: how to strengthen requirements on individuals to raise standards.
4. Evidence: a demonstration from subjects that they have raised standards in the areas of identified weakness.
5. Dispute resolution: is there a means of arbitrating between parties to resolve matters before they reach the complaint stage?

*5.1. Report correctly, truthfully, clearly, and so far as is possible in the circumstances, fully and convey their findings objectively. No member shall fabricate or falsify data or information or commit fraud and members shall use their best endeavours to prevent fabrication, falsification or fraud by others.*

*There is no evidence that the report is untruthful or that data has been falsified, however, the report is not considered to be of an acceptable standard.*

*i. The report lacks clarity; neither the methodology nor the results are clearly set out and contextual information is missing from the survey results. This makes it very difficult for the reader who has neither visited the site nor been present during the surveys to fully evaluate the results of the survey and renders the survey unrepeatable.*

*All reports should clearly state:*

- *the name(s) of the surveyor(s);*
- *the surveyor's qualifications;*
- *licence details (where required to be held); and*
- *how many surveyors there were for each survey.*

*The methodology should also include:*

- *types of bat detectors being used;*
- *whether recording was undertaken;*
- *what software was used to analyse recordings; and*
- *the surveyors positions.*

*These are basic requirements to provide evidence for and evaluate the robustness of the survey. Whilst additional information was subsequently provided e.g. the number of surveyors, 'up to four experienced bat surveyors' during the surveys, it remained vague. The marking of the exact position of surveyors for each survey provides understanding of how well the site has been covered.*

*ii. The purpose and aim of any survey must be clearly stated at the beginning of the report. In this case it should have been made clear as to whether this was just a 'bat activity survey' or did it include 'emergence and re-entry' as well.*

*IEEM would recommend, that when commissioning surveys it is clearly requested in a brief that a consultant works to specific industry standards; in this case the commissioning of a bat survey: BCT Survey Standards and Natural England guidance (and that the report follows the IEEM Guidance on Report Writing for Ecologists). It should though be acknowledged that these documents are only guidance and that professional judgement will need to be used. If the specified guidance is then not adhered to, ecological justification must be provided in the report.*

**Note**

[1] The member against whom a complaint has been alleged.

[2] *Ecological Skills: Shaping the Profession for the 21st Century*

Correspondence:
lindayost@ieem.net

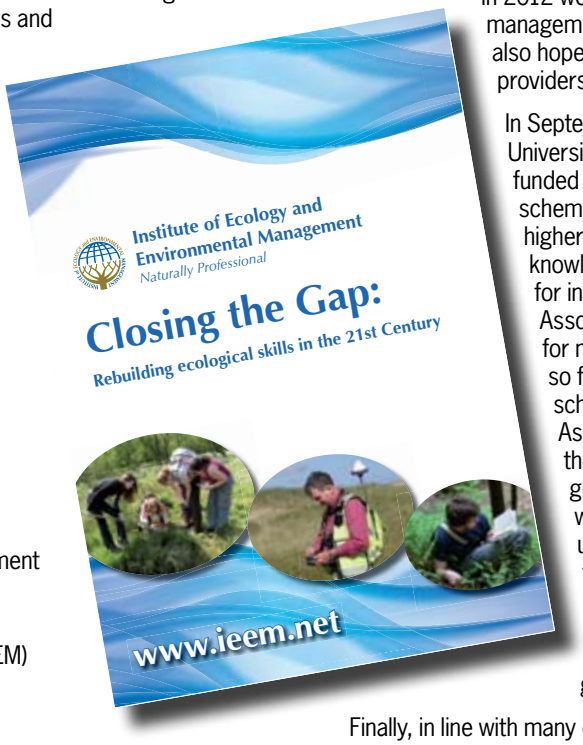
# Ecological Skills Project – An Update

*Sally Hayns*
*IEEM Chief Executive Officer*

**Since the publication of the research findings of the Ecological Skills Gap project and the launch of our *Closing the Gap* summary and call for action in July 2011, the Secretariat team has been busy raising awareness of the report and the need for a 'joined up' strategic response.**

The Skills Report received considerable press attention with articles and interviews in various online media including Sustainable Business Magazine, GreenWise Business (twice), Business Green, ClickGreen, and various blogs and newsletters also picked the story up.

In August copies of *Closing the Gap* were sent to over 160 contacts including those in UK and Irish governments, statutory agencies, NGOs, training organisations, higher education funding councils, related professional bodies and learned societies. The overall response has been very positive in that the findings clearly resonate with many practitioners and organisations who are concerned at the diminution of key skills within their own staff but also that of the profession in general.




To date follow-up meetings or teleconferences have been held with, amongst others,

- Natural Environment Research Council (NERC)/Living With Environmental Change (LWEC)
- Countryside Council for Wales (CCW)
- Scottish Natural Heritage (SNH)
- Natural England
- Environment Agency
- Institute of Environmental Management and Assessment (IEMA)
- Chartered Institution of Water and Environmental Management (CIWEM)
- Lantra
- Field Studies Council (FSC)
- Freshwater Biological Association (FBA)
- Countryside Management Association (CMA)
- Royal Town Planning Institute (RTPI)

Last month the Welsh Assembly Government hosted a joint CCW-Natur-IEEM key stakeholder workshop to discuss the findings, together with research undertaken by Natur, and to develop an agenda for action to address the skills issue in Wales. We have also had invitations from the Scottish Government and Northern Ireland Executive to meet with them to discuss the issue from a skills and training perspective. To date we have received replies, but no offer of practical help or a meeting, from both Defra and the Department of Business, Innovation and Skills (BIS). This is something we will continue to press as we are determined to try and influence the higher apprenticeships agenda to help graduates trying to enter the profession.

*Closing the Gap* identified a number of specific actions that the Institute felt would help to address the skills issue. Discussions with potential partners and providers are continuing but, in the meantime, there are several things that the Institute is already doing.

Firstly, our own Professional Development Programme is expanding to increase the variety of training courses offered, the geographical spread and the skills level (*i.e.* beginner, intermediate, advanced). Members will have seen the recent launch of Masterclasses as a means of bringing experts in to cover a topic in depth. There are more Masterclass themes in the 2012 programme and we will be adding to them throughout the year. We are also talking to new training partners, including Natural England, about designing courses to meet specific skills gaps highlighted in the report. A future development will be to offer accredited training for specific roles within the profession.

In 2012 we will be introducing a new quality management system for our training programme. We also hope to develop accreditation of external training providers in 2012-13.

In September this year we began a project with the University of Portsmouth Business School, part-funded by the Knowledge Transfer Partnership scheme, to develop a methodology for accrediting higher education courses which deliver the core knowledge and skills that employers are looking for in ecology/environmental graduates. A Project Associate, Michael Ramsell, has joined the team for nine months to deliver the project and has so far undertaken extensive research of similar schemes as well as consulting Graduate and Associate members and employers as to the areas of knowledge and skill required in graduate roles. A pilot accreditation scheme will be tested in the New Year and, if it proves useful and worthwhile, we hope to be able to offer that during the second half of 2012. The aim would be to use accreditation to influence degree course content in order to deliver better outcomes in terms of graduate employability.

Finally, in line with many other professions, the Institute is working on developing a generic competency framework for ecologists and environmental managers. The competency framework will become a tool for defining ecological and environmental manager roles in terms of the application of relevant knowledge and skills. It will be a career planning tool, a professional development tool and will ultimately underpin competence assessment of our own professional membership grades.

But they key to addressing the skills issue is teamwork. The Institute will lead on the agenda and commit resources to delivering it but we cannot, and should not, do it alone. We will continue over the coming months to build partnerships and to work with others to ensure that the necessary action needed to ensure that our profession is able to deliver the knowledge, skills and competency that our natural environment and society requires.

Correspondence: enquiries@ieem.net

NEW FOR 2012!

INSTITUTE of ECOLOGY and ENVIRONMENTAL MANAGEMENT

NEW FOR 2012!

# IEEM MASTERCLASS SERIES

## Protected Species: How Local Planning Authorities Should Discharge Their Legal Duties

**Trainer:**
Penny Simpson, Environmental Lawyer with DLA Piper UK LLP

**Dates and Venues:**
Thursday 19 January 2012, Birmingham

**Level:** Intermediate - Advanced

**Costs:**
IEEM Members: £125
Non-members: £175

These half-day masterclasses will focus on the legal duties relating to wildlife that local authorities are required to discharge, and what this means in practice. Many practical examples will be provided and there will be ample opportunity to discuss any specific case studies, issues or problems that attendees wish to bring with them.

**What previous attendees have said:**

"Good to address the issues that experienced local authority ecologists encounter."

"Lots of information given about a very important subject."

## European Protected Species: Legal Training Seminar for Commercial Ecological Consultants

**Trainer:**
Penny Simpson, Environmental Lawyer with DLA Piper UK LLP

**Dates and Venues:**
Thursday 26 January 2012, Edinburgh
Thursday 9 February 2012, Manchester

**Level:** Intermediate - Advanced

**Costs:**
IEEM Members: £125
Non-members: £175

These half-day masterclasses will provide a detailed explanation of up-to-date environmental law and the implications that this legislation has on providing a robust ecological consultancy service to clients. Many practical examples will be provided and there will be ample opportunity to discuss any specific case studies, issues or problems that attendees wish to bring with them.

**What previous attendees have said:**

"This masterclass has been extremely useful as a consolidation of all legislation changes relating to EPS."

"Useful to extend knowledge and extend skills of more experienced ecologists."

**For further information and to book your place, please visit: www.ieem.net/masterclasses.asp**

Photo credits: Derek Crawley, David Clements, Chris Gleed-Owen, Nick Jackson, Nick Mott, Liam Russell, Michael Woods, www.wildstock.co.uk

# Working Towards our Royal Charter – An Update from the President

*Penny Anderson CEnv FIEEM*
*IEEM President*

**One of the most important targets in our new Strategic Plan is to submit our application for a Royal Charter. Membership numbers have continued to grow steadily and IEEM's Council now feels that we are in a position to take this aspiration forward as we approach our 21st anniversary.**

To be granted a Royal Charter the Institute must be able to demonstrate its pre-eminence in the field of ecological and environmental management practice, the steps it takes to uphold professional standards through membership accreditation, its role in supporting the profession through education and training and its record of achievement.

## The Process

The application itself consists of the draft Charter, the Petition and the By-Laws. The Charter sets out the Institute's objects and powers and will be based on the existing Memorandum of Association. The By-Laws will be based on the existing Articles of Association and will set out how the Chartered Institute will be governed, how members would be admitted and the process for removal of members. The Petition is the application itself and follows a prescribed format. The draft Charter and By-Laws will need to be adopted by the Institute's members at an AGM or EGM[1].

The application for a Royal Charter is made through the Privy Council and is accompanied by a list of organisations that support, or at least do not object, to our application. Council has identified an extensive list of organisations to approach about our reasons for petitioning for a Royal Charter. Inevitably there will be some that object – they will be able to raise their objections when the Petition is advertised in the *London Gazette*. The Privy Council will make their own enquiries as to the Institute's suitability for incorporation by Royal Charter and will consider any objections. It will then make a recommendation to Her Majesty as to whether or not the Royal Charter should be granted.

## Some Issues to Consider

Successfully gaining a Royal Charter would effectively create a new body to which the assets and liabilities of the existing Institute would need to be formally transferred. Transfer of membership to the new body is relatively straightforward as membership is effectively an annual renewable contract, especially if the chartered institution is timed to begin operation at the same time of year as renewal subscriptions become due.

In most cases a successful application for a Royal Charter results in a change of name whereby the word 'Chartered' is included. Thus we could become known as the Chartered Institute of Ecology and Environmental Management (CIEEM). This will be a matter for members to decide at an AGM or EGM but in the 2010 Members' Survey 94% of respondents were in favour of this change. Members would then need to decide what to do with the old organisation. It could be wound up altogether or it could be maintained as a shelf company to protect the name and avoid any misleading uses of the name in the future.

We can include within our Charter a clause to enable us to award a professional designation of chartered practitioner status in addition to our existing licence to award Chartered Environmentalist. The 2010 Members' Survey clearly indicated that respondents were in favour of this as 70% indicated that they would apply for such an individual practitioner status and the same percentage indicated that the most popular title should be Chartered Ecologist. This does create a potential problem in that we would want the chartered title to reflect the practice of all of our members, including those who regard themselves as environmental managers rather than ecologists. Indeed the second most popular chartered title was that of Chartered Environmental Manager (20% of respondents).

Council has taken advice and has been informed that in general the Privy Council do not encourage Petitions that include a clause in the Charter regarding the authority to award a specific chartered practitioner title. The preference is to have more generic chartered practitioner titles such as Chartered Scientist, Chartered Engineer and Chartered Environmentalist and for individual chartered bodies to apply to award these titles. We would need to make a strong case as to why we wished to include our own specific chartered practitioner title. Including the word environment or environmental in the title is likely to undermine significantly our argument on the basis that we already confer the Chartered Environmentalist title.

Council has considered the matter carefully and feels strongly that we should include a clause in the Charter to award our own chartered practitioner title **in addition** to awarding Chartered Environmentalist. In view of the feedback already gained from last year's members' survey and of the potential problem of using the words environment or environmental in the title, Council has decided to proceed on the basis that the additional title should be that of Chartered Ecologist. However this would need to be ratified by members at a future AGM or EGM and **Council is very keen to hear your views**.

Do you agree that the individual chartered practitioner title should be Chartered Ecologist or do you have an alternative suggestion that encompasses the practice of all of the Institute's members? Do we need to define properly ecological and environmental management, as practised by our members in such a way that the term Chartered Ecologist can be applied to all appropriately qualified and experienced members?

Please do tell us what you think. This is your professional institute and your views are important in this process.

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**Note**

[1] An EGM is an Extraordinary General Meeting.

# Review of IEEM's Governance Structures and Processes

*Robin Buxton CEnv FIEEM*
*IEEM Vice-President and Chair of the Governance Review Working Group*

**IEEM is still operating the original structures and processes from its establishment 20 years ago, when all decisions were made by volunteers, with support contracted from the Nature Bureau. Is this structure still effective and efficient? Earlier this year Council appointed a working group to review the governance of the Institute. The group is made up of the President, Vice-President, Honorary Secretary, Honorary Treasurer, Chief Executive and two Fellows, Roger Crofts and Stephanie Wray, with an external advisor, Roger Dobbs.**

Our first meeting, in June 2011, agreed that the review should proceed in stages:

1. to define the current situation and what members feel about it;
2. to identify a preferred outcome; and
3. to propose structures and procedures that will deliver this outcome.

It was agreed to approach the review without inhibitions of past structures and approaches without prejudice to the outcome. We agreed to seek the views of as many members as practicable while aiming to complete the whole review by the end of 2011.

In stage 1 we have spoken to most members of Committees and Convenors of Geographic Sections, some 70 people, and we are grateful for their interest and willingness to give their frank assessments. There was remarkable consistency in responses to governance issues as well as providing a lot of useful general comments and suggestions.

## Situation Analysis

Key findings of stage 1 in relation to governance:

1. Almost everyone is strongly motivated, supporting the Institute to advance our profession and to 'give something back'. There is wide recognition that given the small size of the secretariat, voluntary help is vital, and more voluntary engagement would have real advantages.
2. 'Environmental management' is poorly accommodated in our activities.
3. The current structure lacks clarity of roles and responsibilities. There is, for example, confusion between executive and governance role, between advisory and decision-making roles and in the respective responsibilities of Committees. There are overlaps and duplication of activities within the structure.
4. It is not clear what powers and responsibilities are delegated and so a great many operational decisions are referred to Council, often through other Committees, and there is no clear separation of governance from management. As a result, work loads of all Committees are barely manageable.
5. The relationships between Geographic Sections, secretariat and Council are unclear and better support for and communication with the Sections is a priority.
6. Communication within the administrative structure could be much better.
7. Too little time is given to strategic deliberation.
8. Too little attention is paid to evaluation of achievement and performance, including the performance of Council. Is IEEM doing enough to uphold and improve professional standards?
9. Concerns that processes of appointment and election may neither honour democratic ideals nor ensure a good mix of skills and experience.
10. Concern that the 2-year presidential term is too short, but recognition that a longer term would be too onerous for many potential candidates.

## Preferred Outcomes

We propose the following, stage 2, Preferred Outcomes:

1. Clear roles and responsibilities of all elements in the structure, including decision-making and advisory roles.
2. Separation of operational from governance roles.
3. Effective and efficient governance structure designed for the future, including presidential tenures that enable real strategic leadership of Council.
4. Clear mechanisms for evaluating organisational achievement (based on strategic plan).
5. Performance assessment of processes (governance, management, delivery) and individuals at all levels.
6. Open and effective appointment and re-appointment processes.
7. Good communication and understanding throughout the structure to improve performance.
8. Commitment of members to support and promote the Institute.

At the last meeting on 20 September 2011, we felt it important to report this to all who have been kind enough to contribute and to the membership at large. We next meet on 24 November 2011 with the aim of taking our proposed structure to Council on 8 December 2011.

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# Institute News

## 2011 AGM

We have a new President-Elect! At the 2011 AGM held in Liverpool on 2 November, **John Box** was unanimously elected as the next President of IEEM and will take office at the 2012 AGM. Over the years, John has worked for the Freshwater Biological Association, the University of Sydney, Telford Development Corporation, English Nature, Wardell Armstrong consultants and, most recently, Atkins. He has particular knowledge and experience of post-industrial ecology, urban ecology and Local Nature Reserves, habitat creation and restoration, and habitat translocation. John is a member of the UNESCO UK-Man and the Biosphere Urban Forum, a working group of urban ecologists and environmentalists. John has published a wide range of papers and articles and given presentations at seminars, workshops and conferences.

***Figure 1. Current IEEM President, Penny Anderson (left), with our new President-Elect, John Box***

Also at the AGM, **Robin Buxton** was re-elected as Vice-President. **Mike Barker** and **Richard Graves** were also both re-elected, as Company Secretary and Treasurer respectively.

The AGM was very well attended (thanks to some careful planning of the autumn conference programme!). The agenda included reports from:

- the current President, **Penny Anderson**, based on the work of the Committees over the year and priorities for the year ahead;
- **Sally Hayns**, Chief Executive Officer, on the work of the Secretariat; and
- **Richard Graves**, the Treasurer, on the accounts and outturn for last year.

All of the reports were very positive and reflected the material already published in the Annual Review 2010-11.

There were few changes to Council this year with no current Council members due to step down or required to stand for a second three-year term. Two co-opted Council members, **David Collins** and **Richard Handley** were formally elected to Council as was **Jenny Neff**, who returns after the mandatory one year break required by the Institute's Constitution. None of the elections were contested and all of the nominees were approved unanimously. The President took the opportunity to again thank **Steve Ormerod** who has now completed his ex-officio role on Council as Immediate Past President.

Thus your Council now comprises: **Penny Anderson** (President), **John Box** (President-Elect), **Robin Buxton** (Vice President), **Mike Barker** (Company Secretary), **Richard Graves** (Treasurer), **Greg Carson**, **David Collins**, **Paul Goriup**, **Mick Hall**, **Richard Handley**, **Richard Jefferson**, **Tom Keatley**, **Lisa Kerslake**, **Jenny Neff**, **Pam Nolan**, **Steve Pullan**, **Paul Rooney**, and **Keith Ross**.

The unadopted minutes of the AGM together with full lists of current Council and Committee members are now available on the IEEM website.

## Policy and Partnership Working

This has been a very busy period for consultation responses and partnership activities, not least because of the work resulting from the publication of the Ecological Skills Project report as described on page 40.

Recent consultation responses include:

- New Inquiry: The Green Economy (Environmental Audit Committee)
- The Planning Guarantee and Information Requirements (Department for Communities and Local Government)
- Red Tape Challenge - Environment (Cabinet Office)
- Expansion of the Society of Biology's Degree Accreditation Programme
- Higher Education White Paper - Students at the Heart of the System (Department for Business, Innovation and Skills)
- Draft National Planning Policy Framework (Department for Communities and Local Government)
- Biodiversity 2020: Developing indicators for measuring success (Defra)

These responses, along with forthcoming consultations, are available to view in the members' section of the website (www.ieem.net/consultations.asp). For more information on consultations please contact Jason Reeves (jasonreeves@ieem.net).

Sally Hayns, Chief Executive, has represented IEEM on a Natural England Industry Panel chaired by Helen Philips and designed to improve communication and understanding between large-scale developers, such as utility companies and house builders, and those charged with protecting the natural environment.

Sally also participated in a review of the performance of Natural England's Land Use Directorate against their agreed performance targets. These performance reviews will continue quarterly.

Linda Yost, Deputy Chief Executive, has been selected as a Member of the BRE Global Governing Body - 'Standing Panel of Experts'. An initial training day will outline information on the work of BRE Global, the role of the Standing Panel and information on the standards, schemes and publications upon which members will be asked to provide expert opinion in the forthcoming year. The event will also give Standing Panel Members an opportunity to contribute to the future direction of BRE Global.

Meanwhile Stephanie Wray represented the Institute at a Natural England workshop on regulatory reform of current wildlife legislation in England.

## IEEM Fellows

As part of the process of encouraging wise heads to contribute to the ongoing development of the Institute and its work the President hosted two meetings of IEEM Fellows in November. A fuller report will appear in *In Practice* in March 2012 but topics under discussion included the delivery of the Strategic Plan objectives, mechanisms to address poor quality work and raise standards, ways of bridging the gap between science and practice, and how to encourage more suitably-qualified IEEM members to apply for fellowship. The latter topic is the subject of a current Working Group chaired by David Tyldesley. The Working Group will report to Council this month but amongst their recommendations will be more detail on the role of the Institute's Fellows, clarification on the eligibility criteria for Fellowship and improved guidance on the application process.

The Institute is keen to encourage worthy fellowship candidates to apply so if you have been meaning to get your own fellowship application in please do make it the one New Year Resolution that you keep in 2012!

## 21st Anniversary Activities

Members will be aware that something big is happening in 2012. The Institute will be 21 years old! Council has approved an outline programme of activities to celebrate the milestone which includes opportunities for members to get involved. The purpose of the programme is to:

- Celebrate 21 years of achievement.
- Raise the profile of the Institute.
- Raise awareness of ecology and environmental management as a profession.
- Promote partnership working.
- Deliver good biodiversity outcomes.
- Have fun!

21st Anniversary activities will be designed to meet all or some of these outcomes. The Geographic Sections are critical to the success of the anniversary and we will shortly be exploring ways in which each national and regional Section can celebrate. We will also be holding a photographic competition for members and publishing an anniversary issue of *In Practice* as well as celebrating at a formal reception at the House of Lords in June.

## New online services

By the time this issue of *In Practice* arrives on your desk or doorstep IEEM should have a new state-of-the-art membership database. This, combined with a new website which is due to be launched next March, will mean that members will be able to take advantage of a range of improved services. Membership applications and membership renewals will soon be able to be done online, we will be able to offer a wider range of direct debit payment options to spread the payments, workshop and masterclass bookings will be done online, CPD returns will be – you've guessed it! – online and the website will have discussion fora for special interest groups.

Members will be able to update their own contact information, navigate their way around a more user-friendly website and download documents more easily. The Commercial Directory will be revamped and improved and there will be a searchable online list of training events and courses.

## 2012 Professional Development Programme

The 2012 programme of workshops and training courses is included in this *In Practice* mailing. We have tried to respond to ideas and suggestions for new courses as well as delivering those that are popular each year and increasing the geographical spread. New courses include professional environmental ethics and train the trainer courses. We will be adding to the programme throughout the year so if you have further suggestions for suitable courses that you would like to see included in the programme please do get in touch with IEEM's Training and Professional Development Officer, Becky May, on 01962 868626 or e-mail her at beckymay@ieem.net

## Future Conferences

Please note the following dates for your diary:

| Conference | Title | Date | Location |
|---|---|---|---|
| Spring Conference 2012 | Planning and Biodiversity: Developing Opportunities through Change | 21 March 2012 | Birmingham |
| Summer Conference 2012 | Soil Management and Biodiversity – Sharing Good Practice | 13 June 2012 | London |
| Autumn Conference 2012 | Renewable Energy and Biodiversity | 7-8 November 2012 | Bristol |

Offers of papers on these themes are very welcome – please contact Becky May (beckymay@ieem.net) for more information.

## In Practice

If you would like to contribute to a future edition of *In Practice* please note the upcoming themes below.

| Edition | Theme | Submission Deadline |
|---|---|---|
| 75 - March 2012 | Planning Reform and Biodiversity | 6 January 2012 |
| 76 - June 2012 | "21st Anniversary Special Edition" | March 2012 TBC |
| 77 - September 2012 | Soils and Biodiversity | June 2012 TBC |
| 78 - December 2012 | Renewable Energy and Biodiversity | September 2012 TBC |

For more information please contact Jason Reeves (jasonreeves@ieem.net) or download the guidance for authors document directly from the website.

# Scottish Section News

## Bugs in the Borders

### Saturday 27 August 2011, Glenlude Estate, Scottish Borders

In the spirit of collaboration with other organisations and tackling ecological skills gaps, IEEM members in Scotland were invited to Glenlude Estate in the Scottish Borders for an event run by the Scottish Section Committee, John Muir Trust (JMT) and Buglife. We were hosted by JMT's Schiehallion Conservation Officer and Conservation Activities Co-ordinator, Sandy Maxwell, and accompanied by JMT Trustee, Deirdre Wilson, and Nevis Conservation Officer, Sarah Lewis.

Glenlude Estate is c. 400 acres with a variety of habitats including a hill that has 360 degree views of open moorland with blanket bog, a gorge, Glenlude Burn and Paddock Burn, two ponds, and plantation and native woodland. The site has not been stocked for over 10 years and as such was thought to support a variety of wildlife. JMT's Biodiversity Officer, Liz Auty, had already started mapping the vegetation and compiling lists of flora and fauna found at the property. The event helped JMT to establish the ecological baseline at this recently inherited estate and contribute to the Buglife primary goal of promoting invertebrate conservation.

Our experts at hand were two experienced entomologists, Chris Catherine (Buglife) and David Pryce (Entomologist at Perth Museum and Art Gallery). They helped the participants to improve their invertebrate identification skills and collection techniques (including pitfall traps, pooting, sweep netting and tree beating) in the field. Classroom sessions increased participant's awareness of invertebrate conservation and suitable habitat management techniques to promote insect diversity.

From the diverse habitats we collected numerous invertebrate samples to identify later that afternoon. Chris's passion for spiders led to an encounter with the four-spot orb-weaver spider - the heaviest spider species in the UK!

David's expert knowledge of Odonata, Plecoptera (for which he is the national recorder) and Hemiptera were inspiring. A highlight was David's demonstration of his Bug Vac machine that can collect vast quantities of invertebrates in a number of habitats in record time with reduced survey effort – a piece of kit that this year's Scottish Conference theme of 'Technological Advances in Ecological Monitoring' salutes!

We were also treated to a fine hoard of moths thanks to Reuben Singleton (the Local County Recorder for moths) who set up his heath-type moth trap on the estate. Nineteen species and 91 individuals were recorded in total, including seven species that are listed on the UK Biodiversity Action Plan. The showy colours of the garden tiger moth were a real crowd pleaser. Reuben's firsts in this area were the Haworth's minor (4th record for v.c.79 Selkirkshire), heath rustic (8th record for v.c.79) and neglected rustic (3rd record for v.c.79). Reuben concluded that none of the species were particularly uncommon, but that the low number of previous records was more reflective, like for so many invertebrates, of low levels of recording.

In the afternoon we returned for a tasty lunch, kindly provided by JMT, before setting to the task of identifying as many invertebrates as possible using microscopes, hand lenses and our newly acquired Field Studies Council (FSC) terrestrial and freshwater invertebrate identification keys.

Sandy Maxwell commented that "the day demonstrated the possibilities of Glenlude with its easy accessibility and rich variety of habitats". The IEEM participants also provided positive feedback including that:

- Sandy and the JMT team were fabulous and generous hosts.
- Chris and David were very enthusiastic, knowledgeable and approachable and it really helped to consult more than one expert to promote a more comprehensive understanding of entomology.
- It was really useful meeting new and catching up with other enthusiastic ecologists with similar interests.
- Being provided with the FSC field guides and presentation hand out notes will inspire further entomological identification in the future.
- The day gave a chance for participants to consider how invertebrate conservation and ecosystem services can be promoted within their current roles.
- A weekend session made attendance possible for many.
- The event was excellent value for money and seen as a real perk of being a member of IEEM.
- It was useful to have an event in the borders as has been the case with other recent events in other more rural areas of Scotland.
- Participants learned mainly not to avoid invertebrates in the future!
- Certain species groups were 'just too hard to even try in this life' demonstrating the need for as many invertebrate enthusiasts as possible. This will help fill skills gaps to afford more attention to certain species groups and overcome problems associated with low survey coverage in some areas.

Thank goodness for our entomological experts, such as Chris, David and Reuben, who devote long hours to searching for and identifying invertebrates as well as promoting the need for their conservation. We salute you all and the keen beginners. We sure could use more dedicated entomologists in the ecological community!

The Scottish Section Committee hope to run more events at Glenlude in 2012 to help JMT build on the ecological baseline and make informed decisions on sensitive land management to promote biodiversity. If you would like to get involved as an ecological expert to provide training to IEEM members (especially if your knowledge will help fill a skills gap) or you have ideas for other events that you would enjoy attending as a participant (such as surveying for a particular species group) then please contact Nicola Tyrrell on the details below. We also hope to run collaborative events with Buglife in the future so watch this space.

For now, thanks to everyone that helped to make the Bugs in the Borders event an educational and fun day out! If you would like to learn more about John Muir Trust (www.jmt.org) and Buglife (www.buglife.org.uk) please visit the websites where you will find details of other work parties and events that they run.

*Buglife training is supported by Scottish Natural Heritage and Initiative for Scottish Invertebrates grant-aid partners.*

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*Nicola Tyrrell MIEEM (nee Marsland)*
*Vice-Convener, Scottish Geographic Section Committee*


*Figure 1. The entrance to Glenlude Estate*

*Figure 2. Chris Catherine of Buglife demonstrating invertebrate collection techniques to participants*

*Figure 3. A fine hoard of moths from Reuben Singleton's moth trap*

*Figure 4. The showy colours of a garden tiger moth*

*Figure 5. An ear moth species (Amphipoea sp.)*

*Figure 6. Invertebrates collected via sweep netting over heath*

*Figure 7. David's impressive Bug Vac*

*Figure 8. Sweep netting over heath habitat*

*Figure 9. Identification back in the classroom*

*Figure 10. Identification back in the classroom*

*Figure 11. Collecting invertebrates from beating trees*

*Figure 12. Chris Catherine demonstrating collecting invertebrates via 'pooting' from sweep nets*

*All photographs by Sandy Maxwell and Nicola Tyrrell.*

# North East England Section News

## AGM

The 6th October saw the Section's 10th Annual General Meeting. Steve Betts, Ian Bond, Andrew Cherrill, Robin Cox, Ben Ralston, and Duncan Watson were re-elected, while Derek Hilton-Brown, Dorian Latham, Jo Rockingham and Liz Juppenlatz stood down. New members are Nicola Faulks and Steve Pullan, both of whom have served on the Committee in previous years. The meeting recorded a vote of thanks to the Committee, speakers, and host organisations that have supported our activities during the last year. The Committee is currently compiling a programme of events for the spring, summer and autumn of 2012. Members are encouraged to contact the Committee with suggestions for future events.

Since the last edition of *In Practice* there have been several meetings within the North East region. Brief reports are included here.

## Waxcap Fungi

A bright and crisp autumnal morning set the scene for a field visit to Tunstall Reservoir, near Wolsingham in County Durham. Andy McLay led a party of 15 to explore the dam wall – an internationally important, but undesignated, waxcap grassland. Waxcap grassland is a term used to describe grassland sites rich in fungi, and particularly the waxcaps (Genus *Hygrocybe*). These unimproved grasslands are mown or grazed, relatively short, well-drained and nutrient poor. Waxcap assemblages are intolerant of fertiliser application, including manure, and in the North East are most frequently associated with U4 and MG5. The dam wall at Tunstall Reservoir supports over 21 species, including crimson waxcap *Hygrocybe punicea* which in the North East is an excellent indicator that a diversity of other waxcap species are likely to be present. Other species found on the day included the violet coral *Clavaria zollingeri*, a proposed UK BAP priority species (Figure 1).

***Figure 1. The violet coral* Clavaria zollingeri *is a UK BAP priority species***
***Photo: Andrew Cherrill***

Useful resources for those wishing to investigate this neglected group include a guide *The genus Hygrocybe* (Boertmann 1996, published by the Danish Mycological Society), *Waxcap-grasslands – an assessment of English sites* (Evans 2003, published as English Nature Research Report 555), and *Grassland fungi* (Genney *et al.* 2009) (Chapter 20 in the JNCC's *Guidelines for selection of biological SSSIs*). Waxcaps are under-recorded. Please send species records or suggestions of sites worth detailed survey to andymclay@ymail.com.

***Figure 2. Andy McLay and North East England Section members get to grips with waxcap identification***
***Photo: Andrew Cherrill***

## Ecosystem Services

The AGM on 6 October was followed by the Section's first joint meeting with IEMA. Peter Glaves of Northumbria University described a series of projects demonstrating the benefits and challenges of applying the Ecosystem Services Assessment (ESA) approach in a seminar entitled 'Ecosystem Services: This year's buzzword or a useful tool for practitioners?'. Peter explained how ESA may be used to identify and understand constraints, opportunities and the multiple benefits that may arise from alternative land use scenarios. ESA has been used effectively as a tool in consultation to identify links between different activities and components of the environment in the development of sustainable solutions. However, the audience was divided on the benefits of ESA as a tool in biodiversity conservation. High level ESA can involve putting a monetary value on biodiversity. Many environmentalists regard 'wild places' and endangered species to be priceless – thus applying a monetary value may undervalue biodiversity with potentially undesirable consequences. At present ESA is not a legal requirement of the planning system and this limits its uptake. Other barriers to adoption of ESA include the opaque terminology, lack of EU/UK guidance, scarcity of robust data for use in assessment, and low levels of awareness and trust in the outcomes. There is an urgent need for well-documented case studies to address these issues. Peter summarised lessons from a range of

demonstration projects. Key findings included the following points – 1) that quantitative economic valuation is not always necessary and is, in any case, often impossible; 2) audit of ESA is most effective when wide and iterative consultation is employed; 3) ESA can have a valuable role in EIA and SEA at the scoping stage to filter in/out ES subject to more detailed analysis; and 4) an ESA is particularly useful in addressing economic, social and health benefits of the environment. Further details of Peter's work can be found in *In Practice* volume 68, pages 12-15, or by contacting Peter at peter.glaves@northumbria.ac.uk.

## Butterflies and Brownfields

On 29 June 2011 Dave Wainwright, Northern Regional Officer of Butterfly Conservation, gave a presentation on mitigation and habitat management work for butterflies on brownfield sites subject to redevelopment.

The work described was part of the Brownfield and Butterflies Project. Brownfield sites often support a range of rare invertebrates and plants, and particularly those requiring patches of bare ground, low soil fertility and warm microclimates for the development of eggs and juvenile stages. These conditions also favour scarce stress-tolerating plants of low competitive ability. Brownfield sites are often seen as unsightly and are priorities for redevelopment; presenting a dilemma for local authority ecologists and ecologists advising developers. Dave focussed on three species that have a high affinity with brownfield sites in the Butterfly Conservation northern region. These were dingy skipper, grayling and small blue with 50%, 80% and 100% of populations on brownfield sites respectively in the northern region. All three are Priority species in the UK BAP and so typically Local Planning Authorities (LPAs) require mitigation work where populations are impacted. Where housing is proposed there is often little scope for on-site mitigation, although translocation of turves and insects to new sites may be effective. Green roofs have not proved successful for butterflies. In contrast, where brownfield sites are subject to continued exploitation for mineral extraction or landfill there are often opportunities for mitigation and enhancement. Dave outlined case studies, including the successful temporary relocation of floristically rich turves to safe areas (prior to re-establishment after working) and recreation of low fertility substrates using 'waste' materials. Experience gained from a number of projects in the northern region suggests some simple rules:

- areas of sparse vegetation on low fertility soil may support butterfly populations and can be created using subsoil stored in temporary bunds while the site is worked;
- new areas of habitat adjacent to the site, and within dispersal range, need to be created before existing habitat is destroyed;
- new areas of habitat may be created by topsoil scraping and use of plant plugs of butterfly host species;
- tree planting should be avoided to maintain open, sunny grasslands post-development;
- use of 'waste' material from the original site can be used to recreate the processes of disturbance that led to the ecological interest prior to re-working; and
- where possible allow the natural succession of vegetation, although careful selection of seed material for low competitive, stress tolerant plants (including butterfly host plants) can be successful.

Further details of the Brownfield and Butterflies Project can be found on the Butterfly Conservation website (www.butterfly-conservation.org). Readers involved in brownfield projects are invited to contact Dave Wainwright (dwainwright@butterfly-conservation.org).

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*Andrew Cherrill CEnv MIEEM*
*Convenor, North East England Geographic Section*

# Welsh Section News

## Activities from Wales

The Welsh Section recently held a workshop on the Ecological Skills Project, with the aim of discussing the findings of the report and developing a Welsh response to the reports' challenges. The event was held at the Welsh Assembly Building in Aberystwyth on 17 November 2011.

We also recently manned a stand at the Llanerchaeron Country Fair (run by Natur and National Trust). Our thanks to Mick Green CEnv FIEEM for organising this.

The Section also thanks David Parker CEnv FIEEM for giving a brief presentation on the Ecological Skills Project during the Wales Biodiversity Partnership conference in Carmarthern in September.

The next Welsh Section event will be on the A470 Cwmbach-Newbridge A470 roadscheme, with presentations and an opportunity for a site visit combined with the inaugural AGM of the Welsh Section. The event will take place on 2 February 2012 in Llandrindod Wells, Powys and is open to all IEEM members in Wales. Further details to follow.

A programme of field events and ideas for appropriate 21st Anniversary activities are being actively developed. If any Welsh members have suitable suggestions for future events, please contact the Committee (or even consider joining us!)

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*Mike Willis MIEEM*
*Convenor, Welsh Geographic Section Committee*

# East of England Section News

## Blackmoor Farm Visit

**Blackmoor Farm, Wrentham, Beccles**

**Thursday 30 June 2011, 6:30-8:30 pm.**

The walk was led by Tim Schofield of Suffolk Farming and Wildlife Advisory Group. This farm is using Higher Level Stewardship (HLS) and the visit viewed the benefits and issues of using this scheme.

***Figure 1. Tim Schofield***

Fourteen members met at an arable farm in Suffolk to look at Environmental Stewardship management of the intense arable fields. Members learnt about the types of management and nature conservation benefits, but it was also fascinating to hear the attitudes of farmers towards nature conservation. My personal impression based on this visit was that farmers are keen to support wildlife within various grant schemes, and where wildlife knows its place within the farm. Members saw grass margins with fine grasses, primarily designed to support grey partridge with benefit to other species being a bonus. Adjacent hedges were managed to below 2 m high, also to benefit grey partridge, although there was a diversity of hedge management in other parts of the farm. Bird cover contained quinoa, millet, and linseed with small oil-rich seeds just right for pheasants and any other seed-eating birds in winter. Separate field edges were allocated for bumblebees, with pollen and nectar plots dominated by legumes.

Undoubtedly these features benefitted farm wildlife, but natural processes were not able to operate. For example, lady's bedstraw was 'invading' a sown clover/Phacelia margin designed for bumblebees, but despite its naturalness, lack of harm to crops and provision of services to invertebrates, lady's bedstraw was actively removed as an undesirable species. Badgers were an unwelcome species, due to their discordant effect on the food chain. The farm had also actively campaigned against the plan to re-introduce sea eagles to the area, in order to protect neighbouring farms' piglets from being snatched, and the implication is that any predator that thinks for itself, roams widely and is not controllable, is not really appreciated in the farmed environment. To counter this implication, barn owl boxes had been erected.

***Figure 2. East of England members at Blackmoor Farm***

***Figure 3. Examples of diversity at Blackmoor Farm***

***Figure 4. Another example of the diversity at Blackmoor Farm***

These views may be an exaggeration and slightly unfair, but after three years away from working with farmers in a different part of the ecology industry it was possible to see issues in a new light; when I was working with farmers it never would have occurred to me to consider how trophic levels would be a determining factor in farm management. There was also an obvious issue of vocal minorities in the nature conservation movement seeming to have a disproportionate influence on grant schemes and advice too. Bumblebees and birds have good lobbyists!

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*Nick Sibbett MIEEM*
*Committee Member, East of England Geographic Section*

# Partnership News

## Society for the Environment

The Board of the Society for the Environment appointed Professor Raymond Clark OBE CEnv CEng HonFSEE as Chair at the end of June. Professor Clarke is the Chief Executive for the Society of Environmental Engineers. One of his first tasks has been to lead the appointment panel for the recruitment and selection of a new Chief Executive to replace John Carstensen who left last October. News of the successful candidate should be available soon.

This is undoubtedly a period of change for the Society, but it is also an exciting time as it seeks to focus its work on developing an environmental voice that can influence both policy and practice. Meanwhile the number of Chartered Environmentalists and the number of licensed bodies continues to increase.

The following members have recently become Chartered Environmentalists: Miss Julia G Bastone, Mrs Joanne Bates, Miss Tabatha Boniface, Mr Simon Boulter, Mrs Laura A Cawley, Miss Elizabeth Coleman, Miss Emma Coverdale, Dr Lewis J Deacon, Miss Chloe Delgery, Dr Kerry Evans, Dr Mikael L Forup, Dr Joseph Franklin, Dr Sally EM Fraser, Mr Stuart A Graham, Mr Graeme Hull, Dr Paul Joyce, Mr Hing Kin Lee, Mr Kenneth J Lipscomb, Mr James A McCrory, Mr Martin G O'Connor, Miss Harriet R Spray, Ms Alexia Tamblyn, Dr Sarah E Toogood

**www.socenv.org.uk**

## European Network of Environmental Professionals

ENEP's latest General Assembly (GA) was held in s'Hertogenbosch, the Netherlands on 7 October 2011 with 21 delegates representing 14 member associations in 8 countries in attendance.

The GA started in positive fashion with the approval of three new members: AFIE (Association Française des Ingénieurs Écologues), COAMB (Col•legi d'Ambientòlegs de Catalunya), and OVED (Overlegplatform voor Energiedeskundigen).

The President and Project Officer presented ENEP's activities and achievements over the last six months and the Accreditation Task Force presented its work on a Code of Ethics for European Environmental Professionals, which it was agreed would be pursued in a 'light' form. A number of the ENEP Working Groups also presented their most recent work, including Environmental Management Systems, Climate Proof Cities, Innovation and Environment, and Biodiversity, which is chaired by Mike Barker CEnv MIEEM.

Elisa Vignaga, from the Italian association AIAT but who is based in Scotland, was elected as the new General Secretary. Mario Grosso, also from AIAT, stood down as General Secretary after completing a second term in the role. He was thanked for his considerable contribution to the network.

The full GA minutes are available on the ENEP website.

**www.environmentalprofessionals.org**

## Countryside Management Association

Council has agreed a new Memorandum of Understanding (MoU) with the Countryside Management Association. The MoU will be signed in the New Year but provides for closer partnership working including the convening of joint meetings, workshops and conferences, promoting knowledge transfer between the two organisations and working together on policy issues where relevant. We are particularly keen to encourage joint events by our respective geographic groups on matters of common interest.

**www.countrysidemanagement.org.uk**

## Europarc Federation

The 2011 Europarc Conference was held in Bad Urach, Germany from 21- 25 September. The theme was 'Quality counts – Benefits for Nature and People.' Although the current financial situation within Europe might have suggested a reduced attendance, the conference attracted 330 delegates from across Europe and beyond.

The 2011 conference was held for the first time in a Biosphere Reserve, the Schwäbische Alp. A Biosphere Reserve is a voluntary, cooperative, conservation reserve created to protect the biological and cultural diversity of a region while promoting sustainable economic development. There are currently three such reserves in England, one in Wales and five in Scotland. A further area, the Galloway and South Ayrshire Biosphere Reserve, is in the process of establishment.

The conference site visits are always popular and I visited a former German/French/NATO military and tank training area of Münsingen, now abandoned, but on which a superb nature reserve is developing. This is part of the core zone of the Biosphere Reserve. The similarities to Salisbury Plain were obvious with the exception that all military activity has now ceased and areas now have to be artificially compacted to simulate the effects of tanks. The area is grazed by 30,000 sheep that seem largely immune to the significant amounts of unexploded ordnance, but humans have to follow very strictly defined paths.

At the General Assembly, Erica Stanciu from Romania completed her term as a very successful and much liked President. The new President is Thomas Hansson from Sweden, who until recently was the Chair of Europarc's Nordic Baltic Section. Unusually, there is now no member of the Board of Europarc from the UK.

IEEM is a member of Europarc and, until recently, Eurosite. For many years the value of having two similar but separate organisations, albeit culturally somewhat divergent in approach, has been questioned. Eurosite had already opted for merger with Europarc and in the Europarc General Assembly the merger with Eurosite was agreed by a large majority. The new body has a vital role to play: it has an opportunity to develop new approaches while carrying forward the successful track record of its two component parts. In the present economic climate this will be no mean feat.

The Europarc equivalent of the IEEM Medal is the Alfred Töpfer Medal which this year was awarded to Hans Biebelrieter, former Director of the Bavarian Forest National Park, Chairman of the Europarc German Section and former Europarc President.

The conference also agreed a declaration available through the following link: www.europarc.org/download/821.pdf

*Jim Thompson CEnv FIEEM*

**www.europarc.org**

## Institute of Environmental Professionals - Sri Lanka

The Institute of Environmental Professionals - Sri Lanka is continuing to grow, with EIA training courses, and charter mark recognition amongst recent milestones for helping the environmental sector of Sri Lanka to increase in influence and professional skill levels.

A new partnership activity to facilitate informal learning opportunities for members of both organisations is that IEP-SL has invited members of IEEM who may be visiting Sri Lanka, and who would like to 'shadow' an environmental professional in a tropical climate for a day during their visit, to get in touch. Contact Geckoella Environmental Consultants (Geckoella@gmail.com) for more information.

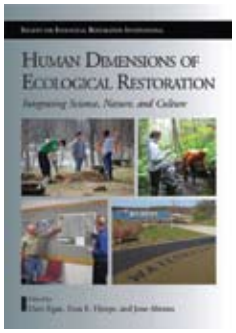
**www.iepsl.lk**

# Recent Publications

## Guide to British Freshwater Macroinvertebrates for Biotic Assessment

**Author:** Simon Pawley with contributions from Michael Dobson and Melanie Fletcher
**ISBN-13:** 9780900386794
**Price:** £25 plus P&P
**Available from:** www.fba.org.uk

This book, published by the Freshwater Biological Association, provides a straightforward guidesto the identification of macroinvertebrate families included in biotic assessment in the UK. It covers flatworms, annelids, molluscs, larger crustaceans, arachnids and all aquatic orders of insects. By making extensive use of appropriate methods for different groups, including dichotomous keys, pictorial guides and tables, along with line drawing illustrations and general tips on identification, it allows rapid and confident identification of all the major groups of British freshwater invertebrates. It has been extensively tested, and illustrations are designed to show both the appearance of whole animals and, where appropriate, key identification features. For each group, a brief indication of typical habitat is given, to further facilitate identification. An extensive list of keys and guides for further identification is also provided.



## Human Dimensions of Ecological Restoration: Integrating Science, Nature and Culture

**Editors:** Dave Egan, Evan E Hjerpe and Jesse Abrams
**ISBN-13:** 9781597266901
**Price:** £31.99
**Available from:** www.nhbs.com

This publication takes an interdisciplinary look at the myriad human aspects of ecological restoration. In 26 chapters written by experts from around the world, it provides practical and theoretical information, analysis, models, and guidelines for optimising human involvement in ecological restoration projects. It delves into the often neglected aspects of ecological restoration that ultimately make the difference between projects that are successfully executed and maintained with the support of informed, engaged communities, and those that are unable to advance past the conceptual stage due to misunderstandings or apathy.

## Good practice guide for the use of BSI PAS 100 compost in landscape and regeneration

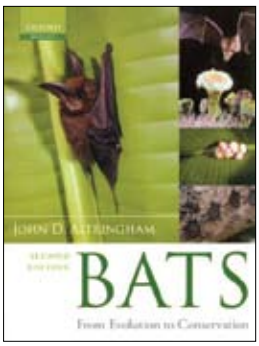
**Authors:** J Edwards, E Petavratzi, L Robinson and C Walters
**Price:** free download
**Available from:** www.wrap.org.uk/landscapegpg

This guidance document aims to provide good practice advice on the use of Publicly Available Specification BSI PAS 100 compost in landscaping and regeneration applications and, in particular, for the following uses: Brownfield restoration and habitat establishment; Highways and waterways; Sustainable urban drainage systems (SUDS) and green roofs; Sports turf; and General landscaping. Agricultural land is not covered within this guidance document as the use of compost in agricultural land falls outside the scope of this study.

## Royal Entomological Society Book of British Insects

**Author:** Peter C Barnard
**ISBN-13:** 9781444332568
**Price:** £34.99
**Available from:** www.nhbs.com

This book is the only modern systematic account of all 558 families of British insects, covering not just the large and familiar groups that are included in popular books, but even the smallest and least known. It is illustrated throughout in full colour with photographs by experienced wildlife photographers to show the range of diversity, both morphological and behavioural, among the 24,000 species. All of the 6,000 genera of British insects are listed and indexed, along with all of the family names and higher groups. There is a summary of the classification, biology and economic importance of each family together with further references for detailed identification. All species currently subject to legal protection in the United Kingdom are also listed.



## Bats: From Evolution to Conservation

**Author:** John D Altringham
**ISBN-13:** 9780199207121
**Price:** £32.50
**Available from:** www.nhbs.com

This book covers the key aspects of bat biology, including evolution, flight, echo-location, hibernation, reproduction, feeding and roosting ecology, social behaviour, migration, population and community ecology, biogeography, and conservation.

This second edition is fully updated and greatly expanded throughout. Written in an accessible style, it builds on the reputation of the first edition by providing a fully revised, comprehensive, and affordable successor of which 60% of the text is new, as is 35% of the illustrations. It incorporates major recent developments in the use of genetics, and major advances in our understanding of social behaviour, community ecology, macroecology, biogeography, and, a new chapter in this edition, conservation.

## A Field Guide to Monitoring Nests

**Authors:** James Ferguson-Lees, Richard Castell and Dave Leech
**ISBN-13:** 9781906204792
**Price:** £24.99 plus P&P
**Available from:** www.bto.org

This publication is intended as an aid to those involved in monitoring nests for research and conservation purposes. It contains a wealth of information for 146 British and Irish species, together with introductory sections on nest-monitoring techniques, nest identification, legislation, the BTO Nest Record Scheme and nest-finding skills. Its combination of concise notes and quick-reference facts and figures, together with expert advice and chapters on the basics, makes it an ideal field companion for both beginners and experienced nest recorders. Each species account covers: where the species breeds, with a UK distribution map and details on typical habitat and nest sites; seasonality of breeding, with a timetable of when most birds are on eggs and chicks; identification of eggs and young, with photographs; and species-specific nest finding methods and considerations.

# In the Journals

BA Woodcock, AW McDonald and RF Pywell
**Can long-term floodplain meadow recreation replicate species composition and functional characteristics of target grasslands?**
*Journal of Applied Ecology* 2011, **48:** 1070-1078

The authors use a single-site long-term data set (22 years) to test the consequences of grazing recreation management in re-establishing plant community composition and functional trait structure as assessed relative to pristine examples of target floodplain meadows. Following a July hay cut, late summer grazing of the re-growth by either sheep or cattle resulted in an increase in the similarity of plants species composition to the target floodplain meadows, but only in terms of what species had colonized, not in terms of their relative frequencies. Where grazing in late summer was applied, the functional traits of the meadows undergoing re-creation became similar to those of the target floodplain meadows only where grazing management was used. When plant traits were divided into subcategories (*e.g.* regeneration, seed biology, life-form, environmental associations), only those traits linked with plant phenology failed to show evidence of a temporal shift towards the functional trait structure of floodplain meadows. Under typical grazing management colonisation by the majority of species that characterise the target habitat type is predicted to take over 150 years. In contrast, recreation of functional trait structure can occur over a considerably shorter time-scale (>70 years). The potential to provide functionally equivalent grasslands that deliver analogous ecosystem services to those of the target habitat type is therefore a more realistic goal for re-creation. The authors suggest that the time-scale needed to recreate grasslands puts into question the benefits of compensation schemes that allow grasslands to be lost to development (*i.e.* gravel extraction) in exchange for future re-creation at other sites.

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T Ceulemans *et al.*
**A trait-based analysis of the role of phosphorus vs. nitrogen enrichment in plant species loss across North-west European grasslands**
*Journal of Applied Ecology* 2011, **48:** 1155–1163

The authors investigated how soil nitrogen (N) and phosphorus (P) availability affect the occurrence of 61 grassland species across North-western Europe. They selected 132 study sites in Great Britain, Belgium and France along a soil fertility gradient based on variability in atmospheric N deposition and on nutrient input from adjacent agricultural land. They examined the role of a suite of plant traits that may mediate a species' response to increased N or P availability. Mixed logistic regression showed that the occurrence of 24 plant species (39.3%) was affected by soil nutrient availability. Of these species, 18 were negatively affected by increased P (29.5%) and five by increased N (8.2%). Regionally declining plant species were absent from both P-rich and N-rich grasslands. Higher susceptibility to elevated P was associated with stress tolerance, low maximum canopy height and symbiosis with arbuscular mycorrhizae. Although the authors also identified negative effects on plant diversity through N enrichment, the results strongly suggest that P enrichment is a more important driver of species loss from semi-natural grasslands. Species in symbiosis with mycorrhizae and with low canopy height are especially at risk. Because detrimental effects of P enrichment are very difficult to mitigate due to the persistence of P in the soil, nature management should give absolute priority to preventing P input in grasslands through fertilisation, agricultural run-off or inundation with P-polluted surface water. To restore species-rich grasslands on P-enriched soils, top soil removal appears crucial and more research regarding alternative removal strategies is essential.

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LF New *et al.*
**Hen harrier management: insights from demographic models fitted to population data**
*Journal of Applied Ecology* 2011, **48:** 1187–1194

The impact of hen harriers *Circus cyaneus* on red grouse *Lagopus lagopus scoticus* populations has received much attention. Little has however been done to model the population dynamics of the hen harrier alone. Such a model is needed to help inform the differing aims of conserving harriers and managing grouse moors. On Langholm Estate in Scotland, intensive studies have resulted in harrier numbers being known without error. The authors fit a Bayesian population model to these data, using a super-population model to permit inference in the presence of demographic and environmental stochasticity and in the absence of observation error. After fledging, hen harrier juveniles show little natal site fidelity, often dispersing long distances into breeding areas rich in their preferred prey, the field vole *Microtus agrestis* and meadow pipit *Anthus pratensis*. Therefore, any increase in a local population is largely because of recruitment into the area as opposed to fledging success. Once birds have settled in an area, harriers are generally site faithful, with year-to-year survival depending, in part, on the density of meadow pipits. The authors' model suggests that temporal patterns in harrier numbers on managed grouse moors, in the absence of illegal persecution, are influenced by vole numbers, whereas meadow pipit density appears to have a limited effect. When used to predict future harrier numbers under alternate management scenarios, the model indicates that harrier numbers on Langholm Estate, Scotland, could be reduced without any direct human intervention if the estate can be managed in a way that reduces vole populations. In contrast, there appears to be little to gain from managing meadow pipit densities. If these conclusions apply to other harrier populations, then management to reduce vole numbers, while maintaining grouse densities, may help alleviate the conflict between conservationists and managers of grouse moors.

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GI Hobbs *et al.*
**Bayesian clustering techniques and progressive partitioning to identify population structuring within a recovering otter population in the UK**
*Journal of Applied Ecology* 2011, **48:** 1206–1217

After a major decline, the UK otter *Lutra lutra* population is now recovering in its known strongholds (northern England, Wales and Borders and southwest England) and also in central England where the population had become small, fragmented and was reinforced with captive bred individuals. Bayesian clustering and GIS are used here to identify the genetic structure of the UK otter population and to assess expansion from strongholds and the contribution of introduced otters. Three Bayesian clustering techniques were used (structure, geneland spatial and baps4 spatial) to estimate the number of otter populations (K). A novel progressive partitioning approach was tested to identify genetic substructuring at various hierarchical levels using successive partitions at K = 2. Four regional populations were identified that reflect known population history. Isolated populations in southwest England and in Wales and its borders showed the lowest levels of genetic diversity. Higher diversity and private alleles in northern and central England reflect the proximity to genetically diverse Scottish populations and the positive effect of reintroductions. Progressive partitioning was used to produce a more detailed analysis, by allowing comparison and combination of clusters identified by different techniques and by avoiding the subjective estimation and choice of K. Although the otter population is increasing, these data show little sign of population expansion from the stronghold regions into central England, instead reflecting the success of population reinforcement in this area. The authors' progressive partitioning approach allows

the identification of fine-scale substructure (11 groups) that enables the prioritisation of management effort including identifying barriers to dispersal within and between populations and monitoring of introduced individuals.

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JM Gibbons *et al.*
**Should payments for biodiversity conservation be based on action or results?**
*Journal of Applied Ecology* 2011, **48:** 1218–1226

There is growing interest in the potential of payments for ecosystem services (PES) to encourage land managers to protect and enhance the environment. Questions remain however about how PES agreements should be designed. There is a division between schemes that structure payments by action or by results, with most biodiversity PES schemes, including European agri-environment schemes, paying by action (*e.g.* incentivising land managers to carry out actions believed to increase biodiversity). Payment by results is a common incentive structure in the private sector (*e.g.* labourers doing piece work or no-win no-fee lawyers) but rarer in PES. Using a theoretical modelling approach, the authors investigate the conditions under which each way of structuring payments may be more cost-effective in a biodiversity PES. Payment by action is favoured where there is a clear action that can be specified at an appropriate level and to which biodiversity is sensitive. They found that payment by results is favoured in degraded landscapes as incentives are created for managers to use their private knowledge and join the scheme only if they can produce the biodiversity services targeted by the scheme. Payment by results is also favoured where biodiversity is less sensitive to conservation action and when it is difficult for a central agency to determine an appropriate level of conservation action. This is because payment by results allows individual managers to optimise their level of action. The relative cost of monitoring action (compliance with an agreement to manage in a certain way) versus results (the presence of biodiversity) has a substantial effect on which payment structure is more efficient only when the central agency can accurately set an appropriate level of action. Payment by results deserves more attention from those designing biodiversity PES (be they agri-environment schemes in agricultural landscapes or direct payment schemes in more intact ecosystems). This paper provides a formal framework to help policy-makers identify the conditions under which payment by results or payment by action is most likely to yield cost-effective biodiversity conservation.

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JL DeGabriel *et al.*
**The presence of sheep leads to increases in plant diversity and reductions in the impact of deer on heather**
*Journal of Applied Ecology* 2011, **48:** 1269–1277

Sheep stocks have recently decreased in Scotland, and quantification of how this affects biodiversity is essential for understanding how different grazing regimes modify upland habitats. The authors investigated the effects of grazing on plant biodiversity in heather/grass mosaics at 16 upland sites in Scotland. Red deer *Cervus elaphus* were present at all sites, but sheep *Ovis aries* had been removed from half of the sites. The experimental design incorporated replication at three spatial scales, from a landscape level down to 10 × 10 m plots. The authors quantified the relative effects of different herbivore species, vegetation structure and rainfall on heather utilisation, species richness and evenness (alpha diversity; Shannon–Wiener index) and beta diversity. At all spatial scales, deer dung counts were higher and heather was shorter when sheep were absent. Furthermore, utilisation of heather was positively correlated with the amount of deer dung, the amount of grass present and smooth grass height. Alpha diversity was consistently positively correlated with the relative amount of grass, but was also positively related to the amount of sheep dung at the largest spatial scale. At the finest scale, alpha diversity was negatively correlated with the amount of deer dung. Beta diversity was higher when sheep were present at all scales. Mixed grazing by sheep and deer appears to be beneficial for increasing both alpha and beta diversity and minimising damage to heather in the uplands. The absence of sheep is likely to result in expanding deer populations and greater impact on heather. Management of grazing herbivores is an important tool for maintaining biodiversity in many ecosystems. The results indicate that reducing livestock may alter the impacts of wild grazers on their habitats and drive changes in diversity, whereas mixed grazing can enhance habitat quality and maintain plant diversity.

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PJ Morris, LR Belyea and AJ Baird
**Ecohydrological feedbacks in peatland development: a theoretical modelling study**
*Journal of Ecology* 2011, **99:** 1190–1201

In a theoretical modelling study the authors identify three ecohydrological links as potentially important to long-term peatland development, namely those between: 1) oxic-zone thickness and the rates of litter addition and depth-integrated decay; 2) time-integrated decay and hydraulic conductivity; and 3) drainage and peatland lateral expansion via paludification. In a simple model that includes none of these links, total peat thickness increases monotonically with annual rainfall, while oxic-zone thickness is controlled by the rates of litter addition and depth-integrated decay. In an intermediate model that includes Link 1, bi-stable behaviour occurs, with both 'dry' and 'wet' peatland forms possible at low rainfall, but only 'wet' peatland forms possible above a threshold value of rainfall. This finding agrees with those from a similar published model. In a more complicated model that includes both Link 1 and Link 2, the bi-stability of the intermediate model is lost. Increases in net rainfall lead to little change in oxic-zone thickness because the model's feedbacks confer self-dampening (stabilising) behaviour. Bog height after 5,000 years is maximal at an intermediate anoxic decay rate, an initially counter-intuitive finding that reflects complex behaviour arising from the interacting feedbacks represented within the model. In a final model that includes Links 1, 2 and a partial representation of Link 3, the mode of peatland lateral expansion (*i.e.* linear, logarithmic or step-wise expansion) has a strong effect on patterns and rates of peat accumulation. Understanding long-term peatland development requires consideration of ecohydrological feedbacks; models without such feedbacks are likely to misrepresent peatland behaviour. Down-profile changes in peat properties, commonly taken to indicate external (climatic) influences in palaeoclimatic studies, may in some cases be consequences of internal peatland dynamics under a steady climate.

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B Moser *et al.*
**Simulated migration in a long-term climate change experiment: invasions impeded by dispersal limitation, not biotic resistance**
*Journal of Ecology* 2011, **99:** 1229–1236

The authors tested whether range shifts of *Bromus erectus* and *Brachypodium pinnatum*, two dominant grasses of calcareous grasslands in the southern UK with different phenologies and competitive abilities, are limited by dispersal and whether local plant communities are able to adapt to changes in climate conditions and resist invasion from novel species. The authors added seeds of the two species to an infertile grassland in northern England, where both species are currently absent and where winter warming and summer drought have been simulated for short (1 year) and long (15 years) durations. They predicted that seed addition would lead to higher establishment of the two species in grassland plots subjected to artificial winter warming than in plots with imposed summer drought, and expected that invasion resistance of the extant grassland community would be higher in long-term than in short-term climate manipulations. Warming induced earlier seedling emergence in both species and resulted in higher invader above-ground biomass at the end of the first growing season. Summer drought did not affect the invasion success of *Bromus* but it offset the beneficial

effects of winter warming in *Brachypodium*. Invader performance was similar in communities with long- and short-term climate manipulations. Climate induced poleward shifts will proceed even if slow long-distance dispersal of migrating species allows extant communities to adapt to a new climate regime. Asynchrony between the phenology of migrating species and seasonal resource use by invaded communities are likely to amplify migration success.

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J Jersáková *et al.*
**Biological Flora of the British Isles: *Pseudorchis albida* (L.) Á. & D. Löve**
*Journal of Ecology* 2011, **99:** 1282–1298

This account presents information on all aspects of the biology of *Pseudorchis albida* (small white orchid) that are relevant to understanding its ecological characteristics and behaviour.

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JL Quinn *et al.*
**Scale and state dependence of the relationship between personality and dispersal in a great tit population**
*Journal of Animal Ecology* 2011, **80:** 918–928

The authors examine the relationship between exploration behaviour – an axis of personality that appears to be important in animals generally – and a variety of dispersal processes over six years in a population of the great tit *Parus major*. Exploration behaviour was higher in immigrant than in locally born juveniles, but the difference was much larger for individuals with a small body mass, though independent of sex, representing one of the first examples of a state-dependent effect in a personality-dispersal syndrome. Despite a temporal trend in exploration behaviour at the population level, the difference between immigrants and locally born birds remained stable over time, both across and within individuals. This suggests that the personality difference between immigrants and locally born birds is established early in development, but that the process of immigration interacts with both personality and state. The authors found that the number of immigrant parents a locally born bird had did not influence exploration behaviour, suggesting either the difference between immigrants and residents was environmental or that the effect is overridden by local environmental sources of variation. In contrast to previous work, no evidence was found for links between personality and natal dispersal distance within the population, either in terms of an individual's own exploration behaviour or that of its parents. The results suggest that there are links between individual differences in personality and dispersal, but that these can be dependent on differences in state among individuals and on the scale over which dispersal is measured.

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A Millon *et al.*
**Natal conditions alter age-specific reproduction but not survival or senescence in a long-lived bird of prey**
*Journal of Animal Ecology* 2011, **80:** 968–975

The authors used 27 years of longitudinal data collected on tawny owls with estimates of prey density (field voles) from Kielder Forest (UK) to investigate how prey density at birth affects ageing patterns in reproduction and survival. Natal conditions experienced by tawny owls, measured in terms of vole density, dramatically varied among cohorts and explained 87% of the deviance in first-year apparent survival (annual estimates ranging from 0.07 to 0.33). The authors found evidence for senescence in survival for females as well as for males. Model-averaged estimates showed that adult survival probability declined linearly with age for females from age 1. In contrast, male survival probability, lower on average than for female, declined after a plateau at age 1-3. They also found evidence for reproductive senescence (number of offspring). For females, reproductive performance increased until age 9 then declined. Males showed an earlier decline in reproductive performance with an onset of senescence at age 3. Long-lasting effects of natal environmental conditions were sex specific. Female reproductive performance was substantially related to natal conditions (difference of 0.24 fledgling per breeding event between females born in the first or third quartile of vole density), whereas male performance was not. No evidence was found for tawny owls born in years with low prey density having accelerated rates of senescence. The results, combined with previous findings, suggest the way natal environmental conditions affect senescence varies not only across species but also within species according to gender and the demographic trait considered.

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J Reiss *et al.*
**Testing effects of consumer richness, evenness and body size on ecosystem functioning**
*Journal of Animal Ecology* 2011, **80:** 1145–1154

Numerous studies have revealed (usually positive) relationships between biodiversity and ecosystem functioning (B-EF), but the underpinning drivers are rarely addressed explicitly, hindering the development of a more predictive understanding. The authors developed a suite of statistical models to test for richness and evenness effects on detrital processing in freshwater microcosms. Instead of using consumer species as biodiversity units, they used two size classes within three species (six types). This allowed them to test for diversity effects and also to focus on the role of body size and biomass. The statistical models tested for (i) whether performance in polyculture was more than the sum of its parts (non-additive effects), (ii) the effects of specific type combinations (assemblage identity effects) and (iii) whether types behaved differently when their absolute or relative abundances were altered (*e.g.* because type abundance in polyculture was lower compared with monoculture). Process rates were independent of richness and evenness and all types performed in an additive fashion. The performance of a type was mainly driven by the consumers' metabolic requirements (connected to body size). On an assemblage level, biomass explained a large proportion of detrital processing rates. The authors conclude that B-EF studies would benefit from widening their statistical approaches. Further, they need to consider biomass of species assemblages and whether biomass is comprised of small or large individuals, because even if all species are present in the same biomass, small species (or individuals) will perform better.

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S Lachish *et al.*
**Fitness effects of endemic malaria infections in a wild bird population: the importance of ecological structure**
*Journal of Animal Ecology* 2011, **80:** 1196–1206

Avian blood parasites (*Haemoproteus* and *Plasmodium*) have been much studied, but the effects of these parasites on hosts in areas where they are endemic remains poorly known. The authors used a multistate modelling framework to explore the effects of chronic infection with *Plasmodium* on survival and recapture probability in a large data set of breeding blue tits, involving 3,424 individuals and 3,118 infection diagnoses over nine years. The authors reveal strong associations between chronic malaria infection and both recapture and survival, effects that are dependent on the clade of parasite, on host traits and on the local risk of infection. Infection with *Plasmodium relictum* was associated with reduced recapture probability and increased survival, compared to *P. circumflexum*, suggesting that these parasites have differing virulence and cause different types of selection on this host. The results suggest a large potential survival cost of acute infections revealed by modelling host survival as a function of the local risk of infection. Analyses suggest not only that endemic avian malaria may have multiple fitness effects on their hosts and that these effects are species dependent, but also that adding ecological structure (in this case parasite species and spatial variation in disease occurrence) to analyses of host–parasite interactions is an important step in understanding the ecology and evolution of these systems.

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S Lachish *et al.*
**Infection dynamics of endemic malaria in a wild bird population: parasite species-dependent drivers of spatial and temporal variation in transmission rates**
*Journal of Animal Ecology* 2011, **80:** 1207–1216

The authors used a novel multi-event modelling framework (an extension of multi-state mark-recapture modelling) that allows for uncertainty in disease state, to estimate transmission parameters and assess variation in the infection dynamics of avian malaria in a large, longitudinally sampled data set of breeding blue tits infected with two divergent species of *Plasmodium* parasites. They found temporal and spatial heterogeneity in the disease incidence rate and the likelihood of recovery within this single population and demonstrate marked differences in the relative influence of environmental and host factors in forcing the infection dynamics of the two *Plasmodium* species. Proximity to a permanent water source greatly influenced the transmission rates of *P. circumflexum*, but not of *P. relictum*, suggesting that these parasites are transmitted by different vectors. Host characteristics (age/sex) were found to influence infection rates but not recovery rates, and their influence on infection rates was also dependent on parasite species: *P. relictum* infection rates varied with host age, whilst *P. circumflexum* infection rates varied with host sex. The analyses reveal that transmission of endemic avian malaria is a result of complex interactions between biotic and abiotic components that can operate on small spatial scales.

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N Bunnefeld *et al.*
**Impact of unintentional selective harvesting on the population dynamics of red grouse**
*Journal of Animal Ecology* 2011, **80:** 1258–1268

Harvesting of terrestrial species with no morphological differences visible between the different age and sex classes (monomorphic species) is usually assumed to be non-selective because monomorphicity makes intentionally selective harvesting pointless and impractical. But harvesting of the red grouse *Lagopus lagopus scoticus*, a monomorphic species, was recently shown to be unintentionally selective. This study uses a sex- and age-specific model to explore the previously unresearched effects of unintentional harvesting selectivity. The authors examine the effects of selectivity on red grouse dynamics by considering models with and without selectivity. Their models include territoriality and parasitism, two mechanisms known to be important for grouse dynamics. They show that the unintentional selectivity of harvesting that occurs in red grouse decreases population yield compared with unselective harvesting at high harvest rates. Selectivity also dramatically increases extinction risk at high harvest rates. Selective harvesting strengthens the 3- to 13-year red grouse population cycle, suggesting that the selectivity of harvesting is a previously unappreciated factor contributing to the cycle. The additional extinction risk introduced by harvesting selectivity provides a quantitative justification for typically implemented 20–40% harvest rates, which are below the maximum sustainable yield that could be taken, given the observed population growth rates of red grouse.

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MA Rudd
**How Research-Prioritization Exercises Affect Conservation Policy**
*Conservation Biology* 2011, **25:** 860–866

By better aligning research with policy needs, conservation science might become more relevant to policy and increase its real-world salience in the conservation of biological diversity. Consequently, some conservation scientists have embarked on a variety of exercises to identify research questions that, if answered, would provide the evidence base with which to develop and implement effective conservation policies. The author synthesized two existing approaches to conceptualising research impacts. One widely used approach classifies the impacts of research as conceptual, instrumental, and symbolic. Conceptual impacts occur when policy-makers are sensitised to new issues and change their beliefs or thinking. Instrumental impacts arise when scientific research has a direct effect on policy decisions. The use of scientific research results to support established policy positions are symbolic impacts. The second approach classifies research issues according to whether scientific knowledge is developed fully and whether the policy issue has been articulated clearly. The author believes that exercises to identify important research questions have objectives of increasing the clarity of policy issues while strengthening science-policy interactions. This may facilitate the transmission of scientific knowledge to policy-makers and, potentially, accelerate the development and implementation of effective conservation policy. Other, similar types of exercises might also be useful. For example, identification of visionary science questions independent of current policy needs, prioritisation of best practices for transferring scientific knowledge to policy-makers, and identification of questions about human values and their role in political processes could all help advance real-world conservation science.

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R Barrientos *et al.*
**Meta-Analysis of the Effectiveness of Marked Wire in Reducing Avian Collisions with Power Lines**
*Conservation Biology* 2011, **25:** 893–903

Attempts to reduce bird mortality from power transmission and distribution line collisions include placing bird flight diverters (*i.e.* wire markers in the form of, for example, spirals, swivels, plates, or spheres) on static and some electrified wires to increase their visibility. Although studies of the effectiveness of such devices have yielded contradictory results, the implementation of flight diverters is increasing rapidly. The authors reviewed the results of studies in which transmission or distribution wires were marked and conducted a meta-analysis to examine the effectiveness of flight diverters in reducing bird mortality. They included in their meta-analysis all studies in which researchers searched for carcasses of birds killed by a collision with wires. In those studies that also included data on flight frequency, they examined eight covariates of effectiveness: source of data, study design, alternate design (if marked and unmarked spans were alternated in the same line), periodicity of searches for carcasses, width of the search transect, and number of species, lines, and stretches of wire searched. The presence of flight diverters was associated with a decrease in bird collisions. At unmarked lines, there were 0.21 deaths/1000 birds (n = 339,830) that flew among lines or over lines. At marked lines, the mortality rate was 78% lower (n = 1,060,746). Only the number of species studied had a significant influence on effect size; this was larger in studies that addressed more species.

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ME Ortiz-Santaliestra *et al.*
**Ambient Ultraviolet B Radiation and Prevalence of Infection by *Batrachochytrium dendrobatidis* in Two Amphibian Species**
*Conservation Biology* 2011, **25:** 975–982

Chytridiomycosis, caused by the chytrid fungus *Batrachochytrium dendrobatidis* (Bd), is responsible for declines and extirpations of amphibian populations worldwide. Environmental covariates modify the host-Bd interaction and thus affect the ongoing spread of the pathogen. One such covariate may be the intensity of ultraviolet B (UV-B) radiation. The authors analysed the potential effect of environmental UV-B (daily maximum 2.5–3.9 W/m$^2$) on the susceptibility of larvae of the common toad *Bufo bufo* to Bd. The proportion of infected individuals increased as tadpoles developed. The prevalence of Bd was significantly lower in tadpoles exposed to environmental UV-B intensities (2.94%) than in tadpoles not exposed to the radiation (9.72%). This finding mirrors that seen for a second amphibian species, the European midwife toad *Alytes obstetricans*, for which conditional prevalence (*i.e.* prevalence of infection conditioned on the probability of a site being infected) across the Iberian Peninsula was inversely correlated with the intensity of UV-B.

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# News in Brief

## FWAG now in administration

After the failure of last minute talks to try to find an alternative, we are saddened to report that the Farming and Wildlife Advisory Group (FWAG) went into administration on 18 November 2011. The administrators are currently seeking a sale of the company's business and its assets in the hope of preserving the future of the charity. We understand that most of the 120 national staff will be made redundant although the exact details are not yet known. It also appears that many regional offices are considering forming independent local groups. FWAG has assured that, wherever possible, projects will be completed. The organisation has struggled financially since its core funding from Defra was cut in 2010's Comprehensive Spending Review. There has also been a decline in the number of stewardship schemes taken up. FWAG was set up in 1969 by farmers concerned at the industrialisation of the countryside, and the consequent loss of habitat and wildlife.

## Natural England *Reptile Mitigation Guidelines* withdrawn

Following feedback from ecological consultants, Natural England has decided to withdraw the first edition of the *Reptile Mitigation Guidelines* (Technical Information Note No. 102, dated 9 September 2011) to enable various points to be clarified and addressed. This is an important work area, potentially affecting large numbers of planning applications in England, so Natural England wishes to ensure that the guidelines are as clear and as widely accepted as possible. The first edition of the *Reptile Mitigation Guidelines* is therefore null and void. All quotes, surveys and technical reports produced by consultants using older guidance (*i.e.* pre-dating TIN102) will still be acceptable, even if the work continues into 2012. Natural England intends to issue the revised second edition as soon as possible, and certainly before the start of the next active season for reptiles. In the meantime, the first edition is to be treated as a draft and Natural England are inviting interested parties to make additional comments to help them further improve the guidelines. The deadline for these contributions is 1 January 2012. The first edition can be downloaded from www.ieem.net/docs/TIN102.pdf. Please send any contributions or queries to technicalinformationexchange@naturalengland.org.uk.

## Farming and Forestry Improvement Scheme (FFIS)

The FFIS is part of the Rural Development Programme for England (RDPE) and is a scheme of support, developed to help farming, forestry and horticultural businesses in England to become more efficient at using resources. The scheme aims to help make businesses more profitable and resilient whilst reducing the impact of farming on the environment. There is £20m available under FFIS until December 2013. The grants are for capital items and the grant rate available is up to 40% in non-upland areas, and up to 50% in upland areas and the maximum grant allowable per project is £25,000. The minimum grant is £2,500. The application form is available to download from the website. There is also guidance in the handbook as there is some preparatory work to do before you can apply. To be eligible for funding under FFIS the project must fall within one of the following key areas of activity: Nutrient Management, Energy Efficiency, Water Resource Management, Animal Health and Welfare, and Forestry. The first round of the scheme is open from 16 November 2011 until 17 January 2012. For further information please see: http://rdpenetwork.defra.gov.uk/funding-sources/farm-and-forestry-improvement-scheme.

## NFU and Badger Trust work on TB vaccination project

The NFU and the Badger Trust have agreed to work together on an initial project to vaccinate badgers on two farms owned by members of the NFU. In addition, the Badger Trust has identified five other landowners around the UK wishing to vaccinate badgers and is working independently with them as part of the initial trial project. Vaccination on all seven farms started in October 2011 after surveys were carried out to identify active badger setts and licences have been granted by Natural England. The vaccination project will ran until the end of November 2011 and will resume in May 2012. It is hoped that the two programmes, although small in scale, will help to identify whether the injectable vaccination of badgers is practical and cost effective. The NFU and the Badger Trust will continue to encourage research and development into an orally-delivered badger vaccine.

## Native trees are fruiting earlier than ever

According to Woodland Trust data, 2011 is set to be a 'mast year' for both acorns and beech nuts. Data recorded by the public for the Woodland Trust suggests that native British trees are reacting to the changing climate by producing ripe fruit on average 18 days earlier than they were a decade ago. The trend, which is consistently advancing across 12 different species suggests that the gradual increase in temperatures over recent years is having an effect on the flowering and subsequent fruiting patterns of many species. Acorns are ripening 13 days earlier than in the period 2000-2002, beech nuts 19 days earlier and rowan berries nearly one month earlier.

## WCL publish report on CAP reform

Wildlife and Countryside Link have published *Crunch Time for CAP: Choosing the right tools for a richer countryside*. The report argues that as we enter this current round of CAP reform, the tools to drive forward more sustainable, humane and wildlife-friendly farming must be developed. It must not be hijacked by those who wish to legitimise the *status quo* through greenwash. The CAP must play its role in meeting UK, EU and global objectives and commitments, to halt and reverse biodiversity declines by 2020 and meet ambitious climate change targets. Download the full report at: http://www.wcl.org.uk/docs/crunch_time_for_cap_08nov11.pdf

## WWT celebrates 65 years

The Wildfowl and Wetlands Trust (WWT) celebrated its 65th birthday in November this year. WWT has saved species, pioneered scientific research and helped governments and communities reap widespread benefits from wetlands. Since its formation at Slimbridge in 1946, as the Severn Wildfowl Trust, WWT has opened eight more centres, covering 2,600 ha, in England, Scotland, Wales and Northern Ireland. More than one million people visit WWT reserves every year.

## Forestry Commission standards set for forest management

The Government has set out its standard for sustainable forest management in a new publication. *The UK Forestry Standard* (UKFS) is the practice code for forest management, and details the conditions that must be met when felling trees, carrying out woodland operations and receiving grants. It has been developed by the Forestry Commission and the Northern Ireland Forest Service in consultation with a wide range of interests. It applies to all woodland, irrespective of who owns or manages it. The Standard ensures that international agreements and conventions on topics such as sustainable forest management, climate change, biodiversity and the protection of water resources are robustly applied here in the UK. Download the full report at: www.forestry.gov.uk/pdf/FCFC001.pdf/$FILE/FCFC001.pdf

## Defra launches new guidelines on environmental risk

To aid the management of its diverse risk portfolio, Defra has partnered with Cranfield University's Risk Centre to update government guidelines on environmental risk assessment and management. The guidelines are now available online at: www.defra.gov.uk/environment/quality/risk

## New Environmental Stewardship guidance for common land

Natural England has published new guidance for prospective Environmental Stewardship (ES) applicants. *Common Land and Shared Grazing* is produced as a supplement to Environmental Stewardship handbooks and gives detailed advice on how to apply for Entry Level Stewardship (including Uplands ELS) and Higher Level Stewardship, where common land or shared grazing are a consideration. It provides guidance on the arrangements that need to be made before submitting an application, including details of how to set up commoners' or graziers' associations; how to record the association as a customer with the Rural Payments Agency and how to register the common or shared grazing land onto the Rural Land Register. The supplement also gives useful information on how to apply for Environmental Stewardship within an SSSI. The Common Land and Shared Grazing supplement should be read with the appropriate ES handbook and is available to download from the Natural England website at: http://naturalengland.etraderstores.com/NaturalEnglandShop/NE316

## Register your interest in ecological contract work on the national forest estate in Scotland

Forestry Commission Scotland (FCS) is in the process of setting up a framework agreement for ecological contract work on the national forest estate in Scotland. This framework agreement will comprise a list of approved suppliers and contractors and will set out the terms and conditions under which ecological work will be sub-contracted by FCS. The purpose of this set up is to minimise bureaucracy and to ensure that reputable ecological contractors are employed *e.g.* IEEM members. The types of ecological contract work covered by the framework will include protected and priority species surveys, habitat surveys, pre-operational checks and various other specialist survey work. If you wish to be considered for inclusion in this framework agreement, please contact Kenny Kortland (kenny.kortland@forestry.gsi.gov.uk) to request a pre-qualification questionnaire.

## Scottish scientists announce bTB resistance breakthrough

Scientists at the Roslin Institute, University of Edinburgh have made a breakthrough which they say could revolutionise efforts to combat bovine tuberculosis (bTB) in the UK. Scientists who took part in research have said that farmers may now be able to select cattle with a level of resistance to bTB. The research team at The Roslin Institute, who worked with a team from Queen's University Belfast, have found that some degree of resistance to bTB is inherited. The team also identified genetic markers associated with resistance. The results mean that it might be possible to selectively breed cattle that are more resistant to the disease. The group is now working with an industrial partner to explore the possibility of implementing selection for increased resistance in commercial dairy cattle.

## Plans to move pine martens in Scotland

The Scottish Government has suggested the possibility of allowing the translocation of pine martens in Scotland to try to conserve the numbers of capercaillies. The Scottish Environment Minister, Stewart Stevenson, said that he would consider relocating the mammals to other areas if scientific research confirms that they are threatening the survival of the largest member of the grouse family. A relocation programme would be the second sanctioned by the Scottish Government, which gave the go-ahead to Scottish Natural Heritage in 2003 to remove hundreds of hedgehogs from the Western Isles to save the eggs of wading birds as part of a £1.3 million experiment. A report this year suggested there was no evidence that that operation has had any effect. Scottish Natural Heritage has stressed that more research would be carried out before any action was taken.

## Report on Seabed Habitats

The Joint Nature Conservation Committee has published the report *UK SeaMap 2010: Predictive Mapping of Seabed Habitats in UK Waters*. The purpose of UK SeaMap is to provide a national and regional perspective on the UK's marine habitats, including their distribution and extent, to support national and regional scale planning and management requirements. The report provides a full coverage predictive seabed habitat map for the sublittoral UK marine area. For more information see: http://jncc.defra.gov.uk/PDF/JNCC446_web.pdf

## Wetland Bird Survey

The Joint Nature Conservation Committee has published its latest Wetland Bird Survey. The report provides details on the number of wintering waterbirds in the UK. The report shows that in winter of 2009-10 influxes of ducks such as mallard and teal occurred. There were also lower numbers of lapwing and golden plover wintering in the UK at this time. For more information see: http://www.bto.org/volunteer-surveys/webs/publications/wituk-200910

## New Republic of Ireland EU Regulations published

The new European Communities (Birds and Natural Habitats) Regulations 2011 consolidate the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats)(Control of Recreational Activities) Regulations 2010, as well as addressing transposition failures identified in the Court of Justice of the European Union (CJEU) judgements. The Regulations have been prepared to address several judgments of the CJEU against Ireland, notably cases C-418/04 and C-183/05, in respect of failure to transpose elements of the Birds Directive and the Habitats Directive into Irish law. More information: http://www.npws.ie/legislationandconventions/irishlaw/euregulations/

## Nearly 500 birds found dead at US windfarm

According to a report for the US Fish and Wildlife Service, the battery storage area at the Laurel Mountain windfarm in West Virginia, USA was the site of a big bird kill in October 2011. It was however not the turbine blades that killed the birds, rather they seem to have been drawn to lights around storage batteries and an associated electrical substation. The windfarm has 1.3 million batteries and electronic components that convert the wind power from direct current to alternating current and back again so the electricity can be put on the grid. The batteries and the electronic equipment are housed in 24 large containers on a gravel pad surrounded by five utility poles, each with a 250 Watt floodlight on it. Between 3 and 18 October 2011, 484 carcasses were found. Blackpoll warblers made up 65% and ovenbirds 7.5%. Thirty species were found in total, including thrushes, cuckoos and one green heron.

## Is it time to give up on tigers and pandas?

According to a report in The Independent, a large majority of professional conservationists now believe it is time to consider shifting efforts away from some of the world's most famous species to concentrate on others which have a greater chance of success. A survey of 583 scientists involved in wildlife protection found that more than half agree with the idea of species 'triage', where conservation efforts are concentrated on certain animals and plants that can be saved at the expense of species that are too difficult or costly to preserve in the wild.

## CBD publishes highlights of International Year of Biodiversity

The Secretariat of the Convention on Biological Diversity (CBD) has published a report on activities carried out during the International Year of Biodiversity (IYB) and other highlights. See the report at: www.cbd.int/undb/iyb/iyb-highlights.pdf

# Tauro-Scatology and Light Bulbs

**Time to banish those Recession Blues for a few minutes and relax with Basil O'Saurus, *In Practice*'s resident tauro-scatologist. And, for this issue, he is going to tell us all a joke. Take it away, Prof...**

How many policy-makers does it take to change a light bulb?

**I don't know, Prof. How many policy-makers does it take to change a light bulb?**

None.

**Explain.**

You've heard of the 'Precautionary Principle'?

**Of course... the lack of full scientific certainty should not be used as a reason for postponing cost-effective measures? Applying it to this situation, presumably, means that we don't need to be 100% sure that the light bulb is defunct before we replace it?**

Yes and no. Applying the Precautionary Principle to this example, we would urge all householders to keep a spare light bulb in case they suddenly needed a replacement. But, actually, a responsible policy-maker would not wish to increase the burden of expenditure on the homeowner unless darkness could be proven beyond all reasonable doubt.

**That's the inverse of the Precautionary Principle, surely?**

Maybe. But in the present fiscal regime we have to assure ourselves that increasing domestic light levels not only brings benefits to the homeowner, but also that there is a statutory requirement for a government agency to facilitate illumination provision in domestic situations before taking any action.

**In other words, policy-makers don't change light bulbs?**

I didn't say that. Government would like to take credit for the benefits of illumination and avoid being blamed for any deleterious outcomes arising from darkness.

**Meaning...**

We would review all legislation that might have a bearing on our responsibilities within the household illumination sector, in order to determine whether there were any significant policy drivers that placed an obligation on the State with this regard. If not, we would encourage the private sector to develop a Code of Best Practice with respect to domestic light provision...

**Basically, do nothing unless there is even a remote chance of infraction proceedings in the European Court of Justice?**

Us policy-makers prefer to call this the Big Society in action, but I see that you are getting the idea.

If we do find a policy driver that requires us to provide illumination, our next step is to define more precisely those situations where we really do have an obligation to provide this facility.

**How do you do that?**

First of all, we need to see how the relevant legislation defines 'light' and 'dark', in order to provide us with a baseline for assessments. The necessity for changing a light bulb, after all, only arises when there is broad agreement that illumination levels have reached a point where the word 'dark' can be applied unambiguously.

**Why not just flick the switch on and off a few times?**

Because that is a crude and old-fashioned approach, based solely on predetermined notions of acceptable levels of illumination and taking no account of the needs of the recipients. Very 20th century.

**And not enough scope for policy wonks to weave their unique magic?**

Precisely. The good news, from a legislator's point of view, is that 'dark' and 'light' are usually defined only in very general terms in primary legislation, which means that we can then develop a workable terminology of our own when we implement it. In practice, of course, illumination needs vary from task-to-task. If you are reading or sewing, you may require a high level of illumination, but if you want to enjoy a romantic meal, then a much lower level of illumination is acceptable. Using these guiding principles, we will devise task-specific illumination criteria which cover the whole range of domestic situations.

**You will, in other words, bring clarity to the vexatious question of adequate illumination?**

Not exactly. Having demonstrated that illumination requirements are not a constant, we will determine the mean level and confidence limits of acceptable illumination.

**Let me guess: the lower confidence limit will represent the point at which it is unambiguously dark?**

Not at all. The lower confidence limit is the point at which we can no longer argue that a room is adequately illuminated. We have to repeat the whole exercise again in order to determine the thresholds of darkness...

**...too dark to read, so dark that you can't find your way to the loo in the middle of the night, and so on?**

Exactly. You're getting the idea of this. We then combine these two estimates and arrive at a point where there is a *prima facie* case for changing the light bulb. Of course, we then need to combine the error estimates, which means that the critical threshold for action drops even further.

**But all you have done is employ some complicated statistics to argue that a room is light, even when any sane person would tell you it was dark?**

You misunderstand the object of the exercise. The system is, in fact, wholly fit-for-purpose in that it just scrapes under the bare legislative requirements set by Brussels whilst, at the same time, leaving enough headroom for individuals to take personal responsibility for something that is better delivered by the private sector.

**What you really mean is that an obligation on the State to provide light bulbs would be prohibitively expensive during a period of unprecedented cuts in public expenditure...**

Absolutely not. This is a matter of principle, not economics. It is pure coincidence that this far-reaching and visionary Government is creating a climate in which individuals are free to exercise choice at a time when we are running a huge deficit.

**I couldn't possibly comment. Thanks again for your time, Prof. And in the next issue we'll investigate just how many policy-makers it takes to decide that policy-makers don't change light bulbs...**

# New and Prospective Members

## APPLICANTS

If any existing Member has any good reason to object to someone being admitted to the Institute, especially if this relates to compliance with the *Code of Professional Conduct*, they must inform the Chief Executive Officer by telephone or letter before **9 January 2012**. Any communications will be handled discreetly. The decision on admission is usually taken by the Membership Admissions Committee under delegated authority from Council but may be taken directly by Council itself. IEEM is pleased to welcome applications for membership from the following:

### APPLICATIONS FOR FULL MEMBERSHIP

Associates applying to upgrade to Full membership were listed previously for their Associate application and are not listed again.

Mrs Miriam Baines, Dr Christopher Bell, Mrs Holly Bowler, Mr James Darke, Mr Jamie Glossop, Mr Andrew Holyoak, Dr Declan Lawlor, Mrs Mary Martin, Miss Hannah Montag, Mr Anthony Nickson, Mr John Pinel, Mr Mark Preece, Mr Alex Prendergast, Mr Dominic Price, Mr Paul Roebuck, Miss Gemma Russell, Mr Mark Vivian, Mr Alistair Watson, Dr Robin Welsh, Dr David White, Mr Andrew Williams, Mr Nick Young

### APPLICATIONS FOR ASSOCIATE MEMBERSHIP

Miss Lucy Hill, Mr Oliver Richings, Miss Heather White

### APPLICANTS WISHING TO UPGRADE TO ASSOCIATE MEMBERSHIP

Mr Thomas Austin, Miss Donna Bigsby, Miss Kelly Burns, Mr Leon Debell, Mr Nathan Edmonds, Mr Barry Grieves, Miss Sian Jones, Ms Sara King, Miss Rhia McBain, Dr Stephanie McGovern, Mr Neil Parker, Miss Eleanor Phillips, Miss Camilla Smith, Miss Elizabeth Stewart, Dr Kimberley Williamson, Miss Jennifer Wilson

## ADMISSIONS

IEEM is very pleased to welcome the following new members:

### FULL MEMBERS

Mrs Emma-Jane Ahart, Mr Kenneth Anckorn, Miss Mandy Apps, Dr Ian Bainbridge, Miss Laura Bambini, Dr Martin Brammah, Dr Anne Brenchley, Ms Genevieve Broad, Mr Philip Collins, Miss Kelly Ann Dempsey, Miss Sasha Dodsworth, Dr Stephen Ellwood, Mr Duncan Ferns, Mr James Foster, Mr Andrew Gibson, Mr Martin Goodall, Mr Robert Havard, Mr Martin Hicks, Mr St. John Hughes, Mr Chris Kaighin, Mr David Keeley, Miss Anna Muckle, Mr Richard Mycock, Mr Andrew Nyul, Mr Richard O'Callaghan, Dr Suzanne Painting, Miss Julie Powell, Mr David Prys-Jones, Mrs Kimberley Purchase, Mr Matthew Roberts, Miss Charlotte Rose, Dr Zoe Russell, Mr James Smith, Mrs Jane Smith, Mrs Anna Sutcliffe, Ms Karen van Eeden, Mr Jonathan Webb

### ASSOCIATE MEMBERS

Ms Crystal Acquavia, Mr Robert Clisham, Mr Alexander Crichton, Miss Laura Hammerton, Miss Suzanne Hogg, Mr John Matthews, Mrs Joanna Milborrow, Mr Peter Newbold, Miss Annabelle Phillips, Mr Nicholas Pond, Dr Johanna Rabineau, Miss Pamela Wakefield

### GRADUATE MEMBERS

Miss Karen Aldridge, Mr Richard J Anderton, Miss Catherine M Baldock, Mr William Balmont, Mr Marc Bartolini, Mr Stephen A Beal, Miss Gillian Benson, Mr Tom Bentley, Miss Jacqueline B Bodimead, Mr Lee Bowden, Mr David W Braidwood, Miss Jennifer Britt, Miss Sinead Calnan, Miss Hayley Care, Mr Andrew J Cole, Miss Julia Coulson, Mr Samuel Davis, Mr Nicholas D Deykin, Miss Samantha Dobbie, Miss Caroline Douglas, Mr Henry JM Durka, Miss Deborah J Evans, Mr Christopher M Eves, Mr Anthony Flint, Mr Peter C Gabriel, Miss Melanie A Gammon, Mr Johnleigh Glenwright, Miss Stefanie L Goodrich, Mr Samuel Green, Miss Josephine Griffiths, Miss Lucy J Groves, Miss Emily Hare, Miss Grace E Harley, Mr Espen Helland, Dr Chantal V Helm, Miss Gemma C Holmes, Miss Candice M Howe, Miss Jennifer M Iles, Miss Kathleen A Irvine, Miss Kathryn James, Mr Christopher JP Jennings, Mrs Philippa Jordan, Miss Kristy L Kelly, Miss Kate Kibble, Miss Kirsty Knight, Mr Iain MacLean, Mrs Lisa Malcolm, Miss Victoria L Mason, Mr John G McCarthy, Mr Matthew T McLellan, Ms Mairead O'Connor, Mr Barry O'Loughlin, Mr Michael Paginton, Miss Carly T Peggie, Miss Tess Pettinger, Miss Donna Popplewell, Mrs Laura M Rogers, Mr Tom Rothero, Mr Agnelli R Santiago, Mr Joshua Stafford, Mr Alastair Stuart, Miss Georgina L S Timmis, Miss Leanne Wall, Mr Alexander P Watkinson, Miss Louise A Watson, Mr Nikolas P West, Ms Liza F White, Miss Louisa Whitthread, Mr Nathan Wood, Miss Paula AR Young

### AFFILIATE MEMBERS

Mr Andrew Cameron, Mr Gareth Clay, Mr Kenneth Coyne, Miss Claire Dovey, Ms Linda Henderson, Mr Gavin P Jones, Mr Jamie Luck, Mr Thomas Lunn, Mr Ian J Marshall, Mr Paul J Roberts, Mrs Laura M Rogers, Mr David W Townend, Ms Caroline Vawdrey

### STUDENT MEMBERS

Miss Louise Abbey, Miss Kemi F Adegoke, Miss Aysha Al-Rubaie, Mr Marc A Anderton, Miss Serena Andreini, Mr Steven Angell, Mrs Jane Applegarth, Mr Dominic S Bower, Miss Michelle J M Bullock, Mr Christopher J Chase, Mr Gozie L Chuka-Okeke, Miss Amy Clinch, Miss Gemma M Coar, Mr Matthew Collis, Mr Dale J Cooper, Miss Natalie B Cozzolino, Miss Laura J Daws, Mr David Depena, Mr Ben Devine, Miss Lucy Elliott, Mr Amata Esieke, Miss Natasha Filer, Mrs Annabel Foskett, Miss Hannah C Gardner, Miss Claire Gomer, Mr Michael Hayward, Miss Jennifer Hodgkin, Miss Helen L Holford, Ms Sarah Hunter, Miss Dawn LL Jackson, Mr Mark A Johnston, Miss Viktoryia Kanonchyk, Miss Vi Gia Le, Mr Sheikh Noor Mohammad, Mr Jonathon Parsons, Mrs Penny Porter, Mrs Claire Rennie-Lis, Miss Susan Robertson, Mr Samuel L Taylor, Mr Jamie Thomson, Ms Jane Todd, Ms Emma K Vaughan, Mrs Maria R Walker, Miss Kathryn Walter, Miss Jayne Wilkinson, Miss Sarah Woodward

## UPGRADES

The following have successfully upgraded their membership:

### UPGRADES TO FULL MEMBERSHIP

Miss Rebecca Brassey, Mr Adam Bratt, Mrs Sarah Candlin, Ms Primrose Duplessis, Mr Jamie Edmonds, Mr Robert Fennelly, Mr Robert Firmin, Miss Victoria Forder, Mr David Goddard, Mr Bill Haines, Miss Eleanor Jones, Miss Charlotte Lea, Miss Frances Lowe, Miss Elizabeth McBride, Miss Alison Pike, Mr Thomas Ryan, Mrs Carol Seddon, Mr Glen Shah

### UPGRADES TO ASSOCIATE MEMBERSHIP

Mr Nicolas Andrews-Gauvain, Miss Barbara Goncalves, Mr Richard Craven, Mr Paul Franklin, Miss Rebecca Harris, Miss Sally-Ann Hurry, Mr Ryan Knight, Miss Sarah Love, Miss Elizabeth Webster

### UPGRADES TO GRADUATE MEMBERSHIP

Mr Philip J Aldwinckle, Mr James D J Bird, Miss Laura J Boggeln, Miss Karen A Carter, Mr Richard Chilcott, Mr Leslie Cousins, Miss Maria A Crastus, Miss Chloe Date, Miss Casey-Ruth Griffin, Miss Amelia Hodnett, Miss Jennifer J James, Miss Natasha Murray, Miss Sian Piper, Miss Jacqueline Platt, Miss Heather J Poulton, Miss Kirsty Radley, Mr Benjamin Richardson, Miss Lucy Taylor, Miss Naomi Taylor, Ms Kay Thompson, Miss Elizabeth M White, Miss Laura E Wilkinson

# Forthcoming Events

## IEEM Conferences

| DATE | EVENT | LOCATION |
|---|---|---|
| 21 March 2012 | Spring 2012 Conference - Planning and Biodiversity: Developing Opportunities through Change | Birmingham |
| 13 June 2012 | Summer 2012 Conference - Soil Management and Biodiversity: Sharing Good Practice | London |
| 6-7 November 2012 | Autumn 2012 Conference - Renewable Energy and Biodiversity | Bristol |

**For more information on conferences please visit: www.ieem.net/conferences.asp**

## IEEM Training Workshops

| | | |
|---|---|---|
| 24 February 2012 | Bird Song for Beginners | Greater London |
| 27 February 2012 | Trees and Bats | Dorking, Surrey |
| 28 February 2012 | BS 5837 (Trees in Relation to Construction) and Bats | Dorking, Surrey |
| 29 February 2012 | Surveying for Bats and Development – The Consultants' Approach | Greater London |
| 1 March 2012 | Basic bats – Ecology, Species Identification, Survey and Mitigation | Hexham, Northumberland |
| 5 - 6 March 2012 | Water Vole Conservation and Development | Lifton, Devon |
| 12 March 2012 | Lichens, Fungi and Bryophytes: Ecology, Survey Techniques and Mitigation | Cleeve, Bristol |
| 20 March 2012 | Making the most of BREEAM and the Code for Sustainable Homes | London |
| 22 March 2012 | Evaluation and Impact Assessment in Ecology | Sheffield |
| 24 March 2012 | Great Crested Newt Survey and Interpretation | Brockenhurst, Hampshire |
| 26 March 2012 | Great Crested Newt Survey and Interpretation | Brockenhurst, Hampshire |
| 27 March 2012 | Habitat Management for Reptiles | Hadleigh, Essex |
| 28 March 2012 | Evaluation and Impact Assessment in Ecology | Perth, Scotland |
| 29 March 2012 | Architectural Features and How They Relate to Bats | South Warwickshire |
| 30 March 2012 | GPS Field Data Collection | Cambourne, Cambridgeshire |
| 11 April 2012 | Mosses and Liverworts of Heath, Mire and Acid Woodland | Newbury, Berkshire |
| 12 April 2012 | Sampling and Identification of Freshwater Macroinvertebrates | Nottingham |
| 16 April 2012 | Bat Basics – Where and How to Find and Survey Bats | near Polegate, East Sussex |
| 17 April 2012 | Introduction to Habitats Regulations Assessment | Chester, Cheshire |
| 17 - 18 April 2012 | Reptile Survey | Horndean, Hampshire |
| 19 - 20 April 2012 | Introduction to Badgers and Badger Survey Techniques | Axminster, Devon |
| 23 April 2012 | Bat Mitigation – Licensing Development | near Polegate, East Sussex |
| 24 April 2012 | Upland Farming for Ecologists and Environmental Managers | Hathersage, Derbyshire |
| 24 - 25 April 2012 | Reptile Mitigation | Horndean, Hampshire |

**For the full list of workshops and more information please visit: www.ieem.net/workshops.asp**

## IEEM Masterclass Series

| | | |
|---|---|---|
| 19 January 2012 | Protected Species: How Local Planning Authorities Should Discharge Their Legal Duties | Birmingham |
| 26 January 2012 | European Protected Species: Legal Training Seminar for Ecological Consultants | Edinburgh |
| 9 February 2012 | European Protected Species: Legal Training Seminar for Ecological Consultants | Manchester |
| 3 April 2012 | Professional Ethics | London |
| 17 October 2012 | Professional Ethics | Birmingham |

NEW !!!

**For more information please visit: www.ieem.net/masterclasses.asp (More information also on page 41)**

## IEEM Geographic Section Events

| | | |
|---|---|---|
| 2 February 2012 | Welsh Section AGM | TBC |

**For more information on IEEM Sections please visit: www.ieem.net/geographicsections.asp**