

inpractice

Issue 89 | September 2015

Conservation Translocations



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Meeting the Favourable
Conservation Status Test for
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Welcome

Maximising the value of translocations

Current policy in Britain is that habitat and species translocations are never an acceptable alternative to *in situ* conservation. This was set out clearly in policy documents published by JNCC in July 2003 in response to the launch of the Rio Convention on Biological Diversity. However, the same policies say that where a development has been given planning approval, translocations should be considered as a means of partially compensating for loss, or to restore the characteristic biodiversity of damaged or degraded sites. As the principle of 'no net loss' is becoming a new policy driver for biodiversity in the context of planning and development, salvage habitat translocations will become more important in achieving this.

A policy of no net loss of biodiversity, as demonstrated in Target 2, Action 7, of the EU Biodiversity Strategy to 2020, suggests that valuable habitats on development sites will have to be translocated because new habitats of the same maturity, structure and ecological functions cannot be created quickly enough to replace the loss of mature and long-established habitats. Where is the logic in felling a number of mature trees or removing a hedgerow only to replace them elsewhere on the same site with nursery bought whips from the continent that will take decades to achieve the same ecosystem functions?

Translocation of animals to ensure no net loss of biodiversity has become commonplace, with many new and novel approaches, as shown by the breadth of articles in this issue of *In Practice*. However, there appears to be a reluctance to salvage habitat features to conserve local genetic diversity and it is telling that no articles on habitat translocations appear in this edition. Capability Brown was moving mature trees around designed habitats over two centuries ago, but an engineer asked me "*Can we do that?*" with a look of incredulity when I suggested translocation of a mature tree recently. A reluctance to attempt habitat translocation over habitat creation could stem from the degree of uncertainty about the likely success, from people being unaware of methodologies or from conceptions regarding cost and effort. Even the outcome of the many animal translocations that are routinely carried out by ecologists are not centrally recorded in a way that is easily available to the profession and so that this information can be used to improve translocation practices.

I would dearly love to see a central, long-term monitoring and recording network for translocation case studies, which would provide measures of success of different methods, ascribe costs for both implementation and aftercare, and apply no net loss and/or ecosystem service calculations to schemes to show the value of translocations. The JNCC habitat and species translocation policies for Britain from 2003 call for the central recording of the results of translocations co-ordinated by an organisation (or consortium) but this has still not happened. The editorial in the June 2015 edition of *In Practice* on Monitoring and Measuring Mitigation Success was still calling for research into the effectiveness of mitigation measures and for improving the evidence base.

Who should the co-ordination body be and how can we work toward a central reporting system to ensure that evolving translocation methodologies are recorded, the translocation methods we use are effective and to compare translocation with habitat creation against the principles of no net loss? Adding to the work that CIEEM is already doing – regarding sharing biodiversity survey data, and also sharing survey and mitigation strategies – I hope that it will have a role to play in working with organisations such as JNCC, statutory agencies, RSPB, Woodland Trust, and the Wildlife Trusts to bring this information together.

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CIEEM Autumn Conference 2015

Reconnecting People and Nature: Opportunities and Challenges

3-4 November 2015, Sheffield

Our two-day Autumn Conference this year will share evidence of the benefits of reconnecting people and nature as part of a healthy, stable and successful society. It will examine, through good practice case studies, recent successful approaches to engaging people with nature and managing conflicts. The role of our profession in effectively communicating the value of nature will also be explored.

www.cieem.net/2015-autumn-conference

See page 58 for more information.

Joint air quality event

On Thursday 16 July, IAQM (Institute of Air Quality Management) and CIEEM organised a joint discussion on air quality and ecological impact assessments. The discussion was attended by over 130 members from both professional bodies. There were four key speakers; James Riley MCIEEM (AECOM), Ben Marner (Air Quality Consultants), Alastair Burn (Natural England) and Kate Bayley MCIEEM (Environment Agency).

Delegates and speakers discussed the need for new guidance to be produced that can provide a consistent approach for both planning and permitting regimes, which CIEEM and IAQM will now look to take forward.

A full summary of the discussion can be found at www.cieem.net/news/263/joint-event-on-air-quality-and-ecological-impact-assessment.

CIEEM takes part in Undergraduate Summer School

In July, CIEEM facilitated a half-day workshop for 50 students at the first ever British Ecological Society Summer School, a five-day residential programme held at Malham Tarn Field Centre, North Yorkshire. CIEEM members Zoe Webb GradCIEEM, Andrew Halcro-Johnston MCIEEM, David Martin MCIEEM and Tim Graham MCIEEM introduced the delegates (all with a strong interest in ecology), to a variety of career paths, insights and tips for success. The students then undertook a lively exercise trying their hand at undertaking a site survey, rounding off the day with an evening careers Q&A session. We look forward to partnering at this event again in the future.

Statutory guidance in survey and mitigation

Until now it has been accepted that the guidance on survey requirements and mitigation issued by statutory organisations in England (i.e. Natural England and the Environment Agency) were to be followed unless there was compelling evidence to do otherwise. CIEEM's understanding is that such guidance no longer has any 'official' status and has been withdrawn (although still available for reference on the National Archives website). This has inevitably created considerable uncertainty with regard to the standards recognised by the Planning Inspectorate.

Other organisations produce best practice guidance, but these also have no 'official' status. It is entirely possible going forward that two organisations could produce conflicting 'best practice' guidance with no 'official' line as to which should be followed.

CIEEM has written to the Planning Inspectorate to ask how Planning Inspectors in public inquiries are likely to address conflicting approaches to survey and mitigation and what their expectations will be in relation to the standards used.



EU Fitness Check of the Nature Directives

CIEEM has responded to the European Commission's call for evidence consultation on the 'fitness' of the EU Birds and Habitats Directives. We submitted our response through our membership of the European Network of Environmental Professionals (ENEP). As part of our engagement with the European Commission's call for evidence consultation, CIEEM attended Green Week (see photo) – the biggest annual conference on European environment policy.

In July we responded on behalf of both CIEEM and ENEP to the second part of the consultation, which sought public opinion.

See both responses at <http://www.cieem.net/past-consultation-responses>.

CIEEM Strategic Plan Summary

Following approval of CIEEM's new Strategic Plan earlier this year, a Summary version has now been published and is available on the website. The Strategic Plan sets out an ambitious agenda for the organisation, one which the Governing Board hopes will inspire as many members as possible to get involved in delivering, so please do take the time to read the Summary and give us your feedback.

www.cieem.net/strategic-plan





CIEEM engaging with the UK referendum on EU membership

Most of our wildlife and environmental legislation is based on EU Directives and we are unsure how these would be replaced if the UK were to leave the EU. A renegotiated relationship with the EU is even more uncertain as it is not known if, or to what extent, any changes to environmental legislation would be sought. Changes to the legislation under which most of our profession works will have profound and potentially serious implications for our members. This political issue is one that CIEEM is engaged with. The first step in this process was to organise a workshop for members and non-members with relevant experience on 31 July 2015 in Birmingham. This first workshop was primarily a scoping exercise to determine the boundaries of the evidence that we want to collect, the types of evidence we will need, and how to go about collecting it. A report on the workshop and ongoing progress will be published in the next edition of *In Practice*.

CIEEM member appointed Lead Author for IPBES

Dr Alan Feest CEcol MCIEEM has been appointed as a Lead Author for Europe and Central Asia for the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES). This is a major role with significant implications for the future of biodiversity conservation.

Staff Changes

We said goodbye to our Registration Officer **Karen Sanderson** in August. We wish her all the best for her new career. At the time of writing we are in the process of recruiting her replacement.

We are pleased to welcome **Kate Flood** as the new Irish Section Support Officer. Kate started in August and is based in the Republic of Ireland.

Activities of the Professional Standards Committee (PSC)

The PSC met in early June at the Environment Agency offices in London.

Complaints update – PSC received their regular summary report of complaints received and discussed trends and future approaches to managing complaints.

Survey guidance for clients – New guidance for homeowners/small-scale developers on what to expect when required to undertake a bat survey was reviewed in final draft form prior to publication and PSC is now looking at other potential guidance for this audience – including things to consider when contracting an ecologist. A working group will be taking this forward.

EclA Guidelines – PSC reviewed the penultimate draft of the Revised Ecological Impact Assessment (EclA) Guidelines and has provided comments to the editorial team prior to the document's consideration by the Governing Board later this year.

Alignment of Preliminary Ecological Appraisal (PEA) and EclA Guidelines – PSC has a working group focussing on clarifying the nature and purpose of PEA, and the relationship between PEA and EclA. The group is working on guidelines that will include reference to the UK Overseas Territories, and will complement planned Guidelines for the Use of Biodiversity Data in the UK (see below).

Data use guidance – A small working group of the Biodiversity Data Management Knowledge Sharing Network or BDN (chaired by CIEEM) is producing draft Guidelines on the Use of Biodiversity Data in the UK. PSC talked about the guidelines and how to ensure we make links to other relevant areas of PSC's work.

Raising Standards Project – The outcomes of this project were reviewed prior to submitting a final report to the Governing Board.

Biodiversity in the built environment – PSC considered a paper proposing options for an initiative looking at biodiversity enhancement in the built environment. PSC saw merit in taking something forward, and proposed further steps to look at who else we might work with to progress this.

Permitted development – following the survey of members and further discussion, PSC have asked the West Midlands Section to develop a position statement on biodiversity and permitted development. They will then keep this issue under review and consider further action if more evidence comes to light of widespread concern.

Habitat classification system update – A working group has been developing this new system, and a number of volunteers have been identified to trial it during the survey season. CIEEM/PSC will also be consulted as the system is developed and trialled.

CIEEM Past President in Queen's Birthday Honours List 2015

CIEEM Past President and Fellow David Hill CEnv FCIEEM has been awarded a CBE in the Queen's Birthday Honours List 2015 for his services to nature conservation and the economy. www.cieem.net/news/255/cieem-past-president-in-queens-birthday-honours-list-2015



Future themes for *In Practice*

Edition	Theme	Submission deadline
March 2016	Managing the Impact of Animal and Plant Disease on Biodiversity	30 November 2015
June 2016	Valuing Ecosystem Services	29 February 2016

If you would like to contribute an article to one of these editions please contact the Editor. Contributions are welcomed from both members and non-members.

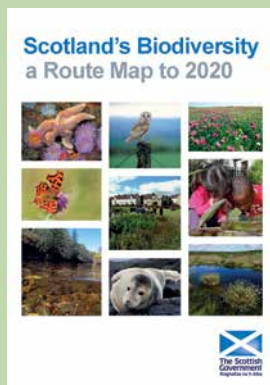
Law Commission review of UK wildlife law

The Law Commission is due to publish its final report and draft Bill in mid-September. There has been a slight delay due mainly to the sheer size and technical complexity of the project, and partly to ensure that it is published when Parliament is sitting.

European Commission Review of the EU Habitats and Wild Birds Directives

The European Commission has added the responses received from their first phase of evidence gathering to their website. The four UK responses can be found at the address below, along with those received from other organisations across Europe.

http://ec.europa.eu/environment/nature/legislation/fitness_check/evidence_gathering/index_en.htm



Scotland's Biodiversity: a Route Map to 2020

The Route Map sets out six 'Big Steps for Nature' and a number of priority projects which focus on collaborative work which the Scottish Government and a wide range of partners are taking forward to help deliver the 2020 Challenge and to improve the state of nature in Scotland.

<http://www.gov.scot/Resource/0048/00480289.pdf>

Assessing the performance of EU nature legislation in protecting target bird species in an era of climate change

This study assesses whether species listed on Annex I of the European Union (EU) Birds Directive differ systematically in their short-term (2001-2012) or long-term (1980-2012) population trends from those of non-Annex I species. In both periods, Annex I species had more positive trends than non-Annex I species. The authors conclude that the EU's conservation legislation has had a demonstrably positive impact on target species.

<http://onlinelibrary.wiley.com/doi/10.1111/conl.12196/abstract>

<http://onlinelibrary.wiley.com/doi/10.1111/conl.12196/epdf>

Green Bridges in England: A literature review (NECR181)

This Natural England publication identifies and analyses evidence to inform understanding of the cost effective design and positioning of green bridges and similar infrastructure (including retro-fitting green features to existing grey bridges) to address landscape, access and ecological severance, connectivity and integration issues on the road and rail transport network, and to maximise the delivery of landscape benefits and ecosystem services.

<http://publications.naturalengland.org.uk/publication/6312886965108736>

New species of amphibian fungus found in the UK

A newly-discovered species of chytrid fungus which can infect and kill a wide range of newts and salamanders has been found in captive UK populations for the first time. *Batrachochytrium salamandrivorans* has become established in a few wild amphibian populations in parts of Europe where it is causing devastating population declines.

<http://www.zsl.org/science/news/new-species-of-amphibian-fungus-found-in-the-uk>
<http://www.freshwaterhabitats.org.uk/news/protecting-amphibians-from-invasive-disease/>

Wales Environment Bill progressing through Stage 1 Scrutiny in National Assembly

Following the Bill's introduction into the Assembly on 11 May, the Bill's passage through the Assembly is well underway. As part of the Stage 1 scrutiny, the Minister for Natural Resources has provided evidence to the Constitutional and Legislative Affairs Committee on 1 June, the Environment and Sustainability (E&S) Committee on 24 June and the Finance Committee on 9 July. The E&S Committee have also held a number of evidence sessions with stakeholders. When the Assembly returns for the autumn term it is expected that the Minister will be invited back to the E&S Committee to give further evidence. The Committee is due to report to the Assembly on the general principles of the Bill by 9 October.

<http://www.senedd.assembly.wales/mglIssueHistoryHome.aspx?lId=12572>
www.assembly.wales

Cheaper alternatives to traditional hedge laying can still reap conservation benefits

A recent study has found an alternative method of hedging that is cheaper than traditional hedge laying but offers the same benefits of dense new growth and berry provision for wildlife.

http://ec.europa.eu/environment/integration/research/newsalert/pdf/cheaper_alternatives_to_traditional_hedge_laying_can_reap_conservation_benefits_419na3_en.pdf

New tool to measure impact of man-made noise on sea mammals

A team of scientists from the University of St Andrews has developed a new computer modelling tool for assessing the impact of noise from human disturbance, such as offshore wind development, on marine mammal populations.

<https://www.st-andrews.ac.uk/news/archive/2015/title,263123,en.php>

Water Strategy for Wales

This Strategy is set within the context of Wales' long-term policy direction to improve its natural resource management and covers a broad range of matters relating to the management of water systems, including all inland waters, estuaries and coastal waters.

<http://gov.wales/topics/environmentcountryside/epq/waterflooding/publications/water-strategy/?lang=en>



Study highlights noise threat to Atlantic cod

Atlantic cod could be at risk from noise created by wind farms and other off-shore developments, according to new University of Stirling research. A study carried out by the University's Institute of Aquaculture found that Atlantic cod exposed to noise levels common in land-based aquaculture facilities exhibited significantly reduced rates of egg production and fertilisation.

<https://www.stir.ac.uk/news/2015/07/stirling-study-highlights-noise-threat-to-atlantic-cod/>



Ireland's Ocean Economy

This report provides a quantification and realistic monitoring of Ireland's ocean economy over time and presents a complete and comparable sectoral profile across the ocean economy, which allows us to observe progress on the targets set out in the Government's *Integrated Marine Plan for Ireland – Harnessing Our Ocean Wealth* (2012).

http://www.nuigalway.ie/semru/documents/semru_irelands_ocean_economy_web_final.pdf

Red kite confirmed shot in County Down

RSPB Northern Ireland has said its "worst fears have been confirmed" after tests proved a red kite found dead in County Down



was deliberately shot. The female bird was discovered near Katesbridge on 20 May and it was recovered by the PSNI and the Northern Ireland Raptor Study Group.

<http://www.rspb.org.uk/news/details.aspx?id=402927>

Scottish Environmental Assessment Newsletter

The Environmental Assessment Team within the Scottish Government, along with the Consultation Authorities (SNH, SEPA and Historic Scotland) have put together this latest newsletter. The newsletter draws together important updates which those dealing with either SEA, EIA or HRA should find helpful.

<http://www.gov.scot/Resource/0048/00481126.pdf>

Biocontrol of Himalayan balsam in Wales

Between 26 and 29 May 2015, scientists from the Centre for Agriculture and Biosciences International (CABI) released a biological control agent to combat this invasive non-native species. The biocontrol agent is a host-specific pathogenic rust fungus. Himalayan balsam plants infected with the fungus have been planted out at four sites in Wales, with monitoring to take place over the next three years.

BES Equality and Diversity Survey

The British Ecological Society is keen to hear about ecologists' experiences. The 10-15 minute questionnaire is open until Monday 21 September.

<https://www.surveymonkey.com/r/299B992>

Study reveals extent of upland burning across Britain

A new study led by the RSPB Centre for Conservation Science has revealed the extent of moorland burning across Britain's upland areas. Burning was detected in 55% of Special Areas of Conservation (SACs) and 63% of Special Protection Areas (SPAs) assessed in the study, and significantly more burning took place within them than on comparable moorlands outside.

<http://www.sciencedirect.com/science/article/pii/S0006320715002372>

Climate change research reveals species most at risk

Wasps, bees, ants and southern species including Dartford warbler and emperor dragonfly are likely to benefit from climate change in England. Further north and in the uplands, breeding birds such as curlew and cuckoo, damp-loving mosses and liverworts will be put at great risk by rising temperatures, according to new research.

<http://publications.naturalengland.org.uk/publication/4674414199177216>

CBD Launches Manual on Tourism and Biodiversity

The Secretariat of the Convention on Biological Diversity (CBD) has launched *Tourism Supporting Biodiversity: A Manual on applying the CBD Guidelines on Biodiversity and Tourism Development*. The manual aims to support the integration of biodiversity conservation and management into sustainable tourism development, and to support the implementation of the CBD Guidelines on Biodiversity and Tourism Development.

<http://nr.iisd.org/news/cbd-launches-manual-on-tourism-and-biodiversity/>

Pine marten in Shropshire!



The first confirmed sighting of a pine marten in England for a century has been reported.

<http://www.shropshirewildlifetrust.org.uk/pine-marten-appeal>



Freshwater pearl mussel *Margaritifera margaritifera*. Photograph: Sue Scott, SNH.

New International and National Guidelines for Conservation Translocations

The freshwater pearl mussel *Margaritifera margaritifera*, woolly willow *Salix lanata* and red kite *Milvus milvus* have all been the subjects of conservation translocations in Scotland in recent years.

Peter M. Hollingsworth
Royal Botanic Garden Edinburgh

Conservation translocations involve human movement of species to provide a conservation benefit. This includes bolstering dwindling populations (reinforcement), replacing those that have been lost (reintroduction), or creating populations in new areas where threats are lower (assisted migration). But moving

Martin Gaywood
Ecosystems and Biodiversity Unit,
Scottish Natural Heritage

species is not without risk. Conservation resources can be squandered if translocations fail, and translocations can spread pests and diseases and in some cases create problems for other species or other users of the land. To maximise benefits and minimise harm from translocations, the International Union for the Conservation of

Keywords: assisted migration, IUCN guidelines, reintroduction, Scottish Code for Conservation Translocations, translocation

Nature (IUCN) has produced new guidelines on conservation translocations. These guidelines have subsequently been used in Scotland to develop a national interpretation and implementation framework: the Scottish Code for Conservation Translocations.

Red kite *Milvus milvus*. Photograph: Lorne Gill, SNH.

Moving species for conservation

Conservation translocations are sometimes described as the action of last resort. Yet in the face of increasing pressures on biodiversity, there is growing interest in human-movement of organisms for conservation purposes. In particular, the 'assisted migration' of species to locations outside of their natural range is receiving increasing attention and publicity as a strategy to ameliorate the twin challenges of environmental change and habitat fragmentation.

When successful, conservation translocations can benefit the species being moved, improve the overall habitat of the system it is moved into and, particularly in the case of charismatic species, provide wider benefits to people and communities (e.g. via development of eco-tourism). Set against this backdrop of positive benefits are some concerns. The total annual cost to the British economy from invasive non-native species has been estimated at £1.7 billion (Williams *et al.* 2010), and there is a natural concern that some out-of range translocations may ultimately become invasive. Likewise, there is the potential for negative impacts on people and livelihoods if the translocated species leads to restriction on other land uses, or in some

way causes direct harm (e.g. predation of livestock or pets).

International guidelines

To promote best practice and to maximise benefits and minimise harm from conservation translocations, the IUCN assembled a task-force from its 'Reintroduction' and 'Invasive Species' specialist groups. The main output of this task-force was the 2013 *International Union for the Conservation of Nature's Guidelines for Reintroductions and Other Conservation Translocations* (IUCN/SSC 2013). These guidelines are the international standard and were used as the basis for the Council of Europe's recommendation on *Conservation Translocations under Changing Climatic Conditions*, now formal policy for the 50 signatory governments to the Bern Convention on the Conservation of European Wildlife and Natural Habitats.

The new IUCN guidelines encompass all stages in a translocation, from assessing whether it is necessary and appropriate, defining goals and objectives, assessing risks and feasibility, through to release and implementation, monitoring and adaptive management, and communication and engagement.

National guidelines: the Scottish Code for Conservation Translocations

The IUCN guidelines are by necessity 'top-level' and are designed for use globally. To facilitate implementation in Scotland, the Royal Botanic Garden Edinburgh and Scottish Natural Heritage produced the Scottish Code for Conservation Translocations and associated Best Practice Guidelines (National Species Reintroduction Forum 2014a,b). The Scottish Code for Conservation Translocations was launched in 2014 (Figure 1) and is summarised in Box 1.

Box 1: Scottish Code for Conservation Translocations 'at a glance'

- Work out whether translocation is the best option: could other conservation actions provide a lower-risk and lower-cost solution?
- Where translocation is the best option, develop a clear plan to deliver a well-defined conservation benefit
- Obtain all necessary permissions and licences
- Maximise the chances of success by understanding the biological needs of the species
- Take great care to protect the species being moved, the habitat it is being released into, and avoid the spread of invasive species, pests and diseases
- Where translocations may affect people, consult with land-users and other interested groups and individuals to identify ways the translocation can provide them with benefits, and do not undertake translocations that would cause unacceptable harm to people's wellbeing, livelihoods and recreational activities
- Monitor the translocation and respond to any issues that arise
- Keep people informed and share information about the translocation to guide future projects



Figure 1. The Scottish Code for Conservation Translocations was launched in July 2014 by Paul Wheelhouse MSP, then Minister for Environment and Climate Change, along with Ian Ross, Chairman of the Board of Scottish Natural Heritage (far left), Professor Pete Hollingsworth, Director of Science at the Royal Botanic Garden Edinburgh (2nd left), and Doug McAdam, Chief Executive at Scottish Land and Estates (right). Photograph: Lorne Gill, SNH.

This Scottish Code and the Best Practice Guidelines represent a world-first national interpretation and implementation of the IUCN guidelines, and were produced



Woolly willow *Salix lanata*. Photograph: Lorne Gill, SNH.

on behalf of the National Species Reintroduction Forum (NSRF). The NSRF consists of 27 organisations representing stakeholders from the land use, conservation and science sectors, and their input was instrumental in setting the tone and the balance of the guidelines.

Many translocations are straightforward. Where a proposed translocation is 'low risk', the guidelines serve as a 'checklist of issues to consider', and enable conservation actions to be delivered efficiently in a safe and controlled fashion, without excessive administrative burden. Where a given translocation has legal constraints, or the potential for negative impacts on people, biodiversity or the wider environment, the code and guidelines outline the process for planning, consultation, and evaluation of benefits and risks to inform whether (and how) to proceed.

A particularly important section of the guidelines is that dealing with Legislation and Permissions. This covers not only legal issues associated with protected species and places, but also provides a guide to other relevant legislation including that concerning international movement of species, pests and diseases, and animal welfare. Details are given of the somewhat subtle but important distinction in Scots law between natural range (e.g. where a species naturally occurs *or has occurred in the past*) and native range (where a species naturally occurs *and is still extant*). Understanding this distinction is important in evaluating

whether a given translocation requires a non-native species licence or not.

The guidelines also provide general advice on the steps that can be taken to maximise the likelihood of successful translocations including selection of donor populations, release sites, and release strategies. They also provide advice on minimising risks, with particular attention given to good biosecurity practice such as the steps that can be taken to minimise the spread and transmission of invasive species, pests and diseases. The ways that translocations can positively and negatively impact on people are summarised in a dedicated chapter including guidance on stakeholder engagement. Finally, the guidelines cover monitoring, adaptive management, and reporting of outcomes to inform future conservation strategies.

Further information on the National Species Reintroduction Forum, and links to the code and guidelines can be found at www.snh.gov.uk/nsrf

Acknowledgements

We are very grateful to the members of the National Species Reintroduction Forum and the IUCN SSC Re-introduction and Invasive Species Specialist Groups' Task Force on Moving Plants and Animals for Conservation Purposes, for numerous helpful discussions on conservation translocations. PMH thanks the Natural Environment Research Council and the Scottish Government's Rural and Environment Science and Analytical Services Division for funding support.

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Tuning in to Crayfish

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Keywords: movement, Passive Integrated Transponder (PIT) tags, translocation, white-clawed crayfish

The decline of our native white-clawed crayfish *Austropotamobius pallipes* in England and Wales has been well documented. Translocations of white-clawed crayfish provide a means of repopulating areas where there exists an opportunity to establish self-sustaining populations. Despite the success of white-clawed crayfish translocation projects there is little information on the movement of individual crayfish after translocation and how this differs from crayfish behaviour at the donor sites. This article provides a summary of a recent study of white-clawed crayfish using Passive Integrated Transponder (PIT) tags to record their movements after translocation to new sites.

Introduction

There has been some success in using translocations of white-clawed crayfish to create isolated refuges, known as 'ark sites', which are 'safe' from non-native crayfish. To date, translocations have taken place at a number of locations including Yorkshire, Staffordshire and the South West of England. An ongoing white-clawed crayfish translocation project led by Staffordshire Wildlife Trust provided an opportunity to investigate the movement of crayfish following translocation. This translocation project is seeking to create 'headwater ark sites' on Cannock Chase (Mott 2015). The streams identified to receive translocated crayfish are low-



Figure 3. Searching for crayfish at potential donor sites (Nick Mott, Staffordshire Wildlife Trust).

gradient woodland streams providing excellent potential habitats for white-clawed crayfish (Figure 1). The radial drainage pattern off Cannock Chase plateaux, culverting downstream, and the fact that each stream is spring-fed means that these sites are hydrologically isolated. As such, each stream is protected from non-native crayfish and associated crayfish plague *Aphanomyces astaci*. In addition,



Figure 1. One of the translocation sites at Cannock Chase (Nick Mott, Staffordshire Wildlife Trust).

should a plague outbreak occur, it is likely to be restricted to a single watercourse.

Tagging crayfish

The main challenge in this work was to establish a suitable way of marking individual crayfish. Several methods have been developed, which involve marking the exoskeleton, attaching plastic tags, punching holes in the telson or attaching tiny radio transmitters to the crayfish. There is, however, a risk that these approaches may disrupt crayfish behaviour and increase the risk of predation. Furthermore, these forms of marking are lost when the crayfish moult and, with the exception of the radio transmitters, the marked crayfish must be re-caught in order to be identified. This latter point means that monitoring may only take place during the survey season, which takes place from July to the end of October.

Recently, a novel invasive technique for marking crayfish has been developed based on the use of Passive Integrated Transponder (PIT) tags (Bubb *et al.* 2002). PIT tags use radio frequency magnetic fields to transfer data, typically a unique identification number, without contact between the tag and the data reader. Crucially, the tag does not require a battery and so has an indefinite lifespan. This approach has two main advantages: firstly, it is possible to discriminate between tagged individuals without having to recapture the crayfish, and secondly, the tag is not lost following a moult. This means that the positions of individual crayfish may be monitored over extended periods throughout the year.

Bubb *et al.* inserted the PIT through an incision, while in our study a sterile hypodermic needle was used to insert the tag directly into the crayfish. The needle was pushed through the cuticle and underlying tissue at the base of the fourth walking leg with the tag inserted via the needle and coming to rest above the segmental musculature and under the hepatopancreas. The position of the PIT tag within recently moulted crayfish can clearly be seen through the use of an x-ray (Figure 2). The tags used were Biomark FD-X minihpt8 (134.2 kHz) 8.4 x 2.1 mm and these tags were implanted using the Biomark MK165 Implanter and disposable N165 needles (Biomark Ltd., Idaho 83702, USA; <http://www.biomark.com>). Tags were checked after implantation using a HPR Plus reader (Biomark Ltd., Idaho 83702, USA; <http://www.biomark.com>).



Figure 2. X-ray of PIT tagged signal crayfish of various sizes (Victoria Stead, Harper Adams University).

It has previously been suggested that crayfish with a carapace length of less than 20 mm are unsuitable for tagging using the incision method due to the high levels

of mortality reported. However, preliminary work using signal crayfish *Pacifastacus leniusculus* as test subjects indicated that the use of a hypodermic needle to insert PIT tags allows crayfish with a carapace length of as little as 16.5 mm to be successfully tagged with no impact on survival rates over a period of 15 weeks post-tagging.

Recording crayfish movement after translocation

Once the method for tagging crayfish had been developed using signal crayfish, the project focused on white-clawed crayfish being translocated as part of the Cannock Chase 'headwater ark sites' project. White-clawed crayfish were gathered by hand-searching a stream (donor site) on Cannock Chase on 16th September 2014 (Figure 3). The health status, size and sex of each crayfish collected was determined before placing crayfish into transportation tanks. A total of 48 white-clawed crayfish (including 28 female and 20 male crayfish ranging in length of carapace from 27 to 40 mm) were collected for tagging and translocation to three new sites or return to the donor site. Each crayfish was tagged using the technique described above (Figure 4) and kept in transportation tanks overnight before being released in groups of 4-5 individuals within a 2 m length of each stream. The release points at the donor site were close to where the crayfish had been collected. In total, 10 tagged crayfish were released at the donor site and between 10 and 18 at each of the three translocation sites. No white-clawed crayfish died as a result of tagging and no dead tagged crayfish were seen after release into the streams.



Figure 4. Inserting a PIT tag into a white-clawed crayfish (Nick Mott, Staffordshire Wildlife Trust).

The position of each tagged white-clawed crayfish was recorded once a week for a total of 12 weeks. Each site was systematically 'searched' by sweeping an HPR Plus reader just above the stream bed, moving upstream and downstream from the release point. The main disadvantage of PIT tags is the limited range over which they can be detected. Here the read range was found to be between 14 and 20 cm (this range is unaffected by water or stream debris). Care was taken, therefore, to ensure that the HPR Plus reader was kept as close as possible to the stream bed or potential refuges. Each sweep of the stream bed was completed in approximately 45 minutes. In order to minimise experimental error the same person carried out each survey and all surveys were completed between 11 am and 3 pm. Each time a crayfish was detected, the unique identification number and upstream or downstream position was recorded relative to the release point. Distances were recorded by taking the straight-line distance between the release point and the position recorded on that assessment.

Of the 48 tagged white-clawed crayfish released into the four streams, two crayfish were not detected subsequently. The remaining 46 crayfish were detected on at least 2 of the 12 weeks of this study. Although the numbers of crayfish detected declined throughout the assessment period, detection rates remained relatively high (40 to 84% at each site). As most crayfish not recorded in one week were detected in subsequent weeks it seems likely that undetected crayfish were still within the study area but out of range of the detector.

From the positional data collected for each tagged crayfish it was apparent that crayfish moved both upstream and downstream relative to the point of release. Within this general pattern, however, some differences were noted. Firstly, the straight line distance between the furthest recorded upstream position and furthest recorded downstream position relative to the release point for male crayfish was greater than for female crayfish at both the donor site and each of the three translocation sites (Figure 5). Secondly, crayfish moved slightly further downstream than they did upstream

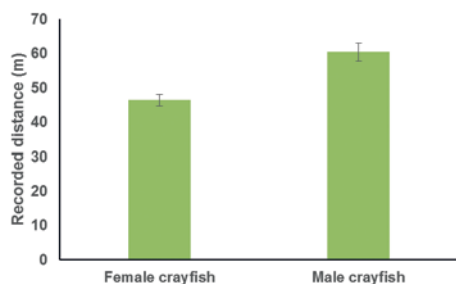


Figure 5. Straight line distance between furthest recorded upstream position and furthest recorded downstream position relative to the release point of female and male white-clawed crayfish at all sites during the 12 weeks of this study (mean \pm S.E., sample size = 26 females and 20 males).

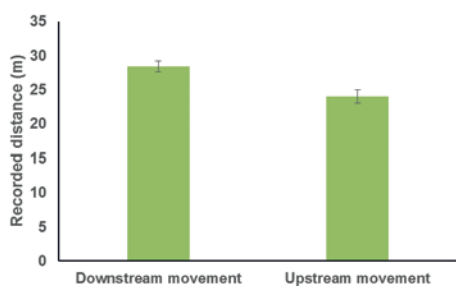


Figure 6. Straight line distance from release point moved by white-clawed crayfish downstream or upstream relative to the release point at all sites during the 12 weeks of this study (mean \pm S.E., sample size = 46).

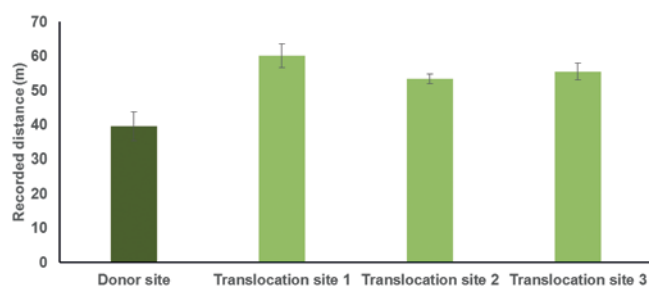


Figure 7. Straight line distance between furthest recorded upstream position and furthest recorded downstream position relative to the release point of female and male white-clawed crayfish at the donor site and each of the three translocation sites during the 12 weeks of this study (mean \pm S.E., sample size = 10 at donor site; 8 at translocation site 1; 10 at translocation site 2 and 18 at translocation site 3).

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(Figure 6) but all crayfish were recorded at least once upstream and at least once downstream relative to the release point. Thirdly, the straight line distance between the furthest recorded upstream position and furthest recorded downstream position relative to the release point was greater for crayfish at each of the translocation sites than at the donor site (Figure 7). Further work is required to understand the reasons for this difference, however, it is known that crayfish establish 'home ranges'. The release point at the donor site was close to where the crayfish had been collected from. As such, the greater distances moved by translocated crayfish may reflect the process of establishing these 'home ranges' in an unfamiliar watercourse.

Conclusions

PIT tagging white-clawed crayfish provides a useful tool that may complement and inform translocation efforts. Although limited to some extent by a short read-range, the technique allows individual crayfish to be detected quickly and without the need for any further disturbance after translocation. In addition, as the PIT tags are not lost following moulting and have an indefinite life-span it will be possible to

return to the release sites over the coming months and years in order to collect data on crayfish movement and establishment patterns following translocation to new sites. The technique may be developed further to allow real-time movement data to be collected automatically. It would be possible to bury a series of detectors just underneath the stream bed allowing the movement of crayfish between each section of the stream to be recorded. This approach would provide a wealth of additional information on the timing, frequency and speed of crayfish movement and how this changes throughout the year.

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Wood Ant Nest Translocations

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Keywords: *Formica*, mitigation, translocation guidance

The translocation of wood ant nests is sometimes necessary as mitigation for development, or for conservation projects and research. Currently, there is no guidance on wood ant nest translocation methods in the UK and little literature documenting previous attempts. Using documented examples, as well as other research, a translocation method is proposed. It is hoped that this article will encourage a more structured approach to wood ant nest translocations.

Introduction

When wood ant nests are encountered at development sites it is best practice to retain these at their original location. However, translocation may be necessary when the nest would otherwise be destroyed. Wood ant translocations may also be used to increase colony numbers in declining populations, as re-introductions or for academic research. Although a number of wood ant translocations have been undertaken in recent years, no formal guidance exists and reports describing methods and results often remain unpublished. This article provides an overview of documented wood ant translocations from the UK, while also drawing upon examples from Europe and research projects. An ecologically structured translocation methodology is proposed, suitable for the hairy wood ant *Formica lugubris* (Photo 1), Scottish wood ant *F. aquilonia*, red wood ant



Photo 1. Hairy wood ant. © Chris Cathrine.

F. rufa, narrow-headed ant *F. exsecta* and slave-maker ant *F. sanguinea*. The conservation status and habitat preference of each species is summarised in Table 1. All wood ant nests offer suitable habitat for the shining-guest ant *Formicoxenus nitidulus*, which is listed on Section 41 and 42 of the Natural Environment and Rural Communities (NERC) Act 2006 (NERC S41 and NERC S42) and the

Scottish Biodiversity List (SBL) (Cathrine 2010). Shining-guest ants are difficult to detect so all wood ant nests should be considered as potential habitat for this species. Species and habitats included on NERC S41 (England), NERC S42 (Wales), SBL (Scotland) and Northern Ireland Priority Species are the foundation of the devolved 'Biodiversity Duty' of public authorities.

Table 1. Summary of conservation status, distribution and habitat preferences of wood ants.

Species	Conservation Status	UK Distribution	General Habitat Preference
Scottish wood ant <i>Formica aquilonia</i>	NIPS, NS	Found throughout Scotland north of the Central Belt and Argyll. Known from a limited number of sites in Northern Ireland, near Armagh. Absent from England and Wales.	Mature woodland/ plantation
Red wood ant <i>Formica rufa</i>		Predominantly southern distribution in England and Wales, becoming less common further north. Absent from Scotland and Northern Ireland.	Woodland succession/edge
Hairy wood ant <i>Formica lugubris</i>		Predominantly northern distribution in England and Wales; absent from the south. Found throughout Scotland north of the Central Belt and in Argyll, but less common than the Scottish wood ant. Absent from Northern Ireland.	Woodland succession/edge and fragmented woodland
Narrow-headed ant <i>Formica exsecta</i>	SBL, NERC S41, RDB1	The rarest UK wood ant, restricted to the Scottish Highlands and a single population in Devon. Absent from Wales and Northern Ireland.	Open glade/forest rides (cannot persist in closed canopy)
Slave-maker ant <i>Formica sanguinea</i>	NS	Disjunct distribution, with populations in the south of England and the Scottish Highlands. There are a small number of records from Wales. Absent from Northern Ireland.	Open glade/early woodland succession (cannot persist in closed canopy)

NERC S41 = Section 41 of the Natural Environment and Rural Communities Act 2006 (foundation for Biodiversity Duty in England)

NIPS = Northern Ireland Priority Species (foundation for Biodiversity Duty in Northern Ireland)

SBL = Scottish Biodiversity List (foundation for Biodiversity Duty in Scotland)

RDB1 = Endangered: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included are taxa which are known as a single population in only one 10 km square, taxa which occur in habitats known to be especially vulnerable, and taxa which have shown a continuous decline over the last 20 years and now exist in five or fewer 10 km squares. Note that other RDB categories cover species with a greater distribution than RDB1 but less than NS (see below). (Shirt 1987) (No statutory significance.)

NS = Nationally Scarce: Taxa recorded in 16-100 10 km squares since 1 January 1980. (No statutory significance.)

Translocation Examples

In Scotland, documented wood ant translocation projects include the A9 road upgrade in 2009 (33 nests) (Fullarton 2012), Aviemore Primary School in 2012 (one nest) (MacIver 2012, Cathrine and MacIver 2014) and Scottish and Southern Energy (SSE) Beaulieu-Denny power line works in 2014 (eight nests) (SSE 2014). In England, a narrow-headed ant nest threatened by off-road activities was moved from Bovey Heathfield in Devon to an enclosure in Paignton Zoo during the 1990s, and an attempt was made to return this colony in 2004 (Carroll 2009). The translocation of red wood ants at Pear Wood Nature Reserve, London, has not been documented (P. Attewell pers. comm.). In Europe, wood ant translocations have been attempted in Finland (Sorvari *et al.* 2013) and guidelines have been published in Germany by Deutsche Ameisenschutzwerke e.V. (Fleischmann 2007). In addition, at

the time of writing, a hairy wood ant translocation project is being completed for a new A9 upgrade following a protocol based on the German guidance and Pear Wood Nature Reserve translocations (Atkins 2015).

The A9 upgrade project in Scotland in 2009 is perhaps the best-documented wood ant translocation, and included control nests that were not moved. Long-term monitoring found a 50% survival rate of control nests compared with a 13% survival rate of translocated nests between 2009 and 2011 (Fullarton 2012). Similarly, while translocation from Bovey Heathfield to Paignton Zoo was successful, the translocation to return this nest failed (Carroll 2009). More recently, wood ant nests were translocated in April 2014 as part of the SSE Beaulieu-Denny project but of the eight nests moved only four were found to remain active four months later (SSE 2014, Wiswell 2014). The poor survival rates in these examples clearly

demonstrate that translocation of wood ant nests should never be the first option.

Translocation Principles

Hughes (2008) set out four key principles for wood ant translocations:

- Principle 1: Wood ant nests should only be moved as a last resort
- Principle 2: Wood ant nests should be moved in a way that retains the nest architecture
- Principle 3: Donor sites should be chosen and prepared well in advance of the wood ants being moved
- Principle 4: Wood ants should only be moved when they are relatively inactive.

All documented examples followed Principles 1 and 2. However, the Pear Wood Nature Reserve translocation did not follow Principles 2 or 4; neither are they included in the German guidelines (Fleischman 2007, P. Attewell pers. comm.).

Principle 2 advocates that nest structure is maintained. Wood ant nests are not symmetrical, being designed to perform functions such as thermoregulation, which are dependent on architecture and orientation. The translocation of red wood ants at Pear Wood Nature Reserve disregarded nest architecture and instead gathered nest material and ants into bags using hand tools, a method also advocated in the German guidelines (Fleischman 2007, P. Attewell pers. comm.). Using this method, the material is placed at the receptor site where the ants must construct a new nest. These red wood ant nests naturally lose structure each winter through damage by weather and predators (e.g. badgers), and are rebuilt in spring (P. Attewell, pers. comm.) so translocation in winter (see below) relies on natural nest-building activity to rebuild the colony. Wood ant nests elsewhere tend to retain the structure of their nest throughout winter and so this method would require them to build a new nest, placing additional demands on the ants in an already stressful situation. It has been suggested that wood ant nests suffering greater disturbance during translocation are more likely to fail, forcing the colony to establish new nests (Wiswell 2014). This can result in an apparent increase in wood ant colonies following translocation, which does not necessarily indicate long-term success (Cathrine and MacIver 2014, Wiswell 2014). It is generally accepted that nests should not be moved in winter when queens are hibernating because exposure to low temperatures, when there are only limited numbers of workers in the colony, can have a detrimental effect. Ideally, translocation should be completed in spring when ants are clustering, which maintains a relatively constant temperature within the nest, leaving the rest of the season to make repairs (Hughes 2008, Cathrine and MacIver 2014). Some sources recommend completing work during the 'rising phase' in spring when queens are present on the surface of the nest, and workers are sunbathing here (Fleischmann 2007, Atkins 2015). This ensures that queens and many workers are translocated without the need to fully excavate the nest (Atkins 2015). Translocation protocols generally consider that wood ant nest are polygynous (have

multiple queens), although the same species may exist as monogynous nests (have a single queen). When translocating a monogynous nest it is essential that the queen is moved or the nest will fail. Unfortunately, it is not possible to determine if a nest is polygynous or monogynous without damaging the nest, unless a genetic study is completed (Breen 1976, Bernasconi *et al.* 2005). If there is uncertainty, the precautionary principle should be followed and the entire nest moved.

Overall, it is recommended that wood ant translocations follow all four of the Principles set out by Hughes (2008). These are applicable to all UK wood ant species, and have been used for the majority of documented translocations with some success.

Proposed Translocation Methodology

The translocation methodology can be subdivided into three stages that distinguish the assessment of donor site and selection of receptor site; the translocation itself; and post-translocation monitoring.

1. Assessment of Donor and Receptor Sites

Donor site:

In order to identify appropriate receptor sites, the donor site must first be assessed. It is essential to identify the resident ant species because different species have differing habitat requirements (Table 1). The micro-habitat surrounding the nest is also important – these are the features that led to the ants selecting the particular location and which have influenced the

nest engineering. As far as is known, the Aviemore Primary School wood ant nest translocation is the only documented example where micro-habitat at both the donor and receptor sites was compared (MacIver 2012). A method for monitoring micro-habitat and nests developed for a research project in Switzerland was adapted for Aviemore Primary School, using 8 m and 25 m buffers (Freitag *et al.* 2011, Cathrine & MacIver 2014). An example field sheet is shown in Figure 1. Features to record include:

- Nest aspect
- Slope
- Elevation
- Hill shading
- Canopy shading
- Location and size (diameter at breast height) of trees within the survey area (particularly Scots pine *Pinus sylvestris* and birch *Betula* spp.)
- Other topographical features (e.g. habitats and landuse).

Wood ants will occupy both coniferous and broadleaf-dominated woodlands, and a variety of soil types.

Receptor site:

The receptor site should provide, or replicate, as many of the key features of the donor site as possible. There should be no barriers to wood ant dispersal and the receptor site should be located as close to the donor site as possible, ideally within 100 m, to maximise familiarity with the colony's new surroundings.

Competition with other ant colonies has been a factor in failed translocations (Carroll 2009, Fullarton 2012). Fullarton



Photo 2. Narrow-headed ant nest. © Chris Cathrine.

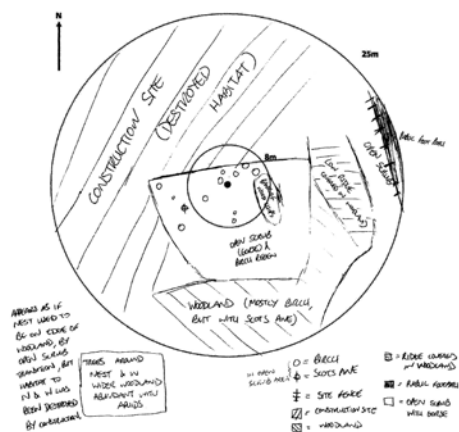


Figure 1. Wood ant nest micro-habitat field sheet. © Chris Cathrine.

(2012) recommends a 20 m buffer between nests (10 m minimum) but research has shown that wood ants have a foraging range of between 20 m and 100 m (Sorvari 2009). Therefore, it is recommended that other ant colonies within 100 m of the receptor site should be considered (and avoided if possible) when assessing potential sites.

Translocated wood ants may have negative impacts on other invertebrates through predation or alterations to habitat at the receptor site so the area should be surveyed for species of conservation concern. In addition, the site must offer populations of tree-dwelling aphid species which wood ants 'milk' for honey-dew (essential food source) (Maggini *et al.* 2002, Hughes 2006, Stockan *et al.* 2010).

2. Translocation Protocol

1. Move nest during times of low activity in early spring.
2. Prepare receptor site prior to translocation by digging a hole equal to or exceeding nest size.
3. Clear route between donor and receptor sites and complete trial run to identify/remove hazards when not using existing roads or tracks (minimising risk of vibration damaging nest architecture).
4. Move nest as early as possible in the morning when temperatures are between 5°C and 10°C.
5. Use thermal coverings to help retain heat within nest.
6. Move nest as one single unit to retain nest architecture).
7. Move nest as slowly and steadily as possible (around 2.5 miles per hour if using an excavator).

8. Maintain nest orientation (e.g. facing south-east) at receptor site.
9. Provide supplementary sugary food (e.g. beef food dough, honey-bread-water mash, or jam) at receptor site daily for first two weeks post-move (Fleischmann 2007).
10. Protect nest with physical barriers (e.g. barrier fencing) to minimise risk of damage from construction traffic and other disturbance.

To date, most wood ant translocations have largely been completed by hand. For example, nests were excavated using hand tools for the A9 upgrade and Beaulieu-Denny projects, and transferred to wooden trays. These were carried by hand over short distances, or in an excavator bucket or pick-up truck over longer distances (Fullarton 2012, SSE 2014). However, it is difficult to maintain nest structure when using hand tools (SSE 2014, Wiswell

2014). At Aviemore Primary School, an excavator was found to be extremely gentle and precise when controlled by a skilled operator. Excavators can also be fitted with different-sized buckets making it possible to excavate an entire wood ant nest (which range from 1.5 m to 3 m in diameter, including integral features such as trees or decaying stumps (Sorvari 2009, Cathrine & MacIver 2014). Therefore, it is recommended that machinery is used for translocations wherever possible (Wiswell 2014, Cathrine 2015). Figure 2 shows various stages of the Aviemore Primary School translocation.

3. Monitoring Protocol

Monitoring should be undertaken for translocations in accordance with published guidance (IUCN/SSC 2013, National Species Reintroduction Forum 2014). Both short-term (daily visits during the first week



Figure 2. Aviemore Primary School wood ant translocation. a) Nest; b) Route preparation; c) Receptor site preparation; d) Nest removal; e) Nest placement at receptor site; f) Nest two years later. Photos a to e: © Cameron MacIver; photo © Eamonn Flood.



Photo 3. Scottish wood ant nest.
© Kirsty Cathrine.

then a further visit at six weeks, three months and six months) and long-term (one visit at one year, two years and three years) monitoring should be carried out. Monitoring should use a standard field sheet (Figure 1) to allow before and after comparisons as wood ant nests will change location and size over time in response to environmental factors. Monitoring should also include satellite nests, where the colony persists but has moved to a new location(s). Careful monitoring is crucial to confirm that translocation methods have been successful, to identify any signs of colony decline and to provide an opportunity for intervention if necessary. A standardised approach to monitoring will allow straightforward comparisons between different projects and will assist with refining translocation methods.

Concluding remarks

The translocation method described here was successfully applied at Aviemore Primary School where the hairy wood ants were still using the same nest two years after translocation, with no

reduction in size (MacIver 2012). The use of a methodology that considers wood ant ecology is preferential to *ad hoc* practices and is more likely to be successful. By monitoring translocated nests using a standardised protocol and making the results publicly available, the methodology can be reviewed and further refined in the future.

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Keeping the Lights On: Ecology, Survey and Trapping Methods for Glow Worm Translocation

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Keywords: glow worm capture methods, LED lures, pitfall traps

It is undoubtedly the bioluminescence of glow worms *Lampyrus noctiluca* that makes them such fascinating creatures: seeing their bright green lights in hedgebanks and grasslands on a summer's evening is a real treat. Glow worms are found across lowland Britain but, although they are not uncommon, the quality and abundance of their favoured grassland habitats has declined in recent decades. Translocation may be a way of saving some populations whose habitats will be lost to development.

A translocation project in advance of a development in Buckinghamshire involved capturing and moving 162 adult glow worms in summer 2012. The project found that setting out pitfall traps and lures early in the evening and focussing active searching on dry and windless summer nights was most effective. LED lures in pitfall traps were a cheap and effective way of capturing male glow worms, attracting them by mimicking the glow of the females. Female glow worms cannot fly and were picked off vegetation by hand. Targeted capture methods were not appropriate for juvenile glow worms, but standard herpetofauna pitfall traps were found to capture them in large numbers. The methods employed were relatively low cost and could also be used to monitor glow worm populations effectively and efficiently.



Figure 2. Female glow worm (Photograph: Emily Drinkwater).

Background

Glow worms have no legal protection and are not listed as "Species of Principal Importance for Biodiversity" in England and Wales under Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006. However, they were listed on the Local Biodiversity Action Plan for Buckinghamshire at the time of the project; (the list is currently being updated). As part of a suite of measures to mitigate for the impacts of development of an 'Energy from Waste' facility at Greatmoor, near Aylesbury, North Buckinghamshire, the developer

(FCC Environment UK Ltd) committed to undertaking a translocation of glow worms from affected habitats to nearby undisturbed habitats within their landholding. This article reports on the success of glow worm capture methods tested by SLR Consulting Ltd through summer 2012 as part of the translocation exercise.

Glow Worm Ecology

Glow worms have a scattered distribution across lowland Britain, especially in southern England. They can be abundant

where habitats are suitable, e.g. unimproved grassland, woodland rides, hedgerows, railway embankments (Figure 1) and heathland where their snail and slug prey are common.

The glow worm is a beetle.

Bioluminescence in the rear segments of the wingless females is used to attract flying males (Figure 2). The adults are generally found between June and July but adult females only live for a few weeks and die shortly after laying their eggs. The larvae, once hatched, spend one to two summers feeding on a wide range of slug and snail species before becoming adults. Studies in captivity have not established a preference for species or size of slug and snail prey (Tyler 2006).

Adult males are winged and search for a mate by flying at a height of about one metre. Male flight is weak and may be abandoned altogether in wet or windy weather (Tyler 2006). In this project, it was considered unlikely that the males would be able to fly from their existing habitat on a disused railway line to one of the receptor sites to find a female, a straight-line distance of between 250 m to 3 km. Therefore, a trapping programme was undertaken as part of the translocation project.

There are few reported examples of successful glow worm translocation (Scagell 2003, Smith *et al.* 2009) although survival is known to be greater at sites that have previously supported glow worm populations or have links to surviving colonies (Sussex Wildlife 2004, Smith *et al.* 2009). Creating conditions suitable for abundant snail prey species is difficult in newly created habitats.

Study site

Glow worms are widely distributed in Buckinghamshire and have previously been recorded near to the development site at Finemere Wood SSSI, an area of ancient woodland that supports a diverse range of native plants, birds, mammals and insects. Female glow worms were recorded along a disused railway line designated as an access road for the development site, as well as in other nearby habitats not affected by the development, including a surface water drainage feature known as the "megaditch". As mitigation for the proposed development, glow worms



Figure 1. Habitat along disused railway line (Photograph: Andrea Wilcockson).

were translocated to existing retained habitats where glow worms were known to be present, i.e. two locations on the megaditch and also grassland verges close to the adjacent Aylesbury – Buckingham branch line railway. In addition, the developer agreed to create new areas of early successional mosaic habitat on translocated rail ballast and to convert an area of arable land to species-rich meadow grasslands with rail ballast mounds which, in time, would increase the amount of good quality glow worm habitat. The two main defining characteristics of high quality glow worm habitat are a mosaic of habitats (such as grassland and scrub) and the structure of the vegetation (its height, density and cover).

Capture Methods

Adult female glow worms are readily identified when glowing and can be collected by hand on dry evenings in summer. In this project they were collected over eight nights between mid-July and early August 2012 by walking the donor site (the disused railway line) from sunset onwards, continuing until no more females were observed, typically between 22:00 and 02:00 hrs. Capture was most successful in the absence of external light sources, e.g. torches, although health and safety issues meant that some artificial light was necessary.

Males were collected from lured pitfall traps constructed from 2 litre plastic bottles placed on the rail ballast (Figure 3). LED lures are designed to simulate female glow behaviour in order to attract males and are known to be an effective method of sampling (Ineichen and Rüttimann 2012). Previous research has shown that males are preferentially attracted to green LEDs (Booth *et al.* 2004, Smith *et al.* 2009) while other studies have reported that males are more attracted to red artificial light (Tyler 2006). It is not clear whether this difference is because males are not searching for the actual colour of the glow but for the contrast between the light and its surroundings (Tyler 2006), hence this project also investigated the relative attractiveness of green and red LEDs.



Figure 3. Pitfall trap with green LED lures (Photograph: Emily Drinkwater).

Three different designs were tested:

- | |
|--|
| (1) 9 KV battery powered light lures using green 5-mm LEDs (n=15) |
| (2) 9 KV battery powered light lures using red 5-mm LEDs (n=15) |
| (3) females in place of LEDs (numbers varied depending on the capture numbers) |

The lures were evenly distributed along the disused railway track, positioned amongst both tall and short vegetation.

Traps were deployed from about an hour before sunset to approximately 02:00 hrs. Initially, they were deployed just after sunset but they were found to be more effective when deployed earlier, presumably because the LED lights were on before the females commenced glowing.

Both male and female glow worms were collected by hand either directly from vegetation or from the lured pitfall traps, which were checked twice every evening. A Garmin eTrex 10 GPS tracker was used to record the exact location of each individual. The position of glow worms on the vegetation, the type of vegetation and prevailing weather conditions were also recorded.

Male and female glow worms were put into one container for transportation and were immediately translocated to the three receptor sites a short distance away, (approximately 250-350 m north of the disused railway; see Figure 4 for typical habitats at the megaditch receptor site). Many males were still attached to the females on their release.

In autumn 2012/spring 2013 the development site was also subject to a European Protected Species mitigation licence for great crested newts *Triturus cristatus*. The disused railway line was subdivided into compartments using temporary amphibian fencing and pitfall traps were installed at 10 m intervals over 3.3 km. Traps were positioned along both sides of the railway line on the inside of the fencing, adjacent to the perimeter scrub. These pitfall traps were not installed to capture glow worms but they were found to be effective at catching juvenile glow worm larvae. Therefore, when the amphibian pitfall traps were checked daily, glow worm larvae were also collected and moved to the receptor sites.



Figure 4. Habitat at the megaditch receptor site (Photograph courtesy of Rob Williams of SLR Consulting Ltd).

Capture Results and Observations

In total, 21 male and 141 female glow worms were collected over eight nights of trapping (Figure 5). The numbers declined towards the end of the capture period

most probably because a substantial proportion of the population had been caught. There was no difference in capture rates between the three lure types used to capture males (the small sample size meant statistical analysis was not warranted). It is likely that the skewed sex ratio of the capture data is a consequence of the ease with which glowing females can be identified, even in vegetation. Males could only be collected in lured traps because they emit no more than a faint glow, which is not obvious in vegetation.

The position of females within vegetation appeared to be related to weather conditions. On calm evenings females tended to move into more open, short sward grassland or onto the railway ballast. On more windy and rainy evenings females were seen to retreat further into higher grassland sward and scrubby areas, where they climbed grass stems or bramble. Captures of males increased on calm evenings compared to evenings when wind speed and precipitation increased.

Approximately 250 juvenile glow worm larvae were captured in autumn 2012/ spring 2013 from standard-design newt pitfall traps. They ranged in size and probably hatched from eggs laid in both 2011 and 2012. This method of trapping could be a useful technique for juvenile glow worm larvae in future translocation work.

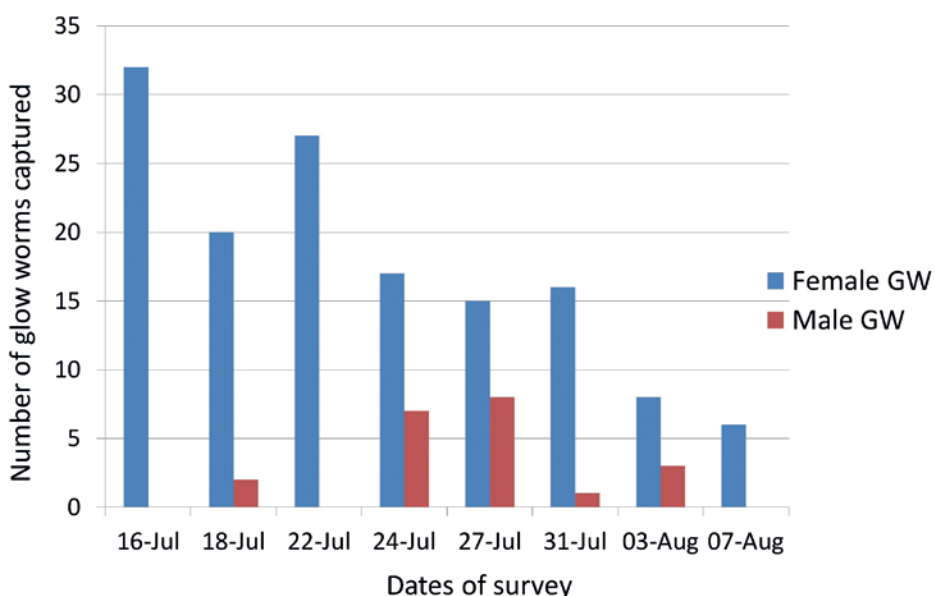


Figure 5. Glow worm captures over the survey period. © SLR Consulting/the authors.

Feature Article: Keeping the Lights On: Ecology, Survey and Trapping Methods for Glow Worm Translocation (contd)

Discussion and Conclusions

Adult glow worms whose habitat is under threat from development can be captured by hand (females) and using lured pitfall traps (males). This study found that male glow worms did not discriminate between lures using red and green LEDs or between green LEDs and live females. LED light traps are an effective means of capturing males without the need to use females.

Timing and weather conditions on capture nights are important factors when planning glow worm trapping. Our study found that setting out pitfall traps and lures early in the evening and focussing effort on dry and windless summer nights was the most effective strategy. Glowing females may still be found on windier days, but typically in less prominent positions.

Juvenile glow worms are more cryptic than adults and are not attracted to lures. However, standard herpetofauna pitfall traps have the potential to capture large numbers of juvenile glow worms and could be used alongside methods to capture adults.



Collected glow worm
(Photograph: Emily Drinkwater).

The methods used in this project were relatively low cost, and further savings could be made if glow worm capture was carried out concurrently with other mitigation schemes. The traps and lures were cheap to manufacture and easy to use and could be used for glow worm monitoring as well as for translocations. Capturing and translocating individual invertebrates is rarely recommended as mitigation for development; however, in certain cases it may be effective as part of an overall strategy to maintain populations following development of a site. Future monitoring work will determine the success of the case study reported here.



Collected male and female glow worms (Photograph: Emily Drinkwater).

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A Novel Approach to Waxcap Translocation

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Keywords: BAP, barcoding, eDNA,
Hygrocybe, mitigation



A population of waxcap fungi threatened by a road development could not be moved using traditional turf translocation so a novel method involving the translocation of spores was trialled. The process is reported here with comments on likely success.

Introduction

Waxcap fungi are largely confined to grassland, most frequently pasture where the turf is kept short by grazing, or amenity areas such as golf courses and church burial grounds that are mown regularly by machine. Some waxcap species are rare in the UK and are Species of Principal Importance (formerly UK Biodiversity Action Plan (BAP) species). For example, the date waxcap *Hygrocybe spadicea* is listed in Section 41 and 42 of the Natural Environment and Rural Communities (NERC) Act 2006. All waxcap-rich meadows are biologically important and in decline due to ploughing and other agricultural improvements

During the early stages of the proposed Heysham to M6 link road north of Lancaster (from 2003), the pink waxcap *Hygrocybe calyptriformis* (Figure 1) was discovered on the site. At the time, it was listed as vulnerable on the Provisional Red List of Fungi (Ing 1992) and had a Biodiversity Action Plan (BAP). The species has a scattered distribution nationally, with most records being in the southern and western parts of the UK (see the National Biodiversity Network gateway for up-to-date records, <http://www.nbn.org.uk/>). By 2006, it was recorded from more than 360 hectads and was removed from the list. However, at a public inquiry in



Figure 1. Pink waxcap *Hygrocybe calyptriformis*. Height 4 cm. (Barry Wright).

2007, the proposers (Lancashire County Council) of the link road acknowledged the importance of waxcap fungi and agreed to endeavour to mitigate loss of all species of waxcaps that were directly affected by the development. This was to be by translocation to an alternative site in the same field complex acquired

by management agreement with the landowner.

There is no reported evidence that grassland fungi such as waxcaps can be translocated successfully although attempts have been made to move large turves containing fungal mycelia (Griffith *et al.* 2004). The underground mycelia (Figure 2) can take 20

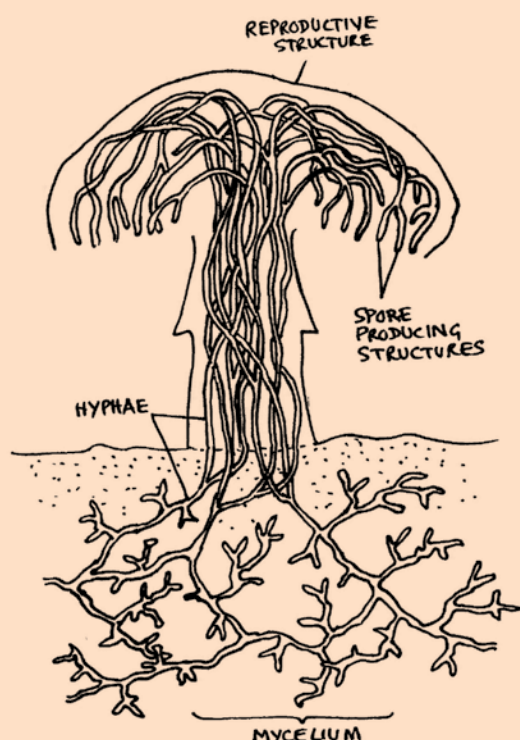


Figure 2. Diagram showing the underground mycelia of a typical Basidiomycete fungus (Anne Wright).

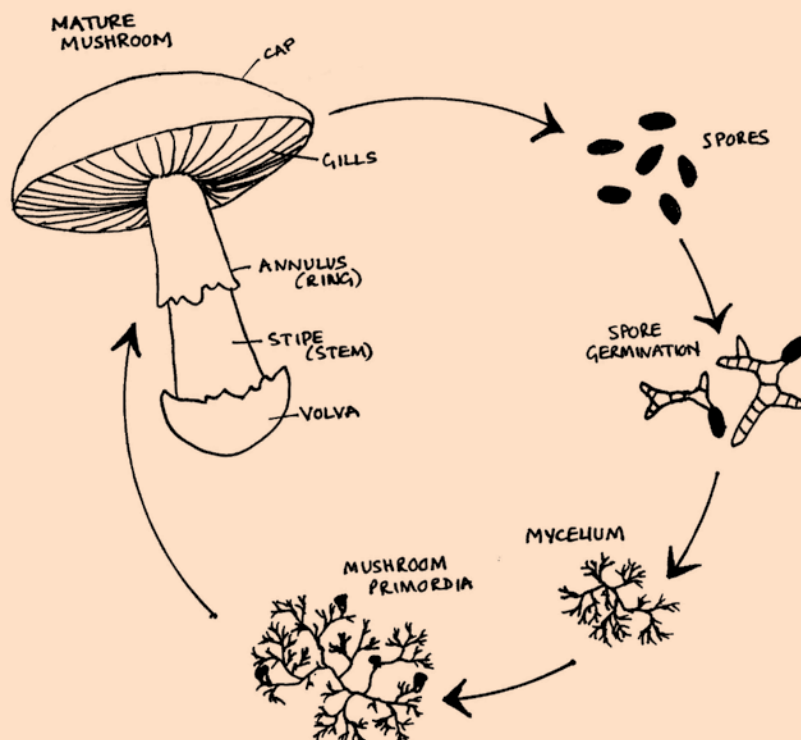


Figure 3. Simplified life-cycle of a Basidiomycete fungus (Anne Wright).

years or more to produce fruiting bodies after disturbances such as ploughing (Keizer 1993) so it is difficult to judge success. The mycelia grow and develop underground until conditions are favourable for the organism to produce fruiting bodies (see Figure 3 for a simplified diagram of the life-cycle of a Basidiomycete fungus) but the fruiting of fungi can be very variable and some species may fruit very rarely. Recent technological advances such as 'bar-coding' soil samples using eDNA (Ainsworth *et al.* 2013, Griffith 2013) might offer potential to assess translocation success. This method involves taking soil samples and extracting DNA to identify waxcap species. It could offer a quick and accurate method of determining the presence of fungi such as waxcaps in grassland, even where there are no fruiting bodies. (See Epp *et al.* 2012, Taberlet *et al.* 2012 and other papers in *Molecular Ecology* 21: 8 for more information on eDNA).

The Lancaster translocation

It was not possible to translocate entire turves containing waxcap mycelia onto the mitigation land for the Heysham to M6

link road because the land was organically farmed and the owner was reluctant to allow access to potentially damaging machinery. An alternative approach was to translocate spores, which offered a low-impact solution that satisfied all parties.

The mitigation area was surveyed to identify locations with similar vegetation to the waxcap-rich donor site but where

there had been no evidence of fruiting waxcaps since surveys began in 2003. The supposition was that these vacant locations could theoretically be colonised by transferring spores from donor areas. This assumption is based on the premise that waxcaps tend to nestle in the grass, which gives limited opportunities for the wind to carry their spores further afield.

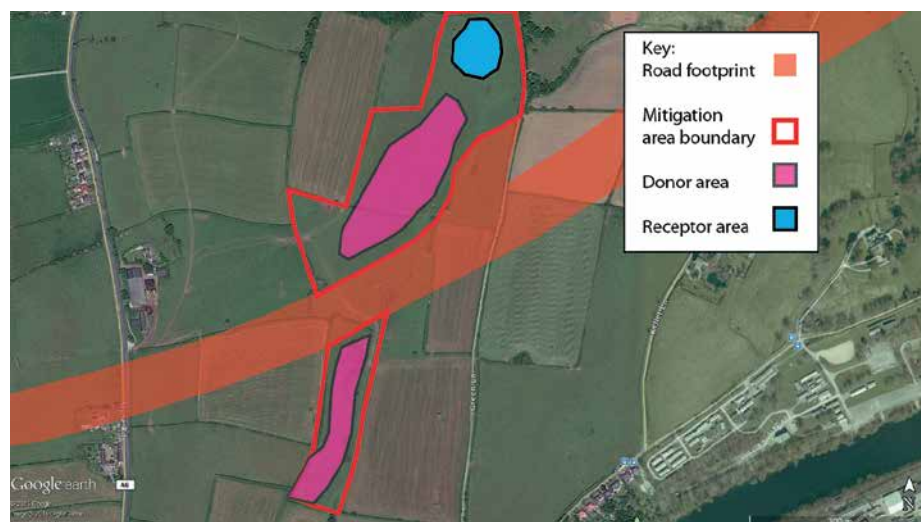


Figure 4. Aerial photograph (© Google Earth) showing the location of the donor and receptor sites, the mitigation area boundary and the footprint of the road.

Therefore, the vacant areas might have no waxcaps because wind dispersal has been restricted. New waxcap colonies could be created by artificially moving fertile caps into these vacant areas (with similar areas of vegetation) and allowing spores to be shed directly into the receptor areas. Figure 4 shows that the road Scheme affected the central part of the mitigation area but that waxcap-rich areas retained both north and south of the Scheme footprint. The assumed vacant area to the north of the mitigation area was selected as the receptor site.

Confirmation of the sporulation of caps was carried out in autumn 2013 by making spore prints from fruiting caps at different stages of expansion to judge the optimum size that would indicate ripeness and spore-shed. The donor sites were visited weekly to collect waxcaps from 19th September to 4th December 2014, beginning before cap production began and ending when cap production had declined to very low numbers due to cold weather, and timed to ensure that early species and specimens were not missed.

All sporulating fruiting caps of waxcaps at optimum expansion were collected, numbering from tens to hundreds on each occasion but varying between collection days (Tables 1 and 2). Generally, species gradually increased in number over time and tailed off slowly. Some species, such as *Hygrocybe conica*, began fruiting late, fruited well, then declined rapidly over the next few weeks; other species occurred on only one or two occasions, such as *H. calyptriformis* (20-11-2014 and 24-11-2014) and *H. splendidissima* (04-12-2014).

At each visit, the donor areas were walked slowly in a zig-zag pattern with each leg being approximately five metres from the previous. As the caps were often very small and difficult to spot amongst the turf, it was important to keep the survey legs close together to ensure good detection rates. The search path was repeated as closely as possible each week using the track-back function on a GPS device.

The location of each donor cap or caps (small colonies of five to twenty caps were often found close together) was recorded as a waypoint on the GPS device and the number of caps and their species recorded. There is debate in the literature

Table 1. The number of separate locations at the donor sites where caps were collected and the number of individual caps of each species collected between 19th September and 4th December 2014.

Species	Number locations	Number caps
<i>Hygrocybe calyptriformis</i>	2	2
<i>H. chlorophana</i>	17	79
<i>H. coccinea</i>	8	19
<i>H. conica</i>	27	185
<i>H. irrigata</i>	5	13
<i>H. pratensis</i>	31	47
<i>H. psitticina</i>	182	546
<i>H. splendidissima</i>	1	1
<i>H. virginea</i>	166	480
Total	439	1372

Table 2. The total number of caps collected each week between 19th September and 4th December 2014.

Collection date	Total no of caps collected
19-09-2014	5
24-09-2014	2
01-10-2014	1
10-10-2014	3
17-10-2014	17
22-10-2014	59
28-10-2014	164
04-11-2014	332
13-11-2014	242
20-11-2014	353
24-11-2014	140
04-12-2014	60

as to whether pulling a cap out of the ground damages the mycelia below so, as a precaution, all caps in this project were collected by cutting the stalk with scissors and placing them in a garden trug in species groups (Figures 5 and 6). The caps were separated into species groups to make it easy to apportion representative numbers of each species to each receptor location. For instance, if the collection yielded enough caps for five receptor locations and there were 50 caps of species A and five of species B, each receptor site would receive approximately 10 caps of species A and one of species B.

Translocation was carried out by moving sporulating waxcaps to receptor sites where they were placed gill-side down to allow them to shed their spores naturally into the receptor turf. Depending upon the number of caps collected at the donor site, between one and five receptor points were used to receive the caps. Each receptor point received an equal proportion of each species of waxcap collected so that the species were distributed evenly over the donor site. The caps were carefully set down within an area of roughly one square metre, with a distance between caps of around ten to fifteen centimetres and receptor areas spaced out three to five metres apart. Only two caps of pink waxcap *H. calyptriformis* were found and both were translocated.



Figure 5. A typical mixed collection of caps (Barry Wright).



Figure 6. Typical receptor location showing the cut caps, GPS and the scissors used to cut the caps (Barry Wright).

Figures 7 and 8 show the distribution of collected caps when few caps were collected (17th October 2014, n=17) and when cap production reached a peak (20th November 2014, n=353). These figures are the total number of caps of all species.

The future

Following the autumn 2014 waxcap translocation, the site will be monitored by walk-over survey to count caps in the receptor area over the 20-year management period. In the future, it is hoped to eDNA barcode the area to compare waxcap presence in the receptor area, the parts of the donor area not affected by the Scheme and the vacant areas away from the Scheme that did not receive the ripe caps.

Gareth Griffith and colleagues at Aberystwyth University have developed and deployed the methodologies for soil sampling, pooling of soil cores and analysis of the DNA sequence data. Forty samples are normally sufficient for an average site. Using eDNA in this way could establish whether the spores deposited at the receptor site have germinated, and whether they can be detected in the receptor sward at this

early stage in their life cycle (G. Griffith, pers. comm.). The method could also establish whether vacant areas are truly vacant or whether they already support the full suite of species laboriously moved in the translocation (Griffith 2013).

This analysis would allow the value of this new method of fungi translocation to be

assessed in advance of fungal colonies becoming established and producing fruiting bodies, which can take over 20 years. If success can be demonstrated, it is hoped that this technique could become an accepted approach in the future. We know that waxcaps can form new colonies from spores (Griffith 2004) so by depositing concentrations of spores into comparable receptor areas, we feel that the probability of success is high.

This article is intended to encourage others to consider this approach to fungi translocation. We cannot wait 20 years to prove success in our project and risk missing opportunities to carry out other similar translocations where species could otherwise be significantly adversely affected as a consequence of development. This method of waxcap translocation is low impact and relatively low cost compared with turf translocation. By using eDNA analysis, we hope to demonstrate a positive result in the next five years. This could enable other similar translocations to take place from which we can learn more about the practicalities, as well as the successes or failures.



Figure 7. The location points from which caps of all species were collected on 17th October 2014.



Figure 8. The location points from which caps of all species were collected on 20 November 2014.

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Soft Felling and Translocating Bat Roosts in Trees – Arboricultural Considerations

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Keywords: arboriculturist, bats, rigging, roost, sectional dismantling, tree

There is a risk that some of the terminology used routinely by ecologists is unclear to contractors and others tasked with carrying out practical habitat management. This could lead to delays, incorrect work and ecological damage. This is discussed in the context of soft felling of trees where potential roost features need to be protected through translocation of tree sections to receptor trees.

To provide meaningful recommendations in relation to soft felling, ecologists need to ensure that we are understood, that we understand what we are asking arboricultural contractors to undertake and the financial implications this work has for the client.

Introduction

The term 'soft felling' is often used by ecologists when making recommendations for work on trees that contain bat roosts. But what is soft felling? Are our recommendations understood by the arboricultural industry?

In this article we describe 'soft felling' and explain the practicalities and limitations with the aim of helping ecologists make more informed recommendations in order to protect and translocate roosting features.

Soft felling options

There are two broad interpretations of soft felling. The first involves softening the impact of a falling tree to enable the



Figure 1. Winching a roosting feature into place.

roosting feature to be retained intact. This can be achieved by laying material, such as brash from tree works, beneath the tree before it is felled or inserting a series of cuts on the underside of limbs

to enable the wood fibres to 'fold' as the tree falls, thereby dissipating gravitational forces. Whilst this method is relatively straightforward, quick and may allow the feature to be removed intact, the

level of disturbance is too high for use when bats are present. In addition, this method would be unsuitable for removing certain features such as hazard beams (longitudinal splits in limbs) as even the reduced force of impact on the ground would cause the feature to break.

The second option involves the sectional dismantling of a tree using a rigging rope or a crane to lower the selected feature from the tree rather than allowing the section to fall under its own weight. It offers far greater control and allows features to be removed safely. There are limitations, however: the arboricultural contractor must be highly skilled; the disturbance to the section may be too great to be used when bats are present (bats should be allowed to disperse naturally or be excluded using a one way gate or similar technique before works commence); and the architecture of the tree may prevent this technique from being effectively applied. The main advantage is that the greater control of descent enables features to be removed intact for translocation to the receptor tree.

Sectional dismantling and tree rigging

Working from the top down, sections of the tree are removed until the tree is small enough to be felled. Sections can be 'hand cast' (thrown from the tree by the climber) or lowered by securing a rigging rope or attaching the section to a crane. Rigging is most often used because of the high costs of using a crane as well as potential site access issues for machinery.

Rigging is a complex operation that requires an understanding of forces and moments if it is to be undertaken safely. During typical rigging operations little concern is given to the twisting of the section being removed or potential pendulum impacts with other parts of the tree; however, this must be considered carefully when removing a roost feature.

Practical considerations

The time needed to plan and undertake tree works involving roosting features is likely to be much greater than for normal tree felling operations. This has implications for the cost and time needed to carry out the tree works.

1) Architecture of the tree

When rigging sections out of a tree, a rigging rope is tied to the section to be removed and attached to the tree via a pulley system and friction device to enable the piece to be lowered out of the tree. The architecture of the tree will have a significant impact on the level of control over the lowering operation. If the pulley can only be located beneath the section to be removed, there is a high likelihood of pendulum swing and possible impact with another part of the tree, making it unsuitable for the removal of roost features.

2) Safety of the tree

In order to undertake any soft felling operations, the tree itself has to be safe. If the structural condition is such that it cannot either be climbed or used to lower sections, the operation would require the use of machinery such as a Mobile Elevated Work Platform and crane.

3) Equipment

A basic rigging system uses just a rigging rope and an operative on the ground controlling the descent using the friction of the rope wrapped around the tree. However, there is a large range of rigging equipment available, which can provide the operator with greater control when lowering and lifting sections.

4) Sections to be removed

Normally, during rigging operations the length of the piece to be removed is determined by the climber based on the space available to lower the section, how much control is needed and the likely weight of the section. By controlling the length, the climber can ensure that the piece can be lowered to the ground safely without overloading the rigging system.

However, there is less scope to make such adjustments when removing roosting features that need to be taken down intact. Removing greater lengths of timber will place additional loads on the rigging system making the operation more difficult.

Translocation of bat roosting features

Before considering whether or not to translocate a roosting feature, the likely efficacy and longevity of the mitigation should be considered. The following are the key aspects:

- **Whether there are suitable trees nearby on which the feature can be erected.** This would include consideration of the original and destination height, orientation, aspect and exposure of the feature within the tree as well as implications for future monitoring, if required. When re-erecting roosting features, the architecture of the tree will have implications regarding how a feature can be installed and, indeed, if at all – just as it does when removing a feature from a tree (Figure 1).
- **Attachment method.** Given the unusual and highly variable nature of resurrecting roosting features in trees, a bespoke attachment method will be required. This should take into account difficulties for future tree safety inspections (changes in tree load dynamics, attachment point or material failure and locations of targets – people or property – beneath the tree); the lifespan of the attachment material (including provision for loosening as the tree grows); and whether a non-invasive attachment method can be employed to limit damage to the tree. On certain sites this may fall under the Construction (Design and Management) Regulations 2015. Advice from an arboriculturist should be sought on the consideration of current and future safety management.
- **Longevity of tree section based on characteristics of wood substrate.** Roosting features taken from species of tree with non-durable heartwood or ripewood (e.g. willow or beech) will decay faster than a feature from a tree with durable heartwood (e.g. oak) and may only last a couple of years.
- **Whether other mitigation/compensation measures would be more practical, longer-lived or more effective.** Re-erecting roosting features may not always provide the best mitigation. Figure 2 shows a re-erected feature and bat boxes; monitoring has shown that the boxes have been used as frequently as the feature and are likely to last longer.



Figure 2. Translocated roosting feature. Whilst bats have continued to use the translocated feature, the bat boxes have also been used by the same number of bats.

Recommendations

It is important that arboriculturists understand the recommendations made by ecologists in relation to tree work.

Use a suitably qualified and insured arboricultural contractor for any operation to remove a roosting feature and ensure they are aware of the method by which the feature within the tree is to be removed. Wherever possible, use an arboriculturist who has experience of working with bats.

Ensure that soft felling is clearly explained and discuss the way in which the sectional dismantling and rigging will proceed. Make sure that the feature of interest is clearly identified; once this has been safely removed from the tree, it may be possible to proceed with the remaining tree works using standard felling techniques.

Before undertaking a translocation, ensure that it is fully thought through, including efficacy of mitigation and future safety implications.

References and further reading

Arboricultural Association website:
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www.climbingarborist.com. Provides easily accessible 'how to' video guides for a range of tree work topics including rigging.

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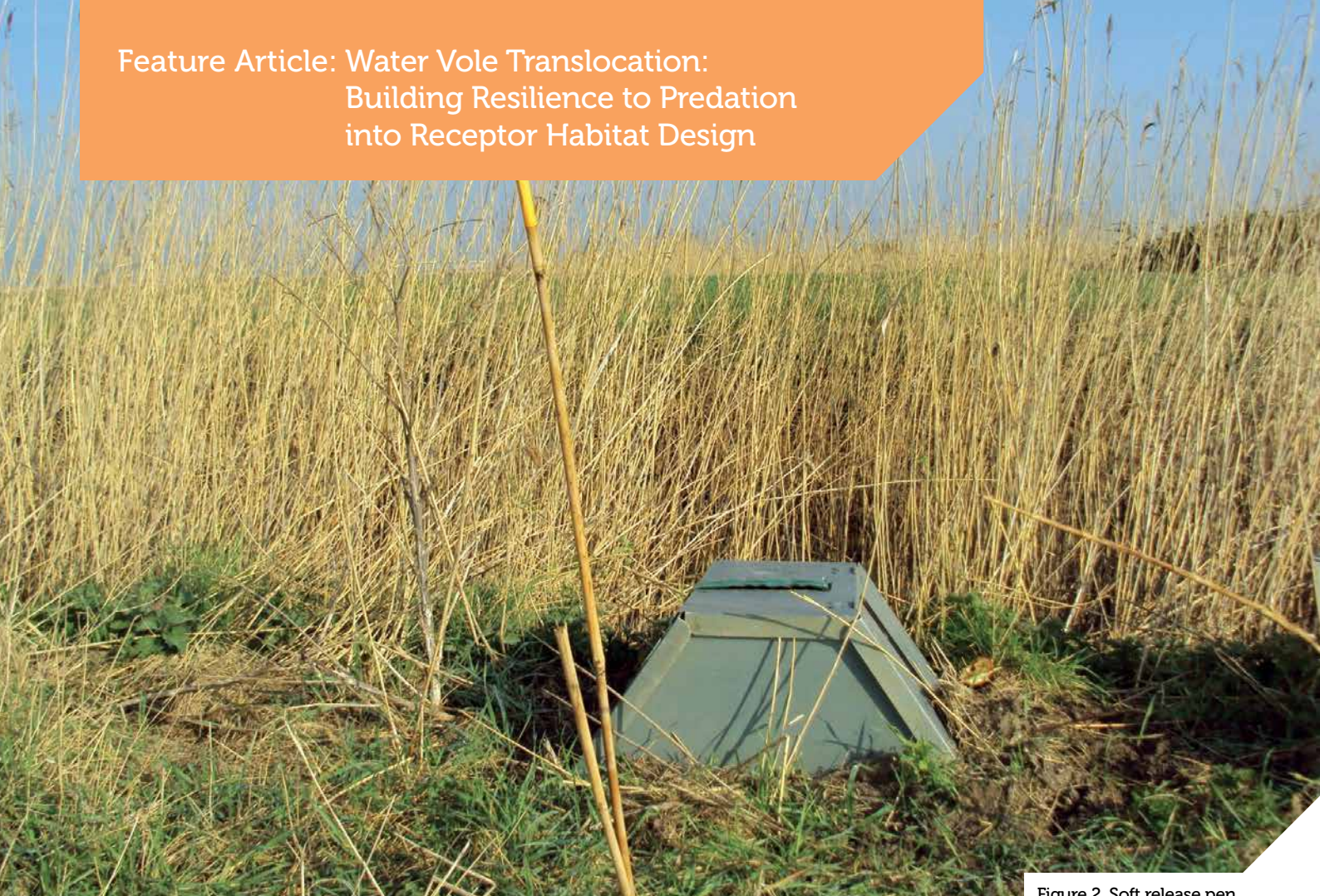


Figure 2. Soft release pen.

Water Vole Translocation: Building Resilience to Predation into Receptor Habitat Design

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Keywords: complex habitat, fox, mink,
radio tracking

The complexity of habitat design is considered to be a key factor in the success of water vole translocation. This article describes a water vole *Arvicola amphibius* translocation project and discusses whether predator resilience can be built into complex habitats designed primarily for water vole mitigation.

Introduction

In order to create new wetland habitat on Wallasea Island nature reserve in Essex, it was necessary to translocate or displace water voles from a network of ditches bisecting former arable land. This was undertaken against a background of continuing widespread decline of water

vole populations in the UK, attributed to the spread of the introduced American mink *Mustela neovison*. Some sites in England still support large populations of water voles and there is evidence to suggest that habitat quality and complexity play a key factor. For example, surveys

in the Chichester/Pagham coastal plain in west Sussex found evidence of water vole activity and mink at sites with an interconnecting network of ditches, isolated ponds and reed beds. Conversely little or no evidence of water vole activity was found in continuous linear water bodies (rivers, streams and ditches) despite the availability of apparently suitable habitat (National Water Vole Survey 1989/90). It is thought that the extreme linearization of riparian habitats increases the vulnerability of water vole populations to predation by mink and native predators, while increasing fragmentation of riparian habitats and a

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reduction in patch size as a result of urban development may limit opportunities for recolonisation following predation events (Rushton *et al.* 2000). Due to the high numbers and widespread distribution of water voles at Wallasea Island, the habitat creation scheme provided an opportunity to assess the importance of habitat complexity in maximising water vole survival following translocation.

The site

Wallasea Island is a 774 ha nature reserve owned and managed by the Royal Society for the Protection of Birds (RSPB). The RSPB, working in conjunction with Crossrail and BAM Nuttall is in the process of creating a new wetland habitat for birds and other wildlife by re-using soil excavated during tunnelling operations undertaken as part of the London Crossrail project.

BAM Nuttall working as principle contractor on behalf of Crossrail at Wallasea Island has imported 3 million tons of excavated material from Crossrail's tunnels and stations. The imported material has accounted for nearly 80% of the total excavated material transported by rail and water from Crossrail tunnels, which removed 150,000 lorry loads from the roads of London. Excavated material from Crossrail wharfs was delivered to Wallasea Island on 2000-tonne ships; up to four of these ships were discharged each day across two, large, purpose-made pontoons and an 800 m conveyor system; the materials were then moved into final position on the site by dumper trucks.

The project timescale and work schedules have taken account of legally protected species including water vole, otter *Lutra lutra*, badger *Meles meles*, European eel *Anguilla anguilla*, adder *Vipera berus* and common lizard *Zootoca vivipara*, as well as breeding birds. Habitats within the site comprise arable, extensively managed and semi-improved grassland, field margins, flood embankments and an extensive network of ditches and soke dykes. Approximately 167 ha of existing arable farmland habitat and 9080 m of soke dyke and ditches will be lost as a result of the wetland creation scheme.

Between March – April and September – October 2013, 206 water voles, 50 adders and 8,200 common lizards were



Figure 1. Water vole with radio-tracking device (courtesy of Thompson Ecology).

translocated outside the Crossrail works area but retained at Wallasea Island site in enhanced or newly created habitats.

The project aimed to enhance biodiversity across the site. Partnership with RSPB was a key part of Crossrail's sustainability strategy and the project was awarded Gold for Habitats and Biodiversity at the Green Apple Awards in November 2014. The award was in recognition of implementation of environmental best practice in relation to ecological mitigation works.

Translocation and predation

An extensive water vole survey in 2012 gave an estimate of 124 breeding female water voles (186 individuals) using methodology defined by Strachan (2006).

Following consultation with Natural England and the issue of a licence by the Wildlife and Licensing unit, a water vole mitigation strategy was agreed that included large-scale displacement and live cage trapping and translocation. The results of the displacement study are still being assessed and are not discussed further in this article.

In total, 23 adult water voles, representing approximately 10% of the population, were trapped and fitted with radio tracking devices (Biotrack product code: Pip Ag393 cable-tie collars, weighing 3.2 g; Figure 1). Eleven of these voles were translocated into soft release pens (Figures 2 & 3) outside the proposed works areas in 2013. Each water vole was released immediately following its capture into an individual soft release pen. A total of 100 metal A-framed soft release pens (Figure 2) were partially dug into the ground and left *in situ* for seven consecutive days following the release of an individual water vole into each pen. The pens were spaced at 25 m intervals along the western edge of the site within a newly created water vole receptor site and along three existing linear ditches. Males and females were released into alternate pens, hay was supplied as cover and a supply of food comprising apple, carrot and cucumber was supplied daily until the water voles had vacated their pen.



Figure 3. Water vole in soft release pen.

The construction of each soft release pen enabled the water voles to burrow out of their own accord.

Each translocated vole was radio tracked and located once a week for 12 consecutive weeks. Radio tracking revealed that five of the 11 translocated water voles survived to set up new territories and remained within 50 m of their soft release pens over the monitoring period. Four voles were tracked to a fox *Vulpes vulpes* den (confirmed by auto-remote trail camera), located approximately 150 m north of the channel where the water voles had been released. The water voles were assumed dead and preyed upon by foxes and no further movement of the tracking devices was recorded. Two more voles were never located on site despite extensive tracking effort using vehicles and an experienced tracking team. It is likely that the two missing water voles were taken by birds of prey, possibly marsh harrier *Circus aeruginosus*. Whilst foxes appeared to be the primary predator affecting the radio-tracked animals, their presence appears to have had no adverse impact upon the population to date (Figure 4).

Although there is currently no evidence of mink at Wallasea Island, future incursions cannot be ruled out. Mink are commonly associated with wooded or scrub cover close to aquatic habitats and generally avoid open and exposed sites (Dunstone 1993). The development of the site as a wetland, providing habitat for ground-nesting waders and wildfowl, will make it more attractive to many predators including mink. The design of new water vole habitat at Wallasea Island (Figure 5) has therefore incorporated a structurally complex ditch system in combination with pools (Figure 6) and scrapes providing both refuges and a focus for future recolonisation. As well as mitigating for the loss of existing field boundary ditches, this new habitat should be a key element in a cryptic landscape restricting access for predators of ground-nesting birds across the island and increasing the likelihood that potential prey will be overlooked, or the costs in effort will divert predators away from potentially productive but difficult to access areas.

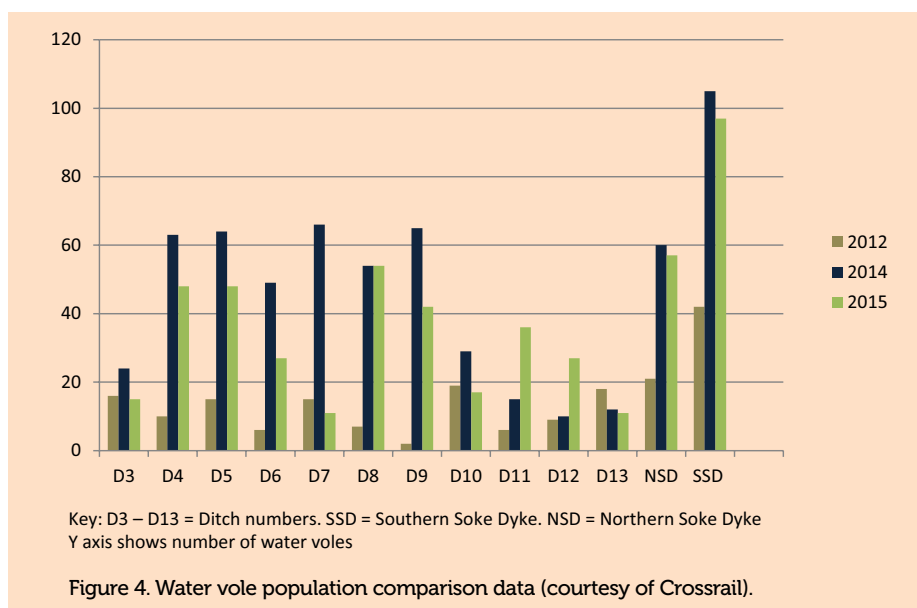


Figure 4. Water vole population comparison data (courtesy of Crossrail).



Figure 5. (Above) Wallasea Island wetland creation scheme design (courtesy of RSPB).



Figure 6. Water vole receptor site (courtesy of RSPB).

Feature Article: Water Vole Translocation: Building Resilience to Predation into Receptor Habitat Design (contd)

Predation of water voles is likely to be focused directly or opportunistically within the ditch system; indeed it is likely that ditches will act as a highway increasing the probability of opportunistic predators encountering water voles. It is suggested that by creating a new ditch network that is as complex as possible with good vegetative cover the likelihood of active burrows being overlooked or missed entirely by predators is greatly increased.

Post-Translocation Population Levels

Monitoring was undertaken at Wallasea Island in April 2014 and 2015. All enhanced ditches, the receptor site and existing ditches where water voles had been displaced and/or translocated into, were re-surveyed using the same methodology as during the initial 2012 water vole survey. A population estimate of 616 and 455 water voles (respectively) was recorded. These results indicate that although the number of individuals decreased from 2014 to 2015, the overall water vole population following large-scale translocation and displacement has increased by approximately 35% since 2012 (Figure 4).

The increase is considered likely to be attributed, in part at least, to the ecological enhancement works that were undertaken within the retained riparian habitats during 2013 prior to translocation. This included dredging of silt and removal of excessive emergent vegetation to increase water flow within the channels. Where connectivity between adjacent ditches had been lost, culvert repair works were undertaken to reinstate connectivity across the site.

Conclusions

Post-monitoring studies indicate that translocation and displacement of water voles at Wallasea Island was largely successful. There has been a 35% population increase since the baseline survey in 2012, prior to the commencement of Crossrail soil relocation and habitat creation works. Evidence that foxes preyed on water voles fitted with radio collars following release into the new ditch system demonstrates the potential impact of predators, although it is not known whether the radio collars increased the vulnerability of water voles by acting as an impediment to escape or as a visual or auditory attractant.

Future translocation and habitat creation projects should consider the potential impacts of mink, foxes and other predators, as well as habitat features such as scrubby areas or rabbit burrows likely to provide denning sites for foxes, when selecting suitable translocation sites. The impact of native predators on fragmented water vole populations is often overlooked (Forman 2004), particularly when there is no evidence for the presence of mink. However, this study suggests that foxes had no long-term impact on the water vole population at Wallasea, unlike mink, which are known to be a potential threat to the survival of fragmented water vole populations or meta-populations (Dunstone 1993). The recovery of the water vole population at the receptor site at Wallasea provides evidence for the importance of a complex ditch system increasing the available area of water edge habitat and the total area for foraging and refugia than might otherwise be expected to be present in a linear ditch system (Rushton *et al.* 2000).

The more complex the habitat, the greater the opportunity for a stable meta-population of water voles to establish and the greater the likelihood that rapid colonisation will follow major predation events. Serious consideration should be given to restoring and enhancing water vole habitat with resilience to predation as a key component. It is hypothesised that increased habitat complexity may even allow mink and water vole to co-exist (Barreto and Strachan 1998). It is therefore strongly recommended that future studies investigate the design of new or existing complex habitats where mink are also known to be present.

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Beavers in Scotland – The Final Report

The *Beavers in Scotland* report was presented to Scottish ministers in June 2015. It is the culmination of many years of research, investigation and discussion, and draws on 20 years of work on beavers in Scotland, as well as experience from elsewhere in Europe and North America. It provides a comprehensive summary of existing knowledge and offers four future scenarios for beavers in Scotland. The report covers a wide range of topics from beaver interactions with natural and human environments, to legal issues and management considerations.



Introduction

Scottish Natural Heritage (SNH) published its final *Beavers in Scotland* report on 12 June 2015 (Gaywood 2015). The report had been requested by Scottish Government and has been designed to support Scottish ministers in making a decision on the future of the Eurasian beaver *Castor fiber* in Scotland. It provides one of the most thorough assessments ever done for a species reintroduction proposal.

The issues surrounding beaver reintroduction to Scotland have been the subject of intense investigation and discussion over the last 20 years. The report draws on work and experience generated through the Scottish Beaver Trial, the Tayside Beaver Study Group, the Beaver-Salmonid Working Group, the National Species Reintroduction Forum and a range of other studies from Scotland and abroad.

Assessing the need for beaver reintroduction has a legal basis, in particular the Habitats Directive. This requires EU Member States to study the desirability of reintroducing certain species. The potential for beaver reintroduction to contribute to the aims of the '2020 Challenge for Scotland's Biodiversity' is a further consideration.

At the current time there are two wild beaver populations present in Scotland on a 'trial' basis, at Knapdale in Argyll and in Tayside. Any decision would need to consider their future, as well as the desirability or not of any further reintroduction.

The information presented

Beavers in Scotland is broken down into several main sections:

- **Introduction and background, and sources of information** – A brief background to beaver reintroduction in Scotland, and conservation translocations in general.
- **Beavers and their interactions with the natural environment** – A summary of latest research on beaver ecology; new assessments of habitat availability in Scotland and predictive population models for Knapdale and Tayside; and current thinking on genetic issues that apply to beavers in Scotland and the rest of Britain. There is also an examination of the interactions of beavers with a range of habitats and species, based on Scottish and international studies. Particular attention is given to habitats and species of European importance.
- **Beavers and their interactions with the human environment** – Information on what is known about how beavers interact, or might interact, with land uses such as forestry, agriculture, fisheries and associated land use infrastructure, as well as public and animal health. An assessment is provided of the over-arching socio-economic factors, including the contribution to ecosystem services.
- **Legal issues and beaver management** – The current, and likely future, legal position of beavers in Scotland, together with a range of techniques which may be employed to manage either beaver impacts, or the beavers themselves, based on

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Keywords: *Castor fiber*, management, reintroduction, translocation

experiences in other European and North American countries.

- **Future scenarios** – Four potential scenarios, developed with a wide range of interested parties, for the future of beavers in Scotland. These range from full removal of beavers to their widespread reintroduction across Scotland. Preliminary information is provided on key considerations in any future beaver management strategy for Scotland.

Throughout the report there are assessments of potential positive and negative impacts, and associated risks and benefits that may arise from beaver presence. Approaches to help mitigate the risks and maximise the benefits are described.

Full details, and links to supporting information, are provided in the report. Much of the information presented will also be relevant to beaver-related issues in other parts of Britain and elsewhere, as well as to conservation translocation proposals being considered for other species.

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Meeting the Favourable Conservation Status Test for European Protected Species: A Different Approach?

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Keywords: EPS licensing, Favourable Conservation Status, Habitats Directive Article 16

This article considers whether a “strategic” (rather than a “site-based”) approach to the provision of compensatory measures for European Protected Species might be consistent with the Favourable Conservation Status test (“**FCS test**”) of Article 16 of the Habitats Directive. It concludes that the FCS test contains a degree of flexibility which could benefit from a greater focus within domestic licensing systems and that a more flexible approach might be of benefit to both protected species and those seeking derogation licences.

Introduction

1. Time and again I am asked to advise developers and other licence applicants on European Protected Species (**EPS**) issues. Most often I am asked to advise on how best to meet the EPS licensing requirements of Regulation 53(2) and (9) of the Conservation of Habitats and Species Regulations 2010¹ and the related

licensing demands of the relevant statutory nature conservation body (most often Natural England, **NE**).

2. Time and again I baulk at the (often) excessive costs, resources and delays involved in the exclusion and translocation under licence of often very small numbers of EPS animals (often great crested newts) and the provision of associated compensatory habitat measures, most often within or sometimes adjacent / close to the site of impact.
3. I have also read recently in relation to great crested newts that “a recent study revealed that in only 12 instances out of the hundreds of mitigation operations sanctioned by government have the licence requirements to monitor the success of the newt translocations been fulfilled. Eleven out of these 12 mitigations resulted in extinction or reduced newt populations compared with the original locations (Lewis et al. 2014)” (Beebee 2015)². Sadly, this may be of little surprise to some readers. Few developers are likely to have a genuine interest in securing the ecological success of small areas of compensatory habitat which must often, under licence, be provided adjacent to or within their development sites for EPS. Whilst licences granted by NE and other statutory nature conservation bodies do often contain long-term habitat management obligations on the licence holder, in some cases continuing for years after the licensable works have taken place, in my experience of advising on EPS issues, I have never seen legal action being brought in respect of a breach of such long-term obligations (please note however that this is not to say that such legal action has not been or would not be taken).
4. I therefore wonder: is the current “site-based habitat compensation” approach to the protection of EPS the most appropriate (by this I mean the existing approach where compensatory measures, including compensatory habitat measures, must be provided by each licence applicant either at the location of impact, or at a location

as close to the location of impact as possible)? Or might there be a better way of securing a healthy and secure future for our populations of EPS?

5. The first key question is this: is there any scientific evidence to suggest that the conservation of EPS would be more successful if, instead of adherence to a site-based habitat compensation approach, licence applicants had the option to contribute to a “strategic habitat compensation approach” under which larger and better-managed areas for EPS were secured in locations across the different regions of the country, managed by organisations with the relevant expertise and will to succeed in delivering conservation value? I do not know the answer to this question and I would challenge someone with the appropriate scientific expertise to offer an answer. I can see that there may well be concerns about an approach which encourages potentially disconnected “islands” of EPS across the country, particularly where there is a recognition that what we need is instead “more, bigger, better and joined” (Lawton et al. 2010)³. But, on the other hand, for great crested newts at least (based on Beebee 2015, referred to above), there appears to be doubt that the site-based habitat compensation approach is working. I can well expect that the answer to my question might be different for each different EPS.
6. If there is any such scientific evidence for any EPS, the next question is whether the species protection provisions of the Habitats Directive⁴ (Articles 12 and 16) are sufficiently flexible to allow an alternative “strategic habitat compensation approach”? If not, does the EU Commission’s Fitness Check of EU Nature Legislation (Birds and Habitats Directives)⁵ present an opportunity to address this issue?
7. My view is that Articles 12 / 16 Habitats Directive may well be sufficiently flexible to accommodate such a strategic approach.
8. Now is a very important time to raise this issue, as we are at a critical point

in terms of the Habitats and Wild Birds Directives⁶, with the EU Commission’s Fitness Check of EU Nature Legislation (Birds and Habitats Directives) before us. Many opponents of the Directives argue that they should be scrapped due to their supposed inflexibility and impact on economic development. In my personal view it is essential that the Directives are retained. In support of this I set out below how I believe the species protection provisions of the Habitats Directive could be interpreted in a way that might offer greater flexibility in the way we maintain favourable conservation status of our populations of EPS.

Approaches to assessing the “FCS test” of Article 16 Habitats Directive

9. The key issue in this debate is the EPS derogation condition (the “Favourable Conservation Status (**FCS**) test”) found in Article 16 Habitats Directive and Regulation 53(9)(b) of the Conservation of Habitats and Species Regulations 2010.
10. The FCS test provides that any activity for which an EPS derogation (i.e. an EPS licence) is sought must not be “*detrimental to the maintenance of the populations of the species concerned at a favourable conservation status in their natural range*”. This is the legal test which in practice requires a licence applicant to deliver compensatory measures (which in most cases includes compensatory habitat measures) for EPS animals / plants affected by a licensable activity. There is no direct reference to, or mention of, the need to provide compensatory measures in the legislation. This is, instead, the practice which has grown up so as to address and meet the test.
11. NE’s EPS Guidance: “How to get a licence”⁷ states:
“In order to obtain a licence to allow for the capture of EPS, damage or destruction of breeding sites, etc, in advance of any otherwise legitimate activity which may impact on the favourable conservation status of the EPS concerned, you and your

consultant ecologist must demonstrate that the damage will be adequately compensated for to satisfy Regulation 53(9)(b)" "Current Natural England advice is that there should be no net loss in the local population status of the species concerned, taking into account factors such as population size, viability and connectivity. Hence, when it is unavoidable that an activity will affect an EPS population, the mitigation should aim to maintain a population of equivalent status on or near the original site". This advice is also repeated in, for example, the great crested newt mitigation guidelines⁸ (page 12, 5th paragraph).

12. Taking great crested newts as an example, NE's advice (page 35 of the great crested newt mitigation guidelines⁸) is that one of the following three outcomes should be achieved from development activity, in decreasing order of preference:

- "no negative impact on great crested newt populations
- where only a minor impact is predicted, compensation by small-scale relocation and exclusion of newts, combined with habitat creation, enhancement or restoration (all occurring on-site or in the immediate surrounding area, i.e. in situ mitigation)
- where a major impact is unavoidable, and it is not possible to compensate through on-site mitigation, translocation of newts away from the site, to an area that provides equivalent or better habitats. To achieve this, new habitats, including ponds, will invariably need to be created, enhanced, or restored prior to translocation." [My own experience, working for clients on a number of difficult great crested newt licence applications, is that NE requires (i) that an off-site location must be as close to the impact of the licensable activities as possible; (ii) that it be demonstrated that no threat of disease transmission (including chytridiomycosis fungal disease) could arise (in some cases through

undertaking disease screening at the donor and receptor sites); and (iii) demonstration that an on-site strategy is not possible].

13. NE also comments that (page 36 of the great crested newt mitigation guidelines⁸) "There should be no net loss of sites, and in fact where significant impacts are predicted there will be an expectation that compensation will provide an enhanced habitat (in terms of quality or area) compared with that to be lost".
14. Is the approach in paragraphs 11 and 12 above the only lawful approach available or could a more flexible approach still be regarded as consistent with Regulation 53(9)(b) / Article 16 Habitats Directive? I believe that a more flexible approach may well be possible.
15. I am not privy to the exact legal basis upon which NE would rely to explain its approach in paragraphs 11 and 12 above. Clearly NE's approach will be based on the wording of the FCS test, i.e. the action authorised must not be "detrimental to the maintenance of the populations of the species concerned at a favourable conservation status in their natural range". I would respectfully suggest that NE may regard the words "the populations of the species concerned" as a reference to the specific "site-of-impact population(s)" of the particular species affected by the proposed licensable activities. It would follow, from such an interpretation, that the compensatory measures would need to address the impacts on the specific site population(s) affected by the licensable activities, as per NE's approach in paragraphs 11 and 12 above.
16. The EU Commission's 2007 "Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC"⁹ would appear, in part, to support such an approach. Page 61 states (underlining added):
- "The conservation status of a species must ultimately be considered across its natural range, according to Article 1(i). In discussions with the Habitats Committee, it was therefore agreed that, for the purpose of reporting*

under Article 17 (in connection with Article 11), conservation status should be assessed at biogeographic level in each Member State. This would ultimately allow information to be aggregated for complete biogeographic regions across the EU. The conservation status of a species within the relevant biogeographic region within a Member State should be important information to be used when considering a derogation.

*However, an appropriate **assessment of the impact of a specific derogation** will in many cases, if not most, have to be at a lower level than the biogeographic region in order to be meaningful in ecological terms. A useful level in this regard could be the (local) population. The wording of Article 16, which points to "populations of the species concerned", confirms this interpretation".*

17. In the second paragraph of the quote above, the EU Commission appears to link the word "concerned" in the FCS test to the population at local level to be affected by the licensable activity. As already noted, this interpretation may explain NE's approach at paragraphs 11 and 12 above.
18. With the greatest respect to the European Commission and (if my suggestion above as to NE's interpretation is correct) to NE, I am not at all convinced that it is correct to read the word "concerned" as a reference to the specific site-based / local population affected by the licensable activity. The meaning of the word "concerned" here is in my view important to the correct interpretation of the FCS test.
19. The word "concerned" in the FCS test can equally be read as referring to the relevant species affected by the derogation ("the species concerned"). If read in this way, the FCS test is making no comment on the specific population level (site, local, regional, national or biogeographic) which must form the basis of the assessment of impact of the licensable activity and whose favourable conservation status must be maintained. It is simply saying that the populations (with the relevant level (undefined))

of whatever species is / are affected by the licensable activity must be maintained at favourable conservation status in their natural range.

20. This interpretation is, in my view, consistent with the definition of favourable conservation status for species under Article 1(i) of the Habitats Directive. In this definition the word "concerned" is used twice, in both cases clearly referring to the species (i.e. the "species concerned"), not to populations. I believe that this interpretation is also consistent with the inclusion of the wording in the FCS test of "*in their natural range*" which clearly links back to the Article 1(i) definition.
21. This interpretation is also consistent with the approach adopted by Defra's Guidance on the Environmental Damage (Prevention and Remediation) Regulations 2009 (EDR)¹⁰ which, until very recently, implemented the Environmental Liability Directive¹¹.

21.1 Even though the focus of the Environmental Liability Directive and the Habitats Directive is different, both regimes offer protection to EPS and some of the language in the Environmental Liability Directive and the Habitats Directive is similar, so comparisons in implementation in certain respects are likely to be justifiable. Specifically, both Regulation 53(9)(b) of the Conservation of Habitats and Species Regulations 2010 and the EDR refer to an assessment of impact on favourable conservation status of species (even though the relevant threshold of damage is expressed differently under each regime).

21.2 Defra's EDR Guidance¹² states (paragraph A1.30) that the relevant range for the purpose of assessing conservation status and impacts on conservation status for the purpose of the EDR is generally at member state level. It justifies this (A1.30) by reference to the reporting under Article 17 of the Habitats



Great crested newts *Triturus cristatus*. Photograph: Barry Kemp.

Directive and other guidance under the Habitats Directive. It says that these sources indicate that the range should generally be taken to be at the member state level. A1.32 states that "*depending on the features of the species or habitat, the relevant range may be the whole of the UK (e.g. great crested newt) or it may be only part of the UK (e.g. stag beetle)*" (note that the stag beetle is not an EPS).

22. If the interpretation presented in paragraph 19 above were correct, there could potentially be more flexibility in identifying appropriate compensatory measures to meet the FCS test when Article 16 derogations (i.e. EPS licences) are sought. This is because, based on this interpretation, there is no specific legal requirement for the assessment of the impacts of the licensable activity to be made at the site / local population level (and indeed the way the European Commission guidance referred to at paragraph 16 is phrased would suggest that this is also their view "*A useful level in this regard...*"). The legal requirement is, rather, to consider the impact of the licensable

activity on "*the populations*" (level undefined) of the species affected by the licensable activity. Impacts on the local population may well be relevant but, importantly, the analysis would not always have to be focused on this. A Member State would have flexibility to identify in any case how the impacts of the derogation on "*the populations*" of the specific species affected is to be judged and how then compensatory habitat measures are to be designed. It may well be possible for a Member State to consider the impacts at a "*higher than site population level*" and for compensatory habitat requirements then to be similarly assessed. This may particularly be the case where there is evidence (as appears to be the case for great crested newts in England, see above, Beebee 2015)¹³ that a purely site-based compensation approach is not succeeding. The European Commission refers to the term "*population*" as meaning "*a group of individuals of the same species that live in a geographic area at the same time and are (potentially) interbreeding, i.e. having a common gene pool*" (page 60 of EU Commission's 2007 Guidance)¹⁴. A "*higher than site population level*" approach to assessment of impacts

and delivery of compensatory habitat measures is likely, in some cases at least, still to allow the Commission's meaning of "population" to be respected.

23. There is also no requirement under the FCS test that every individual EPS specimen is protected from harm. The FCS test instead focuses on "the populations". Therefore, taking great crested newts as an example, it is in my view not correct to assume that every licensable activity must be accompanied by a compensatory measures strategy which must include exclusion and translocation of the animals from the site of impact. A particular licensable activity could potentially lawfully benefit from the EPS Article 16 derogation where there is a risk of harm to a small number of individuals of an EPS but where compensatory measures are still taken to maintain the
- populations (of the relevant species) at a favourable conservation status in their natural range.
24. Following this interpretation of the FCS test, there could, in particular for EPS where the efficacy of the site-based approach is in question, be a reduced focus on site-based provision of compensatory measures for the particular animals affected by a licensable activity. Licensing authorities could potentially instead lawfully grant a licence to permit activities which risked harm to, for example, a small number of great crested newts through destruction of habitat on the basis that the licence holder cooperated with other licence holders, land owners or conservation bodies to create a great crested newt stronghold in the wider locality, although not at the site of impact.

Conclusions

25. The approach adopted at least in England to date (see paragraphs 11 and 12 above) could perhaps be regarded as representing the safest possible approach to implementing the FCS test. By seeking to ensure a status quo, i.e. that the EPS present at the site of impact are, wherever possible, saved from any harm (in particular through exclusion and translocation) and provided with compensatory habitat at that location, the UK could not easily be criticised for non-compliance, as long as the approach actually worked, i.e. the licences granted were not detrimental to the maintenance of the populations of the species concerned at a favourable conservation status in their natural range. The irony is that, despite this approach, it seems (see above, Beebee 2015)¹⁵ that there is doubt that this approach is securing the "no detriment" outcome that is intended and legally required.
26. My concern therefore is that the approach adopted at present, in England at least, does not reflect the flexibility which the FCS test, in my respectful view, may well offer and ultimately (despite the best of intentions) may be failing the species it is intended to protect.
27. I would very much hope that Defra, NE and the European Commission could discuss the issues I have raised in more detail and come to a common view as to an appropriate approach. I would obviously be delighted to play a part in any such discussions.

Notes

1. Conservation of Habitats and Species Regulations 2010 (as amended).
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4. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
5. Fitness Check of EU Nature Legislation (Birds and Habitats Directives) http://ec.europa.eu/environment/nature/legislation/fitness_check/index_en.htm.
6. Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
7. Natural England (2007). *European Protected Species: Mitigation Licensing – How to get a licence (WML-G12)*, Version: December 2013. <http://publications.naturalengland.org.uk/publication/4727870517673984>
8. English Nature (2001). *Great crested newt mitigation guidelines*, Version: August 2001. <http://webarchive.nationalarchives.gov.uk/20140605090108/http://publications.naturalengland.org.uk/publication/810429?category=30014>
9. EU Commission, February 2007: Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC http://ec.europa.eu/environment/nature/conservation/species/guidance/pdf/guidance_en.pdf.
10. The Environmental Damage (Prevention and Remediation) Regulations 2009/153 (as amended). Note that Environmental Damage (Prevention and Remediation) (England) Regulations 2015/810 came into force on 19. July 2015 whereupon the 2009 Regulations were revoked but this does not affect the point being made in this article.
11. Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage.
12. Defra, November 2009 (2nd update): The Environmental Damage (Prevention and Remediation) Regulations 2009 Guidance for England and Wales https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/221095/pb13895-indepth-guide-regs09.pdf.
13. See note 2.
14. See note 9.
15. See note 2.

About the Author



Penny Simpson is a partner within Freeths LLP's Planning & Environment Group and a specialist in natural environment legal issues. She advises both private and public sector clients on a wide range of issues including protected sites, protected species, water issues, planning issues, prosecution, wildlife licensing and compliance issues.

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Meet the Author – Emily Drinkwater

What do you do?

My current position is a Project Ecologist at SLR Consulting Limited. My responsibilities include liaising with site managers and others associated with a project; Phase 1 Habitat surveys; protected species surveys; data analysis and reporting.

What or who first inspired you to get into ecology?

It was probably a combination of things such as camping holidays in Wales as a child, visits to nature reserves, David Attenborough documentaries and reading various books including Douglas Adams' *Last Chance to See*.

How did you get to where you are today?

I studied for a foundation degree in Animal Welfare and Behaviour alongside volunteering as an animal keeper at The Living Rainforest. This led on to a BSc and MSc in Ecology whilst working as a Field Ecologist for SLR. After completing my MSc, I volunteered for BBOWT (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust) as a Conservation Trainee for a year before taking a permanent position with SLR.

What have been the most important steps along the way?

I made the most of my degree courses by asking lots of questions and making contact with various organisations. This led to training courses and volunteer work where I gained a range of experience. Further

practical experience included seasonal employment with SLR, volunteering for local Wildlife Trusts and with the North Buckinghamshire Bat Group.

Are there any 'must-have' qualifications and/or experience?

A good honours degree in a biological/ecological science is generally required. However, practical experience, either paid or voluntary, is essential. Many employers look for at least two seasons' worth of practical experience or a combination of field work and training courses. Practical tests may be used in job interviews, therefore basic survey knowledge and plant/animal identification skills are important.

Do you have any advice for someone setting out on a career in ecology and environmental management?

Get stuck in helping with local conservation groups, i.e. botany, bat, amphibian and reptile groups. Involve yourself in training courses to enhance your CV and gain valuable skills. CIEEM, Field Studies Council, The Species Recovery Trust, BSBI and individual consultancies offer a great variety of training courses.

What's the best thing about your job?

I really enjoy the wide variety of work and learning from the wealth of experience within the company. I have received in-house

training on a number of different species, which has been valuable. Also, the fieldwork can be physically demanding, which is great as it means not having to visit a gym!

What's the downside?

It depends on the individual. Some might say it's the early mornings/late evenings whilst carrying out bat or great crested newt surveys, or travelling long distances. However, if you're like me you relish seeing a beautiful sunset/sunrise or animals you only get the chance to see at dusk or dawn such as badgers or hedgehogs searching for food.

What's next for you?

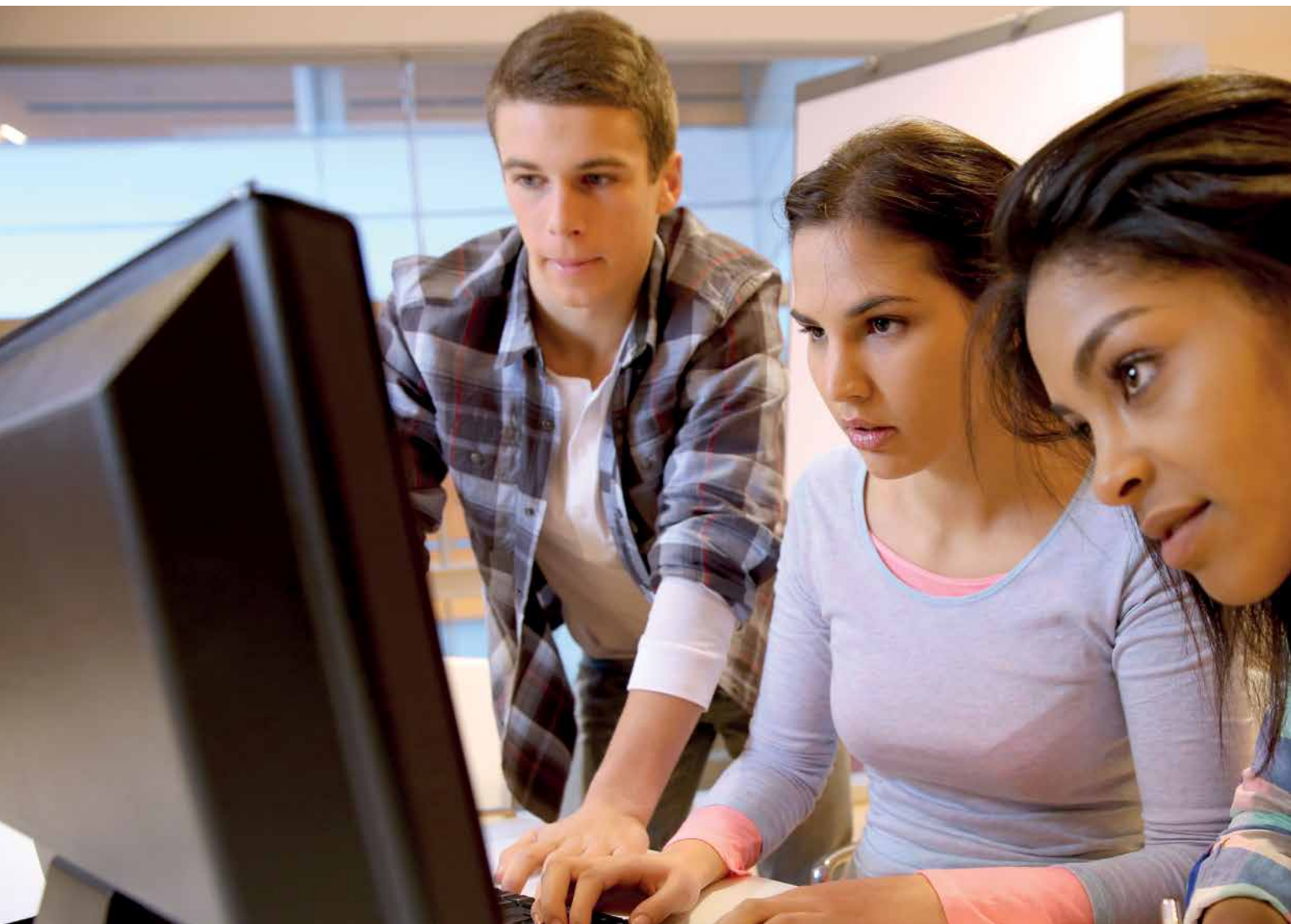
I am in the early stages of my career so I am learning all the time. I was lucky enough to be the recipient of the prestigious CIEEM Promising Professional Award 2015 which will spur me on in my work in gaining further experience. I hope to gain more protected species licences as I progress within my job, which will open up more opportunities to work on different projects and take on more of a lead role.

What is your top tip for success?

It is important to be flexible and snap up any opportunities. Practical experience is key, and quality rather than quantity is important. Talk to people in different jobs and sectors that you are interested in by attending conferences, volunteering or speaking to alumni – it can be a great way to help you make informed decisions on where to go next.

For further information

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I've Got My Degree, Now What...? Becoming a Junior Ecologist

Dan Wales GradCIEEM, Jack Fenwick GradCIEEM and Sarah Emerson GradCIEEM
Naturally Wild Consultants Ltd

It was a conversation with CIEEM President John Box during lunch at this year's North East England Section Conference that spurred the idea for this article. We, as the authors of this article, know

from our own experiences, and speaking to those newly graduated ecologists and biologists, that the field of ecology can be a rather competitive one to break into, especially at a junior level.

This article will mainly focus on getting into ecological consultancy, purely as that is the background that we hold. It often seems that there is a lack of junior positions; and combined with the number



of people trying to get into the sector professionally, this provides a pool of competition that means it is important to be one step ahead of the game in order to make yourself stand out to prospective employers.

Gaining the Right Experience

In a competitive job market, such as ecology, it is important to stand out from other applicants. There are several ways to do this, some of which are almost essential. Crucial criteria for most ecologist positions include a degree in a relevant subject – that's one thing ticked off the list! – and a full, clean UK/EU driving licence.

The majority of ecologist positions involve travelling to sites/projects, so a willingness to travel and be flexible with working hours to meet the requirements of the job is a must. Other criteria that are often included in graduate ecologist post advertisements include: membership of CIEEM – although if you are reading this article you are likely to have achieved this; a basic knowledge of the relevant UK legislation, policy and guidance; and experience in undertaking surveys. A postgraduate qualification is often listed as desirable, but we will cover this later in the article.

We would consider ecological surveying experience as the most important factor in getting your foot in the door. Understanding and experience in a range of survey techniques and skills, all of which would be required for the job, are always a gold star on an applicant's CV; this is often most important with bats and great crested newts, which make up a large percentage of an ecologist's surveying time. For bats, this includes the use of hand-held detectors for in-the-field bat detection and also identification of species in the hand (although this is likely to need the help of a licenced surveyor in order to handle bats). For great crested newts, experience should focus on the main survey protocols; including bottle trapping, torchlight surveys and egg searches, as well as identification of sex and age (again, please ensure that this is undertaken under the supervision of a licenced individual). Phase 1 habitat surveying and plant/tree identification skills are highly desirable in an applicant, especially as this is likely to be a day-to-day skill for an ecologist. There is a wealth of reference material on the internet, as well as floral identification books that can help to increase your knowledge of floral species and Phase 1 techniques.

There are a range of sources to increase your knowledge and experience without spending your life in a library or sat at the computer. Field experience is a much more important skill than text-based knowledge, and can be obtained from contact with relevant groups including: local Wildlife Trusts; conservation charities (RSPB, WWT, etc.); local species groups (bats, badgers, birds, reptiles and amphibians), and even local authorities and county councils that have their own ecologist

and/or countryside conservation team. Volunteering with these groups can give you a huge advantage that will separate you from somebody applying for the same job that hasn't done any relevant ecological fieldwork. However, as part of your preparations for the profession, do familiarise yourself with some of an ecologist's commonly used desktop tools whilst at a computer. These include tools such as the National Biodiversity Network (NBN) Gateway, MAGIC mapping, and even software such as Google Earth and map drawing tools (e.g. CorelDRAW).

So, we have talked about some of the techniques and skills you can start to understand and practice to stand out as an ideal candidate, but many of these survey methods are not covered by university courses or projects – this is especially true of essential bat and amphibian surveying experience. Students hoping to enter the ecological sector should gain these skills as part of extracurricular work experience and volunteering as mentioned above, but how can students tailor their university studies (and even choice of university in the first place) to best prepare them for a career in ecology and the environmental sector?

Fieldwork is key – does the course you are undertaking involve ample opportunities to go out into the field and use various ecological survey techniques? What about extended trips out on week-long courses, or residential field trips? Choosing university modules which have a great deal of field work can be challenging but extremely rewarding; performing well in these modules will allow you to take in lots of knowledge concerning ecological field work, and will show your aptitude for working in the environment and away from home if you can talk about a range of different fieldwork experiences at an interview. In addition to fieldwork, map editing/creation and report writing capabilities are imperative for your success in an ecology role. Try to choose modules where you will be able to write reports in a manner that is similar to writing an ecology report for a client in the professional world. If this opportunity doesn't arise, try having a look at some different reports from ecological consultancies (these can be found by looking at planning applications

on planning portals) and make your own practice report for a piece of land there is public access to using the structure an ecologist would do. In regards to mapping, have a go at plotting survey areas using freely available maps; many, but not all ecologists, use Geographical Information Systems (GIS) – try to choose modules and projects where you can practice using GIS, should you require it in the workplace after graduating.

Is Postgraduate Study Essential?

As mentioned previously, a postgraduate degree is more often than not a desirable criterion in job applications rather than essential. However, it can be a valuable way to get your application noticed over the many others likely to be applying for the same positions.

Through our personal experience (one author without a postgraduate degree and two with), we agree that although higher qualifications may look good on paper, they are not necessarily the most important attribute to boost a CV when applying for a junior position. However, the skills gained and contacts made can be great ways to get ahead in this ever more competitive profession.

As mentioned previously, the same as with undergraduate degrees, module choices are essential. Species identification and survey methodology modules are worth their weight in gold and will really help you gain an understanding of what you will be doing in a consultancy setting and a basic proficiency is almost essential. On the other hand, a close look at the core modules is required, as the majority of modules may not actually be that relevant to your intended career, resulting in a limited range designed with academic relevance at the forefront.

A final thesis project is a great way to gain some valuable experience in survey work and large report writing, universities generally have a large pool of contacts and you could be involved in great projects, gathering useful data for scientific research or for a consultancy company. It is also a great way to work within a subject area that you are passionate about, gaining contacts in the industry and also working towards gaining experience to obtain protected species licenses.

Making Ecology More Prevalent

Our final point is aimed at current ecologists and employers within the environmental sector. From our personal experiences and from speaking with younger people on numerous occasions, it is clear that ecology as a choice of career – especially ecological consultancy – is widely unknown to young people, college students and even final year undergraduates. Often people entering ecology have done so only after realising towards the end of their education that an exciting career is available. By this point, many graduates-to-be may have undertaken various volunteering and work experience opportunities, but not necessarily ones that will help them pursue a role in ecology.

Many career paths are promoted to children at a very young age, and

reinforced throughout their educational lives. This is a positive and effective way of getting young people interested in entering careers with a basis in science, technology and engineering. However, jobs of an ecological or environmental foundation often go undetected by younger audiences – this is perhaps due to ecology being a relatively niche subject broadly in the realm of animal sciences, which is also a smaller subject within the overarching field of biology. We feel that ecology can be better promoted to younger people, especially school leavers and college-aged students. This is especially true if we as ecologists hope that ecology is to have a greater presence in the future due to rising pressures on the environment. We can do this through promotion of the sector through university contacts or via active involvement in education promotion bodies such as STEMNET.

About the Authors



Dan Wales BSc (Hons) MSc GradCIEEM – Ecologist: Dan recently started a career in ecological consultancy this year after completing undergraduate and postgraduate degrees. He gained widespread ecological survey skills undertaking work experience whilst studying and finding employment with an ecological consultancy and a local authority ecologist. Dan completed a Phase 1 habitat survey on a very large sector of land and undertook GIS analysis on habitat data for his postgraduate dissertation. He is now developing his ecology skills and promotes the ecology sector as a STEMNET Ambassador. Dan is a member of the CIEEM North East England Geographic Section Committee.

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Jack Fenwick BSc (Hons) GradCIEEM – Senior Ecologist: Jack graduated in 2011 and has worked in consultancy since finishing his undergraduate course, following a three month position as an assistant ecologist on a marine research project in Tanzania. He is an experienced ecologist and has developed a broad range of skills during his role in ecological consultancy, working with a range of UK and EU protected wildlife and on a wide range of projects; from private residential conversions to large scale residential EIA schemes, industrial developments and BREEAM and Code for Sustainable Homes assessments; and a passion for bat ecology and conservation.

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Sarah Emerson BSc (Hons) MSc GradCIEEM – Ecologist: Sarah began working in ecological consultancy this year after recently finishing her undergraduate and postgraduate degrees. She gained ecological experience through volunteering with a local authority ecologist in between graduating and finding a job in ecology. Sarah undertook many hours of raptor surveys for the Game and Wildlife Conservation Trust as part of her postgraduate thesis, preparing her for a role in ecology. She is now continuing to develop her ecological survey skills.

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Featured CIEEM Training Events

Protected Mammals – Survey, Impact Assessment and Mitigation

Co. Dublin 8 October

This training is ideal for those wanting to learn about designing survey protocols for nationally-protected terrestrial mammals in the Republic of Ireland. The course will consider different impact assessment scenarios and at different times of year, how to advise clients on avoiding impacts and best practice for mitigating significant impacts. The training is suitable for those who are responsible for coordinating surveys of various mammal species as well as those actually undertaking field surveys.

Ecological Clerk of Works

Birmingham / Edinburgh / London

13 October / 26 October / 18 November

The role and responsibilities of an Ecological Clerk of Works (ECoW) are introduced in this one day course. Training sessions consider construction site constraints and survey methods, how to ensure biodiversity features are protected from the types of activities encountered during construction and client liaison to avoid conflict with relevant legislation or planning consents.

Media Training

Winchester 21 October

Whether discussing an environmental issue, raising awareness about habitats or dealing with a flooding crisis, communicating with the media is absolutely essential. This highly practical training will develop delegates' understanding of how to handle difficult questions and the importance of key messaging. The training includes practice interviews (print, radio and television) with feedback from course leader, and former BBC correspondent, Fergal Parkinson.

Red Squirrel Surveys

Dunkeld 22-23 October

This two day course provides comprehensive training in a range of methods for surveying and recording red squirrels. Delegates will develop their knowledge of red squirrel ecology, distribution and behaviour and the interpretation of field signs. The course includes sessions on habitat suitability and conservation management (including grey squirrel control) and explores the potential impacts of development projects on red squirrels, together with licensing requirements.

Water Vole Live Trapping, Care and Restoration

Lifton, Devon 5-6 November

This advanced level course offers two days of practical activities to complement our Water Vole Mitigation course. Delegates will have opportunities to handle voles of different ages and sexes and to gain familiarity with the practical elements of water vole trapping. A range of considerations for maintaining water voles in captivity are explored. The practical and strategic requirements for effective re-establishment of water vole populations are considered together with techniques to assist with successful restoration.

Outdoor First Aid

Inverness 5-6 November

Two days of practical, hands-on training which has been tailored for those who work outdoors, often remotely, alone or in poor weather conditions. The course will examine and develop good risk assessment skills and meets the needs of the Forestry Commission's 'Emergency First Aid at Work + Forestry first aid certification'. The training exceeds the content of typical first aid courses by focusing on incident management when help will not arrive quickly.

Train the Trainer for Ecologists

London 10-11 November

This unique two-day course has been specially designed to support ecologists and environmental professionals to develop techniques for designing and delivering field and classroom based training courses. The course includes sessions on different learning styles, strategies to ensure tuition is learner focused, techniques for working effectively with mixed ability groups, and ideas for checking delegates have met their learning goals. The course is suitable for experienced trainers wishing to enhance their skills as well as for those new to training and wanting guidance to achieve a professional standard of tuition.

Professionalism and Environmental Ethics

Leeds 17 November

Does your role involve facing conflicting demands from clients, employers, local authorities, legal and regulatory requirements and the needs of local communities? Using CIEEM's Code of Professional Conduct as a basis for discussions this course will help develop the skills and knowledge required to build a professional reputation and high professional standards. The sessions include fundamentals of 'professionalism' and 'environmental ethics', negotiating conflicts of interest, obligations on professionals and how local environmental concerns match up to global objectives.

Effective Workplace Coaching and Mentoring

London 17 November

Coaching and mentoring challenges staff to think for themselves and grow in their capabilities, empowering them to perform to their potential and achieve their aspirations. Sessions are designed to help delegates explore the knowledge, skills and behaviours of an effective coach or mentor and develop their understanding of how coaching and mentoring can make a major difference to staff development, retention and motivation.

www.cieem.net/training-events

Time to Work, Rest and Play

Sally Hayns **CEcol MCIEEM**

Chief Executive Officer, CIEEM

Time to work, rest and play makes perfect sense as an adage to living a balanced, healthy and fulfilling life. But what can you do when work leaves no time for rest and play? The answer is, if you are self-employed, not much unless working under contract to deliver services on behalf of an employer. You set your own working hours and have to take responsibility for ensuring that you have sufficient non-working time to maintain your health and wellbeing. If you are employed, however, it is the responsibility of your employer to ensure that you have sufficient rest periods in accordance with the European Working Time Regulations (WTR). It is up to you to take them.

We occasionally get asked what the 'rules' are in respect of the WTR and the work patterns of those involved in ecological surveys, habitat management and other seasonal activities. The first rule is that the WTR cover not only permanent employees but also temporary staff, freelancers who are sub-contracted and agency workers – we will collectively refer to them all as 'workers'.

Next, 'working time' is the period during which a worker is carrying out their duties or during which they are receiving training. It does not include time spent 'on call, travelling to and from work (although it may include time spent travelling to and from a workplace away from the normal workplace stipulated in an employment contract if, for example, it is longer than the normal travelling time) or going to work-related social events.

As a general rule (but there are exceptions) the WTR mean that workers have the following entitlements:

- A maximum working week of 48 hours (averaged over 17 weeks) unless the worker has opted out;
- A maximum night time work period of 8 hours (averaged over 17 weeks) unless the work involves special hazards;
- Eleven hours uninterrupted rest per 24 hours;



- Twenty-four hours uninterrupted rest per week (or 48 hours uninterrupted rest per fortnight); and
- A minimum rest break of 20 minutes when working more than 6 hours per day.

The limit on working hours is to protect workers from becoming so tired that they are unable to work effectively and to protect the employer from the liability for accidents that may occur as a result of tiredness. When workers have conducted survey work late at night or have worked an unusually long day, they should be given adequate opportunity for sleep before they are expected to work again.

Taking Rest Breaks

It is the employer's responsibility to make sure that their workers can have these entitlements, but not to make sure that they do take them. Workers can choose

to work additional hours by not taking their rest break entitlements provided they do not endanger their own health and safety and/or that of others. In such circumstances (i.e. where the worker has chosen not to take a rest period) employers do not have to provide an alternative rest period (compensatory rest) at another time. However if an employer insists that a worker works through a statutory rest period then they must provide compensatory rest (i.e. an equivalent rest break).

Employers do need to be mindful that requiring workers not to take their rest breaks could (arguably) constitute a breach of the WTR if it can be shown that it compromised the worker's health and safety and/or the employer's common law duty of care. We would suggest that such an action should be used only where necessary and the employer should be able

to justify a) the need and b) what steps they have taken to ensure the worker's health and safety. Examples of where requiring a worker to work through a statutory rest period are:

- The worker is a 'special case' worker.
- The worker is a shift worker changing shifts (e.g. from day to night) which prevents the taking of a full daily or weekly rest period.
- The work requires periods of work to be split up (e.g. a requirement to undertake a survey at prescribed intervals).
- Unforeseen emergencies which place exceptional demands on an employer's operation.

Employers can insist that workers take their rest break entitlements, together with any additional rest period (i.e. in excess of the 20 minutes) allocated by them, even if the worker is willing to forego them. Traditionally the norm was a one hour lunch break but this is now more variable with the move to a flexible working hours culture.

Compensatory Rest

Compensatory rest should be equal to the length of period of the interruption to the rest break and not the total length of the rest break. So, if the entitlement to an uninterrupted 11 hour rest break in 24 hours is not fulfilled because the worker has to work for 2 hours in the middle of the rest period then the worker is entitled to 2 hours compensatory rest.

Compensatory rest should be granted 'within a reasonable period' of the interruption. This is a rather grey area. Logically it would seem that the worker should take the compensatory rest as soon as possible after the working period ends. However it might suit the worker (and the employer) to 'bank' the hours to be taken at a more convenient time. Some flexibility is available but we would suggest that this should either be specified in the employment contract or arranged with the agreement of the worker. The key principle is that the health and safety of the worker and/or others is not compromised and the employer must take responsibility for ensuring that their workers are fit and able to work safely.

Exclusions and Special Cases

As with most legislation, there are exceptions. These exceptions include:

- Where the worker's home and places of work are distant from each other or the places of work are distant from each other.
- Where the worker is engaged in security or surveillance work requiring a permanent presence (I don't think this would extend to protected species surveys!).
- Where the worker's activities involve the need for continuity of service or production (this may include aspects of agricultural work, industries in which work cannot be interrupted on technical grounds or research and development activities).

The key question is whether ecologists and environmental managers working 'in the field' required to undertake repeat species or habitat surveys or habitat management activities that are dependent on being done within specific time frames could fall within one of the exclusions that then allows an employer to work through statutory rest breaks (provided compensatory rest is subsequently provided).

The answer is that this has not (as far as we know) been tested in law but it seems as though one or more exclusions could apply. For example:

- the statement 'where the worker's home and places of work are 'distant' from each other or the places of work are distant from each other' is likely to include anyone who spends a significant proportion of their work time travelling to and from work places, such as survey sites. It would not always be practicable for a worker to take an 11 hour rest break away from home. But of course they should still have sufficient rest as to be fit for work and an employer should ensure that they have the opportunity to take the rest they need;
- fieldwork, especially species surveys, could well be examples of work which cannot reasonably be interrupted on technical grounds;
- similarly surveys could come under the research and development activities exclusion if it can be shown that the survey design requires it to be

undertaken at regular intervals by one individual;

- the 'survey season' could be identified as a foreseeable surge of activity that must be completed within a time period (e.g. as with some agricultural activities), and
- the requirement to undertake some surveys or habitat management activities over split time periods (e.g. dawn and dusk surveys, intertidal surveys) could meet the split work period criterion however there is an onus on the employer (as with some other exclusions) to demonstrate why the work could not be done by more than one worker.

We would certainly be interested in hearing from employers who have successfully applied these exclusions. However the fundamental principles of the employer acting responsibly to safeguard their workers' health and safety, and those of others, as well as ensuring that work can be done to a satisfactory standard, must apply in all cases. CIEEM's *Professional Guidance Series no. 13: Good Working Practices* (December 2013) provides some useful guidance on what might be accepted as reasonable work patterns to undertake seasonal field-based work at unsocial hours but this will also depend on an individual's capacity to cope with disturbed sleep patterns. Tired workers cannot do their best work.

An employer should always be open with their workers and new recruits about the requirement to work long hours and/or have disturbed rest and not try to impose such working conditions without consultation. A good employer will be mindful of the impact of seasonally long hours and disturbed rest periods on their workers and take steps to manage this sensitively for the benefit of all.

With thanks to Elizabeth Ferguson of Freeths LLP for her advice included in this article.

For further information

Contact Sally at:
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Work on Construction Sites – A Further Update on LISS/CSCS Cards

Sally Hayns CEcol MCIEEM

Chief Executive Officer, CIEEM

Further to the article in the December 2014 issue of *In Practice*, it appears that there remains an unsatisfactory situation regarding the provision of LISS/CSCS cards.

To apply for the full Professionally Qualified Person card valid for five years, or the Graduate card valid for five years, you will need to:

- demonstrate that you have achieved the recognised qualifications required for your occupation (e.g. CIEEM membership);
- pass the relevant CITB Health, Safety and Environment test at managers level **and** the ROLO test (having taken the one-day ROLO course);
- submit a signed LISS/CSCS application form; and
- pay the appropriate fees.

We have tried, unsuccessfully, to argue that two health and safety tests are unnecessary and we thought it had been accepted that it was an either/or situation but it now appears that both tests are retained and required.

There are other card options (e.g. the provisional card which is valid for six months and only requires the CITB test to have been passed) as set out in the previous article and on the relevant website at www.bali.org.uk/quality_assurance/liss_cscs/occupations.

We are still hopeful that there will be an opportunity later this year to have input into the redesign of the bespoke elements of the ROLO course in order to make it more useful to ecologists and environmental managers as we know that this currently causes frustration for our members.



Viewpoint: Is Ecology Really That Dangerous?

Steve Betts CEnv MCIEEM

BSG Ecology



Introduction

This article was prompted by two recent CIEEM discussion threads on LinkedIn about health and safety, and the realisation that not everybody in the industry is working to the same standards. Does this really matter? And is the industry as a whole doing all that it should to provide a safe working environment for ecologists and the people that we deal with?

There is a raft of legislation establishing a range of duties relating to health and safety, and these have significant implications for the ecology profession. In this article we look at some of the measures that a professional ecological practice needs to think about adopting to help ensure that it complies with the legislation and guidance.

Health and safety is a broad subject area and necessarily this article just scratches the surface. It looks at some of the most commonly encountered hazards for ecologists in the course of their work but is not intended to be a source of guidance, which should always be sought from a qualified professional.

Risk Assessments

The need to consider health and safety is firmly embedded in a great raft of legislation, which means that hazards must be identified and measures put in place to reduce their significance to an acceptable level. Importantly these are not only hazards to employees but to the people that we deal with, including clients, contractors and the public.

The Health and Safety at Work etc. Act 1974 is the primary piece of legislation covering occupational health and safety in Great Britain, and this establishes certain obligations for employers and employees. The requirement to carry out risk assessment is a legal duty established under the Management of Health and Safety at Work Regulations 1999. This legislation makes it the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of their employees. However, it also makes it the duty of every employee while at work to take reasonable care for their own health and safety as well as that of other persons.



As part of managing health and safety in what we do day to day, risks in the workplace need to be controlled and this requirement is firmly embedded in current legislation. To do this it is necessary to identify hazards, assess risk and put in place control measures to reduce the identified risks to an acceptable level. Hazards that are commonly encountered during ecology work include the following:

- **Lone Working** – A lot of work undertaken by ecologist may involve lone working, often in remote locations or locations where access is restricted. In such situations it is important that



measures are put in place to minimise the risk to ecologists and to deal with an accident if it should happen, whether it is a twisted ankle whilst surveying on remote moorland or assault whilst working in an urban area. A decision may need to be made about whether lone working is ultimately appropriate for a given set of circumstances.

- **Working at Height** – Ecologists may use ladders for a range of survey work, for example to check buildings for signs of bats, to monitor bird boxes or gain access to lofts. The use of ladders can be challenging, particularly when used on uneven ground or unstable surfaces and when the surveyor is using other equipment, such as an endoscope. Safe working procedures with ladders is essential and should include, for example, the use of the correct class of ladders, the use of an anti-slip device, the completion of project specific risk assessments and a limit placed on the maximum working height. Other industries commit a lot of time and resources to ensuring that working at height is done safely and ecologists should do the same.
- **Asbestos** – Ecologists may have to enter buildings as part of their work, for example when undertaking bat surveys or looking for nesting birds. There is a risk that asbestos could be present in any building and structure built before 2000, and it may be present in highly mobile forms that can easily be inhaled. If appropriate measures are

not adopted then there is an increased risk of exposure to asbestos, which can result in serious health issues. Asbestos awareness training is essential for all ecologists who could be exposed to these sorts of situation.

- **Manual Handling** – Ecologist may occasionally need to carry heavy or awkwardly shaped equipment, such as ladders, monitoring equipment, bat boxes or reptile mats, and if this is not done carefully it can result in strains and other injuries.
- **Confined Spaces** – Working in any space that is defined as being a confined space can present serious life-threatening risks to surveyors and their colleagues if appropriate measures are not adopted. Such a situation might occur if an ecologist inspects a culvert for signs of otter or a tunnel for roosting bats. It is important to note that the definition of a confined space is very broad and is related to 'specified risks' that can prevent normal breathing, and that a confined space is not always easily identified. For example, under certain conditions a loft area could be considered to be a confined space.
- **Working in or near water** – A lot of ecological survey work involves working in or near water, such as a pond, ditch or stream. Working in or near water can be extremely hazardous with the more severe risks including slips and trips, disease or drowning.
- **Disease** – Ecologists are potentially exposed to a number of diseases all of which can result in serious health problems: Weil's disease (working in or near water); Lyme's disease (working in areas where ticks are present); and rabies (handling bats). There is also a risk of contracting tetanus whilst working in the field, and insect bites and stings can result in a wide range of reactions.

CDM Regulations

It is not enough for employers and employees to just consider their own health and safety. There is also a requirement to consider the welfare of others and this principle is central to the Construction (Design and Management) Regulations 2015 (recently updated). Under

this legislation ecologists can have duties as a Designer or a Contractor, depending upon the scope of their work. This places a responsibility on them to eliminate, reduce or control foreseeable risks during all stages of a development – design, construction, use and decommissioning.

Examples of situations where an ecologist might be considered a designer are presented below, together with examples of what hazards they might need to address:

- Bat roost design – How will a bat box be erected and will the installed bat roost need to be monitored as a condition of a licence: if so, how will this be done safely?
- Brown roof design – Will the roof need to be maintained and monitored following construction and, if so, how will this be done safely?
- Habitat creation – Will a newly created habitat need to be managed in a particular way to maintain its diversity and, if so, how will this be done safely?



It is less obvious when an ecologist might have a role as a contractor but in simple terms it could be any situation where somebody is involved in some aspect of construction. It is important to remember that construction is broadly defined in the CDM Regulations and includes demolition, site investigation and site clearance. Consequently, assisting with vegetation clearance or removing slates to check for bats are likely to form part of the construction process and hence mean that the ecologist is acting as a contractor.

An ecologist cannot be expected to be an expert in hazard identification and control, but this is not an excuse for doing nothing. It is important to work with other CDM duty holders to ensure that requirements are understood, and that hazards are identified and eliminated or controlled.

RIDDOR

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 are a key consideration for all ecologists when carrying out their work. This makes it a statutory requirement to report certain incidents and occurrences to the Health and Safety Executive – HSE (in the UK), which may then result in an investigation being carried out. For example, if an ecologist is injured at work and they are incapacitated for more than 7 consecutive days, this is reportable to HSE, who will then decide whether further investigation is warranted. Inevitably the process takes up a lot of management time and there can be serious consequences for those with responsibility for the welfare of staff. In some cases the HSE may choose to prosecute a business depending upon the severity of the infringement.

Training and Supervision

Appropriate training for all ecologists for the work that they carry out is an essential requirement. This includes regular refresher training for risk assessment, working at height, asbestos awareness, manual handling, CDM Regulations and First Aid. All projects should be subject to appropriate risk assessment and control, potentially with review by senior, accountable personnel.

Personnel Protective Equipment

Employers have duties concerning the provision and use of personal protective equipment (PPE) at work. PPE is equipment that will protect the user against health or safety risks at work, and for ecologists this might include items such as safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses. Ideally PPE should only be used as a last resort, i.e. the hazard should be avoided or removed. If PPE is still needed after implementing other controls, the employer is required to provide this for their employees free of charge. Furthermore, the equipment should be chosen carefully so that it is fit-for-purpose, and it is important to ensure that employees are trained to use it properly, and that they know how to detect and report any faults.

Final Thoughts

Accidents occur infrequently and this can lead to complacency. However, when accidents do happen the consequences of illness or injury can be significant both for the individual and the employer. In a recent case the HSE prosecuted an ecological consultancy for safety failings after an employee broke her back in a fall whilst surveying a loft space for wildlife in a derelict hospital building. It was concluded that the company had not properly assessed the work to be undertaken and, having pleaded guilty, was fined a total of £12,000 and ordered to pay costs of £1,138.50.

Whilst employers and employees have legal responsibilities with regard to health and safety, it is worth noting that incidents can impact on the reputation of a company, can affect staff morale and can divert people's time away from the core business. There are therefore numerous benefits to ensuring that health and safety responsibilities are taken seriously, notwithstanding the legal requirement to do so. Whilst it may be tempting to ignore health and safety in the interests of being more competitive and profitable, the risks to both employers and employees far outweigh the benefits. Finally, the reputation of ecology as a profession is still in the building phase, and being seen to do things properly, and to pay proper attention to the health and safety of all within our sphere of influence, can only help our industry in the long run.

For further information

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Disciplinary Matters

Phillip Edwards CECol FCIEEM

Over the past couple of years I have had conversations with non-members, and with members who have reported having similar conversations with non-members, which suggest that one of the objections to joining CIEEM is that the standards of work to which CIEEM aspires its members to reach are in fact not being met, and that a major factor in this is that complaints against members are not resulting in adequate disciplinary action being taken by the Institute. My immediate reaction on encountering this assertion was a more colourful version of "poppcock" and I aimed to write an article for *In Practice* to refute it outright. In so doing, I found the situation to be more complex and difficult to summarise. The bald statistics would appear to support non-members' assertions. As can be seen from Table 1, of 14 complaints made against members from 2012 to 2014 for inadequate standards of survey and reporting, only two were upheld. However, this does not tell the whole story and the following information is provided to help members refute the above perceptions whenever they may come across them.

The initial Code of Professional Conduct was issued by (C)IEEM soon after the Institute was formed and revised and approved by the Annual General Meeting of 10th November 2004. The first record

of a complaint being raised about a member is in an e-mail dated September 2005 and it may have been this that acted as a catalyst in November 2005 for the establishment of a pool from which senior members of the Institute would be drawn to sit on Disciplinary and Appeals Boards. The first training workshops for pool members were held in March 2006 and these have continued intermittently since with updates from lessons learned from recent cases. The first complaint to reach a Disciplinary Board was in June 2007 but it is clear from the files that procedures differed somewhat to those employed today and data from the period 2005-2012 are not directly comparable. Nonetheless, between September 2005 and July 2012, 46 case files were set up. This number is a little misleading because it does not equate to 46 formal complaints being lodged. The figure includes initial enquiries after which no formal complaint was received as well as formal complaints which were dropped because, for example, complainants were not prepared to be identified – a requirement introduced by the Institute following legal advice. Five of these complaints' files are marked as "deleted" suggesting they may have been actively withdrawn. During this period, only seven complaints were heard by Disciplinary Boards of which two were upheld. In 2012,

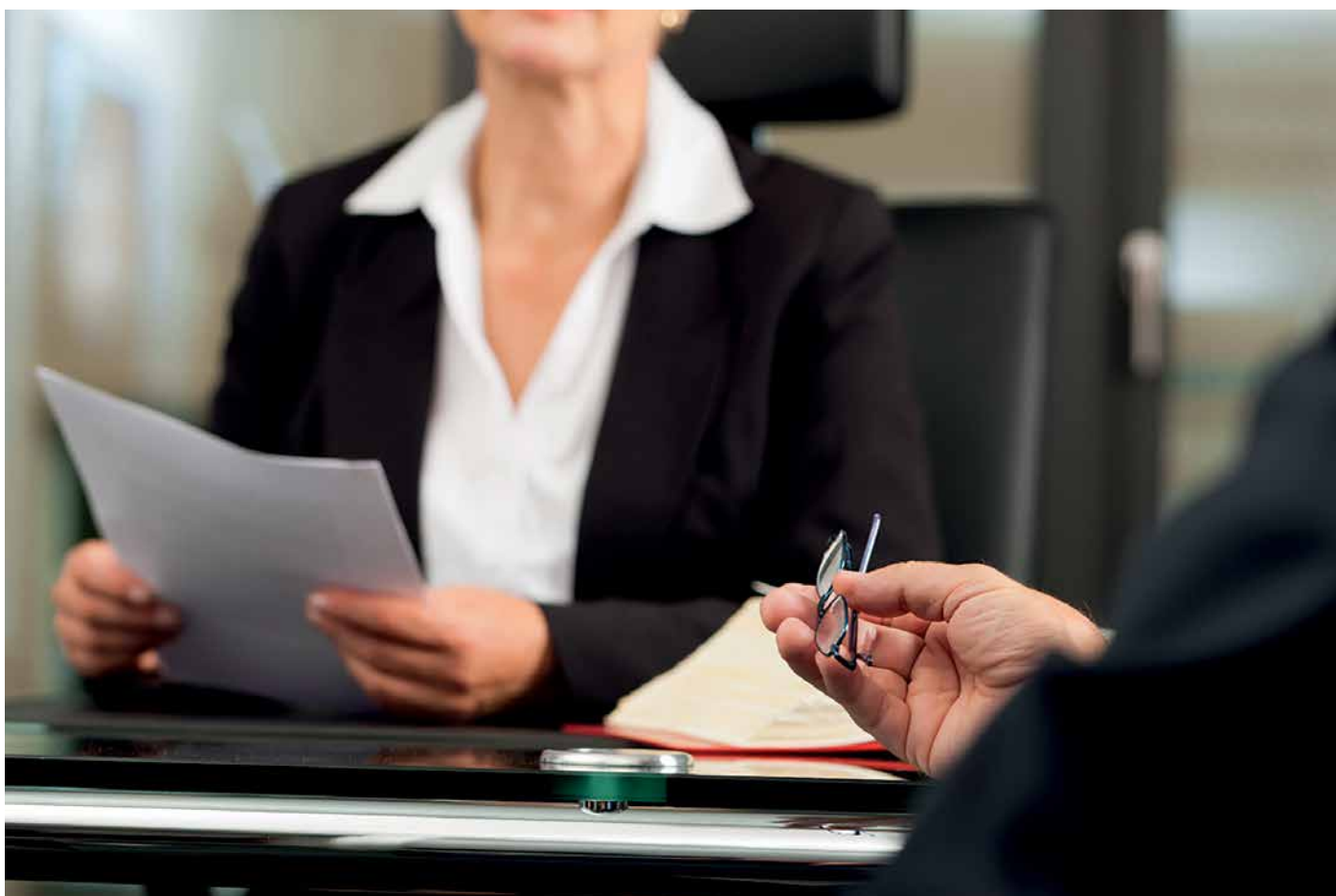
the Secretariat's administrative procedures for dealing with complaints were revised and brought onto a more formal footing which has enabled comparable data to be collated. These are given in Table 1.

In the three years for which comparable data is available, it is clear that the number of formal complaints in most categories has risen. Most of these are about the claim of membership by non-members but in these cases CIEEM cannot refer the subject to a Disciplinary Board since the non-member does not fall within the Institute's jurisdiction – an obvious point but one which is easily overlooked. In such cases the issue may be brought to Trading Standards, to an employer, and/or to the local planning authorities. Incorrect claims of membership are usually fairly black-and-white and have involved non-members, lapsed members, applicants, and completely fictional individuals! Non-return of continuing professional development forms is a new category after the instigation of the Institute's CPD audit in 2014. Complaints about survey and reporting standards and the number (and proportion) of them upheld appear to be rising. While this may in part be due to an increasing profile of the Institute as well as of the increased confidence (of at least some people) in its disciplinary procedures, it may also in part be due to

Table 1: Complaints Report 1st April 2012 to 31st March 2015.

Year in which case confirmed †	2014-15		2013-14		2012-13	
Type of complaint	No. of complaints	No. upheld	No. of complaints	No. upheld	No. of complaints	No. upheld
Claim of use of membership by non member	12	n/a	8	n/a	3	n/a
Claim of incorrect membership grade by a member	4	0	3	2	1	1
Survey/Reporting standards	11	4	6	1	8	1
Unprofessional Conduct	0	0	1	1	0	0
Objection to membership	0	0	0	0	1	1
Non-return of CPD forms	5	5	n/a	n/a	n/a	n/a

† Additionally, 8 formal complaints have been lodged that are currently in the pipeline, i.e. referred to a DB, under investigation, or awaiting formal confirmation by the secretariat. Of these, 5 relate to survey/reporting standards; 2 to claim of membership by a non-member; and 1 to unprofessional conduct.



an extensive revision and simplification of its Code of Professional Conduct in June 2013; as well as its revised Disciplinary Procedures June 2014. In 2013-14, of the seven complaints received over survey/report and unprofessional conduct, three (43%) were brought by non-members, one by a member (14%), and three (43%) by CIEEM (but the process has since changed and anonymity is now granted only in exceptional circumstances); while in 2014-15, eight of the 11 complaints (73% were brought by non-members and three (27%) by members. Many of these complaints by non-members involve protected species, and the Professional Standards Committee is currently producing some guidance for homeowners/clients regarding protected species survey guidance to help address misunderstandings about the survey process and hopefully help reduce the number of complaints in this area. In addition, CIEEM has recently revised its Guidelines on Ecological Report Writing, and an article on this was featured in the March issue of In Practice.

As this brief review shows, the Institute's disciplinary procedures, administration, and implementation have been evolving over the past ten years to the practical and robust system that is in place today. That system involves three clear stages, namely:

- Stage One: verifying that a complaint can be considered by CIEEM and establishing that there is sufficient evidence to support an allegation of a breach(es) of the Code to justify further enquiry. It is worth noting (after this was challenged in a recent case) that this stage is entirely an administrative process undertaken by the Preliminary Investigations Panel (PIP) drawn from members of the Professional Standards Committee – it has no judicial remit.
- Stage Two: an enquiry by a Disciplinary Board (DB) to establish whether any breach of the Code has occurred, and, if so, what sanction is appropriate.
- Stage Three: a right to seek leave to appeal the Disciplinary Board's decision.

Three further points are worth making. First, as with any judicial process in the UK, the burden of proof lies with the complainant and failure of some of the cases to be upheld has been due to insufficient evidence being placed before a PIP or a DB. Second, the standard of proof required to uphold a complaint is "*on the balance of probabilities*" as in civil cases, but if a decision is being made to expel a member, then this standard has to be raised to "*beyond reasonable doubt*" as in criminal cases. Yet even "*on the balance of probabilities*" can be difficult to establish, particularly where, as is often the case, a complaint revolves around what could be termed "*a difference of professional opinion*". Even where a default position appears clear-cut, e.g. a member not following sampling guidelines or procedures approved by CIEEM, judgement is important since guidelines are just that; they are not a rule and the member may have had a good reason to have deviated from them; in other cases, e.g. where methods and data are unquestioned but

for which alternative interpretations can be provided, the level of proof often falls short of the clarity required for judgement. Third, these difficulties should not put off those seeking to raise a formal complaint; members and non-members will always complain about standards of work, but if formal complaints are not made by people prepared to put their name to them, then CIEEM will not be aware of the problem and cannot investigate.

Finally, in all but exceptional cases, the purpose of the Institute's disciplinary procedures is not to punish members, whatever members or non-members may feel, but to identify errors and encourage improvement in standards and conduct to the level expected by the Institute as laid out in the Code of Professional Conduct. CIEEM's disciplinary processes are a final part of a twin-track approach (carrot and stick) to improving professional

performance which focuses on nurturing professional development (e.g. through the revision of guidance and the provision of training) rather than engendering a blame culture that is overly-reliant on disciplinary processes. Even once the Institute finds against a member, reprimand together with guidance, training and/or mentoring is considered a more beneficial outcome to the profession as a whole than, say, expulsion from the Institute where that person would then be free to continue to practice without recourse to the Institute's guidance – a point often lost in non-members' arguments that the Institute does not take adequate disciplinary action against its members when complaints are received. However expulsion is still seen by Disciplinary Boards as an option in cases where the breach(es) of the Code are so serious as to warrant such an action.

About the Author

Phillip Edwards CEng FCIEEM has served on several Disciplinary Boards; and as the Institute's Treasurer and Chair of its Membership Admissions Committee. Having practiced ecology in 43 countries over the course of 30 years, he took semi-retirement last year.

Complaints Update

Breaches of the Code of Professional Conduct

Case 1

Steve Adams CEnv MCIEEM (Cornwall Environmental Consultants Ltd.) was found to have breached the following clause of the Code of Professional Conduct: 7.iv

This breach related to:

- Undertaking a survey and producing a report of insufficient quality for its intended purpose

Mr Adams has been reprimanded with advice.

Case 2

John Sproull MCIEEM (Cornwall Environmental Consultants Ltd.) was found to have breached the following clause of the Code of Professional Conduct: 7.iv

This breach related to:

- Reviewing a survey and report of insufficient quality for its intended purpose

Mr Sproull has been reprimanded with advice.

Expanding CIEEM's CPD Training

Helen Boulden

Professional Development Officer, CIEEM

CIEEM's professional development programme has advanced considerably in the last couple of years in both the range and scope of training that we are now able to deliver. There is still progress to be made in our commitment to providing local opportunities for Continuing Professional Development (CPD) to all members, but the good news is that we now have greater resources and plans in place to achieve this goal.

The number of individual courses we have scheduled to provide in 2015 is 134, an increase of 62% from 2014, and the number of trainers we work with has also increased to more than 50. The maps illustrate a sample of the geographic spread of courses provided over the last two years.

The diversity of CPD topics we cover extends to two thirds of the competences in CIEEM's Competency Framework, which is the foundation for all the learning outcomes addressed within our programme. This ensures that all CIEEM courses are relevant to the profession, providing skills and knowledge that meet with professional standards. Evaluations completed by those attending our training

are monitored closely and we are proud that the average delegate feedback score for our courses remains consistently over 3.7 (out of 4) across the whole range of criteria we measure against. This includes areas such as venue, information imparted and training delivery style.

Planning the future development of the training programme is happening all the time, and is carried out in a number of ways. We are identifying gaps in local provision against densities of members to target new locations for courses. New topics for training are being developed based upon indications of demand, through surveying members, keeping abreast of professional advancements, and identifying new areas within the Competency Framework. Training opportunities that have recently come online include Ecological Report Writing, eDNA sampling for great crested newts and using and understanding the British Standard BS 42020. Once new courses



Figure 1. Density map of members in 2015

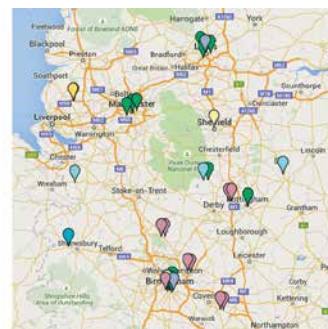


Figure 2. Distribution of training events in 2015

have proved successful we can then look to roll them out more widely, being careful to ensure the same quality of training is provided and sourcing local trainers where able to do so.

There are always going to be limits to the number of training courses that we can provide at any one time, whilst ensuring the highest quality of training and the best experience for participants. Our current focus is to modernise administration processes so that we can better meet the challenge of sustainable growth for the programme.

If you would like to have a discussion with the Professional Development Team about training needs, please give us a call (01962 868626) or email us at cpd@cieem.net.

New tool to support CPD recording on the go!

Helen Boulden

Professional Development Officer, CIEEM

This autumn is the planned launch for CIEEM's bespoke online CPD recording tool. This will be available to all members via the CIEEM website and is designed to make CPD (Continuing Professional Development) recording quick and easy to access, replacing the current downloadable format.

Benefits to members include:

- a password protected area for planning, recording and reviewing your professional development;
- quick and easy to use online format, compatible across all mobile platforms, allowing you to update your CPD record at any time; and

- useful functions including uploading supporting documents and indicators to flag how much CPD you need to meet the annual requirement.

Keep an eye out for further announcements and guidance communicated through the CIEEM E-Newsletter and website.

Chartered Members

Fellows and Full Members of CIEEM can develop their skills and gain professional recognition from employers, colleagues and clients by achieving Chartered status.

CIEEM offers two Chartership awards:

- **Chartered Ecologist (CEcol):** The Register of Chartered Ecologists recognises the effective application of knowledge and understanding of the science of ecology by professionals committed to the highest standards of practice.

- **Chartered Environmentalist (CEnv):**

CIEEM is one of 23 professional bodies licensed by the Society for the Environment (SocEnv) to award Chartered Environmentalist status. CEnv is an increasingly recognised standard of good environmental practice.

The adjacent profiles highlight the work of Chartered professionals and provide an insight into the kind of roles that these senior ecologists and environmental managers are required for.

Dr Martina Girvan
CEcol MCIEEM

Technical Director, Hyder

I joined CIEEM in 2004 when moving from academia into consultancy to feel part of the wider ecology community and to promote ecology as a profession to aspire to. As soon as the Chartership became available I applied, seeing this as a great opportunity to encourage other technical professions to view ecology on the same level. I found the process incredibly rewarding and educational; it was challenging in a good way and was reflective of the many different aspects of our discipline, revealing the depth of experience present within our field that is relevant across many other technical specialisms. While gaining the Chartership has not immediately impacted the type of work I am offered or undertake, I am convinced



that its introduction and uptake will add to the surge of recent appreciation of the benefits of biodiversity and will further advance the understanding and promotion of the relevance of biodiversity.

In addition to my consultancy role I also undertake volunteer work, am a member of

the Environmental Law Foundation, sit on CIRIA's Biodiversity Interest Group (BIG) Steering Group, and contributed to the Natural Capital Initiative and UK Green Building Council Workshops and guidance. I also undertake pro bono work for charities and actively promote biodiversity wherever possible, presenting to NE's Development Industry Group (DIG), and even capturing the very youngest naturalists by holding reptile handling events for my 5 year old son's school friends. I recently joined the ranks of Chartership assessors which further

increases my appreciation of the wide variety of skills we have as ecologists.

I personally find interdisciplinary engagement on projects, interactive workshops, presenting and attending conferences, networking with colleagues and steering group participation the most rewarding ways of advancing my own knowledge by gaining the perspectives of others. What I most enjoy about my job is the ability to affect change within the development industry for the benefit of biodiversity – directly through project design, mitigation and monitoring but also indirectly through encouraging a cultural change amongst clients, contractors, the general public and other technical specialists. This is carried out by promoting positive experiences with biodiversity design and enhancements, proving how good design can increase the efficiency, cost effectiveness and overall value of the end product in addition to benefiting biodiversity.

Mr Mike Padfield
CEnv MCIEEM
Principal Ecologist,
URS Infrastructure
& Environment Ltd

I became a full member of CIEEM in 2002 as I wanted to be part of a professional community and demonstrate credibility

to our clients and work colleagues. Over the years membership to CIEEM has been useful and sometimes essential in winning the trust of new clients, obtaining new work and career development.

I gained CEnv status in 2006 when it was fairly new and found the process straight-forward. As well as getting some letters after my name, this has helped



me to be on a par with other professionals I work with such as landscapers, planners and engineers, who each have their own professional groups and can gain chartered status. I think achieving Chartered Status has helped with career progression and raised the profile of ecologists amongst other professions. I have been able to get involved in

other aspects of ecology, such managing projects, dealing with clients and demonstrating experience to other staff with the company. I would recommend and encourage our staff to apply for CEnv status.

Although the core of my work is similar to when I started I also get more involved in the project management side of the work through our company's

Project Manager Certification training and have been developing in-house survey standards. In the last few years our survey work now embraces new technology including using mobile GPS mappers, remote detectors and thermal imaging equipment.

As well as my consultancy work I volunteer for the Bat Conservation Trust. This provides good experience in solving bat related issues and helping home owners deal with bats. I am a keen botanist and attend field meetings when I can with a local recording group in Norfolk.

The best thing about my job is still being able to get out and do fieldwork, the satisfaction of seeing a job through from the start to the end and having satisfied clients.

New Chartered Members

CIEEM is pleased to announce the following new Chartered members:

Chartered Ecologists
Miss Kerry Elliott CEcol MCIEEM
Mr Nicholas Ellis CEcol CEnv MCIEEM
Mrs Penny Lewns CEcol CEnv MCIEEM
Dr Meryll Parle-Gelling CEcol MCIEEM
Ms Louise Redgrave CEcol CEnv MCIEEM
Mr Daniel Thomas CEcol MCIEEM
Mr Kevin Webb CEcol MCIEEM

Chartered Environmentalists
None to report.

Chartered Ecologist application deadlines

CEcol Application due date	CEcol Interviews	Ratification
21 Sept 2015	8 December 2015	Mid Jan 2016
7 Jan 2016	7 March 2016	Late March 2016

Please note, these dates are subject to the availability of assessors and may change.

Chartered Environmentalist application deadlines

CEnv application due date	CEnv report submission deadline	CEnv Interviews
31 Aug 2015	30 Nov 2015	1-12 Feb 2016
31 March 2016	23 June 2016	29 Aug – 9 Sept 2016

Please note, these dates are subject to the availability of assessors and may change.

If you are interested in submitting your own profile please contact the Registration Officer (KarenSanderson@cieem.net). Karen is particularly keen to hear from Chartered members working in academia and the statutory agencies.



CIEEM Autumn Conference 2015

Reconnecting People and Nature: Opportunities and Challenges

3-4 November, Sheffield

This two day conference will share evidence of the benefits of reconnecting people and nature as part of a healthy, stable and successful society. It will go on to examine, through good practice case studies, recent successful approaches to engaging people with nature and managing conflicts. The role of our profession in effectively communicating the value of nature will also be explored.

For programme information, sponsorship opportunities or to book your place, visit

www.cieem.net/2015-autumn-conference

Supported by:

FREETHS

Keynote Speakers:



CIEEM Patron Sir John Lawton led the review and subsequent publication of the influential 2010 report 'Making Space for Nature'.

Stuart Brooks is Chief Executive of the John Muir Trust and Chairman of the International Union for Conservation of Nature (IUCN) UK National Committee.



#CIEEMConf
@InstEcolEnvMan

CIEEM Awards 2015



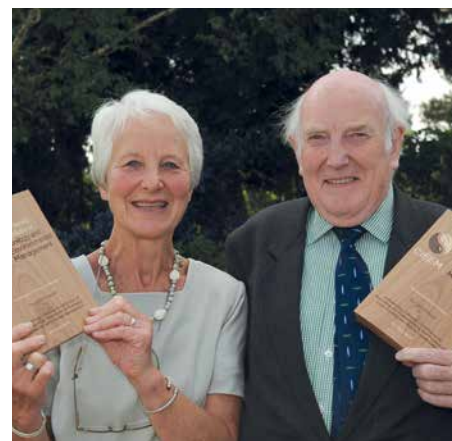
On Thursday 25th June, the Birmingham Botanical Gardens played host to this year's prestigious CIEEM Awards. It was a day to celebrate excellence in the fields of ecology and environmental management, honouring individuals, organisations and projects that have demonstrated exemplary and inspirational best practice in the industry.

The day began with a drinks reception and the chance for finalists and guests to wander around the beautiful gardens. The Birmingham Botanical Gardens has been the perfect setting for these Awards for the second year, and guests always comment on the wonderful setting. John Box, President of CIEEM, opened proceedings and was followed by our guest speaker, independent environmental expert, Tony Juniper. Tony highlighted the importance of nature to society and emphasised that nature and business can and do work together. He gave



Pam Nolan, Tony Juniper and Sally Hayns

examples from his new book, *What Nature Does For Britain*, to illustrate this. About the Awards Tony commented, "The Awards are a chance to recognise the excellent work that ecologists and environmental managers do and the positive impact they make to a healthy and sustainable society. CIEEM Awards continue to promote professionalism and good practice across the industry and my congratulations go to all of the finalists and, of course, the winners." Following Tony's talk, guests enjoyed a three-course luncheon before Pam Nolan,



Penny Anderson and David Goode

the Awards host, began the announcement of the Award categories and winners. The day concluded with the highlight of CIEEM's most prestigious accolade, the CIEEM Medal, being awarded to Professor Penny Anderson, who was recognised for her achievements in promoting high standards of professional consultancy and her contribution to upland management, and to Professor David Goode, who was recognised for his achievements in urban ecology and nature conservation.

1



The Awards finalists and winners are listed below:

Best Practice Awards

These five flagship project-based awards recognise the highest standards of ecological and environmental management practice by CIEEM members.

Sponsored by



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ECOLOGICAL, FENCING, ARBORICULTURE, INVASIVE WEEDS

Best Practice Award for Large-Scale Nature Conservation (1)

WINNER

Cumbria Wildlife Trust – Witherslack Mosses SAC Restoration

HIGHLY COMMENDED

Great Fen Partnership (Cambridgeshire Wildlife Trust, Environment Agency, Huntingdonshire District Council, Natural England and the Middle Level Commissioners) – Great Fen

COMMENDED

Environment Agency supported by Black & Veatch Ltd – Kilnsea Wetlands Creation Project

Best Practice Award for Small-Scale Nature Conservation (2)

WINNER

Natural Resources Wales supported by Black & Veatch Ltd and Galliford Try – Fairbourne 'Brickpits' Wetland Habitat Creation

Best Practice Award for Innovation (3)

WINNER

The Crown Estate & Arup – The Crown Estate Ecology Masterplan

COMMENDED

Arup, the Environment Agency, Hull International Fisheries Institute, Cascade Consulting and APEM Ltd for and with Yorkshire Water – Adaptive management of Water Framework Directive mitigation measures for water storage and supply

COMMENDED

The Canal & River Trust – Canal & River Bank Restoration: Kennet & Avon Canal

2



3



Best Practice Award for Knowledge Sharing (4)

WINNER

Bat Conservation Ireland – Irish Bats in the 21st Century

HIGHLY COMMENDED

Anglian Water Services – Anglian Water's Biodiversity: Guidance for Operations Booklet

HIGHLY COMMENDED

Bat Tree Habitat Key



Best Practice Award for Stakeholder Engagement (5)

WINNER

Dialogue Matters – Green Economy Project in the UK Overseas Territory of the Turks and Caicos Islands

HIGHLY COMMENDED

Environment Agency with Wildfowl and Wetlands Trust, Team Van Oord, EC Harris and CH2M HILL – Steart Coastal Management Project



Promising Professional Award (6)

Sponsored by



This individual award recognises the exceptional achievements of a CIEEM member (Graduate, Associate or Qualifying) during the early stages of their career. The winner will have demonstrated above-average competence and a strong commitment to their professional development.

WINNER

Emily Drinkwater GradCIEEM

HIGHLY COMMENDED

Emma Pickering GradCIEEM

HIGHLY COMMENDED

Morgan Taylor ACIEEM



NGO Impact Award (7)

Sponsored by

ATKINS

This award recognises the achievement of Non-Governmental Organisations in delivering initiatives that have a major impact in benefiting nature. The initiative can be wide-ranging: local to national to international, site-based or species-based, campaigning or raising public-awareness. The key criteria is that it has made a difference to the natural environment.

WINNER

The National Trust for Jersey
– Love Plemont

HIGHLY COMMENDED

The Land Trust – Countess
of Chester Country Park

HIGHLY COMMENDED

The National Trust – The Cyril Diver Project



Corporate Achievement Award (8)

Sponsored by

ATKINS

This award recognises the success of a corporate initiative to benefit the natural environment. The criteria will include how the initiative is communicated to staff and other stakeholders as well as the practical outcomes of the project 'on the ground'.

WINNER

Oxford Properties – Green Park

Postgraduate Student Project Award (9)

Sponsored by

The Environment Partnership



This individual award recognises achievement by CIEEM Student Members in planning, undertaking and reporting a taught Masters degree project in a relevant aspect of ecological or environmental management.

WINNER

Thomas Chapman

Infrared and thermal cameras in bat
species surveillance

Oxford Brookes University

HIGHLY COMMENDED

Olukayode James Ayodeji

Assessment of the level and impacts of
participatory approach in the proposed sale
and development of Sefton Park Meadows
Liverpool Hope University

HIGHLY COMMENDED

David Kent

Biodiversity Offsetting the HS2 Phase 1
Development within the Chilterns AONB:
An analysis of biodiversity offsetting
methodologies, compensation areas,
compensation cost and financial viability
of alternative routes

Oxford Brookes University

In Practice Award (10)

Sponsored by

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Design | Print | Signage | Display

This award recognises the invaluable
contribution to knowledge sharing made
by authors of feature articles in our
members' bulletin, *In Practice*. The judges
look for the most influential and thought-
provoking article of the year.

WINNER

Water voles – a preview of new guidelines
for survey and mitigation

– by Mike Dean CEcol CEnv MCIEEM,
Derek Gow MCIEEM and Richard Andrews
CEnv MCIEEM

(June 2014 edition)

HIGHLY COMMENDED

Communication skills for ecologists:
to influence policy on biodiversity
and ecosystem services we must know
our audiences

– by Claire Wansbury CEcol CEnv FCIEEM,
Juliette Linford, Veronica Lawrie CEnv
MCIEEM, Liam Atherton ACIEEM, Jasmin
Barwig CEnv MCIEEM, Clare Pugh CEnv
MCIEEM and Octavia Neeves MCIEEM

(December 2014 edition)

HIGHLY COMMENDED

Ecology Legal Update – The freshwater
environment, ecological appraisal and
the Water Framework Directive: Why,
who and how?

– by Owen Peat and Penny Simpson
(December 2014 edition)

For more information on the 2015
Awards winners and finalists, and also
the forthcoming 2016 Awards, please visit
www.cieem.net/awards.

Meet the Membership Team



Stuart Parks, Sarah Cox, Sarah Hayward and Katie Allen

CIEEM's Membership Team, based at the Secretariat in Winchester, is primarily responsible for all aspects of the Chartered Institute's application and assessment processes. This newly expanded team also plays a key role in the identification, development and delivery of many of our membership benefits and services.

The Membership Team is supported in its work by the Membership Admissions Committee (MAC) who meet four times a year to provide guidance on the strategic development of membership services. In addition, MAC members perform a vital role throughout the year in assessing applications for membership. An additional pool of assessors has recently been recruited to support them in this work.

Our Membership Manager, Stuart Parks, took up his post in August 2014, tasked with reviewing CIEEM's Membership and Chartership schemes and identifying ways to significantly increase membership both in the UK and overseas. Prior to joining CIEEM, Stuart worked as the Membership and Marketing Manager for the Learning through Landscapes Trust, a national charity that supports schools to make better use of the outdoors as a learning environment; and as a Schools' Consultant for the Government-funded

STEMNET programme, raising awareness of STEM career opportunities for students in secondary schools.

Sarah Cox joined CIEEM in January 2014 as Membership Officer. Sarah looks after all applications to Associate and Full membership grades and oversees all membership administration. Sarah studied Biology at university and then went on to complete an MSc in Biodiversity and Conservation. After completing her MSc Sarah volunteered as an ecologist with the National Trust for a year, followed by a couple of years working in small ecological consultancies. Sarah then worked for two and a half years in the RSPB's marketing department before joining CIEEM.

Our Assistant Membership Officer, Sarah (Saz) Hayward, joined CIEEM in January 2013. Sarah's responsibilities include looking after Graduate, Student, Qualifying and Supporter membership applications and assisting with the development of these grades. Having gained a BSc in Environmental Sciences from Southampton University, Sarah initially started a career working as an Aquatic Graduate Ecologist at Jacobs in the freshwater department. Before joining CIEEM Sarah was Executive Assistant at Hampshire & Isle of Wight Wildlife Trust, providing support to the CEO

and helping with governance, fundraising events and membership.

Katie Allen has been our Membership Administrative Assistant since April 2015 and it's her friendly voice you'll typically hear first when you contact the membership team. Katie finished college with A-Levels in Psychology, Sociology and Photography, undertaken at the college where our Professional Development Coordinator, Lexie Munro, was teaching! Prior to joining CIEEM Katie completed an NVQ in Business and Administration whilst working for Community Action Fareham.

The Membership Team has spent much of the last 18 months implementing significant changes to CIEEM's application and assessment criteria and processes. Whilst we're continually refining these processes we're now looking forward to working with members to review the relevance and value of our benefits packages, identifying ways to better support under-represented sectors of our membership, and attracting a larger number of aspiring and newly qualified members at lower grades.

You can contact the Membership Team at membership@cieem.net or if you have specific comments about membership development contact Stuart at stuartparks@cieem.net.



CIEEM's Member Networks:

Geographic Sections and Special Interest Groups are run by members for members to provide opportunities to network, share knowledge and learn more about the science and practice of our profession. There is also a role to play in promoting

professional standards, feeding into consultations and representing the views of members at a local, national and international level.

For further information about Member Networks and how you can get involved, please visit www.cieem.net/get-involved.

SOUTH WEST ENGLAND

Butterfly Bonanza in Gloucestershire

South West Section members were very fortunate to see both imago and egg stages of the marsh fritillary butterfly *Euphydryas aurinia* at a beautiful limestone grassland reserve in Chalford, Gloucestershire on 12 June. There was a fine display of butterfly orchids too.

Read more about this event at www.cieem.net/south-west



Marsh fritillary imago

SOUTH WEST ENGLAND

Somerset Wildlife Trust talks

In March this year the Somerset Wildlife Trust presented two excellent talks for South West Section members relating to research projects they have undertaken on the Somerset Levels. These were funded by the European INTERREG funding stream 'The Value of Working Wetlands' and included ecosystems services and landscape-scale monitoring on the Somerset Levels.

Read more about these talks and view the presentations at www.cieem.net/south-west



SWT's research involved representing ecological networks for target species on an area of the Somerset Levels, derived using species' habitat requirements, dispersal distances and dispersal ability within the landscape

Read more about this event at www.cieem.net/south-west.



David Edmondson, Strategic Development Manager, Cornwall Council, chaired the morning session, with a packed audience

SOUTH WEST ENGLAND

Biodiversity and Development Planning Conference

The South West England Committee joined forces with Cornwall Council and Spalding Associates to put on this well-attended regional conference on 24 April in Redruth. Cornwall is well endowed with natural assets which are important to its economy and character. This conference was convened to bring planners, ecologists and other professionals together to inform, inspire and explore how these professions can work together to not only protect but enhance biodiversity in the county.

SOUTH WEST ENGLAND

South West England Conference and AGM 2015: Promoting a catchment approach to improve water quality and flood management

This year's South West England Section conference will be held at Exeter University on 15 December and is an excellent opportunity to get away from the pre-Christmas chaos and enjoy a day with fellow ecologists talking about what really makes us tick! Conference sponsors South West Water will talk about their innovative Upstream Thinking Project and other presentations will look at reintroductions, ecohydrology and landscape-scale mitigation. If you have any suitable papers or posters on this theme that you would like to propose, the Committee would be delighted to hear from you. Please get in touch via vickybowskill@cieem.net.

Look out for further details at www.cieem.net/events/category/57/cieem-conferences.

EAST OF ENGLAND

Hanningfield Bat Evening

Around 30 people turned up to Essex Wildlife Trust's Visitor Centre in Hanningfield at 7:30pm on 22 April, for a talk led by Pete Cloughton, from the Essex Bat Group. Pete's passion for bats was truly inspiring and a lot was learned of the soprano bat roost in the roof of the Visitor Centre. Up to 1,500 bats can be living there at peak season.

Read more about this event at www.cieem.net/east-of-england.



Soprano pipistrelle
Pipistrellus pygmaeus

SOUTH EAST ENGLAND

2015 AGM and Queen Elizabeth Olympic Park Tour

The 2015 South East England Section AGM was followed by a tour of the Queen Elizabeth Olympic Park, to see the diverse range of wildlife habitats created and how the Biodiversity Action Plan was being delivered as part of the Olympic legacy.

Read more about this event and the new committee line up at www.cieem.net/south-east.



Cowslips within meadow grassland

SOUTH EAST ENGLAND

'Towns to Downs': Ecological Engineering within the Brighton and Lewes Downs UNESCO Biosphere Region

This event was held at Dorothy Stringer School, Brighton on the evening of Wednesday 17 June 2015, and involved two fascinating talks by leading proponents of the Biosphere Reserve. They explored the significance of the designation in providing the basis for a systematic programme of habitat creation across the area as well as specific details of the features which have been created so far.

Read more at www.cieem.net/south-east.



Dr Dan Danahar giving an explanation of the features of interest in the 'Butterfly Haven'

SOUTH EAST ENGLAND

3D Bat Surveys: Getting the most from advanced licensed bat survey methods

With the promised publication of new bat survey guidelines from the Bat Conservation Trust (BCT) in September, which will include much more detailed sections on advanced bat survey techniques, this topic was clearly of major interest to CIEEM members and was attended by over 30 people from as far afield as London and Sussex.

Read more at www.cieem.net/south-east.

SOUTH EAST ENGLAND

Grassland Survey Workshop: A CIEEM South East England Section Workshop held jointly with FSC, Juniper Hall Field Studies Centre

This practitioner workshop was held at Juniper Hall on 27 June and led by Ben Benatt of the South East England Section committee. The day was aimed at discussing and sharing techniques used in identifying, evaluating and conserving undisturbed grassland habitats.

Read more at www.cieem.net/south-east.



Ben Benatt discussed the finer points of botanical ID with one of the attendees

WEST MIDLANDS

Biodiversity Offsetting: An examination of current legislation, its implications for planning and successful case studies

A joint CIEEM West Midlands Section and RTPI event on Biodiversity Offsetting was hosted by AECOM on Tuesday 2 June in Birmingham. The event was well attended with presentations – including from Aidan Marsh, Andrea Wilcockson and Oliver Barnett of the West Midlands Committee – provoking healthy discussion on where we are with offsetting, what practical lessons have been learned to date, and what the future is likely to hold.

Read more at www.cieem.net/west-midlands.



IRELAND

We are pleased to welcome CIEEM's new Irish Section Support Officer, Kate Flood, who joined the team at the beginning of August. Kate will be working closely with both the Irish Section Committee and with the Secretariat staff in Winchester to support and develop our work across the whole of Ireland.

For more information about what is going on in Ireland please visit www.cieem.net/ireland.

WALES

Meet the Welsh Section Committee

The Welsh Section had their AGM in February this year at Bangor University and several new Committee members formally joined the Committee, alongside a number of existing members who were re-elected. Updated pen portraits for the new Committee line up are now available at www.cieem.net/geographic-sections/8/02.-wales.



Look out for upcoming events in your Section at www.cieem.net/geographic-sections and keep up to date with what's been going on at www.cieem.net/member-network-news. For information on vacancies on your Section Committee visit www.cieem.net/cieem-committee-vacancies.

New Members

The decision on admission is usually taken by the Membership Admissions Committee under delegated authority from the Governing Board but may be taken by the Governing Board itself.

CIEEM is pleased to welcome the following individuals as new members:

ADMISSIONS

Full Members

Mr Freddy Brookes, Miss Hannah Gibbons,
Mr Neil Harris, Dr Simeon Jones,
Dr David Kelly, Mr Mike Morton,
Mr Gavin Mullan, Mr Tyrone Nelson,
Mr Philip Oliver, Mr Jeffery Picksley,
Mr Duncan Priddle, Dr Cilian Roden,
Mr Fraser Rush, Mr Colin Scott,
Mrs Alison Short, Dr Mark Telfer,
Ms Katherine Tonge, Dr Mark Trinder.

Upgrades to Full Membership

Mr Richard Bull, Mrs Kirsten Bywater,
Mr Eamonn Delaney, Mr Richard Flight,
Mr Brandon Murray.

Associate Members

Mr Andrew Chick, Ms Lisa Dolan,
Dr Victoria Nall, Mr Stuart Venables.

Upgrades to Associate Membership

Mr Philip Aldwinckle, Miss Jessica Brooks,
Miss Georgia Croxford, Mr Sam Davis,
Miss Rachel Fine, Miss Candice Howe,
Miss Laura Jones, Miss Victoria Newlove,
Mrs Clare Nisbet-Czuprynski,
Miss Gemma Nixon, Miss Emma Pickering,
Dr Nick Underhill-Day.

Graduate Members

Mr Thomas Bellamy, Miss Kelly Brown,
Miss Jessica Burkitt,
Miss Catherine Bywood,
Mr William Campbell, Miss Lindsay Clark,
Miss Jodi Conuel, Mr Darren Cook,
Miss Rona Cooper, Miss Emily Costello,
Miss Laura Cuming,
Miss Elizabeth Cwilewicz,
Mr Robert Davies, Mr Jonathan Dye,
Miss Sarah Emerson, Mr Scott Ford,
Miss Arabella Fox, Mr Rob Gordon,
Miss Rebecca Henderson,
Miss Samantha Hodgson, Ms Laoise Kelly,
Miss Georgina Knibbs, Miss Lorna McRae,
Mr Alexander Melson, Miss Frances Morris,
Ms Sarah Mullen, Mr Euan Murray,
Mrs Sabina Ostalowska,
Miss Rebecca Oswin, Miss Cerys Owen,
Miss Naomi Perry, Ms Taryn Rodgers,
Miss Emma Seaton, Ms Jessica Smith,
Mr Gareth Starr, Ms Rebekah Strong,
Mr Luke Taylor, Miss Francesca West.

Upgrades to Graduate Membership

Ms Sophie Carr, Mr Stephen Doso Jnr,
Mr Declan Ghee, Mr Samuel Smith.

Student Members

Mrs Bonnie Aldridge, Miss Rebecca Bailey,
Miss Ashleigh Begg, Miss Rachel Bentley,
Mr Alexander Blundell, Mr Peter Breivik,
Miss Rosanne Broyd, Miss Lorna Clark,
Miss Jessica Clayton, Miss Penelope Coles,
Mr Thomas Doherty-Bone,
Mr Stuart Garner, Mr Murray Gauld,
Miss Anne Green, Mr Ovat Innocent Ovat,
Mr Timothy Kelly, Mr Alexi Lamoon,
Mr David Macknay, Mr Tom Nitti,
Mr Mark Norriss, Mrs Anoushka Nutting,
Miss Hayley Percival, Ms Andrea Perz,
Miss Fiona Plenderleith, Mr Scott Roe,
Miss Katrina Schofield, Mr Paul Sheridan,
Mr Tim Stephen, Miss Hayley Tomlin,
Miss Anne Walker, Mr Bertie Welch,
Miss Natasha Wynne-Hughes.

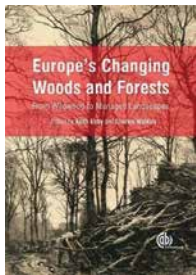
Qualifying Members

Mr Kane Burchill, Mr Daniel Flew,
Ms Elizabeth Petchell, Mr Robert Smith,
Miss Alison Stubbings.

Supporter Members

Mr Chris Couldrey.

Recent Publications



Europe's Changing Woods and Forests

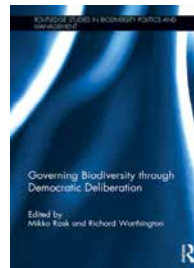
Authors: Keith Kirby FCIEEM and Charles Watkins

ISBN: 9781780643373

Price: £85.50

Available from: www.cabi.org/bookshop/book/9781780643373

Our understanding of the ecological history of European forests has been transformed in the last twenty years. Bringing together key findings from across the continent, this book provides a comprehensive account of the relevance of historical studies to current conservation and management of forests. It combines theory with a series of regional case studies to show how different aspects of forestry play out according to the landscape and historical context of the local area.



Governing Biodiversity through Democratic Deliberation

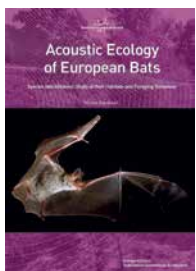
Editors: Mikko Rask and Richard Worthington

ISBN: 9780415732185

Price: \$160.00

Available from: www.routledge.com/products/9780415732185

This book discusses political controversies involved in global biodiversity policy, and the practical opportunities that are opened up in solving them through increased citizen participation and democratic deliberation. It examines the emerging practice of deliberative global governance and its political consequences.



Acoustic Ecology of European Bats

Author: Michel Barataud

ISBN: 9782366621440

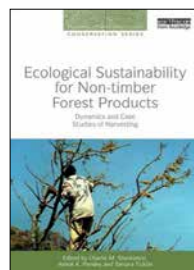
Price: £39.99

Available from: www.nhbs.com

The introduction summarizes the physical basis of biological sonar and gives an overview of the technologies used to

convert ultrasound into audible frequencies. The identification criteria for 34 European bat species are given in detail, with an entire chapter devoted to the methodology of the acoustic study of their foraging habitats. It focuses on the concept of acoustic ecology, illustrated with many examples. This concept explains how the acoustic behaviour of a bat sheds light on its flight environment, its activity, and even its diet, contributing in all cases to improving the reliability of species identification.

A DVD is included, which comprises over 300 sound sequences (in both heterodyne and x10 time expansion formats) collected from formally identified individuals flying in natural conditions. It also includes charts in .xls format for the identification of all bat species.



Ecological Sustainability for Non-timber Forest Products: Dynamics and Case Studies of Harvesting

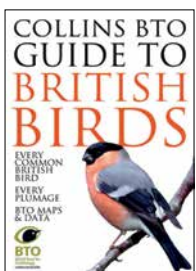
Editors: Charlie M. Shackleton, Ashok K. Pandey and Tamara Ticktin

ISBN: 9780415728591

Price: \$145.00

Available from: www.routledge.com/products/9780415728591

There is growing knowledge about and appreciation of the importance of Non-timber Forest Products (NTFPs) to rural livelihoods in developing countries, and to a lesser extent, developed countries. However, there is also an assumption on the part of policy-makers that any harvesting of wild animal or plant products from the forests and other natural and modified ecosystems must be detrimental to the long-term viability of target populations and species. This book challenges this idea and shows that while examples of such negative impacts certainly exist, there are also many examples of sustainable harvesting systems for NTFPs.



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Developing and enhancing biodiversity monitoring programmes: a collaborative assessment of priorities

Pocock, M.J.O. *et al.*

Journal of Applied Ecology 2015, 52: 686–695. doi: 10.1111/1365-2664.12423

The authors used a collaborative approach, involving 52 experts, to develop a list of attributes of relevance to any biodiversity monitoring programme and to order these attributes by their priority.

A final list of 25 attributes of biodiversity monitoring schemes was developed, ordered from the most elemental (those essential for monitoring schemes; e.g. articulate the objectives and gain sufficient participants) to the most aspirational (e.g. electronic data capture in the field, reporting change annually). This ordered list is a practical framework which can be used to support the development of monitoring programmes.

The ordered list of attributes developed in this study will assist in prioritising resources to develop biodiversity monitoring programmes (including citizen science). The potential conflict between end users of data and participants in data collection that were discovered should be addressed by involving the diversity of stakeholders at all stages of programme development.

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Evaluating conservation and fisheries management strategies by linking spatial prioritization software and ecosystem and fisheries modelling tools

Metcalfe, K. *et al.*

Journal of Applied Ecology 2015, 52: 665–674. doi: 10.1111/1365-2664.12404

Well-designed marine protected area (MPA) networks can deliver a range of ecological, economic and social benefits, and so a great deal of research has focused on developing spatial conservation prioritisation tools to help identify important areas. However, whilst these software tools are designed to identify MPA networks that both represent biodiversity and minimise impacts on stakeholders, they do not consider complex ecological processes. Thus, it is difficult to determine the impacts that proposed MPAs could have on marine ecosystem health, fisheries and fisheries sustainability.

Using the eastern English Channel as a case study, this paper explores an approach to address these issues by identifying a series of MPA networks using the Marxan and Marxan with Zones conservation planning software and linking them with a spatially explicit ecosystem model developed in Ecopath with Ecosim. These were then used to investigate potential trade-offs associated with adopting different MPA management strategies.

Limited-take MPAs could have positive benefits for conservation and fisheries in the eastern English Channel. The findings also clearly indicate that no-take MPAs should form an integral component of proposed MPA networks in the eastern English Channel, as they not only result in substantial increases in ecosystem biomass, fisheries catches and the biomass of commercially valuable target species, but are fundamental to maintaining the sustainability of the fisheries.

Using the above software tools in combination provides a powerful policy-screening approach. This could help inform marine spatial planning by identifying potential conflicts and by designing new regulations that better balance conservation objectives and stakeholder interests. In addition, it highlights that appropriate combinations of no-take and limited-take MPAs might be the most effective when making trade-offs between long-term ecological benefits and short-term political acceptability.

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Comparing impacts of alien plants and animals in Europe using a standard scoring system

Kumschick, S. *et al.*

Journal of Applied Ecology 2015, 52: 552–561. doi: 10.1111/1365-2664.12427

The authors reviewed literature describing the impacts of 300 species from five major taxonomic groups: mammals, birds, fish, terrestrial arthropods and plants.

The authors found that overall, alien mammals in Europe have the highest impact, while fish have the lowest. Terrestrial arthropods were found to have the lowest environmental impact, while fish had relatively low socio-economic impact.

Overall, the magnitude of environmental and socio-economic impacts of individual alien species is highly correlated. However, at the species level, major deviations are found.

Comparing the impacts of alien species across taxa is necessary for prioritising management efforts and effective allocation of resources. By applying the generic impact scoring system (GISS) to five major taxonomic groups, the authors provide the basis for a semi-quantitative cross-taxa listing process (e.g. 'black lists' or 100-worst-lists).

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Sound exposure in harbour seals during the installation of an offshore wind farm: predictions of auditory damage

Hastie, G.D. *et al.*

Journal of Applied Ecology 2015, **52**: 631–640. doi: 10.1111/1365-2664.12403

The authors report on a behavioural study during the construction of a wind farm using data from GPS/GSM tags on 24 harbour seals *Phoca vitulina*. Pile driving data and acoustic propagation models, together with seal movement and dive data, allowed the prediction of auditory damage in each seal.

Growth and recovery functions for auditory damage were combined to predict temporary auditory threshold shifts in each seal. Further, M-weighted cumulative sound exposure levels were calculated and compared to permanent auditory threshold shift exposure criteria for pinnipeds in water exposed to pulsed sounds. The closest distance of each seal to pile driving varied individual seals. Comparison to exposure criteria suggests that half of the seals exceeded estimated permanent auditory damage thresholds.

The authors predicted that half of the tagged seals received sound levels from pile driving that exceeded auditory damage thresholds for pinnipeds. These results have implications for offshore industry and will be important for policy-makers developing guidance for pile driving. Developing engineering solutions to reduce sound levels at source or methods to deter animals from damage risk zones, or changing temporal patterns of piling could potentially reduce auditory damage risk. Future work should focus on validating these predictions by collecting auditory threshold information pre- and post-exposure to pile driving. Ultimately, information on population-level impacts of exposure to pile driving is required to ensure that offshore industry is developed in an environmentally sustainable manner.

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REVIEW: Towards a risk register for natural capital

Mace, G.M. *et al.*

Journal of Applied Ecology 2015, **52**: 641–653. doi: 10.1111/1365-2664.12431

Systematic monitoring of natural assets is a major challenge that could be both unaffordable and unmanageable without a way to focus efforts. The authors introduce a simple approach, based on the commonly used management tool of a risk register, to highlight natural assets whose condition places benefits at risk.

The authors undertook a preliminary assessment using a risk register for natural capital assets in the UK based solely on existing information. The authors estimate the status and trends of benefits relative to societal targets using existing regulatory limits and policy commitments, and allocate scores of high, medium or low risk to asset–benefit relationships that are both subject to management and of concern.

The risk register approach reveals substantial gaps in knowledge about asset–benefit relationships which limit the scope and rigour of the assessment (especially for marine and urban habitats). Nevertheless, strong indications were found that certain assets (in freshwater, mountain, moors and heathland habitats) are at high risk in relation to their ability to sustain certain benefits (especially freshwater, wildlife and climate regulation).

With directed data gathering, especially to monitor trends, improve metrics related to asset–benefit relationships, and improve understanding of nonlinearities and thresholds, the natural capital risk register could provide a useful tool. If updated regularly, it could direct monitoring efforts, focus research and protect and manage those natural assets where benefits are at highest risk.

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Social and ecological drivers of success in agri-environment schemes: the roles of farmers and environmental context

McCracken, M.E. *et al.*

Journal of Applied Ecology 2015, **52**: 696–705. doi: 10.1111/1365-2664.12412

The authors analysed variation across 48 farms in the quality and biodiversity outcomes of agri-environmental habitats designed to provide pollen and nectar for bumblebees and butterflies or winter seed for birds.

Multi-model inference indicated social factors had a strong impact on outcomes and that farmer experiential learning was a key process. The quality of the created habitat was affected positively by the farmer's previous experience in environmental management. The farmer's confidence in their ability to carry out the required management was negatively related to the provision of floral resources. Farmers with more wildlife-friendly motivations tended to produce more floral resources, but fewer seed resources.

This is the first study to show a direct role of farmer social variables on the success of agri-environment schemes in supporting farmland biodiversity. It suggests that farmers are not simply implementing agri-environment options, but are learning and improving outcomes by doing so. Better engagement with farmers and working with farmers who have a history of environmental management may

therefore enhance success. The importance of a number of environmental factors may explain why agri-environment outcomes are variable, and suggests some – such as the weather – cannot be controlled. Others, such as shelter, could be incorporated into agri-environment prescriptions. The role of landscape factors remains complex and currently eludes simple conclusions about large-scale targeting of schemes.

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Forthcoming Events 2015-16

For information on these events please see www.cieem.net.

Conferences and Other Events

Date	Title	Location
3-4 November 2015	CIEEM Autumn Conference – Reconnecting People and Nature: Opportunities and Challenges	Sheffield

Training Courses

16 September 2015	Management of Invasive Plant Species	London
16 September 2015	Water Vole Ecology and Surveys	Nr Cirencester
17 September 2015	Water Vole Mitigation	Nr Cirencester
24 September 2015	Environmental Impact Assessment (EIA) Using Fish and Shellfish Data in Marine, Coastal and Estuarine Systems	London
29 September 2015	Japanese Knotweed – Identification, Assessment and Management	London
6 October 2015	Ecological Report Writing	London
8 October 2015	Introduction to Bat Surveys	London
8 October 2015	Protected Mammals (Republic of Ireland) – Survey, Impact Assessment and Mitigation (Covers terrestrial mammals)	Co. Dublin
13 October 2015	Making the Most of BREEAM and the Code for Sustainable Homes	London
13 October 2015	Effective Communication Skills for Women	Birmingham
13 October 2015	Ecological Clerk of Works	Birmingham
14 October 2015	British Standard BS42020 Biodiversity – Code of Practice for Planning and Development	Manchester
15 October 2015	British Standard BS42020 Biodiversity – Code of Practice for Planning and Development	Edinburgh
20 October 2015	Badger Survey Impacts and Mitigation	Linlithgow
21 October 2015	Media Training for Ecologists and Environmental Managers	Winchester
22 October 2015	European Protected Species for Consultants	Nottingham
22 October 2015	Hazel Dormouse Ecology and Surveying	Monmouth
22-23 October 2015	Red Squirrel Surveys	Dunkeld
23 October 2015	Hazel Dormouse Handling for Advanced Practitioners	Lydney
26 October 2015	Ecological Clerk of Works	Edinburgh
27 October 2015	Environmental Advisor for Construction Sites	Edinburgh
28 October 2015	Otter Ecology and Surveys	Jedburgh
29 October 2015	Trees and Bat Roosts	Dorking
29-30 October 2015	Pine Marten and Wildcat Ecology and Surveying	Perthshire
29 October 2015	Introduction to Biodiversity Offsetting	London
3 November 2015	Introduction to Ecological Impact Assessment (EclA)	London
5 November 2015	Water Environment – The Legal Framework	London
5-6 November 2015	Water Vole Live Trapping, Care and Restoration	Lifton, Devon
5-6 November 2015	Outdoor/Wilderness First Aid	Inverness
10-11 November 2015	Train the Trainer for Ecologists	London
10-11 November 2015	Developing Practical Skills in Ecological Impact Assessment (EclA)	Birmingham
11 November 2015	Protected Mammals Surveys	Dunblane
12 November 2015	Protected Mammals – Impacts and Mitigation	Dunblane
17 November 2015	Professionalism and Environmental Ethics	Leeds
17 November 2015	Effective Workplace Coaching and Mentoring	London
18 November 2015	Ecological Clerk of Works	London
18 November 2015	Conflict Resolution in the Workplace	London
19 November 2015	Survey and Assessment of Hedgerows in Winter Months	Fordingbridge
19 November 2015	British Standard BS42020 Biodiversity – Code of Practice for Planning and Development	London
24 November 2015	Ecological Report Writing	Cardiff
24 November 2015	Habitats Regulations Assessment (HRA) of Projects (England/Wales and their territorial waters)	London
26 November 2015	Understanding Wildlife Law	Nottingham
1 December 2015	Ecological Report Writing	Leeds
1 December 2015	Habitats Regulations Assessment (HRA) of Plans (England/Wales and their Territorial Waters)	London
8 December 2015	Advanced Course in Ecological Impact Assessment (EclA)	London

Geographic Section Events

7 September 2015	Ireland – Chartered Ecologist Workshop	Dublin
10 September 2015	Yorkshire and Humber – Chartered Ecologist Workshop	Leeds
26 September 2015	South East England – Deer rut at Richmond Park	London
10 October 2015	Ireland – Glendalough bryophyte outing	Glendalough
20 October 2015	South East England – Chartered Ecologist Workshop	London
20 October 2015	South East England – Chartered Ecologist Workshop	London
11 November 2015	East Midlands – Chartered Ecologist Workshop	Buxton
15 December 2015	South West England – Section Conference & AGM 2015: Promoting a catchment approach to improve water quality and flood management (sponsored by South West Water)	Exeter
27 January 2016	Scotland – Section Conference & AGM 2016: Wildlife Crime in the spotlight: a closer look at wildlife crime fighting initiatives in Scotland	Glasgow



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