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In this issue

Welcome

A Green Recovery

There is light at the end of the Covid-19 tunnel as doors start opening again. It is time for us to make sure that we make the most of what we've learned during the experience as there are important aspects which we can use to alter our behaviour with significant benefits for biodiversity and climate change. If we don't act now, there is a very real risk that these game-changing benefits may be lost in the rush and enthusiasm to try to return to where we were before all this happened and, understandably and importantly, to support the recovery of our economy. *In Practice* isn't the place to be preaching about how we might change our own future behaviours as good citizens but please don't let the opportunity pass by – if only because the learning of some of these has been hard won and would add to the tragedy of letting them slip away. As professional ecologists and environmental managers we have had the opportunity to experience different ways of doing a whole range of aspects of our work: travel to work sites, a re-evaluation of our surveys, achieving business efficiencies, managing team and personal relationships from a distance, and coming to terms with Zoom. These have environmental implications, from more working from home and virtual meetings to the use of more energy efficient travel and waste management and they should be a key part of our coming out of the pandemic, not just surviving but thriving.

Now is the time to ask you as members to provide examples of commitments to new ways of working: the reasoning for change, the lessons learned in reaching the decision, and the anticipated benefits personally, to the team and more widely. Small or large, it would be very valuable to share your commitments across our membership and provide a basis for us all to learn and to be encouraged to make our own commitments to achieving sustainable change. Please do share your experiences via enquires@cieem.net. Embedding the good stuff in your new normal will make a significant difference to you, your teams, your organisations and society. Multiplied up – if only across our 6,000 plus membership – the effects amplify the substantial benefits to clients, funding agencies, statutory bodies, and society. And if we promote these changes, they can all benefit from integrating such change into their new normal, ensuring at least some positives come from the Covid-19 pain.

CIEEM is already working towards its new normal, which includes advice from the Governing Board's Covid-19 Recovery Working Group. Some members, having extra time, have used the opportunity to complete membership upgrade and Chartership applications, indicative of the continuing growth of CIEEM. A bold approach to delivering online training and a series of webinars, organising a successful online conference, and maintaining the Institute's programme of committee meetings, workshops and task and finish groups are just some experiences that have helped us re-shape a new way of coming out of Covid-19 – bigger, better and stronger.

Max Wade CEcol CEnv FCIEEM

President

Information

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Editor
Dr Gillian Kerby (gillkerby@cieem.net)

Internal contributions coordinator
Mr Jason Reeves (jasonreeves@cieem.net)

CIEEM Office
43 Southgate Street, Winchester, Hampshire, SO23 9EH, UK

T: 01962 868626
E: enquiries@cieem.net
W: www.cieem.net

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Front cover: Social distancing due to the Covid-19 pandemic

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Feature Articles

Covid-19 Pandemic

Throughout the Covid-19 outbreak and social distancing measures, we have collated the latest advice, government guidance and updates on our dedicated Covid-19 webpages (cieem.net/i-am/covid-19/), and kept members updated with regular emails.

Along with collating advice and information from others, we have also published *Advice on Covid-19 and Undertaking Site-Based Ecological Work*, and *Guidance on Ecological Survey and Assessment in the UK During the Covid-19 Outbreak*. At the time of writing we are just finalising guidance for Ireland too.

Throughout this period we have also been in constant contact with governments and the statutory nature conservation agencies to ensure that members and the sector are kept up-to-date. This has resulted in a number of letters and communications clarifying ecology and environment work during the lockdown.

We hope that these resources have been a help to you in these uncertain times, and we welcome your feedback.

We continue to provide support, for example, planning for recovery and starting a new webinar series.

Member Assistance Programme (MAP)

At an extraordinary meeting of the Governing Board at the end of March 2020, Board members agreed to bring forward a plan to introduce a Member Assistance Programme as a matter of urgency. We are very pleased to say that our chosen delivery partner reacted quickly and CIEEM members can now access an extensive package of support including telephone advice lines, counselling services and a website full of information and practical advice on topics as wide ranging as debt management, stress management and mental health. Their services are available 24/7 and are delivered confidentially. More information is available via the 'My CIEEM' area of the website under 'Member benefits'.

New Sector Streams Webinar Series

In response to Covid-19, we started a new webinar series – Sector Streams. The new series is an opportunity for us to share information with you and for participants to ask questions of our expert panels.

Topics covered so far including the response to the Covid-19 pandemic, support for members and insurance issues, results of the Covid-19 membership survey, and responses from the non-consultancy sector.

Previous episodes of the series are available to watch on the CIEEM Resource Hub: www.cieem.net/resources-hub/

Future episodes can be booked on the CIEEM website: http://events.cieem.net/Events

Update to the Mentor Platform

In addition to the Member Assistance Programme, we have made an adjustment to the mentoring platform to provide you with another route to make contact with fellow members who are facing similar challenges. If you have already registered as a mentor and would be willing to be contacted for a discussion about the Covid-19 situation please do update your registration using the new option available.

If you have yet to register as a mentor or a mentee please do consider using the platform to connect with fellow members. You can use your 'My CIEEM' login details to access the platform at: https://cieem.onpld.com/, and use the messaging functionality to connect.

Staff Changes

At the beginning of March, and just before the Covid-19 lockdown started, we were joined in the CIEEM team by two new colleagues. Laura Wilson has joined us as a Membership Officer, with the primary responsibility of looking after our Chartership processes. Natalie Harvey was welcomed the following week as the new Membership Administrator, taking over the reins from Katie Allen who is settling into a new role as CIEEM's Systems Coordinator.

CIEEM Conferences		
21 July 2020	**CIEEM Summer Conference 2020** – The Climate and Biodiversity Crises: Professional Approaches and Practical Action	Online
22 September 2020	**CIEEM Welsh Conference 2020** – The Well-Being of Water: Bringing our Rivers Back to Life	Online
27 October 2020	**CIEEM Scottish Conference 2020** – Land Use in Scotland: Changes, Challenges and Solutions	Online
1-2 December 2020	**CIEEM Autumn Conference 2020** – Time to Change: Putting the Environment at the Heart of Social and Economic Well-Being	Bristol

In Practice Digital Editions

Due to the Covid-19 situation, this edition of *In Practice* has been distributed as a digital version only. If you would like to reduce your and CIEEM's carbon footprint and receive only digital editions in the future, please let us know by contacting enquiries@cieem.net.

In Practice Themes and Deadlines

Edition	Theme	Article submission deadline
109 – September 2020	Climate Action and Green Recovery	n/a
110 – December 2020	Nitrogen	24 August 2020

If you would like to contribute to one of these issues, please contact the Editor at GillKerby@cieem.net. Contributions are welcomed from both members and non-members. Further information and guidance for authors can also be found at: www.cieem.net/in-practice/

Revised UK shadow cabinet announced

Sir Keir Starmer, the newly elected leader of the Labour Party, has selected his new shadow cabinet members. Former Labour leader Ed Miliband has the climate brief, having been made Shadow Secretary of State for Business, Energy and Industrial Strategy. Luke Pollard retains the position of Shadow Defra Secretary.

https://labour.org.uk/people/shadow-cabinet/

Natural Capital Committee publish advice on Green Book guidance and nature-based solutions for attaining net-zero

The Natural Capital Committee has set out its advice to the UK Government on Green Book guidance. In particular, how to include natural capital, ecosystem services and the value of these into policy appraisals. The NCC also published a report setting out their advice to government on taking a natural capital approach to attaining net zero.

https://www.gov.uk/government/publications/natural-capital-committee-advice-on-the-green-book-guidance-embedding-natural-capital-into-public-policy-appraisal

https://cieem.net/natural-capital-committee-publish-advice-on-nature-based-solutions-for-attaining-net-zero/

Summer 2019 gave a welcome boost to UK butterflies

The latest results from the annual UK Butterfly Monitoring Scheme (UKBMS) led by Butterfly Conservation, the Centre for Ecology & Hydrology (CEH), British Trust for Ornithology (BTO) and Joint Nature Conservation Committee (JNCC), show that 2019 was the best year for UK butterflies in over 20 years.

https://cieem.net/summer-2019-gave-a-welcome-boost-to-uk-butterflies/

Budget 2020

On 11 March, Chancellor Rishi Sunak, delivered his first UK budget in the House of Commons. A £640m Nature for Climate fund was announced to protect natural habitats in England, including 30,000 hectares of new trees, along with £800 million for carbon capture and storage. However, measures such as a freeze on fuel duty and billions for "strategic roads" have been criticised due to the future impact on climate.

https://www.gov.uk/government/publications/budget-2020-documents/budget-2020

Wales launches £5 million national forest scheme

The Welsh Government has kick-started its national forest scheme which aims to link existing woodland with new forests, parkland and hedges, creating green corridors. The route for the forest has not yet been determined but will be consulted on widely.

https://www.theguardian.com/environment/2020/mar/12/wales-launches-5m-national-forest-scheme-with-pupils-help

Welsh Government launch initiative to bring nature to communities

The Welsh Government, in partnership with Keep Wales Tidy, has launched a new scheme which offers over 800 pre-paid nature 'starter packages' to communities across Wales. Starter packages will include all materials needed to create a community nature area, guidance on how to install it and Keep Wales Tidy officer time to provide advice and support.

https://cieem.net/welsh-government-launch-new-initiative-to-bring-nature-to-communities/

Previously unknown colony of freshwater pearl mussels found in Scottish Highlands

A watercourse survey carried out ahead of work to replace culverts has uncovered a previously unknown colony of freshwater pearl mussels in north Highland. The project aims to improve habitat for the species by planting trees along the watercourse and removing barriers to fish.

https://www.nature.scot/double-boost-freshwater-pearl-mussels

Northern Ireland tree planting pledge

Minister Edwin Poots has pledged to help tackle climate change by planting 18 million trees over the next 10 years as part of the 'Forests for our Future' programme.

https://www.daera-ni.gov.uk/news/poots-planting-pledge

European Commission launches EU climate law proposals

The European Commission has outlined its proposal to enshrine the EU's 2050 climate neutral commitment in law. Progress will be reviewed every five years in line with the global process under the Paris Agreement and the proposed law would require the Commission to explore options by this September for a new 2030 target of 50-55% emission reductions compared to 1990 levels.

https://greennews.ie/ec-2050-climate-law/

COP26 UN Climate Conference postponed

The COP26 UN climate change conference set to take place in Glasgow in November has been postponed due to Covid-19. At the time of writing, no dates have been announced, however it will take place in 2021. The decision was taken to ensure all parties can focus on the issues addressed at the conference and make necessary preparations.

https://www.gov.uk/government/news/cop26-postponement

Dealing with Ancient Woodland – Time for a Rethink?[1]

Richard Gowing CEnv MCIEEM
WSP

Keywords: ancient woodland, compensation, evidence-based conservation, woodland survey

Ancient woodland is irreplaceable and is one of the UK's most biodiverse habitats. This article argues the need for better evidence to inform survey, assessment and when designing compensation for this habitat.

Introduction

The National Planning Policy Framework (NPPF; Ministry of Housing Communities and Local Government 2019) provides guidance on how planners and developers should deal with projects which could impact ancient woodland. Ancient woodland is an irreplaceable habitat and only for *'wholly exceptional reasons'* (NPPF, paragraph 175c) should its loss or deterioration be countenanced. Impact avoidance should be the primary way to deal with development which may significantly harm ancient woodland, and compensation measures must only be considered as a *'last resort'* (NPPF, paragraph 175a).

It is an unfortunate reality that some nationally significant infrastructure projects may be deemed of sufficient public benefit to pass the strict planning test imposed by the NPPF. Prominent examples listed on the Woodland Trust's campaign website include High Speed 2 and the Oxford to Cambridge Expressway. What follows, for ecologists working on these types of project, is the unenviable task of planning what should happen next. A *'suitable compensation strategy'* (NPPF, paragraph 175c) is required.

Working on projects involving ancient woodland is a cause for both professional and personal anxiety. Keen public interest in the subject; newspaper headlines severely criticising developers and their contractors

Figure 1. NVC type W10 woodland in spring. Photo credit Richard Gowing.

(Barkham 2019); and romanticism around the notion of 'ancientness', all serve to raise the stakes. Ecologists are rightly fearful of public backlash from making the 'wrong' decision.

Scrutiny is vital to democratic decision making. However, the controversial nature of the subject may also result in decisions which are driven by public relations expediency and by tradition and emotion, as much as by evidence. This article seeks to explore a number of themes that I, or colleagues, have encountered when undertaking project work on ancient woodland.

Surveying ancient woods

Are we overlooking the wood for its trees? Almost all reports on ancient woodland produced to inform planning contain a statement confirming that ancient woodland is a nationally important habitat type and that it is irreplaceable. Whilst this category definition rightly communicates the extremely high importance of the habitat type, it also acts to group ancient woods under the same banner, as if they were all similar.

A host of factors make ancient woods different from each other: soil, management (or lack of), livestock/deer browsing, climate/microclimate, topography, hydrology and others. However, when it comes to the survey and assessment of ancient woodland to inform planning applications, the approach often taken is to conduct a National Vegetation Classification (NVC) survey which is used to define the woodland by reference to an alphanumeric code in *Volume 1* of *British Plant Communities* (Rodwell 1991) (e.g. W10 *Quercus robur – Pteridium aquilinium – Rubus fruticosus*

woodland; see Figures 1 and 2). Bird and mammal communities present in ancient woods may be surveyed. Occasionally invertebrates are sampled. Seldomly are lichens and bryophytes looked at in detail. Ancient woodland soils are spoken of as rich in fungi, but fungal diversity almost never documented. Using botanical data, possibly from an NVC survey, an inventory of ancient woodland vascular plant indicator species (AWIS) may be compiled. Where there is a requirement for compensation, the recovery or otherwise of AWIS, or of a particular NVC type, may be used as the primary measure of success. Oliver Rackham cautioned that:

'All too often, professional conservationists look for how a wood resembles other woods, rather than what makes it special. The former was made easy by the woodland volume of the National Vegetation Classification, published in 1991.'

'Research and understanding include looking for resemblances, but conservation is about protecting differences. It is important to keep an open mind and be prepared for unexpected categories.' (Rackham 2006: pg. 547).

It is a long-established and just principle that nature conservation should be about protecting typical examples of each ecosystem (Ratcliffe 1977). One would not wish to take Rackham's point to the extreme by amplifying the importance of the rare and unusual at the expense of the wider woodland ecosystem. But the problem with broad groupings such as 'ancient woodland' or NVC classes, is that they may in some situations close debate and reduce scientific objectivity rather than promote understanding.

In a development planning context, it is perhaps unrealistic to expect an exhaustive inventory of ancient woodland biodiversity which could take many years to gather. However, it feels like we are missing something in our current approaches to survey, assessment and when designing compensation measures. Sometimes we over-simplify the special qualities of ancient woodland. When this happens, the resources invested in habitat creation, particularly that seeking to re-create ancient woodland, may not deliver the biodiversity benefits which are hoped for.

Advances in environmental DNA metabarcoding (e.g. Barsoum *et al.* 2018) offer promise for inventorying cryptic taxa but are yet to be in widespread use in consultancy. eDNA metabarcoding may enable comparison of the biodiversity content of woodlands and their soils, providing objective evidence to strengthen the case for impact avoidance.

Figure 2. NVC type W7 woodland in spring. Photo credit Richard Gowing.

Where impacts are unavoidable, these data would provide a more comprehensive baseline to compare the relative success of different compensation measures. Upskilling in the consultancy sector is required, along with development of appropriate professional standards, to ensure competent interpretation of the outputs of eDNA metabarcoding data. In the short term this technique is unlikely to replace traditional approaches. At the lower end of the technology scale, simple modifications to botanical survey would increase the resolution of our field data. For example, combining NVC survey (which captures ground flora variation relatively well) with other woodland classifications such as the stand type classification (Peterken 1981; which offers a more detailed way of capturing the variation in dominant tree and shrub associations).

Appreciating the human history of ancient woodland

On Environmental Impact Assessment (EIA) projects, it is uncommon for colleagues who are specialists in arboriculture, archaeology and landscape architecture to be involved in the process of ancient woodland valuation and assessment to the same degree as ecologists, at least in a truly holistic sense. Each discipline applies its own lens to the issue of ancient woodland. In extreme cases, ancient woodland is landscape screening; a group of Tree Preservation Order trees; its soils are merely a store of buried archaeology; and it is a vessel for rare plants and animals alone. Separate technical reports are written on the same subject. This is another way in which the unique qualities of individual ancient woods are currently being overlooked.

Most ancient woods have a rich human history which is fundamental to understanding their ecology. This history will only be revealed by adopting an interdisciplinary approach. For example, there are important questions, such as how old is an ancient wood; was the woodland managed as part of a historic parkland or common; and was it always managed for coppice products or has it been grazed in the past? Taking the age of a wood, the convention is that ancient woodland must pre-date 1600 (1750 in Scotland)[2]. However, some historical studies have shown that woods post-dating 1600 may have been colonised by AWIS and may be botanically similar and of comparable importance to ancient woodland (e.g. Williamson and Barnes 2019). In addition, individual ancient woods may contain areas of differing antiquity, whether part former-medieval field system or part of a mosaic of enclosed woodland and wood pasture.

The human history of each ancient wood accounts for its irreplaceability, just as much as biological criteria do. Appreciating this history provides an understanding of the ecology of different woods. This cultural evidence may also strengthen the case for avoiding impacts when answering the NPPF test of whether *'…the public benefit* [of a development] *would clearly outweigh the loss or deterioration of habitat'* (NPPF, paragraph 175c, footnote 58).

Frameworks for interdisciplinary working already exist and are beginning to be more widely used in consultancy, but they are often confined to the largest projects. Adopting these approaches needn't result in major increases in assessment time and cost. For example, Natural England's Ancient Woodland Inventory Handbook (Sansum and Bannister 2018) provides a method for reviewing basic historical information on ancient woodland. Even more simply achieved would be to institute formal interdisciplinary meetings, and make cross-discipline reporting a standard part of EIA delivery in relation to ancient woodland.

Compensation

Ancient woodland is irreplaceable. Compensation measures must never be used to justify its loss or degradation. However, where compensation is required, it is legitimate for ecologists to strive to make this as good as possible for woodland biodiversity. On occasion, this may mean challenging received opinion in favour of evidence-based approaches.

Creating new woodland

We understand that ancient woodland is irreplaceable. However, so often when designing new woodland as a compensation measure, we aim to create an ecological replica. It seems valid enough to seek to re-create a community of plants and animals matching those which will be lost. But this may play-out in rather unexpected ways, for example where consultants are encouraged to 're-create' medieval wood banks and other historical landforms, mimicking those in the impacted ancient wood, but utterly detached from the social and cultural significance of their original formation. A Woodland Trust officer, recently quoted in the Guardian, captured this issue rather poignantly: *"They* [ancient woodlands] *are the most biodiverse habitats in the UK. They are uniquely British, and part of our heritage. They are our natural cathedrals, and cannot be replaced just by planting trees elsewhere. It is like knocking down St Paul's Cathedral, putting the pile of bricks somewhere else and trying to say it's the same thing"* (Laville 2019).

The philosophy of this form of conservation action is one that looks backwards rather than forwards. Those historic management practices which created the woodland are no longer in widespread use outside of nature reserves. Further, the timeframe set for this 'backwards looking', in the context of ancient woodland, is set somewhat arbitrarily as 1600 or earlier. Is this always the correct model for woodland conservation in the UK's increasingly congested modern landscape, where biodiversity is changing in response to climate change?

There are certainly many good arguments for recreating what has been lost. For example, it is possible that uncommon species may depend on the small-scale, ecological conditions offered by a woodland archaeological feature or where compensation habitat is required to buffer or re-connect existing ancient wood. Nevertheless, the 're-create model' should be validated each time it is used; it should not be rolled-out as a default. Three examples of other solutions that may benefit woodland biodiversity are as follows (there are others):

- The chronic lack of traditional management is arguably the major contemporary threat to ancient woodland conservation in the UK, not development (e.g. Rackham 2003, Goldberg *et al.* 2011). Compensation schemes would meaningfully contribute to ancient woodland conservation by directing resources at restoration and preservation rather than new woodland creation.

- Wildling initiatives, such as the Knepp Wildland project in West Sussex, show that self-sown, spontaneously generated scrub and woodland can be very rich in biodiversity (Tree 2018, Casey *et al.* 2020). These vegetation types do not meet conventional expectation of what wooded ecosystems *should* be like, but they are intrinsically high in wildlife and cultural value because of their naturalness. Clive Hambler (2015) makes a similar case for the wildling of existing woodlands, but this time by adopting a non-intervention approach, which favours development of dead wood, detritus and damp habitat niches which support many declining species.
- George Peterken (2017) has questioned the compartmentalisation of woodland and grassland as separate domains of conservation management. Many species are common to both habitats, and biodiverse communities occur at their shared edges. In some situations, mixed mosaics of woodland, grassland and parkland may be better suited to the human-dominated landscapes around developments.

Translocation and planting

Translocation is a specific activity referring to the movement of ancient woodland soils and other features (e.g. coppice stools) from the donor site to a receptor site. It is regularly proposed as a compensation measure for ancient woodland. I have observed the measures designed to compensate for ancient woodland generally, described as 'salvage strategies'. 'Salvage' rather presupposes that translocation is the best solution to compensation. It may well be, but this term forecloses proper debate about the relative merits of this technique. Why not just ancient woodland strategy?

There are several studies into the effectiveness of ancient woodland translocation (e.g. Ryan 2013). Evaluation of translocation success mainly focuses on the recovery of AWIS. Given the widespread and growing use of translocation in our industry, a rigorous, updated, scientific analysis of all previous attempts is needed. Without this, our ability to make informed decisions about compensation for ancient woodland is reduced. At present, we do not know with confidence if the results (for all taxa) justify the cost and difficulty of translocation.

Planting trees is an equally common prescription put forward as compensation for ancient woodland loss. Often it is rightly justified, such as where there is a need for a quick establishment period; and where there are landscaping, heritage or specific ecological reasons for planting trees (e.g. to preserve bat flight lines or to buffer retained habitat from pollution). Yet planting is not the only option for establishment of woodland, there is also natural regeneration. Possible benefits of natural regeneration include trees which are better adapted to the location (Farjon and Hill 2019); the establishment of spontaneous communities of trees and shrubs which are of high value for their naturalness; and reducing the spread of tree diseases and non-local genotypes. But it is rare for natural regeneration to be recommended (or even considered) in compensation strategies. To some extent this is not surprising. Which ecologist would dare to advocate a 'do nothing' approach when faced with having to design compensation for a nationally important habitat type? But natural regeneration is far from devoid of value.

Conclusion

Ancient woodland is more fiercely contested than most other ecological issues when it comes to planning and development. High levels of scrutiny are a cause for fraught project work and may result in consultancy advice which is not based on the best evidence. However, we should not simply fall back on conventional approaches without considering how resources might be spent more effectively. There is a need for better evidence at the survey and assessment stage of our work, and in the unfortunate situation where loss is unavoidable and compensation measures are required.

In relation to survey and assessment, we need to better understand each woodland and not simply rest on the category headings of 'ancient woodland' or particular NVC types. This is especially the case in view of how much emotional baggage some of these terms carry. Simple adaptations to NVC survey; use of eDNA metabarcoding approaches; and working holistically, and as a matter of course, with other technical specialists, are all opportunities that need to be advanced. Obtaining a better evidence-base is important for two reasons. Firstly, it will strengthen the case for avoiding impacts in the first place. Secondly, it will better allow us to test which compensation measure are most effective for multiple taxa, and not just higher plants. Ineffective techniques should be discontinued.

Where compensation is required, ecologists often propose the translocation of ancient woodland soils/woodland features and tree planting. A rigorous scientific analysis of these techniques is sorely needed. The aim of many compensation schemes, to re-create woodland mimicking historical land uses, may be desirable but it should not be an automatic position. Other approaches for creating biodiverse woodland should be legitimised and given appropriate credence. They include enhancing existing ancient woodland; wilding (of both new and existing woodland); and creating mosaics of woodland, grassland and parkland.

To some degree there are bigger forces at play dictating the choices ecologists make. Our industry needs to better appreciate the impact of these external factors and address them where appropriate. They include:

- the need for compensation land to be within the 'red line boundary' of a development (a requirement for planning and practical reasons)
- the fact that it is easier to defend like-for-like compensation and conventional survey and assessment approaches to local communities, pressure groups and in front of planning inspectors, rather than propose different approaches
- the real risk of personal ridicule for seeking to advance the theory and practice of compensating ancient woodland.
- stakeholders' fear, with some justification, that compensation could be used as an excuse for ancient woodland loss.

Finally, the traditional paradigm for nature conservation in the UK continues to promote single-use land uses (e.g. for development, agriculture or indeed nature conservation). Thinking which advocates habitat creation offering multiple public benefits is yet to fully penetrate the way ecologists operate (Leslie 2019).

We need a more open and transparent debate about how to deal with ancient woodland. So often the forces are aligned for a pitched battle between developers and stakeholders, and are wholly adversarial. This comes at the cost of better possible outcomes for woodland biodiversity. Developers need to be more realistic and honest about the public benefits they claim to provide when arguing that avoidance is not possible. The true financial cost and difficulty of compensation needs to be part of this calculation and the benefits lost need to include those which are ecological and cultural, not just those which are financial. In turn, where society determines that the NPPF tests are satisfied, campaigning organisations may sometimes have to be more magnanimous and work with developers to get the best outcome. CIEEM should play a role here by continuing to promote technical excellence in survey and habitat creation but *also* by developing best practice in fair, open stakeholder engagement and consensus building.

Finally, the Government, its agencies and local authorities would enable bigger and better outcomes for woodland biodiversity by adopting bolder planning for habitat creation and by allocating land strategically for that purpose. They should incentivise developers and ecologists to provide woodland creation schemes which offer multiple benefits to people and wildlife. These will never replace ancient woodland, but may go some way to offer new biodiversity and cultural connections to woodland in recompense for those damaged or degraded by development.

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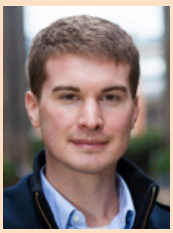
Notes

1. The title for this article was borrowed from a recent 'rethinking' of the evidence and theory on ancient woodland in Norfolk written by Williamson and Barnes (2019).

2. Ancient woods are defined in the UK as areas that have been continuously wooded since 1600 (or 1750 in Scotland) after Spencer and Kirby (1992) and Scottish Natural Heritage (2014).

About the Author



Richard Gowing is a London-based ecologist and is team leader for WSP's London ecology team. He is involved in a number of projects requiring the survey and assessment of woodland.

Contact Richard at:
richard.gowing@wsp.com

Fruit Trees and Their Potential as Medium-Term Mitigation for Roosting Bats

Stephanie Harper, Simon Barker CEnv MCIEEM, Ian Davidson-Watts MCIEEM and **Oliver Barnett CEnv MCIEEM**

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Early senescent fruit trees develop veteran features much earlier than other tree species. When prescribed as medium-term mitigation for bats, they provide natural Potential Roost Features (PRFs) and a wealth of ecological benefits.

Introduction

Fruit trees enter senescence or 'veteranise' much earlier than most tree species. This means that they start to decay at a younger age, leading to the development of cavities and other features that could provide roosting sites for bats. These features also provide many other wildlife benefits, especially for saproxylic invertebrates (Ivin and Barker 2011). The natural veteranisation of fruit trees is of interest to ecologists looking to add Potential Roost Features (PRFs) to a site as mitigation or compensation for developmental impacts.

In this article, we advocate the widespread planting of fruit trees in new tree planting schemes, and their addition to existing woodland, to provide roost sites relatively quickly compared to traditional planting schemes. Although comprehensive evidence is lacking, we argue that fruit trees are an overlooked resource for bats that could easily be provided more widely in the landscape to offset the loss of roosting features to development.

Fruit trees in the landscape

Fruit trees are only found in significant numbers within commercial or traditional orchards. Older fruit trees (>25 years old) typically will only survive in traditional orchards or as individual specimens in gardens, as they become less productive after 15-20 years and are likely to be grubbed up and replaced. Unfortunately, many traditional orchards have been lost over the past century as fruit cultivation has become more intensive, and they are now a rarity in the UK landscape (Figures 1, 2). Orchard remnants (with a few surviving veteran apple *Malus domestica* or pear *Pyrus* spp. trees) do still occur in gardens and at the fringes of developments.

Figure 1. A traditional apple orchard in Shropshire with veteran trees. Photo credit O. Barnett.

Fruit trees typically have a short life in comparison with other tree species, and will die after 70-100 years. This age will vary depending on factors such as the species, the rootstock chosen, planting density, disease, soil chemistry and drainage, canopy closure from taller surrounding trees, and climate change. For these reasons, ancient fruit trees are rarely found outside a cultivated setting.

Figure 2. A rare, restored, traditional orchard. Photo credit S. Barker.

Figure 3. A wealth of different types of roost feature occur on veteran apple trees, e.g. woodpecker holes, rot holes and hollow trunks. Photo credit O. Barnett.

The exception is the pear which is a much longer-lived tree, with dense wood resistant to decay making it relatively slow to acquire PRFs. This is especially true for perry pears, which are a particular feature of traditional orchards in the Three Counties (Gloucestershire, Herefordshire and Worcestershire). These make magnificent veteran trees after 100-200 years.

Apple, plum *Prunus* spp. and cherry (cultivated sweet *Prunus avium* or sour *Prunus cerasus*) trees are 'early senescent' and veteranise from 30 years of age with dead heartwood in domestic apple trees frequently recorded after 40 years of age (Figure 3). Cultivated varieties of plum on vigorous rootstocks are the quickest to veteranise (but have the smallest stature so will develop a more limited range of PRFs – see Figures 4 and 5), followed by apple and then cherry. Veteran features in any tree species create roosting opportunities for bats, and these features also provide many other wildlife benefits, especially for saproxylic invertebrates and cavity nesting birds. The benefits of orchards and fruit trees for invertebrates and birds have been well studied (Barker *et al*. 2011), although assessment of their associated benefits for bats has been neglected.

Figure 4. Veteran damson tree. Photo credit S. Barker.

Figure 5. Veteran plum tree. Photo credit S. Barker.

Fruit trees and bats

There are limited data on the tree species preferred by roosting bats. The Bat Tree Habitat Key Database (Bat Tree Habitat Key 2018) compiles survey records of Potential Roost Features (PRFs) in different species of trees, how they are formed, and their use by bats. The records are supplied voluntarily by a significant number of dedicated bat ecologists (171 ecologists had contributed by 2018), many of whom are tree climbers. The Bat Tree Habitat Key (BTHK) has records of roosts in domestic apple (for Bechstein's *Myotis bechsteinii*, Daubenton's *Myotis daubentonii* and Natterer's *Myotis nattereri* bat) and in wild cherry *Prunus avium* (for soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared *Plecotus auritus* bat). No records have been reported for cultivated sweet cherry (also *Prunus avium* although much altered from its wild progenitor), plum or pear trees, crab apple *Malus sylvestris* or bird cherry *Prunus padus*.

Veteran fruit trees are relatively rare; where they have survived they are often protected and so there is a lack of development pressure that would necessitate bat surveys. Orchards and fruit trees are occasionally surveyed for bats as part of a planning application. Unfortunately, as is generally well recognised, traditional surveys of individual trees are statistically unlikely to find bat roosts. Tree climbing surveys of trees to inspect features with potential for bats rarely find signs of bats using those features, even when radio-tracking confirms a significant and well-used roost in the feature (IDW pers. obs.). Any transient organic evidence (droppings, urine stains, etc.) swiftly deteriorates or is disguised by the complexities of the feature.

Ecologists have recorded incidences of bats roosting within veteran fruit trees (for example, a male Bechstein's bat radio-tracked to a veteran apple tree in a paddock, IDW pers. comm.; Figure 6). Of course, these few records pall when compared with the number of roost records for oak *Quercus* spp., sweet chestnut *Castanea sativa* (another early maturing species) and ash *Fraxinus excelsior* trees. However, the rarity of veteran fruit trees is clearly a factor. Furthermore, sweet chestnut and ash are no longer recommended for inclusion in any planting mix due to the disease risk. Although fruit trees do have significant diseases that affect their commercial productivity, as part of a diverse planting scheme they are unlikely to be badly affected, especially where the goal is biodiversity enhancement, and there are no significant known risks from the spread of fruit tree diseases to other important native trees.

Provision of roost features for bats at development sites

For development sites where significant impacts to bats will be incurred, ensuring the Favourable Conservation Status (FCS) of the impacted bats is a key consideration for planners and regulatory bodies, especially where a protected species licence may be required. Immediate replacement of any roosts to be lost is mandatory. Often this is achieved by erecting bat boxes adjacent to the works / impact area, and building bat boxes and roost features into new buildings. Favourable Conservation Status of bats is also affected by the availability of sufficient PRFs as well as of habitat suitable for foraging. Bats use a wide range of roost features and change roost frequently to minimise disease, so an adequate supply and variety of PRFs within an area is important to maintain bat populations at the pre-development level. Mitigation for loss of roost features is rarely considered, although mitigation for habitat loss is usually achieved through landscaping proposals (where eventual development of PRFs in the planting is inferred / assumed).

Bat boxes have a useful lifespan of approximately 15 years and are usually installed prior to development works commencing. However once the bat boxes reach the end of their useful life, these roosts / PRFs are lost. Typical native broadleaf tree planting for new

Table 1. Specification and management of fruit tree planting to provide Potential Roost Features for bats and other biodiversity benefits.

Factor	Detail
Fruit tree species	Domestic apple *Malus domestica* Cherry *Prunus avium* (cultivated varietal rather than wild cherry) Plum *Prunus* spp Other early senescent varieties may be selected. Local varietals preferred; choice best undertaken in liaison with local orchard / fruit tree interest groups.
Rootstock	Very vigorous: Apple = M25 (possibly M106); Cherry = F1.12.1; Plum = Brompton.
Density per ha	Woodland edge band: 150 trees / ha Typical traditional orchard: 7-15 m centres variably (10 m average) = 100 tree / ha
	Scattered in grassland to create attractive veteran trees within 30-50 years.
Initial management	0-5 years: establish planting, replace any dead / diseased / damaged trees.
Intermediate management	5-25 years: management to ensure tree reaches maturity. Formative pruning is not required for trees only planted for biodiversity benefits.
Long-term management	25+ years: ensure tree develops veteranised features. If required, intervene with arboricultural techniques which encourage early veteranisation, e.g. 'coronet cuts'. Maintenance only on pasture trees and / or where a longer-lived specimen tree is desired for its visual amenity value.
Goals	a) 0-25 years to grow trees to full size and maturity; and b) 25-100 years for the trees to develop rot holes, natural senescent features and die at variable rates.
Assumptions	Trees will naturally develop one veteran feature each, starting from 30 years old; more features will develop as time passes.
Other factors	Disease, climate change, root zone of adjacent woodland and overshadowing by canopy of adjacent trees, all will affect the lifespan of the trees. A lifespan of 50 years is the target and some loss is expected (up to 30%) before this. Dead trees to be left *in situ* without management unless deemed to be unsafe. Any felled branches to be left at the base of the tree.

Figure 6. Bechstein's bat roost in a veteran apple tree (Photo taken just prior to the follow-on emergence survey). Photo credit I. Davidson-Watts.

developments will comprise mainly long-lived trees that will only mature after 50-70+ years, developing PRFs from that time forward. This leaves a significant time gap in the compensatory provision of PRFs at a site for bats of between 15-50 years, as there is usually no licensing or planning mechanism to ensure bat boxes are replaced after 15 years so that the number of PRFs within the area is maintained.

Specifying fruit tree species as part of the landscaping proposals for a development is an ideal way to enhance the PRF resource in the medium-term for bats. The fruit trees will degenerate without any intervention or active management, to create naturally occurring PRFs from 30+ years. Management can be undertaken, if desired, to ensure the trees reach maturity in a healthy condition and to encourage early formation of veteran features. Table 1 provides some basic principles to inform fruit tree specification and management.

Other tree species that are planted widely and veteranise earlier than other species (from approximately 40 years) are silver birch *Betula pendula* and downy birch *Betula pubescens*, which are well-used by bats. Barbastelle *Barbastella barbastellus*, Leisler's *Nyctalus leisleri*, common pipistrelle *Pipistrellus pipistrellus* and brown long-eared bat have all been recorded using silver birch, with Natterer's, common pipistrelle, soprano pipistrelle and brown long-eared also recorded using downy birch (Bat Tree Habitat Key 2018).

Birch trees are significantly more common in the landscape than fruit trees as they propagate much more readily; they are also frequently planted as part of a well-designed native broadleaf planting scheme. In comparison, fruit trees are only rarely specified for new developments (usually as part of a biodiverse fruiting hedgerow to provide benefits for small mammals and invertebrates) and only really thrive over the long-term when actively cultivated. This presents an unusual design advantage. Without management, fruit trees will die and eventually disappear without trace. If they are not desired as part of the end-goal for the planted habitat (e.g. broad-leaved woodland) then they can simply be left alone. In the meantime, they will significantly enhance the biodiversity of an area, provide flowers and fruits for invertebrates, as well as providing PRFs that both bats and birds may exploit.

Conclusion

The availability of sufficient roost sites within an area is a key consideration in supporting the Favourable Conservation Status of bats where they are significantly impacted by development proposals. Immature trees and shrubs lack any features to support bat roosts; these will not develop until the planting matures, which can be 50+ years. Veteran features on mature trees are typically exploited by bats as roosts; despite the relative lack of supporting data, there is no reason to believe bats would not use such features on fruit trees. Fruit trees possess unique natural traits that offer great potential for medium-term (30-70 years) enhancement for bats in almost any habitat. The rapid development of veteran features from 30 years of age creates natural Potential Roost Features to support healthy bat populations with minimal human management. With the bonus of the benefits they provide for other wildlife, and by enhancing biodiversity generally, the inclusion of fruit trees within planting schemes ensures that proposals to mitigate or compensate for impacts to bats will be significantly more robust and will provide value much earlier than traditional mitigation schemes.

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About the Authors

Stephanie Harper (Harper Environmental Ltd) is a bat-licenced ecological consultant with an academic background, having previously worked on a variety of projects at AECOM, Arup and ENVIRON (now Ramboll).

Contact Steph at:
Stephanie.Harper@consultant.aecom.com

Simon Barker CEnv MCIEEM is a Wildlife Adviser with the National Trust, based in the West Midlands. He lives in a traditional orchard heartland and has a specialist interest in this habitat and its associated wildlife, especially birds.

Contact Simon at:
simon.barker@nationaltrust.org.uk

Ian Davidson-Watts (Director, Davidson-Watts Ecology Ltd) has undertaken various regulatory, consultancy and research roles. He has specialised in advanced survey methods for bats for over 25 years. His research on woodland bats has led to the designation of a number of woodland bat Special Areas of Conservation.

Contact Ian at: ian@dwecology.co.uk

Oliver Barnett is Co-Lead for AECOM's UK&I Ecology team and has been involved with advanced bat surveys and bat mitigation design on High Speed 2 and other major infrastructure projects for eight years. He has a strong interest in conserving wild bat populations.

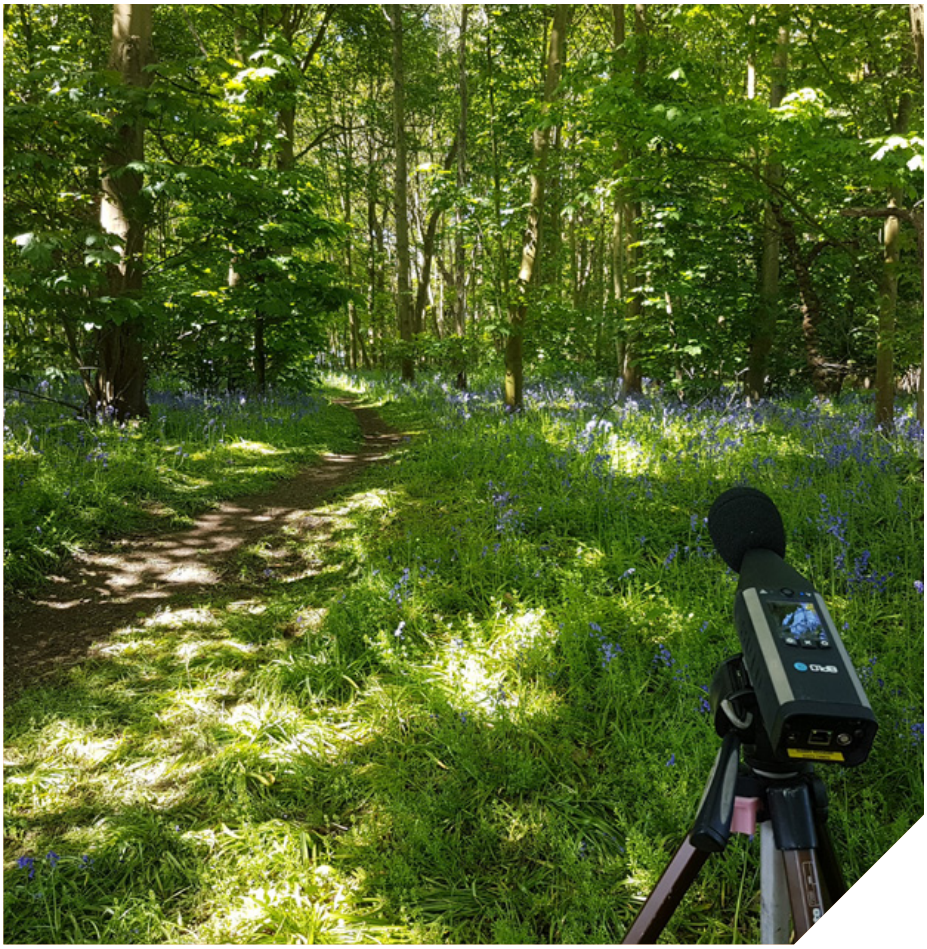
Contact Oliver at:
oliver.barnett@aecom.com

Noise Impacts on Bats – A Sound Assessment?

Paola Reason CEcol CEnv MCIEEM
Clive Bentley CEnv

Keywords: bats, development, impact assessment, noise

Whilst many studies have been published in the last few years which consider the potential effects of noise on bats, none of these contains sufficient information about sound levels to enable a reliable threshold for disturbance to be derived. However, based on the research which is available, it is possible to assess a level below which one can be confident that noise disturbance is unlikely for bats in roosts, when commuting and during foraging. Further research is called for with input from both an acoustics specialist as well as a bat specialist being critical to obtaining usable data.



Recording noise in a natural habitat. Photo credit Clive Bentley.

Introduction

In 2016, West produced a major report and literature review: *Technical guidance for assessment and mitigation of the effects of traffic noise and road construction noise on bats* (West 2016). However, the section providing 'guidelines for project noise assessment and management' is short, and calls for research.

Simmons *et al*. (2016) note that *'echolocating bats… have evolved in noisy environments, where they are naturally exposed to continuous intense sound levels from their own and neighbouring sonar emissions'*. Their research shows that, although echolocating bats emit very high sound levels (typically at around 110 decibels Sound Pressure Level (dB SPL) measured at 10 cm distance; BCI & NREL 2013), bats do not experience short-term hearing loss in the same way that other animals do (Simmons *et al*. 2016).

From this, it could be assumed that we needn't worry about noise impacts on bats, but it is likely that bats continually monitor their environment and develop 'dynamic acoustic pictures' of what is normal, different, or possibly threatening (West 2016). That said, *hearing* a sound is not the same as being *disturbed* by it. Case law suggests that disturbance relevant to impact assessments is that which is sufficient to interfere with bat behaviour to the extent that it impacts negatively on the demography (survival/breeding) of the species at the local population level (Simpson 2011).

Three mechanisms for disturbance were suggested by Luo *et al*. (2015):

- acoustic masking: background noise overlaps with the sounds bats use to detect prey, reducing foraging efficiency
- reduced attention: competing noise means a bat can give less attention to prey capture
- noise avoidance: a bat avoids areas that it perceives as noisy.

Noise measurements

Animals detect sound over a range of frequencies, but not all frequencies are detected equally (Figure 1). This is also true for humans, so almost all noise measurements are 'weighted' to reflect the relative loudness of sounds in air as perceived by the human ear (hence A-weighted, denoted by dBA). Higher frequency sounds (above 8 kHz) are de-emphasised. Limited available UK bat audiogram data (Coles *et al.* 1989 and Bohn *et al.* 2006) suggests that only sounds above 8 kHz need to be considered when assessing potential effects of sound on bats. These frequencies are outside of the range given emphasis by A-weighting, which will over-emphasise sounds inaudible to bats and underplay those they can hear.

The parameter used for measurements (SPL, L_{eq}, L_{max}; see Glossary) and the time weighting also play a critical part in understanding the sounds present. Reported sound levels without this additional information are insufficient to enable any reliable conclusions about disturbance to be made. Unfortunately, the published studies do not report this crucial additional information.

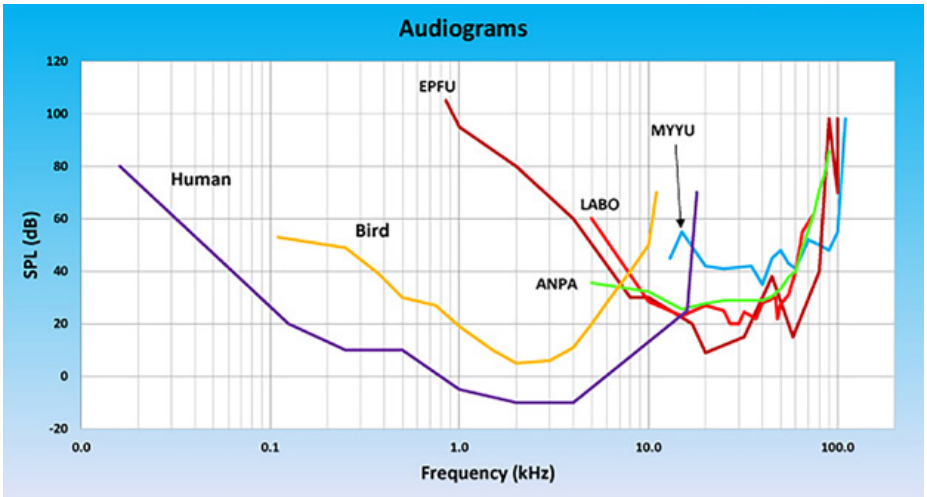


Figure 1. Audiograms, which plot the minimum audible Sound Pressure Level (SPL) that an animal can detect in dB across a frequency range, tend to be U-shaped, showing that a louder noise is required to evoke a response at the highest and lowest frequencies. Audiograms are shown here for human, bird and four bats: little brown bat *Myotis lucifugus* (MYLU), pallid bat *Antrozous pallidus* (ANPA), eastern red bat *Lasiurus borealis* (LABO), and big brown bat *Eptesicus fuscus* (EPFU). Reproduced with permission from West 2016.

The evidence for responses to noise

The evidence available suggests that responses differ by species:

Roosting bats

- Five common species of bat roost in Wolvercote Tunnel, Oxfordshire, which supports a live railway (Billington 2013).
- Bats roost in motorway and trunk road bridges (anecdotal records and reports).
- Various studies (Shirley *et al.* 2001, Packman *et al.* 2015, Zeale *et al.* 2016, Janssen *et al.* 2017) provide sound level data along with reports of bat behaviour, for example during a music festival and in response to bat deterrents in churches, but none of the data reported contain sufficient sound level information to enable it to be used to derive a reliable threshold for disturbance at roosts.

Foraging bats

- Bunkley *et al.* (2015) compared bat activity near compressor stations; the assemblage of bats calling at <35 kHz showed a 70% reduction in activity at 'loud' sites compared to 'quieter' ones. However, they used dBA and did not measure high-frequency components, which undermines their apparent findings.
- Janssen *et al.* (2017) radio-tracked brown long-eared bats *Plecotus auritus* before and during a music festival and found no statistical difference in flight movements during concerts. Though there seemed to be less activity in areas experiencing sound >60 dB at 8 kHz, foraging was unchanged at levels below this. In a previous year, breeding common pipistrelles *Pipistrellus pipistrellus* continued to forage with no detectable change in behaviour.
- Luo *et al.* (2015) played noise recordings of differing frequencies to Daubenton's bats *Myotis daubentonii* to determine whether acoustic masking, attention reduction or noise aversion was responsible for reducing foraging efficiency. At around 76 dB, noise created an avoidance response whether or not it overlapped with echolocation calls.
- Schaub *et al.* (2008) studied greater mouse-eared bats *Myotis myotis* which forage by listening for the sounds of prey rustling. In laboratory experiments, bats avoided areas when the frequencies of the noise overlapped with those used to locate prey, but did not stop all foraging where noise was unavoidable.
- Burton (2019) reported on field tests of acoustic deterrents in the UK (using similar deterrents to Zeale *et al.* 2016). The distance of effectiveness of the deterrents on bat behaviour was up to 20 m in front of (and 10 m behind) the devices; results over longer distances, and on habituation in different species, were not reported.
- None of the available studies contains noise levels measured and reported in a way which enables a comparison between studies nor the derivation of a reliable threshold for disturbance.

Commuting bats

- Schaub *et al.* (2008) found no differences in bat flight ability under different noise treatments, suggesting that navigational ability by echolocation was not affected, even when loud high-frequency noise overlapped with echolocation calls.

Hibernating bats

- By measuring increases in skin temperatures of greater mouse-eared bats, Luo *et al.* (2014) found that torpid bats seemed less responsive to mechanical noise than active bats, and habituated rapidly when the noise was repeated and prolonged.

Does this evidence lead to disturbance thresholds?

Bats have been found roosting in a range of apparently noisy sites but noise

measurements have not been made. Janssen *et al*. (2017) suggest a level of tolerance of 40 dB at 8+ kHz for brown long-eared bats; common pipistrelles appeared more tolerant. In other studies, louder acoustic deterrents were effective in deterring Natterer's bats *Myotis nattereri* (Zeale *et al*. 2016), but were eventually tolerated by soprano pipistrelles *Pipistrellus pygmaeus* (Packman *et al*. 2015). Since key sound level data is missing from all published studies, reliance on any of the levels suggested in these is quite likely to lead to incorrect conclusions and false confidence in thresholds so derived.

Field measurements from natural daytime sounds in rural locations (C. Bentley, unpublished) suggest levels of 40 dB or more in the frequency range 8 to 20 kHz are not uncommon, with readings from gently rustling reeds at a distance of around 10 m resulting in approximately 50 dB in this frequency range. Applying the precautionary principle, non-natural, unfamiliar or unpredictable noise exceeding 50 dB, L_{max} at 8+ kHz within a roost *could* begin to have deleterious effects (e.g. increased stress). This does not mean that disturbance should be considered significant as soon as construction noise exceeds that level, nor that this should be cited as a threshold for disturbance; much may depend on baseline conditions and the character of the sound as well as the bat species.

For bats on the wing, the evidence is even less definitive. Janssen *et al*. (2017) hint at effects above 60 dB, but the method of noise measurement was not comparable to the way most development-related noise data is collected. Bunkley *et al*. (2015) recorded foraging at ambient sound levels of up to 68 dBA (though, as noted, dBA data are likely to over-estimate the noise perceptible to bats). Luo *et al*.'s (2015) study shows noise avoidance between 68–84 dB, but does not test other noise levels. None of these lead to a definitive threshold.

West (2016) proposes that all areas that would be subject to noise levels above the baseline should be assessed for the likelihood of impact, on the assumption that bats are adapted to existing baseline conditions. Until more evidence is available, this is the only way forward, although the baseline noise level considered would need to be unweighted and measured in the frequency range audible to bats. It may not be possible to determine where higher levels of noise would begin to have an effect, but it should be possible to predict with reasonable confidence (using modelling) where noise impacts can be expected *not* to occur. For larger development projects, this will allow unaffected commuting routes to be identified, and the extent (proportion) of unaffected foraging areas to be estimated.

In the absence of unweighted data for a particular site, it may be tempting to use data collected for human receptors (dBA). However, these will inevitably result in unreliable conclusions and are likely to result in overestimates of the noise within the spectral range of hearing of bats, potentially leading to unnecessary constraints on construction and/or over-precautionary mitigation.

Factors to be considered in assessing noise impacts on bats

Whether or not noise modelling is available, the factors to be considered in any bat noise impact assessment are as follows:

- **Tolerance to noise will (almost certainly) differ between species and behaviours** (roosting, hibernating, foraging, commuting), so these should be considered separately.
- **Baseline conditions indicate existing levels of tolerance**; to be considered significant, change to the baseline needs to be sufficient to cause disturbance.
- **Roosting behaviour and range size may influence the severity of any impact**. Species with smaller home ranges and high roost fidelity (e.g. brown long-eared bat) may be affected more than species that have larger home ranges, typically fly further to foraging sites, and/or move roosts frequently (e.g. barbastelle *Barbastella barbastellus*).
- **The season and duration of development works will influence the severity of any impac**t. If bats are seasonally absent, then they cannot be disturbed, but they could be deterred from returning to a roost. Foraging and commuting bats are more active between April and November although noise in habitats close to important hibernation sites should not be ignored.
- **Bats may avoid commuting through areas they perceive to be nois**y, thus disrupting movements between roosts and foraging areas and potentially resulting in the abandonment of roosts.
- **Noise avoidance could lead to bats avoiding optimal foraging areas** in favour of quieter locations. Alternatively, where noise is unavoidable because other feeding resources are not available, foraging may continue but with reduced efficiency. If the noise continues, habituation may occur.
- While noise avoidance may result in changes in foraging behaviour, **movements which are less frequent**, such as travelling to mating roosts or moving between breeding and hibernation sites, **are less likely to be affected**.
- **The character of sound** (continuous, regular and/or familiar; or discontinuous, intermittent, irregular) and its source (traffic, agricultural machinery, light plant, heavy plant) **should be taken into account**, ideally with appropriate noise data supplied.
- **Contributory factors such as lighting and human disturbance must be considered** as part of any assessment of disturbance to bats.

The consequence of disturbance on the Favourable Conservation Status (FCS) of a population of bats (JNCC, undated) is very difficult to predict. Roost abandonment or a lack of bat activity in a previously well-used foraging area might be obvious, but the impacts of increased energy demands as a result of longer commutes, additional vigilance or competition are harder to determine.

The conservation status of each species must also be taken into account (Simpson 2011). If the disturbance is likely to be sufficient to constitute an offence under the Habitats Regulations 2017 (for example, causing roost abandonment), a European Protected Species (EPS) licence will be required to allow a development to proceed, and FCS will need to be maintained.

What next?

There is a clear gap in our understanding of the importance of noise impacts on bats. In the absence of empirical data, the potential effects of noise should be considered pragmatically. If the nature, scale and duration of a development are

such that noise could cause disturbance to important bat populations, then unweighted, high-frequency noise measurements of existing ambient levels based on frequencies audible to bats (~8 kHz upwards) should be collected. This should continue during construction to monitor the bats' response to noise, and all such data should be made freely available so that impacts can be better understood. Lighting may yet prove to be more important than noise as a factor in disturbance, at least for some species, and should be monitored in parallel.

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Glossary

dBA: unit of sound level weighted for the human ear, termed A-weighted

kHz: unit used to measure sound frequency

L_{eq}: equivalent sound level, ambient sound level (like an average of a measurement period)

L_{max}: the highest noise level recorded during a measurement period; the time weighting used should be stated

SPL: Sound Pressure Level, the constantly fluctuating level of sound, expressed in decibels (dB)

Time-weighting: the pre-set speed at which a sound level meter responds to a change in sound

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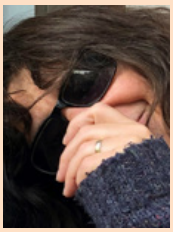
About the Authors



Paola Reason CEcol CEnv MCIEEM MIEMA SpDipEM is a Director at RSK Biocensus (and a member of Natural England's Bat Expert Panel). Her interest in bats started with Comoro Islands fruit bats in 1992, and she became a consultant in 1995. She became interested in the effects of noise on bats when researching the subject for large infrastructure projects. Paola is happy to connect with anyone undertaking or considering research into noise impacts on bats.

Contact Paola at:
paola.reason@biocensus.co.uk

Clive Bentley CEnv CSci MIEnvSc MCIEH MIOA is an acoustic consultant living in Suffolk, UK. He has worked in environmental science and noise control since 1986. Clive regularly provides expert witness evidence in planning appeals and court cases relating to environmental noise. He is a passionate advocate for outdoor tranquillity.

Contact Clive at:
clive@sharpsredmore.co.uk

Should We Rethink Winter Pond Maintenance For Newts?

Bradley Fairclough MCIEEM,
Grant Walker MCIEEM
and **Erik Paterson MCIEEM**

Keywords: maintenance, newt, palmate, pond, residence, winter

Adult male palmate newt. Photo credit Erik Paterson.

Newts in Britain typically migrate from terrestrial over-wintering refugia to spring breeding ponds; and, post-breeding, back to terrestrial over-wintering refugia. There are, however, reports of adult newts being present and active in ponds over winter months. The aim of the work reported here was to determine if adult newts were present in a pond in Scotland throughout the year. Torchlight surveys undertaken between July 2016 and April 2017 identified 56 adult male palmate newts *Lissotriton helveticus* present and active in the pond in mid-December. They had retained secondary sexual characteristics, indicating likely winter residence. Conservation and pond maintenance activities, for example removal of pond vegetation and substrate to improve breeding habitat for newts, are often undertaken between November and January to avoid newts. However, it appears that newts may be seriously disturbed or killed during such activities. This finding highlights the requirement for winter surveys prior to winter pond maintenance work and the need for further research to better understand aquatic winter residence of newts.

Introduction

Newts are common throughout Great Britain (ARC 2020) and are found during ecological surveys for a variety of projects. There are three species of newt native to Britain, with the great crested *Triturus cristatus* likely to be the most familiar due to its prevalence throughout England and its protection as a European Protected Species. The other two 'small newt' species, smaller but no less charismatic, are smooth *Lissotriton vulgaris* and palmate *Lissotriton helveticus*, which are only protected by UK legislation against sale. If impacts to newts or their habitat cannot be avoided, one of the most effective methods available to ecological consultants to mitigate for loss of suitable aquatic habitat is enhancement of existing unimpacted ponds.

The accepted newt life cycle involves spring breeding in ponds with adult males from all species fully forming striking secondary sexual characteristics once in the water, such as crests or webbed hind-feet. Post-breeding, the adult newts leave the ponds for terrestrial foraging and winter hibernation refugia - under log piles, in compost heaps or in drystone walls – and males will lose their secondary sexual characteristics. This phenological pattern is caused by exposure to wide seasonal air temperature variations; and it is considered that the signal for newts to return to the ponds in spring is an increase in air temperature following successive days of stable air temperature around 4-5 °C for great crested newts and 0 °C for the other two species (Harrison *et al*. 1983, Verrell and Halliday 1985).

This predictable life cycle allows ecologists to plan pond enhancement activities to occur over the winter months, when the adult newts are assumed absent, so that it is less likely that newts will be disturbed or killed during removal of sediment or vegetation. It is well-documented in the literature that the few newt larvae that have not fully metamorphosed will remain in ponds during winter months and could be at risk during works (Griffiths 1997, McNeill and Downie 2017). However, as the adults will not be impacted whilst in terrestrial hibernation, the local population will survive. There would be a much larger risk to the population if the adults remain in the pond during the winter pond maintenance.

In contradiction to the accepted newt life cycle, there have been some reported cases of adult newts being present within ponds during winter months. Dodd and Callan (1955) recorded that the majority of adult males of a palmate newt population over-wintered in a pond in Fife, Scotland, and Edgar and Bird (2006) reported that small numbers of adult great crested newts hibernate in aquatic habitat. The Froglife website also suggests that some adult newts might hibernate in pond sediments (Froglife 2020). It is unclear why adult newts can be present in ponds during winter months and whether this phenomenon is rare, undetected, or under-reported.

The aim of the work reported here was to determine if adult newts were present in a pond in Scotland throughout the year.

Adult male great crested newt. Photo credit Erik Paterson.

Methods and results

Fourteen torchlight surveys were undertaken at a pond in Pumpherston, West Lothian, Scotland, between July 2016 and April 2017. Air and water temperatures were measured; and newts were counted 30 minutes after sunset following standard methodology (Griffiths *et al.* 1996). Torchlight surveys were the only viable survey option as bottle-trapping should only be used when air temperatures remain above 5 °C. Female palmate and smooth newts, and male palmate and smooth newts without secondary sexual characteristics, could not be identified to species level without being in the hand and were therefore recorded as 'unsexed small newts'.

Air temperature for non-survey days was obtained from a weather station located 9.5 km from the pond (Edinburgh/Gogarbank; Met Office 2018).

All three newt species were recorded in the pond, with an adult of at least one species recorded during every survey (Figure 1). In 2016, there were no juveniles of any species recorded in the pond after September and no larvae of any species recorded after mid-December. Adult great crested newts were not recorded in the pond after October 2016 or before March 2017.

The maximum survey count between July and November 2016 for adult male palmate newts was nine (with an additional three unsexed small newts). However, on the 15 December 2016 the survey count for adult male palmate newts was 56, with a further six unsexed small newts recorded. This count coincided with an air temperature of 8.6 °C and water temperature of 6.9 °C.

Discussion

The survey results clearly demonstrate winter presence of adult male palmate newts in a pond in West Lothian, Scotland. Griffiths and Mylotte (1988) showed that the adult male palmate newt secondary sexual characteristics fully form between one and two months after entering the aquatic habitat from terrestrial refugia and are lost within 25 days of exiting the aquatic habitat. As the 56 adult male palmate newts recorded on the 15 December 2016 exhibited their secondary sexual characteristics of black webbed hind feet and tail filaments, it can be deduced that these males had not been out of the aquatic habitat for longer than 25 days, if at all.

The survey prior (12 November 2016) to the high count of 56 adult male palmate newts only recorded eight adult male palmate newts. It is possible that the 56 males recorded on 15 December 2016 had recently entered the surveyed pond from an adjacent larger waterbody, or may have been buried in the sediment during the survey on 12 November 2016, thus remaining undetected. However, based on the adult male newts displaying secondary sexual characteristics, they had demonstrably remained within the aquatic habitat.

Air temperature obtained from the weather station showed that the minimum daily air temperatures on the days preceding the high count of male palmate newts on 15 December 2016 was

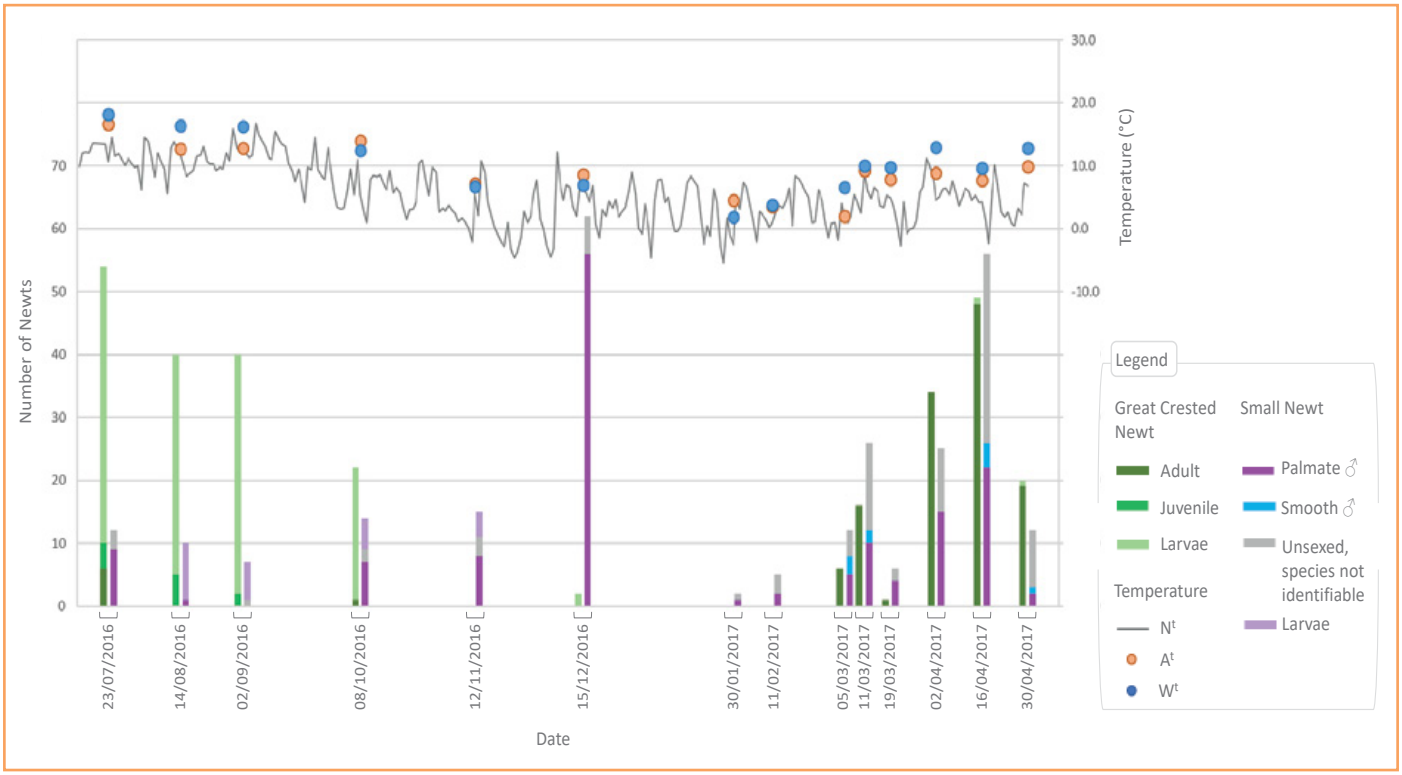


Figure 1. Environmental parameters (N^t = non-survey day air temperature from Edinburgh/Gogarbank weather station, A^t = survey air temperature, W^t = survey water temperature) and newt counts with one great crested newt bar and one small newt bar per survey (♂ = adult male; 'Unsexed, species not identifiable' could be either adult palmate or smooth females, or males without secondary sexual characteristics) for 14 surveys undertaken at a pond in Pumpherston, West Lothian, Scotland, between July 2016 and April 2017. Contains public sector information licensed under the Open Government Licence v1.0.

above 0 °C from 7 December 2016. These data concur with Langton *et al.* (2001) who suggest that the preceding daily air temperatures influence newt activity – when triggering breeding migration - and Harrison *et al.* (1983) who suggest that small newts are active above 0 °C.

There was a low count of adult male palmate newts in January (n=1) and February (n=2) 2017, in comparison to the 56 recorded on 15 December 2016. The air temperature taken from the weather station shows ten days of less than 0 °C on the non-survey days between 15 December 2016 and 30 January 2017. This drop in temperature could explain the low palmate counts, as potentially the newts may have finally left for terrestrial refugia.

The palmate count did not return to a resemblance of the peak count of 56 adult males until 16 April 2017 when 22 male palmate newts and 30 unsexed small newts were recorded. Some of these unsexed small newts may have been palmate males that had recently returned to the aquatic habitat after being in the terrestrial habitat for longer than 25 days and so had not fully formed secondary sexual characteristics. It is therefore reasonable to posit that the 56 adult males recorded on 15 December 2016, mid-winter, comprised a large proportion of the local palmate male newt population that utilise this pond.

Adult great crested newts had most probably left the pond for winter terrestrial refugia as no adults were recorded between November 2016 and February 2017, inclusive. This would suggest that any remedial work to enhance the pond over winter months would be unlikely to impact the adult great crested newt population. However, standard best practice does not advise monitoring small newt populations over winter months and, therefore, pond maintenance at this location during winter 2016/2017 would most likely have had a major adverse effect on the local palmate newt population.

Winter pond maintenance - recommendations

Pond maintenance for newts can involve invasive activities such as removal of sediment or leaf litter, or removal of aquatic vegetation, which can harm newts present in the pond. For this reason, remedial works are often advised to be undertaken between November and January (Natural England 2014) without prior surveys for over-wintering newts. The data reported here demonstrates that winter pond maintenance can pose a threat to newt populations, and due to lack of data it is unclear if this behaviour is restricted to Scotland. The results suggest that a general assumption of newt absence from ponds during winter may be incorrect; therefore, surveys should be considered to establish newt presence, or likely absence, prior to winter remedial works.

If winter pond maintenance is planned, the results of this study would suggest that torchlight surveys following standard methodology (Griffiths *et al*. 1996) should be undertaken as a minimum. These should be carried out during winter months prior to the works, on nights with successive preceding days of minimum air temperatures above 0 °C. Torchlight surveys should be undertaken alongside monitoring of air and/or water temperatures. If it can be confirmed that temperatures will remain above 5 °C overnight then netting or bottle-trapping could be used in addition to torchlight surveys to increase success rates, at the surveyor's discretion (usual precautions still apply, as per Griffiths *et al*. 1996; both newt and surveyor safety is paramount whilst deciding on survey technique).

An alternative, or complementary, technique could be to use eDNA analysis during winter months to determine newt presence. Additionally, if winter maintenance is planned a year in advance, then a full suite of spring breeding surveys could be undertaken (standard survey methods for egg-searching, and torchlight, net and bottle-trap surveys following Griffiths *et al*. 1996) to determine if newts utilise the pond. Spring breeding surveys should not supplant winter surveys but can be used to inform maintenance and species management plans by assessing the size of newt populations that utilise the pond. Importantly, not observing newts during winter surveys does not necessarily imply absence because newts may be inactive in the pond sediment; however, undertaking winter surveys provides more information for management plans. If newts are present, then measures can be put in place to protect them during winter maintenance, such as minimising mechanical equipment usage; however, it is not within the scope of this article to discuss species protection plans for winter pond maintenance.

Ambient temperature

The data presented in this article were collected during a relatively warm year for the UK (thirteenth warmest since 1910), with an unusual cold snap in November (Kendon *et al*. 2017). In Scotland, November mean temperature was ranked in the lowest third of all Novembers since 1910, but the December mean temperature was ranked in the top ten warmest Decembers since 1910. Both England and Wales followed a similar trend, but with a cooler December mean temperature that was only ranked in the upper third of all Decembers since 1910 (Kendon *et al*. 2017). Despite observing newts active and present in the pond in December during this unusual temperature variation, more data needs to be collected to be able to determine if temperature is the cause.

As the climate changes, the prevalence of this behaviour may either increase or decrease. Warmer winters may lead to an increase in suitable temperatures for terrestrial hibernacula, or may lead to more productive pond ecosystems over winter, reducing the requirement for newts to leave the pond. Additionally, newt winter presence in aquatic habitat could be a strategy for reducing the energy cost associated with forming secondary sexual characteristics. It is possible that palmate newts at the most northernly distribution of their range may be behaviourally adapted to remain in the aquatic environment, if temperatures allow, to retain their secondary sexual characteristics for the next breeding season.

How you can get involved

Further work is clearly required to understand this phenomenon, notably to determine if it occurs throughout Great Britain; therefore, data needs to be collected throughout Scotland, England and Wales, over multiple years. Ecological consultants and professional ecologists carrying out newt surveys and pond maintenance work are well placed to help build a database of observations.

To get involved, it is recommended you get in touch with your local Amphibian and Reptile Group in the first instance for advice and assistance (find your local group at www.arguk.org). There are undoubtedly more records of high newt counts in ponds over winter months but the data are not widely available. Where possible, these data should be published, or collated with your local Amphibian and Reptile Group or Local Environmental Record Centre (see www.alerc.org.uk and www.nbn.org.uk).

Monitor weather over winter near your local pond via MetOffice (www.metoffice.gov.uk) and conduct a torchlight survey, noting the number of preceding days of air temperatures above 0 °C (for newt and surveyor safety, other survey techniques are not recommended unless it is for informing winter pond maintenance). Ensure you record the coordinates and a description of the pond (including as a minimum: pond size, depth, and presence of aquatic vegetation, or use the Habitat Suitability Index which is designed to describe pond criteria for great crested newt; see www.arguk.org); and, where possible, air temperature and water temperature should be recorded at the start of the survey. Ensure you have permission to visit the pond at night, always make sure someone knows where you are (it is recommended that you do not survey alone), and follow the safety advice of your local Amphibian and Reptile Group.

Conclusion

Clearly, there is a need for further investigation of newt winter presence in ponds, particularly to prevent major adverse impacts to local newt populations from winter pond management. Winter temperature probably plays a part in this phenological phenomenon and with the current changing climate, perhaps warmer winters could lead to winter newt presence in ponds becoming more frequent, further putting our native species at risk from maintenance activities. *In Practice* readers can play their part by recording and reporting newt presence in ponds in winter.

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Note

Data presented in this article has been published by Walker, Fairclough and Paterson (2019). Winter presence of adult male palmate newts (*Lissotriton helveticus*) in a pond in Scotland. *The Herpetological Bulletin*, **149**: 24-27. See https://www.researchgate.net/publication/336170702_Winter_presence_of_adult_male_palmate_newts_Lissotriton_helveticus_in_a_pond_in_Scotland.

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About the Authors

Bradley Fairclough MCIEEM is an ecologist at Jacobs UK Ltd, an author and independent researcher based in Scotland. He is experienced in a variety of ecological work with a particular interest in herpetofauna.

Contact Bradley at:
b.fairclough@hotmail.co.uk

Grant Walker MRes MCIEEM CBiol is an ecologist at Jacobs UK Ltd. He is also an independent researcher with an interest in Scotland's native wildlife and a specialism in marine turtles.

Contact Grant at:
grantwalkergw@gmail.com

Erik Paterson MCIEEM is a senior ecological consultant and herpetofauna specialist who has been undertaking and publishing research on UK amphibian populations and survey methodologies for the past ten years.

Contact Erik at:
erik.paterson01@gmail.com

Vacant and Derelict Land – Its Impact on Communities

Kathie Pollard
Policy Officer, Scottish Land Commission

Keywords: community empowerment, land reform, place-making, regeneration, wellbeing

Vacant and derelict land is a highly visible symbol of lost industry and prosperity, which often only adds to a general sense of decline and decay across many urban regions. Scotland has 11,000 hectares of vacant and derelict land which is roughly equivalent to 9,000 football pitches. The land reform body, the Scottish Land Commission, is tackling the issue to help create a fair, inclusive and productive system of ownership, management and use of land that delivers greater benefit for all the people of Scotland.

Derelict building. © Tom Manley.

Introduction

It is well known that life expectancy in Scotland is lower than elsewhere in the UK and that this cannot be explained by differences in socio-economic conditions alone. Even after adjusting for differences in poverty and deprivation (the main causes of poor health in any society) around 5,000 more people die in Scotland each year than should be the case.

A huge amount of research has been done over the years to explain this. In 2016 the findings from this research were brought together in a major report which for the first time identified the major causes of Scotland's 'excess mortality' (Walsh *et al.* 2016). One of the factors identified was an 'adverse physical environment'. The legacy of Scotland's industrial past means that almost a third of the Scottish population lives within 500 m of derelict land. In deprived communities (which also have the worst health outcomes) that 30% increases to 58%.

Derelict land (and buildings) is defined by the Scottish Vacant and Derelict Land Survey as land which has been so damaged by development that it is incapable of development for beneficial use without rehabilitation (Scottish Government 2019). The land must currently not be used for the purpose for which it is held or a use acceptable in the local plan. Land also qualifies as derelict if it has an unremedied previous use which could constrain future development.

Bringing sites back into a positive use has transformational potential for many communities across Scotland where dereliction is having a detrimental impact on their lives and local environment. Re-using neglected land and buildings for valuable greenspace, housing or employment can make an important contribution to achieving a greener and fairer economy. Many sites can be re-naturalised or put to green end uses, enabling access to nature, enhancing biodiversity and environmental quality, as well as delivering on climate objectives.

Some derelict sites will support important habitats and populations of rare species, which need to be identified, protected and championed. When their special nature is recognised and celebrated, local communities can come to view these sites as assets to be proud of rather than blights on their neighbourhood (see Buglife website for examples).

Understanding the problem – the Vacant and Derelict Land Taskforce

Scotland has had a Vacant and Derelict Land Register (Scottish Government 2019) for more than 30 years, yet the amount of registered land on it has remained virtually static. There are around 11,000 hectares on the Register – roughly twice the size of Dundee – but although it was recorded, little effort has been made to consider what should be done with this land. Importantly, no single public body has overall strategic responsibility for vacant and derelict land. To help address this, the creation of a Vacant and Derelict Land Taskforce – comprised of senior decision-makers with a range professional backgrounds from public, private and third sector organisations such as Scottish Natural Heritage, the Scottish Environment Protection Agency and the Central Scotland Green Network Trust – was formed by the Commission in 2018 to act as a catalyst for addressing long-term land vacancy and dereliction across Scotland.

The Taskforce's Statement of Intent details the actions required to make this happen at a national level (Scottish Land Commission 2019a). These are to:

- Coordinate priorities for action and align finance and support
- Use the rich data Scotland has about vacant and derelict sites to promote opportunities for re-use of land
- Learn through demonstration what changes are needed in regulatory, policy and finance systems
- Embed a socially responsible corporate culture to prevent future sites being abandoned.

This is no small task. Much of Scotland's vacant and derelict land has been in that condition for many years – in some cases decades.

Underpinning the work of the Taskforce, the Land Commission leads a programme of research and analysis to help better understand the nature of the challenge, identify potential changes to policy and practice, identify opportunities and constraints, and share experience of successful projects. This includes research that sets out, for the first time, an analysis of the different types of sites on the Vacant and Derelict Land Register and the challenges of bringing them back into use (Scottish Land Commission 2019b). It broadly sets out a lens for how vacant and derelict sites can be re-used and looks at their development, community, and green infrastructure potential as well as their existing biodiversity value. In some cases, it is the whole site that offers greening potential, but for many a compatibility alongside appropriate development could be sought to deliver productive re-use.

Using the Vacant and Derelict Land Register as a starting point (Scottish Government 2019), the Taskforce set out to properly identify what to classify as vacant or derelict, and what the potential for re-use might be and where it is appropriate. Some sites will have important biodiversity value and should be protected and managed for this.

The resulting report also sought to understand the factors behind a core of persistent, so-called 'stuck sites' – usually older, larger and derelict sites – some of which have been on the Register for decades. Dubbed 'persistently problematic', the Taskforce believes that bringing these unloved urban spaces back into a productive end-use can deliver wider benefits for the local environment, community and economy. For example, the sites could be used to:

- Build new homes to limit urban sprawl and reduce commuting
- Provide new allotments and city farms for fresh food, grown locally
- Create new parks, green space and networks to enhance existing biodiversity value and improve wellbeing
- Attract new investment, creating jobs and wealth in parts of the country that need it most
- Generate renewable energy, potentially helping to tackle fuel poverty in poorer communities.

Transforming these sites can play a major role in reducing social inequalities, improving wellbeing and delivering inclusive growth. Some of the sites have the potential to help address and mitigate the effects of climate change. Enhancing already naturalising derelict land or developing a temporary or permanent green-end use could deliver natural climate solutions such as reducing pollution,

Vacant building in Glasgow. © Scottish Land Commission.

allowing natural flood risk management and reducing the effects of urban heating. In addition, they could support local habitat and green networks and improve the quality of life in urban areas.

There are a range of organisations undertaking work to support local environmental initiatives using vacant and derelict land. These range from the Shettleston Growing Project, a community food growing project in Glasgow (more information on the Scottish Land Commission website); Stalled Spaces projects which look at temporary greening as a solution to stalled sites; and the Central Scotland Green Network Trust which works on projects that have re-used land to deliver positive change for surrounding communities and environments (Wadsworth and Howlett 2019). Funding is also available for a wide range of uses, including environmental restoration projects (Scottish Land Commission 2019c).

Impacts on communities

The Land Commission has published a research report *Vacant and Derelict Land in Scotland: Assessing the Impact of Vacant and Derelict Land on Communities* (Peter Brett Associates 2019), which finds that derelict sites can blight a community by affecting the health of the people living there and polluting the local environment, so impacting the local economy and social cohesion. The researchers carried out a systematic review of available data, and academic and 'grey' literature, and found a general lack of research focusing on the impacts of vacant and derelict land on affected communities. Data sources which can profile health, environment, economic, and community impact were identified, but more detailed data analysis was needed to better establish vacant and derelict land correlations and management to understand the extent of harm on communities.

To address this information gap, the Land Commission's researchers (Peter Brett Associates, now part of Stantec (PBA), in association with Kevin Murray Associates & Glasgow Caledonian University) met with a number of focus groups around Scotland as part of the project. These groups identified vacant and derelict land with economic downturn, vandalism, neglect and population emigration. Communities also felt constricted in improving vacant sites as ownership can be unclear, costs of redeveloping can be too high for investors, and it is often uncertain who is responsible for driving the redevelopment. However, the research also noted that derelict land can have some public and environmental value as the sites may have become important wildlife sites and also have the potential to serve as green infrastructure assets should a community be able to access and use them.

The report found that there are different types and gradations of impact, usually depending on the scale, former use and surrounding context, including the community's social composition and its former relationship with the site.

Shettleston Growing Project, Glasgow.

Health

- There is evidence of a spatial association between interaction with vacant and derelict land and impacts on physical health including poorer health outcomes, population health and life expectancy.
- Vacant and derelict land can negatively impact community wellbeing, raising anxiety levels, agitation and anger and increasing the incidence of crime and antisocial behaviours. Perceptions of risk to health from contaminated sites can also impact wellbeing and may contribute to poorer physical health outcomes.
- Vacant and derelict land may inhibit or prevent movement through an area, influencing feelings of personal safety and restricting interaction/use due to fencing/hoarding.
- Evidence suggests that communities in areas of higher deprivation interact with vacant and derelict land more regularly, with disproportionate negative impacts on their health and wellbeing.

Environment

- Contaminated vacant and derelict land sites can result in the pollution of watercourses, with potential for airborne contamination and negative impacts on human health and wildlife.
- Contaminants from former industrial sites can represent environmental hazards in the form of materials incorporated into structural materials, e.g. asbestos.
- Contaminated sites requiring costly remediation can act as a barrier to development and can negatively influence area perception.
- Vacant and derelict land sites which are not maintained can create poor impressions of a neighbourhood, locally and externally.

Economic

- The cost of remediating contaminated land, the means and timescales for recovery of infrastructure expenditure and development risk due to economic factors beyond a developer's control, reduce the likelihood of redevelopment on vacant and derelict land sites.

- Proximity to vacant and derelict land negatively impacts developer perceptions and confidence.
- Significant opportunity cost may be associated with continuing vacancy and dereliction.
- The level of maintenance of vacant and derelict land sites can influence values of neighbouring properties.

Community

- Vacant and derelict land can have a significant impact on community perceptions of the local area. Visibility and clustering of these sites can have a multiplier effect which exacerbates these impressions.
- Impacts can vary on different parts of the community, e.g. legacy effects may be keener for older residents more aware of what sites were previously used for and the decline over time from more productive use.
- Vacant and derelict land sites used as community green spaces can be lost following redevelopment, negatively affecting the community. It is important to recognise potential harms from removal of community assets or the refusal of temporary use of a site, and suggest measures to offset them.
- More affluent communities may have greater resilience to cope with the impacts of vacant and derelict land including the capacity to source funding and the skills of local working or retired professionals (e.g. lawyers, solicitors) to set up organisational structures. While this may accelerate re-use, the converse is also true – communities lacking such resources may see slower, more incremental change.

The report includes a toolkit which can be used by decision-makers and communities to properly assess the impacts of vacant and derelict sites on communities. The idea is that this toolkit could become part of national and local decision-making and could be used in conjunction with various planning processes. The intention is to gauge how much harm to a community derelict sites are causing, helping to build a case for intervention or appropriate management. The review of funding sources for vacant and derelict land along with a handy resource table add to the practical tools (Scottish Land Commission 2019c).

Derelict petrol station. © Ewen Wetherspoon.

Demonstrating solutions

The Land Commission now understands more about the problem and the extent to which bringing these unloved urban spaces back into use can play a major role in reducing social inequalities, improving health, contributing to a resilient environment or delivering inclusive economic growth.

Importantly, the Land Commission also knows that genuine community engagement must be a part of land re-use, with a need to work across all social groups to deliver improvements where they matter most (Scotland's Regeneration Forum (SURF) and the Scottish Land Commission 2019). The Land Commission's programme of Good Practice focuses on sharing case studies, tools and different approaches for engaging communities in decisions relating to land. It is also working on early intervention and preventing sites from becoming derelict in the first place. It is unacceptable for surplus land to become derelict or remain unused indefinitely, which is why the Land Commission is focusing on a range of voluntary and compulsory measures to ensure that socially responsible land use is embedded in corporate culture.


Vacant land. © Scottish Land Commission.

Clyde Gateway. © Clyde Gateway.

The next steps for the Taskforce will be to demonstrate and help deliver collaborative approaches that shape change on the ground. The scale of Scotland's legacy of vacant and derelict land means that a site-by-site approach to re-use will be inadequate. There needs to be a thematic approach in which solutions for different types of sites are developed and then applied to other sites with similar characteristics. A range of demonstration projects that reflect a variety of different types of sites and end uses, should consider previous regeneration experiences and can offer a way to mainstream improvements to policy and practice.

If we're going to succeed in turning these ideas into reality, then we need to create a policy environment that supports and encourages action. Part of this will require changes in how we value land, to encompass biodiversity as well as other aspects, and how we assess the full costs and benefits of re-use. The aim is to develop an approach that will allow us to look beyond narrow financial returns to capture the wider benefits that vacant and derelict sites can offer. For too long, Scotland's legacy of vacant and derelict land has languished in the 'too difficult' pile; a problem that's just too big, too nasty and too expensive to fix. If we want to change that then we need to change the narrative. We need to stop telling ourselves it can't be done and recognise it for the massive opportunity it is.

Conclusion

The Land Commission decided to tackle the issue of vacant and derelict land as one of its priorities from its inception in 2017. To effect real change in transforming neglected sites across Scotland requires a coordinated approach that is supportive of innovative and community-led regeneration and management, as well as re-imagining how we value the long-term potential of these sites. This should take into account the wider benefits of regeneration and a range of other values, including environmental and ecological, that these sites can deliver.

For more information visit our website or follow the campaign on twitter via #notsoprettyvacant.

About the Author

Kathie Pollard, Policy Officer Scottish Land Commission. Kathie works on a range of workstreams relating to land for housing and development, land use decision-making and land ownership. Her focus is on projects relating to vacant and derelict land. She has a background working in planning policy and developing green infrastructure projects.

Contact Kathie at: katherine.pollard@landcommission.gov.scot

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LAND USE IN SCOTLAND

CHANGES CHALLENGES & SOLUTIONS

WITH THE PRESSURE ON SCOTLAND'S LAND USE INCREASING AT A RAPID PACE, WE LOOK AT KEY CHALLENGES FACING CONSERVATION BODIES, LANDOWNERS, LAND MANAGERS & DEVELOPERS, & WHAT SOLUTIONS ARE BEING DEVELOPED TO ADDRESS THESE CHALLENGES. THE CONFERENCE WILL COVER LAND USE CHANGE IN THE UPLANDS & LINEAR INFRASTRUCTURE PROJECTS.

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CIEEM

Is the Suitable Alternative Natural Greenspace (SANG) Strategy Working?

Dr Liz Allinson-Thomas MCIEEM
Surrey Wildlife Trust

Keywords: connection to nature, dog walking, net biodiversity gain, recreation, visitor disturbance

Suitable Alternative Natural Greenspace strategy is an innovative, bespoke avoidance strategy to mitigate visitor disturbance from new housing developments within 5 km of the Thames Basin Heaths Special Protection Area. The results of a research study reported here demonstrate that several barriers and drivers influence whether people choose to visit a greenspace or not. These findings can support best practice and policy recommendations for professionals involved in the strategic planning of greenspace and sustainable development. The strategy yields potential beyond its remit, by improving local landscapes, adding measurable biodiversity net gain and improving connection to nature.

Introduction

Suitable Alternative Natural Greenspace (SANG) strategy provides mitigation for the impacts of housing developments on the Thames Basin Heaths Special Protection Area (SPA) by the provision of new greenspaces to attract potential visitors away from the SPA. The strategy is underpinned by the Habitats Directive 92/43/EEC and is one of three strategic approaches of the Thames Basin Heaths Special Protection Area Delivery Framework. The Framework proposed a three-pronged solution for mitigating the effects of impacts associated with new developments: SANGs, access management, on-site management and monitoring (SAMM) and habitat management (Thames Basin Heaths Joint Strategic Partnership Board 2008).

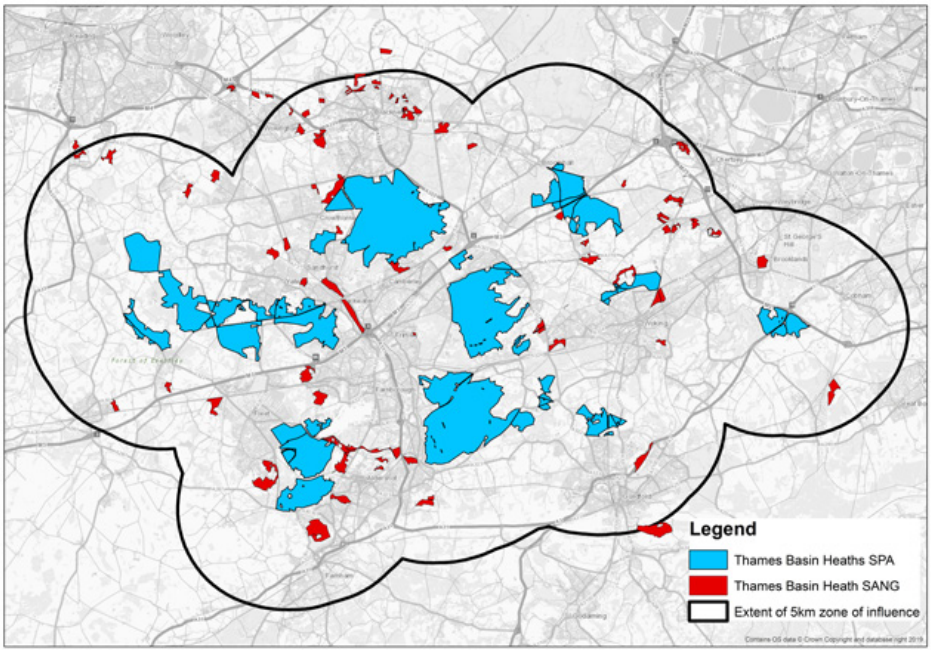

Figure 1. The spatial arrangement of SANGs (coloured red) providing alternative greenspace to the Thames Basin Heaths Special Protection Area (coloured blue), within the black 5 km boundary of the Zone of Influence (Natural England 2020).

The seminal High Court Judgment of J Sullivan in Hart DC v the Secretary of State for Communities and Local Government (May 2008: the 'Dilly Lane Judgment'[1]) upheld the principle that avoidance measures such as the provision of SANGs are an effective method of deflecting recreational disturbance away from the Thames Basin Heaths SPA. The approach broke new ground and resulted in a collaboration between Natural England, local planning authorities and other organisations responsible for the protection of the Thames Basin Heaths SPA together with several stakeholders known as the Thames Basin Heaths Joint Strategic Partnership Board (JSPB).

The Community Infrastructure Levy funds the acquisition, enhancement and management of strategic SANGs, and Section 106 agreements are used to secure the developer contribution to the SAMM project. The majority of SANGs are greenspace sites that are owned and usually managed by a local authority.

Developers pay the initial costs of the enhancement of these greenspaces to SANG status followed by long-term management costs in perpetuity. There are a few SANGs that are managed by a third party such as an ecological consultancy or by the site developer themselves.

Visitor disturbance resulting from new housing developments surrounding the Thames Basin Heaths SPA is a potential threat to the breeding success of three Annex 1 bird species: nightjar *Caprimulgus europeus*, woodlark *Lullula arborea* and Dartford warbler *Sylvia undata* (Murison 2002, 2007, Mallord 2005). Annex 1 species include 194 species and sub-species that are particularly threatened. EU Member States must designate Special Protection Areas (SPAs) for their survival, including all migratory bird species according to the Birds Directive 2009/147/EC on the conservation of wild birds. SANG strategy has been delivered as an avoidance measure since 2008 when residential housing developments of more than ten houses have been built in an area between 400 m and 5 km from the Thames Basin Heaths SPA boundary known as the Zone of Influence, shown in Figure 1 (Thompson 2015).

The SPA is made up of several large tracts of heathland habitat (Figure 2a). SANGs are smaller sites allocated under the strategy and can be either new sites or new access on existing sites with enhancements. SANGs that are bespoke are provided mostly for large developments and are in close proximity to the associated development (Figure 2b). SANGs that are strategic are usually provided for smaller developments that cannot allocate land for SANGs and should be situated within 5 km of the development (Figure 2c).

SANGs are provided based on at least 8 ha per 1,000 population with the average occupancy rate assumed to be 2.4 persons per dwelling. Criteria relating to the design and quality of SANGs, for example provision of car parking, viewpoints and a minimum 2.4 km circular walk (based on the median length of a visitor walk), were developed from research commissioned by Natural England (Liley *et al*. 2005). SANGs should not resemble an urban park but be natural and provide an attractive alternative destination to the SPA despite being smaller scale.

The impact of SANGs on the change in numbers of Annex 1 breeding birds is likely to be long term. Hence, it is crucial to measure the strategy outcomes involving human behaviour change such as visitor habits to see if the target is well served by the strategy so far and to inform recommendations for best practice (Boaz *et al*. 2008). This article reports the results of a study that aimed to evaluate the delivery of SANG strategy in the Zone of Influence and identify factors that influence its effectiveness in attracting visitors away from the Thames Basin Heaths SPA. The study objectives were as follows:

Objective 1: Identify the patterns of greenspace use amongst residents of post-strategy housing developments and establish if residents choose to visit SANGs in preference to the SPA.

Objective 2: Identify factors that underpin the residents' decision-making processes when choosing to use a greenspace and assess if they are potential barriers to the effectiveness of SANG strategy.

Objective 3: Evaluate expert stakeholder opinion on the effectiveness of SANG strategy to date.

Methods

The qualitative information gathered in the study was used to explain and interpret the quantitative results using a sequential explanatory design whereby the collection and analysis of data occurred in two consecutive phases. Each method was given equal priority.

Postal survey

A quantitative postal survey was used to identify the pattern of greenspace use and to establish which factors led to a SANG being chosen. A sample of 2000 postcodes was randomly selected from the 8,934 postcodes issued to new dwellings in the Zone of Influence since the start of SANG delivery in 2008.

Focus groups

Qualitative data were gathered from seven focus groups. These were dynamic group discussions with the interaction between participants producing invaluable insights that would not necessarily be revealed either by a survey or individual interview. Recruitment was through a combination of third-party environmental groups, a professional recruiting company and snowball sampling by a focus group member who recruited participants for a future focus group from among their acquaintances. Recruitment stopped when the last focus group produced no new information, and the data collection was considered to have reached a saturation point.

The focus group consisted of twelve standard questions that were open, i.e. designed so that it was not possible to answer them with a simple yes or no. Two digital voice recorders were used to record the discussion.

Figure 2. a) A typical expanse of SPA heathland. Photo credit Martin D'Arcy ©TBH Partnership, b) Edenbrook Bespoke SANG showing housing in close proximity. Photo credit Michael Jones ©TBH Partnership; c) Chobham Water Meadows Strategic SANG with access enhancements. ©TBH Partnership.

Expert stakeholders

Participants for expert stakeholder interviews were recruited through Natural England. The interviews were conducted and recorded on an all-in-one speakerphone and were based on eight standard questions. A sample of 32 property developers, ecological consultants, SANG managers, SAMM project wardens, planning policy officers and development control officers were interviewed to provide a range of opinions from those involved in the strategy on a day-to-day basis.

Results

Patterns of greenspace use

The postal survey response rate was 8.5%, which was lower than anticipated. Significantly more residents visited a SANG than the SPA and they travelled significantly further than the 5 km threshold identified in previous studies (Liley *et al*. 2006). Significant numbers of participants were not visiting their nearest greenspace.

Factors that influenced whether a SANG was visited were, firstly, residents who had moved into the Zone of Influence post-SANG strategy and had no prior knowledge of the area were the most likely to visit SANGs. Secondly, residents of properties where a SANG was within walking distance from home were highly likely to visit a SANG. Finally, rating good infrastructure as important, such as surfaced paths and way-marking at the SANG, significantly and positively influenced the likelihood of choosing a SANG when visiting with or meeting people on-site.

Unexpectedly and contrary to previous studies (Liley *et al*. 2006), SANGs did not appear to attract dog walkers, one of the strategy targets. This result may have been influenced by the small number of postal survey respondents compared with previous on-site studies.

Factors that influence the choice of greenspace

In line with the postal survey results, the focus group confirmed that if there was a SANG next to a new development, residents would walk to it in preference to travelling by car. However, a busy personal schedule meant that visits were often part of a multi-destination trip, explaining why, on average, people travelled longer distances than expected and did not visit their nearest greenspace. Participants also travelled further to sites they had an emotional attachment to.

Perceived safety on-site was an important factor affecting the choice of greenspace. Visiting with a companion could mitigate any personal safety concerns of visiting alone. Safety concerns can also be addressed by good site infrastructure such as well maintained paths and signage because it gives the impression that the site is looked after by countryside staff who may be present on-site.

Participants in the focus group discussions showed a lack of awareness of the two different types of greenspace - SANGs and the SPA - and the strategy. Most participants found the location of greenspaces on websites or social media so there is an opportunity to provide information online to encourage the use of SANGs.

Expert stakeholder evaluation of SANG strategy

It was interesting to note that Brexit had created speculation about the future legal status of the Habitats Directive in the UK, and this was raised in many of the interviews. Opinions ranged from 'Business as usual' to speculation about the repeal of the European laws that underpin SANG strategy. There were mixed views about causal evidence linking breeding bird numbers to visitor disturbance, and it was thought that existing evidence should be regularly disseminated amongst all members of the Joint Strategic Partnership Board. It was felt that the lack of local plans and availability of land was preventing the strategic delivery of mitigation and there was an expectation of changes in government legislation to facilitate housebuilding in the future.

Stakeholders acknowledged the strategy to be expensive to implement because of the requirement to manage sites in perpetuity. However, developers also thought that bespoke SANGs helped to sell houses more easily. Expert stakeholders unanimously agreed that the minimum size of SANGs needed to be increased to easily accommodate a 2.4 km circular walk. Most participants perceived the strategy as providing extra greenspace, which was a benefit regardless of its effectiveness as a mitigation policy.

The strategy is gaining popularity as an impact avoidance strategy both in the south east of England and further north. The Thames Basin Heaths SANG Strategy has been cited in an international review of mitigation hierarchy as an exemplar policy for avoidance mitigation against housing development (University of Cambridge Conservation Research Institute 2015). The SANG legislation was cited as the most effective driver for an avoidance strategy to be successfully developed and implemented. Expert stakeholders believed that SANG strategy could be used effectively in other parts of the country, and there was a desire to collaborate and integrate with other strategies such as health and wellbeing, green infrastructure and biodiversity agendas.

Conclusions

Prior to this study, the key factors known to affect greenspace choice in the Thames Basin Heaths Zone of Influence were travelling a distance of under 5 km from home and the personal importance of specific site attributes to visitors. This study investigated if this was also the case for residents living in new housing developments. The key findings in order of magnitude of the effect are that 1) being new to the area and having no knowledge of greenspace in the Zone of Influence before the delivery of SANG strategy in 2008; 2) having a (bespoke) SANG within walking distance of home; 3) good site infrastructure such as paths and clear signs; and 4) suitability for visiting or meeting with another person, all positively influence the decision to visit a SANG.

Recommendations

Local authority planners, developers and Natural England need to support new housing developments by incorporating adequate integral greenspace as bespoke SANGs. Strategic planners should promote larger 'Super SANGs' on a par with some of the SPA sites, that are at least 100 ha in size and preferably 500 ha, in accordance with the Natural England Accessible Natural Greenspace Strategy agenda (Natural England 2010). Natural England should act on the evidence from this research and modify the criteria for

SANGs to increase the minimum size of a SANG so that a 2.4 km walk can be easily accommodated on a site.

SANG owners and managers need to continue to improve awareness of SANGs. This is currently being addressed by the Thames Basin Heaths SAMM project (Thompson 2015). Ensuring developer packs, social media and websites have the relevant information and increasing signage to, and within SANGs will address this over time. Planners and design consultants should aim to integrate outdoor play areas into greenspace to encourage children to connect with nature (Hughes *et al*. 2018).

SANG ownership, management and monitoring should be the responsibility of an enduring public body with the associated inalienable rights, rather than a stakeholder, to ensure that standards are upheld if the land manager fails in its duty to manage the SANG. SANGs are a welcome addition to Green Infrastructure strategy and an opportunity for a measurable net gain for biodiversity as mitigation for development. SANGs have an advantage over Green Infrastructure sites in that they are a planning designation with appropriate funding in perpetuity and with the opportunity to maximise on-site biodiversity and landscape appeal. SANG strategy presents an opportunity for strategic planners to promote the integration of SANGs into other strategies such as health and wellbeing.

This study has evaluated the effectiveness of SANG strategy in encouraging visits from the target population of residents of new housing developments instead of visiting the Thames Basin Heaths SPA. However, evaluation of the likely long-term impact of SANGs on Annex 1 bird populations in the nearby SPA requires an investigation of the causal relationships with other environmental variables such as environmental pollution, pesticide use and climate change.

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Note

1. The Dilly Lane High Court Judgement (Hart District Council v Secretary of State for Communities and Local Government, Luckmore Ltd and Barratt Homes Limited and Taylor Wimpey Developments Limited and Natural England [2008] EWHC 1204(Admin)).

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About the Author

Liz Allinson-Thomas MCIEEM studied Agriculture at university and then worked in nature reserve management and later landowner advice for several Wildlife Trusts for more than twenty years. She left to study for her PhD at the University of Southampton and is currently on a 'returnship' with Surrey Wildlife Trust's planning team.

Contact Liz at:
e.allinson@btinternet.com

Insights From a Decade of Monitoring a Marsh Fritillary Metapopulation in South Wales

Part 1: Ecology and Methodology

Lucy Emery CEnv MCIEEM, Stephanie McCambridge, Rhian Lewis MCIEEM
Jacobs

Keywords: data management, devil's-bit scabious, GIS monitoring strategies, invertebrate surveys, Lepidoptera, survey techniques

A monitoring strategy was established to record trends in the Blaen Cynon Special Area of Conservation metapopulation of marsh fritillary *Euphydryas aurinia* in South Wales, potentially threatened by a road widening scheme. In line with published guidance, habitat quality mapping, larval web counts and adult counts were undertaken annually at ten sites over the last twelve years within the Heads of the Valleys area. This article discusses the process followed to set up a long-term monitoring survey, how the survey methodology has been put into practice and how the monitoring survey results are stored and presented.

A comprehensive review of the results of the monitoring strategy will be presented in a subsequent article, together with a detailed description of the mitigation strategy to sustain the metapopulation of marsh fritillary.

Marsh fritillary *Euphydryas aurinia*.

Introduction

As part of initial ecological survey work conducted in 2007, it was concluded that the A465 Sections 5 and 6 road-dualling scheme, located between Dowlais Top and Hirwaun in South Wales, could have a significant effect on the Blaen Cynon Special Area of Conservation (SAC) within the Upper Cynon Valley, specifically in terms of the impact on its marsh fritillary *Euphydryas aurinia* qualifying feature. The SAC covers an area of 66.62 ha and is located approximately 55 m north of the scheme (Joint Nature Conservation Committee 2016).

Annual monitoring of marsh fritillary habitat has been undertaken along the existing A465 since 2008, at six sites between the A4060 junction (Dowlais Top roundabout) in the east, and the Rhigos roundabout south of Hirwaun in the west.

An additional four sites were added in 2009 giving ten monitoring sites, which range in size from 1.2 ha to 33 ha.

The aim of the monitoring is to provide a robust baseline of the availability of suitable habitat outwith the SAC for use in the Habitats Regulation Assessment and to give an indication of current conditions and trends in species and habitat changes. This was important as the SAC itself was not directly affected by the road scheme, but the marsh fritillary is known to use habitat outside the SAC, referred to by Fowles as the functional landscape area (Fowles 2005). The habitat types within the functional landscape area for this SAC were unknown and so the monitoring strategy was designed to sample representative habitats to determine the likely effects of the road scheme on the habitat and the mitigation options that might be required.

Species ecology

In the United Kingdom, adult marsh fritillary butterflies breed in two distinct types of unimproved habitats: damp neutral or acid grasslands known as 'rhos pasture' (a generic term that includes marshy grassland, purple moor grass *Molinia caerulea* and rush pasture and wet heath) and dry chalk and limestone grasslands. Adults emerge in early to mid-May and are on the wing until late June, although individuals rarely live for more than 5-8 days (Hobson *et al*. 2002). The adult butterflies mate and the female lays a batch of around 300 eggs on the underside of large devil's-bit scabious *Succisa pratensis* leaves (Porter and Ellis 2011) (Figure 1). The eggs hatch in July to August with the brown/black spiny caterpillars feeding upon the devil's-bit scabious leaves, which is the single food source for the caterpillars, inside a silken web. The larvae move together from one leaf to the next, spinning a new web each time (Butterfly Conservation 2004).

The hibernation period starts in October/November, with the caterpillars spinning a small, dense web which is hidden in the grass tussocks low to the ground (Figure 2). The larvae emerge in February to early March to bask communally during sunny periods, allowing their body temperatures to increase and the larvae to grow rapidly before dispersing. Fifth and sixth instar larvae will move several metres to find fresh leaves of *Succisa*. In late April and May, larvae undergo pupation, emerging as adults after 16 to 26 days.

Marsh fritillaries exist in metapopulations whose survival is dependent upon having a network of nearby patches of suitable habitat within which there is periodic extinction and re-colonisation, i.e. areas where not all the habitat is occupied by the butterfly all of the time (Warren 1994, Wahlberg *et al*. 2002).

Marsh fritillary in Wales

The relatively high number of marsh fritillary populations in Wales (approximately 132; Butterfly Conservation Wales 2017) is correlated with the large amount of suitable habitat found throughout the country. Phase 1 surveys carried out during the 1990s by Countryside Council for Wales (CCW, now Natural Resources Wales, NRW) (Howe *et al*. 2005) revealed that Wales contained a high percentage (63%, 35,000 ha) of the UK's suitable habitat for marsh fritillary butterfly including marshy grassland, wet heath and the wet heath / acid grassland known as rhos pasture. The borough of Rhondda Cynon Taff contained 4% of the total rhos pasture in Wales (Countryside Council for Wales 2003) and the highest density of purple moor grass and rush pasture within Wales at 4 ha per square kilometre (Smith 2005).

Legislation

The marsh fritillary is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (UK Government 1981). It is listed on Annex II of the Council Directive 92/43/EEC [8] on the conservation of natural habitats and of wild fauna and flora (Habitats Directive; European Commission 1992). Annex II lists the habitats and species considered to be of outstanding international

Figure 1. Devil's-bit scabious *Succisa pratensis* plant. Photo credit Lucy Emery.

Figure 2. Marsh fritillary caterpillar web. Photo credit Lucy Emery.

significance and therefore of importance to the maintenance of biodiversity in the European Union. The regulations require the creation of a coherent ecological network of protected areas across the EU, known as NATURA 2000, for these species and habitats. The Blaen Cynon SAC is one of these sites.

Monitoring strategy

The aim of the monitoring strategy was to collect a baseline dataset for the marsh fritillary metapopulation which uses the Blaen Cynon SAC. Monitoring locations were selected as representative habitats of those across the metapopulation or those likely to undergo significant change with implementation of the A465 road-dualling scheme.

The highly variable nature of the marsh fritillary population dynamics makes it difficult to adopt a single monitoring approach, particularly as there are regular localised extinctions and reappearances of the species at different sites. Following discussion with both NRW and Butterfly Conservation, a three-part approach to long-term monitoring was agreed that was considered to be robust. The monitoring strategy allows trends in the metapopulation to be recorded through: 1) habitat quality mapping, 2) larval web counts and 3) adult counts, with data collected on an annual basis.

Habitat quality

The devil's-bit scabious plant is an important limiting factor to the extent and distribution of marsh fritillary because it is the only food plant that the caterpillars will eat (Figure 1). The structure of the vegetation is also very important with an optimal sward height of 12 to 25 cm providing effective protection for the eggs; shelter for pupae to develop; dense tussocks for larvae to overwinter; and robust devil's bit scabious plants for caterpillars to locate and eat later in the year.

Fowles and Smith (2006) set out a methodology for evaluating the landscape for suitable marsh fritillary habitat by establishing criteria for the definition of landscape and habitat quality categories. Habitat clusters are assessed systematically to better determine the significance of the landscape for the conservation of the metapopulations. This method provided the basis for the long-term monitoring of the Blaen Cynon SAC metapopulation.

Table 1. Habitat quality (defined by Fowles 2005).

Habitat quality	Habitat quality description
Good Quality (GQ)	Grassland where the vegetation height is within the range of 12-25 cm for at least 80% of the quadrat, and *Succisa pratensis* is present within a 1-m radius. Scrub (>1 m tall) cover <5%.
Suitable (Undergrazed) (SU)	Grassland where vegetation height is above 25 cm and *Succisa pratensis* is occasional / frequent / abundant. Or in which sward height is between 12-25 cm and *Succisa* at least occasional, but scrub (>0.5 m tall) covers >5% of area.
Suitable (Overgrazed) (SO)	Grassland with frequent-abundant *Succisa* but which is currently overgrazed such that the sward is below 12 cm on average.
Suitable (Sparse) (SS)	Grassland with sparse (occasional or rare) *Succisa* and vegetation height is less than 25 cm on average.
Potential Rank (PR)	Grassland with rare *Succisa* but which is currently undergrazed or neglected such that the sward is above 25 cm on average and *Succisa* occurs as scattered plants in a rank, tussocky sward.
Scrub (SC)	Scrub up to 3 m height.
Secondary Woodland (SW)	Scrub, young trees, etc., established to >3 m height.
Not Suitable (NS)	All other unsuitable habitat, not containing *Succisa*.

The habitat quality of each site is assessed once every year, ideally in September when devil's-bit scabious is in flower and is easier to see in tall vegetation. A grid-based recording method is used whereby a 10 x 10 m grid is set up using geographic information system software (ArcGIS) in advance of the field visit. The sample points are equally spaced on the grid and surveyed using mapping software on iPads with a global positioning system (GPS) to record information. The use of a fixed grid system allows changes in habitat quality at fixed points to be assessed over the long term. Each year the survey team returns to the same points using the GPS.

At each sample point the habitat quality for the 10 x 10 m square around the point is categorised according to standard definitions (see Table 1; Fowles 2005) and recorded on the mapper. The presence of *Succisa pratensis* is recorded using the DAFOR scale (Dominant, Abundant, Frequent, Occasional or Rare).

Secondary woodland and scrub are also mapped to provide a more detailed overview of each site even though these habitats are unsuitable for marsh fritillary.

Larval web counts

Each year in September/October when the larval webs are most prominent, areas of available suitable habitat located within monitoring sites are surveyed. Devil's-bit scabious plants are examined for larvae and larval webs. The location and number of larval webs are recorded using mapping software on iPads. Target notes are also taken which include the type of management practices that are evident at each site.

Adult counts

A survey of adult butterflies is carried out annually at each of the monitoring sites between mid-May and late June. The location and number of adult butterflies is recorded using mapping software on iPads, following the UK butterfly monitoring scheme field guidance notes for butterfly transect counts (United Kingdom Butterfly Monitoring Scheme, n.d). In line with the guidance, counts are made between 10:45 and 15:45 hours, in warm or at least bright weather, with no more than moderate winds and not when it is raining. The

minimum criteria are either 13-17 °C with at least 60% sunshine, or if there is no sunshine the temperature must be 17 °C or above. Windspeed (Beaufort scale) should be no more than 5 unless the transect route is sheltered from the wind.

Survey output

The monitoring strategy allows for quick and simple data collection in the field and enables the survey team to accurately locate the same sample points each year using GPS, ensuring repeatability and delivering a robust data set. The raw data is transferred and stored in an electronic database where formulae can be applied automatically. Data analysis is straightforward and processing times are quick, producing clear and precise outputs that can be updated year-on-year allowing simple trend analysis to be undertaken. This also removes the need for double-handling data and therefore reduces human error.

The output from the data collection and analysis is presented visually to allow a quick assessment of marsh fritillary population sizes and changes in the available suitable habitat at the monitoring sites over time. Figure 3 shows how the results of one year's habitat quality mapping, larval web counts and adult counts can be assessed on a site-by-site basis. The colour-coded habitat quality types provide a visual representation of the habitat that can be compared year-on-year. Figure 4 shows the results of surveys from a single site that has been monitored annually over a ten-year period, showing the change in the proportion of different habitat types (percentage habitat cover) and the number of marsh fritillary adults and larval webs counted at this site over the same period.

Key factors

Although the survey methodologies described are standard, the long-term nature of the monitoring and the assessment of the habitat in a wider functional landscape area, as opposed to only monitoring the SAC itself, makes this an important dataset. This level of detailed monitoring is rarely possible on development projects. In this case, the long project timescales for the road scheme as well as the need for a robust scientific approach to assessing the potential impact of the development on the SAC, were important factors.

The monitoring protocol relies on electronic data collection for quick and simple recording in the field and reliable repeatability in successive years. Data input into a rigorously tested database allows for quick and accurate processing and analysis of the data, and the production of clear and precise outputs that can be updated year-on-year. The trend analysis being undertaken is producing valuable insights into the ecology of marsh fritillary butterflies and the specific habitat requirements that the metapopulation relies upon for survival.

Insights gained

Conducting annual adult butterfly and larval web counts alongside annual habitat

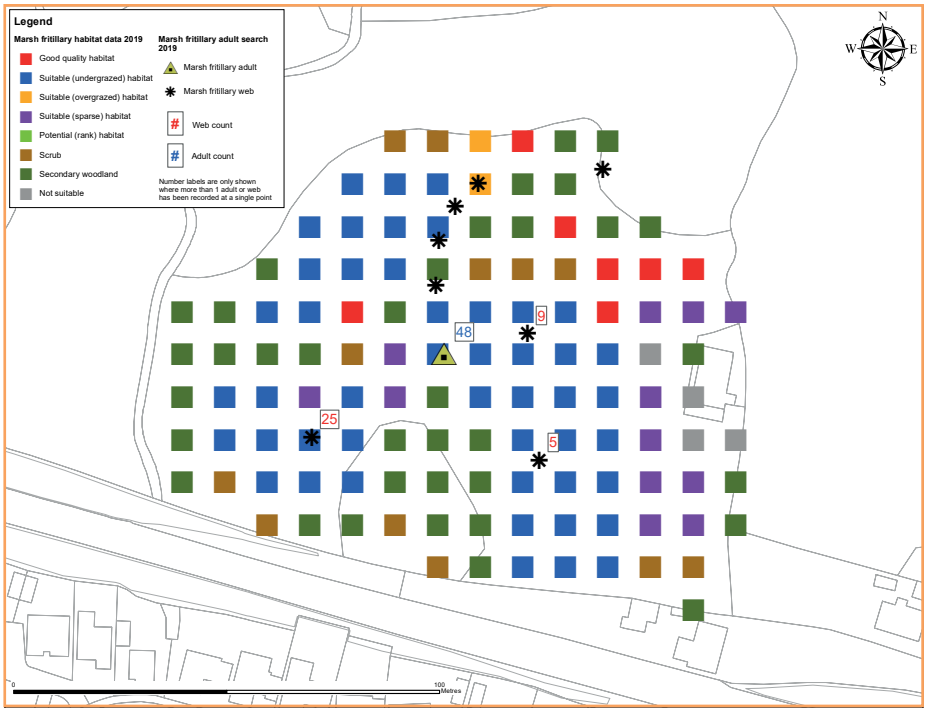

Figure 3. Example of the data output from a single year's monitoring at a site. The habitat quality within each 10 x 10 m quadrat is represented visually by different coloured squares. The locations of larval webs and sightings of marsh fritillary butterflies are mapped and counts are given. Data are from 2019.

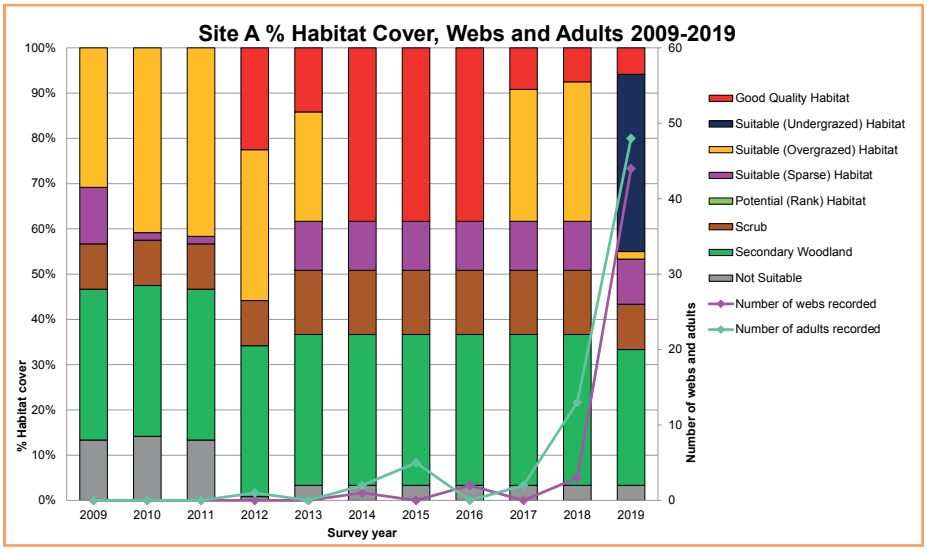

Figure 4. Example of a graphical output of survey results from one site in the Blaen Cynon SAC area that was monitored annually between 2009 and 2019. The coloured bars show the change in the proportions of different habitat types while the solid lines show how the number of marsh fritillary adults and the number of larval webs increased as the habitat composition changed.

mapping has yielded a robust data set. Insights from twelve years of monitoring at these sites include:

- Developing and maintaining good landowner relationships from the beginning of the monitoring period not only helped us to gain access to land on an annual basis but also enabled us to gain insights into the management and condition of the site prior to monitoring and between monitoring visits.
- The time spent at the beginning of the project scoping sites, and then planning and setting out a fixed GIS grid system on our monitoring sites to record habitat quality, was really important to the success of the methodology.
- There are obvious challenges in basing any assessment of marsh fritillary presence or absence on collecting adult count data alone, given the very specific weather requirements needed to carry out an accurate survey on any one day. There is also an element of judgement based on monitoring weather in previous weeks to predict the peak flight period of the adults, which can be challenging and can result in variability in count data. We have experience of visiting a site on a dry, overcast day and seeing no adults on the wing to return a day later on a sunny, bright day to count large numbers. The importance of weather for these counts cannot be underestimated.
- Conducting larval web count surveys is less weather dependent as the webs can still be seen in light rain; however, surveys after prolonged heavy rain provide less confident results.
- Continuity of staff conducting the surveys year-on-year has allowed for great landowner relations, familiarisation with the survey techniques and consistency in data collection.

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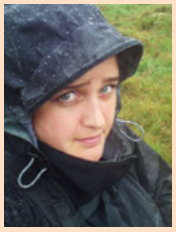
Note

The results of monitoring the changes in habitat quality, the direct impact of these changes on the marsh fritillary population at the sites, and how that has influenced management decisions and the development of mitigation, will be discussed in more detail in a subsequent article

About the Authors



Lucy Emery BSc CEnv MCIEEM Principal Ecologist has worked for Jacobs for 12 years. Lucy carried out studies of silver studded blue butterflies in Dorset and edge effects on butterfly species assemblages in Honduras in her undergraduate years. In her professional career Lucy specialises in ecological surveying and interpretation of data, particularly bats, and has been involved in the monitoring of marsh fritillary butterfly on this road scheme since 2008.

Contact Lucy at: lucy.emery@jacobs.com

Steph McCambridge BSc MSc Senior Ecologist at Jacobs with over 6 years' experience. Steph specialises in ecological surveying and interpretation of data with regards to protected species on large infrastructure projects and has been involved in the monitoring of marsh fritillary butterfly on this road scheme since 2014.

Contact Steph at: stephanie.mccambridge@jacobs.com

Rhian Lewis BSc MRSB MCIEEM Senior Ecologist has worked for Jacobs for over 10 years. Rhian specialises in ecological surveying and interpretation of data with regards to the environmental impacts of large infrastructure projects, including road schemes and other proposed developments, and has been involved in the monitoring of marsh fritillary butterfly on this road scheme since 2010.

Contact Rhian at: rhian.lewis@jacobs.com

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Contrasting Project Assessments Under Article 6(3) of the Habitats Directive in Ireland and the UK

Robert Fennelly CEcol MCIEEM
Lead Senior Ecologist, EirGrid

Keywords: Appropriate Assessment, Habitats Regulations Assessment, Ireland

Under Article 6(3) of the EU Habitats Directive 92/43/EEC, the effects of projects and plans on European sites designated for their conservation value must be assessed, and consents cannot be granted unless the appropriate tests are met. This affords practitioners an influential role in development consents. This article signposts some fundamental legal principals driving Article 6(3) practice across Europe and explores key differences between Ireland and the UK, concluding that Irish practitioners operate in a more challenging environment.

The article has topical relevance to practitioners assessing projects that might affect the six cross-border European sites straddling Ireland and Northern Ireland, given uncertainties around Brexit (Figure 1). More widely, the article explains the significance to planning in general of Ireland's 'Third Party Right of Appeal', and discusses relevant case law and available guidance relating to Article 6(3).

Figure 1. The River Finn Special Area of Conservation in Co. Donegal (Ireland) which adjoins the River Foyle and Tributaries SAC in Co. Derry, Northern Ireland. Photo credit William O'Connor, Ecofact.

Introduction

Article 6 is one of the most important articles of European Council Directive 92/43/EEC on the 'Conservation of natural habitats and habitats of species' ('the Habitats Directive). Article 6 sets out the framework for the conservation and protection of designated European sites, comprising Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). While SPAs are designated for birds and bird habitats, SACs are designated for non-bird species and habitats. Under Article 6(3) any plan or project likely to have a significant effect on a designated European site, either individually or in combination with other plans or projects, must undergo an Appropriate Assessment (AA) to determine its implications for the site. These requirements do not apply if the project or plan is *'directly connected with or necessary to the management of a European site'*.

The first step under Article 6(3) is to 'screen' whether an AA is needed. AA Screening, which does not actually appear in Article 6(3), was introduced by the European Commission (European Commission 2001). In the UK, a 'Stage 1 Habitats Regulations Assessment (HRA) Screening' determines if AA is required, followed by a Stage 2 HRA where AA is required. In Ireland, an AA Screening is reported within an AA Screening Report or Statement (although the report name is not legally defined), while an AA is accompanied by a 'Natura Impact Statement' for all projects, and any plans not covered within the Planning Acts, or a 'Natura Impact Report' for land-use plans under the planning Acts. The term HRA is not used in Ireland.

Across the EU, competent authorities can only agree to a plan or project after having ascertained that it will not adversely affect the integrity of the site concerned, following an Article 6(3) assessment. However, there is both convergence and divergence in the interpretation of European law. In Ireland, a lack of clarity and up-to-date guidance compounds the situation which, together with the implications of the Third Party Right of Appeal (TPRA), creates an especially challenging environment for Irish practitioners. Table 1 highlights some of the key differences between the approach taken by the UK and Ireland. Whilst acknowledging the complexity of the situation, this article discusses possible resolutions and offers some advice to fellow professionals.

Article 6(3) practice across member states

The founding Treaty on the Functioning of the European Union has the principle of 'subsidiarity' at its heart. Subsidiarity gives member states a degree of freedom in how to translate (or 'transpose') European laws into domestic ones. EU Directives especially

are *'designed to foster subsidiarity'* (Craig 2012). Fuelled by the subsidiarity principle, UK and Irish laws transposing Article 6(3) differ in number and substance.

Countering subsidiarity, rulings of the Court of Justice of the European Union (CJEU) are unapologetically precise and binding on all member states. In this way, European case law tempers the subsidiarity effect and several CJEU rulings have harmonised EU-wide Article 6(3) practice in fundamental ways. The pivotal ruling in 'People Over Wind' (C-323/17), which reversed a decade of UK and Irish case law by forbidding mitigation in AA Screening (HRA Stage 1), reflects the potential for paradigm shifts in practice as a result of CJEU case law. In a sense, case law can 'trump' subsidiarity, therefore practitioners need a heightened awareness of emerging cases.

An important shared principle: no projects (should) escape Article 6(3) in Ireland or the UK

Across the EU, only (conservation) projects *'directly connected with or necessary to the management of a European site'* are legally excused from Article 6(3) assessment. CJEU case C-98/03 'Commission v Germany' even expanded Article 6(3) to projects not subject to some type of permission. Unfortunately, Irish and UK Article 6(3) laws do not make this explicit. Regardless, in practice, localised works on private lands in both Ireland and the UK can evade Article 6(3) assessment, especially when no other consents are required which might prompt investigation by the authorities. Examples include property extensions, peat extractions, and farm improvements. Unless the private undertaker of such works voluntarily contacts the authorities or, perhaps a more likely scenario, a third party reports works perceived to be damaging, the competent authority will not know works are proposed, and an Article 6(3) assessment is unlikely to be carried out.

In Ireland, against a historical backdrop of failed biodiversity protection (Fógarty 2017), developers can pressure practitioners to provide the legal rationale as to why 'minor' projects not requiring planning permission (e.g. Site Investigation works) require Article 6(3) assessment. This puts practitioners in a difficult situation if they are not confident of the law. Happily, there seems to be a growing acceptance of Article 6(3) and broader environmental obligations by Irish developers.

Table 1. Article 6(3) in practice: Ireland vs. the UK.

	Ireland	UK
Third Party Right of Appeal available on planning decisions	Yes	No
Number of laws transposing Article 6(3) in onshore domain	2	1
Number of laws transposing Article 6(3) in offshore domain	1	1
Scope of sites assessed	European sites only	European and Ramsar sites
Latest guidance by central government	2009 (general) and 2012 (marine); updated guidance pending	2019
Targeted technical guidance	Limited	Varied
Explanatory memorandums typically accompany legislation?	No	Yes

Article 6(3) in Ireland

In Ireland, two different national laws currently transpose Article 6(3):

I. The Planning and Development Act 2000 as amended (and supporting regulations) applies to development projects requiring planning permission
II. The EC (Bird and Natural Habitats Regulations) 2011 as amended ('Habitat Regulations') apply to projects not requiring planning permission.

Deciding which regime applies may well involve input from planners to interpret 'development' and identify available planning exemptions. The regime applicable may affect:

- Which competent authority should receive the Article 6(3) assessment. In planning, this will be either the local authority or Ireland's independent planning board, An Bord Pleanála; alternatively where planning is not required, under the Habitat Regulations it will be the local authority, a public authority or a Minister
- The Article 6(3) decision timeframes, which can affect pre-construction survey scheduling. In planning, assuming no Requests for Further Information or other delays, decision timeframes are typically eight weeks (with a local authority) or 18 weeks (with An Bord Pleanála). Under the Habitat Regulations, the decision timeframe varies from being unstated (where public authorities determine applications by private developers), to at least six weeks (where a public authority is the developer, and has carried out an AA).
- The risks of third party appeal. This is available in planning only but, if successful, appeal can alter the competent authority, decision timeframe, and other requirements.

In contrast to Ireland's dual transposition, a single law transposes Article 6(3) in each UK jurisdiction under the respective Conservation Regulations. An exception applies only to offshore projects, in which Article 6(3) is transposed by the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 No. 1842 (the UK Offshore Conservation Regulations).

Guidance in Ireland

Guidance on Article 6(3) is more regular, timely and comprehensive in the UK than in Ireland, with each of the four UK governments publishing their own advisory documents. Scottish Natural Heritage (Scottish Natural Heritage 2019), and the English and Welsh government (Ministry of Housing, Communities & Local Government 2019) have published recent Article 6(3) guidance, both including specific advice on the pivotal 'People Over Wind' ruling. In the UK, Article 6(3) advice is also published by local authorities.

Conversely, in Ireland, there seems to be no Irish local authority guidance, and there has been no comprehensive methodological guidance for a decade (Department of Environment, Heritage, and Local Government 2009). A 2012 working document (National Parks and Wildlife Service 2012) dealt solely with marine assessments, and has not been updated. There has been no interim advice (e.g. via government circulars) on a stream of landmark CJEU cases, including:

- C-258/11 'Sweetman v An Bord Pleanála': any permanent loss of priority

SAC qualifying habitat is an adverse effect to site integrity (i.e. regardless of how localised or relatively small the loss in the context of the site)

- C-164/17 'Grace v An Bord Pleanála': new or enhanced habitat cannot be used to mitigate for loss or damage to SAC qualifying habitat in an Appropriate Assessment/HRA Stage 2
- C-323/17 'People Over Wind': measures intended to avoid or reduce harmful effects on European sites cannot be considered at AA Screening/HRA Stage 1 (thereby overturning over a decade of Irish and UK case law allowing certain mitigation in Screening)
- C-461/17 'Holohan and others v. An Bord Pleanála': wide-ranging ruling which included finding that impacts outside European sites must be considered if they interfere with Conservation Objectives,

or on Irish court cases with significant rulings on Article 6(3) matters:

- 'Kelly v An Bord Pleanála' [2014] IEHC (Irish High Court Decisions) 400: planning authorities have less discretion in Article 6(3) decisions, compared to planning decisions
- 'Connolly v An Bord Pleanála' [2016] IEHC 322: a simple assertion by planning authorities that no adverse effects on European sites will arise, is not sufficient reasoning
- 'Eoin Kelly v An Bord Pleanála' [2019] IEHC 84: Sustainable Urban Drainage Systems (SUDS) were not (in the case of an ALDI store) mitigation as interpreted by the CJEU in C-323/17 'People Over Wind'.

A flurry of six Irish government circulars relating to Article 6(3) ceased unexpectedly in 2010, despite circulars continuing to be issued on Environmental Impact Assessment.

Neither the Environmental Protection Agency nor An Bord Pleanála have issued guidance in over seven years, despite the number of landmark court rulings since then (Environmental Protection Agency 2012, An Bord Pleanála 2013). A recent government tender for updated Article 6(3) (and 6(4)) guidance is welcomed.

Whilst not methodological, procedural advice is available online from the Irish Development Applications Unit (DAU) (Department of Culture, Heritage and the Gaeltacht 2018) which processes consent applications and consultations. The advice addresses Article 6(3) consultation, Habitat Regulations consents, and other information (e.g. on Conservation Objectives) and includes links to European guidance. However, unlike the UK, it is silent on case law. The National Parks and Wildlife Service publish pioneering survey and monitoring manuals on European protected species and habitats, on everything from upland habitats to white-clawed crayfish *Austropotamobius pallipes*. Whilst not assisting with Article 6(3) methods or case law, this work is invaluable to practitioners whose data must constitute 'best available scientific knowledge'.

Breadth of guidance

UK practitioners benefit from targeted methodological guidance supporting Article 6(3) assessments including freshwater (Scottish Natural Heritage 2006), air quality (Natural England 2018), bird ranging distances (Scottish Natural Heritage 2016), and 'Impact Risk Zones' (Natural England 2019). Guidance on assessing lesser horseshoe bat *Rhinolophus hipposideros* (Bat Conservation Ireland 2012) is the only comparable guidance specific to Ireland but much of the general UK guidance will also be relevant and useful in an Irish context.

Whilst there is no Irish equivalent to the HRA Handbook (Tyldesley and Chapman 2020), this commercial product includes UK and CJEU case law analysis, decision trees, and an online search function, and provides a very useful resource for Irish practitioners.

UK practitioners also benefit from 'explanatory memorandums' to all UK Conservation Regulations. Of particular value is the 34-page memorandum to the Offshore Conservation Regulations, which is wide-ranging in scope including existing and planned guidance, government policy, and different legislation across UK jurisdictions. At present, no significant memorandums accompany the Irish Planning Acts or Habitat Regulations.

The challenge to Irish Article 6(3) practitioners from the Third Party Right of Appeal

In Ireland, the existence of a Third Party Right of Appeal allows concerned individuals or organisations other than the applicant to appeal a local authority planning decision to An Bord Pleanála. Residents in Denmark, Sweden, Australia, New Zealand, and Jersey also have Third Party Right of Appeal in the planning system. UK residents do not have this right and only the applicant can appeal a planning decision to the Planning Inspectorate. The Third Party Right of Appeal (TPRA) is important to Irish practitioners because it allows those with no site ownership who are not applicants to appeal and potentially block development on grounds including Article 6(3) concerns. Under the Planning Acts, appellants must first satisfy An Bord Pleanála that their appeal is not 'vexatious', 'frivolous', or made with the sole intention of delaying the development, or securing payment or other 'inducements'.

The TPRA was written into Ireland's first planning code in 1963. Surprisingly, there is no TPRA for projects under the Habitat Regulations regime (Note: reference to *'any party to an appeal'* in Regulation 42 8a ii does not confer TPRA). This is significant, because Article 6(3) assessments under the Habitat Regulations (e.g. including all foreshore projects) are subject to lower scrutiny. For Article 6(3) assessments of planning projects, the existence of TPRA means that there is an elevated risk of a) planning decisions by local authorities being appealed to the planning board, and b) planning board decisions being appealed to the courts. In Ireland, public decisions made by administrative bodies including An Bord Pleanála may be judicially reviewed by the High Court, subject to certain criteria.

Ecology and in particular Article 6(3) has served as a successful ground for judicial review by third parties in Ireland. A high profile example is the appeal of Roscommon County Council's decisions on the proposed Sevenhill Windfarm, culminating in the landmark ruling 'Kelly v An Bord Pleanála' [2014] IEHC 400 (see above), which quashed the windfarm planning permission. As such, Irish practitioners are more likely than their UK counterparts to find themselves defending their Article 6(3) assessments in court.

Ironically, the term Third Party Right of Appeal is so deeply embedded in Irish mind-sets that it may not be widely understood, while the term may be unfamiliar in the UK because the right has never been available. Perhaps to improve understanding, UK campaigners have re-branded TPRA as Equal Rights of Appeal.

The number of planning appeals on Article 6(3) grounds that are genuinely motivated by European site protection is unknown, as are the number that

are simply exploiting the strong arm of European law. Regardless, the existence of TPRA and its implications for Article 6(3) is a major difference between Ireland and UK planning and environmental practice with significant implications for practitioners.

Resources for Irish practitioners

This statement from the Irish government (Department of Culture, Heritage and the Gaeltacht 2018) crystallises the challenge facing practitioners: *'It is important to be aware of European and Irish jurisprudence where this has implications for interpretation and application. Where legislation has updated [..] existing guidance, the legislation should be followed or applied in preference in all cases….'*. Some helpful resources are available:

- Legal workshop and Q&A sessions are arranged by the CIEEM Irish Section, free or at minimal cost. Numbers are limited and the events book out fast so members should regularly check Irish Section News
- The Irish Environmental Law Association offers affordable membership providing access to quarterly online updates on European case law, Irish case law, and Irish statute changes to Irish laws that are frequently relevant to Article 6(3)
- Irish practitioners might consider subscribing to the HRA Handbook whose HRA journal includes analysis of relevant Irish court cases (Tyldesley 2019)
- Professional training which includes case law updates is available
- Finally, targeted technical guidance from the UK is relevant to Ireland, adapted as appropriate using professional judgement.

Conclusions

Whilst opinions may vary, it can be argued that Ireland is a more challenging landscape for Article 6(3) practitioners. Amongst other factors, this is due to the dual Article 6(3) transposition for onshore projects in Ireland, the deficit of Irish guidance and the Irish Third Party Right of Appeal. In response to these challenges, some helpful resources have been provided for Irish practitioners. The UK is expected to be technically free from Article 6(3) obligations on 1 January 1 2021, potentially rendering UK 6(3) practice, as we know it, obsolete although it is possible that the Covid-19 crisis may result in an extension of the transition period. Notwithstanding Brexit, Article 6(3) will still be a relevant consideration on cross-border European sites and familiarity with the obligations is likely to remain a requirement for all ecology and environmental management professionals into the future.

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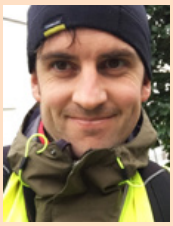
About the Author



Robert Fennelly CEcol MCIEEM is Lead Senior Ecologist in EirGrid, Ireland's Transmission Systems Operator, which develops, manages and operates the electricity transmission grid. Robert welcomes comments on this article. The views in this article are those of the author alone.

Contact Robert at: Robert.fennelly@eirgrid.com

Accredited ECoW – An Update

Sally Hayns CEcol MCIEEM
Chief Executive Officer, CIEEM

Ecological Clerks of Work (ECoWs) perform a critically important role during construction projects, ensuring, as a minimum, compliance with environmental legislation and planning conditions for the protection not only of biodiversity on the site but also clients and contractors.

However, despite the acknowledged importance of the role in project risk management, the role of ECoW is poorly defined and is often allocated to relatively junior ecologists who are ill-prepared for the role. There is no resource or shared understanding for either the construction industry or the ecological profession that clearly sets out the competences of an ECoW. There is no assessment process to ensure ECoWs are competent to perform the role and there is no register or directory of suitably qualified ECoWs that the construction industry can access.

Many members will be aware that CIEEM is developing an accreditation scheme for the ECoW role. The development process is being funded by the Construction Industry Training Board (CITB) and is being delivered by Greenbridge Ltd with additional support from Balfour Beatty.

We are now nine months into this development phase. With the support of an Advisory Group made up of a range of stakeholders, we have completed the following steps:

- Clarified the number of ECoW roles required on construction sites (see note below), defined the role specifications and drafted the competency profiles.
- Defined 16 National Occupational Standard (NOS)-style ecological standards covering the competencies of the roles (see Table 1). These National Ecological Standards (NES) followed a review and gap analysis of existing NOS.
- Developed a qualification framework that links together the role profiles and ecological standards.
- Drafted 13 course units which set out what the ECoW should know, understand and be able to do – this sets out the basis for accreditation assessment.
- Produced course materials for five related training courses (for inexperienced ECoWs).
- Drafted most of the content for the accompanying ECoW Handbook.
- Agreed the assessment strategy for the accreditation.

Table 1. List of National Ecological Standards for the Accredited ECoW Roles

NES Ref	NES Title
ECoW/S/001	Initiate pre-construction and ongoing surveys to identify ecological features at risk during construction operations
ECoW/EM/003a	Provide advice and guidance on design and implementation of ecological mitigation required during construction
ECoW/EM/003b	Implement ecological mitigation measures on construction sites and monitor their effectiveness
ECoW/EM/003c	Anticipate and manage risks during construction.
ECoW/A/004	Prepare and use Ecological Impact Assessment (EcIA) as a tool to inform and guide mitigation on construction sites
ECoW/P/005	Advise and guide on the measures necessary to ensure compliance and to achieve agreed quality standards
ECoW/PC/006a	Apply professional codes of conduct and ethics to the construction site environment.
ECoW/PC/006b	Recognise personal limitations and areas for development and seek opportunities to develop knowledge, understanding and skills
ECoW/HS/007	Conform to general workplace health, safety and welfare on construction sites
ECoW/C/008a	Establish effective communication and negotiation on construction sites
ECoW/C/008b	Record and report ecological issues, activities and incidents on construction sites.
ECoW/C/008c	Resolve conflict and challenge/stop activities and behaviours that would result in a breach of contract, permit, licence or planning consent.
ECoW/F/009	Work collaboratively with other construction professionals to generate ideas, solve problems and produce solutions
ECoW/OM/010	Undertake ecological quality and compliance audits on construction sites
ECoW/CON/011a	Recognise the duties and responsibilities of all relevant parties on construction sites
ECoW/ CON/011b	Carry out ecological work in accordance with established construction activities, operations and procedures.

Role profiles

One of the most important (and as it turned out, most challenging) activities to date has been to gain agreement on how many ECoW roles are required on construction sites. Having started at one and reached three, the Advisory Group has finally agreed on two roles, those of Adviser and Inspector, and two levels of seniority/experience/competence: Ecological Clerk of Works and Principal Ecological Clerk of Works.

Broadly speaking, the Principal ECoW role is more senior than the ECoW role. For many construction projects an ECoW, acting as an Adviser, would be sufficient. However, for larger, more complex projects it is likely that there will be numerous ECoWs required on site at different locations and times. Such large-scale or complex infrastructure projects typically require someone who can supervise or manage the team of ECoWs. This is the Principal ECoW.

Such major projects often also require a senior ECoW who is in the role of an Inspector (usually employed by the contactor). The Inspector would be expected to be a Principal ECoW but their role in this situation is to inspect for compliance with legislation and planning conditions.

Next steps

Despite the challenges of Covid-19, work is continuing on this project – although some activities may be delayed. At present, the assessment materials are being developed and the Handbook content is being finalised. The next steps will be to recruit and train assessors prior to running a pilot accreditation process later this year.

For regular project updates and more information please see the project webpage (https://cieem.net/accredited-ecow/).

Net Gain and the Marine Environment: A Great Opportunity If We Get It Right

Colin Scott MCIEEM and Vicky West
ABPmer

Summary

Marine biodiversity is in decline and this situation will not change unless we alter the way we manage our coasts and seas. One way to change the *status quo* would be to apply a net gain approach. This will ensure the delivery of enhancement measures as part of future developments.

The newly re-introduced Environment Bill will, when enacted, mandate a net gain strategy and it will encompass coastal habitats down to the low water mark. In anticipation of this, Natural England (NE) has recently developed, and consulted upon, a new 'intertidal biodiversity net gain' metric.

Until we have more detail about how intertidal net gain is to be implemented, and how the distinctive characteristics of the marine environment are to be dealt with, we will not know whether real benefits can be achieved. The outcome will, though, be heavily dependent on how the intertidal metric is applied.

ABPmer is a strong advocate of net gain, and here we consider the options and issues for delivering it in the marine environment. We advocate that net gain metrics are developed to cover the whole marine environment and not just its coastal margins. We also strongly recommend that these metrics are achievable, adaptable and applied as soon as possible. Given the challenges of making such interventions in coastal and marine environments, it is likely that a strategic approach, co-ordinated by public bodies, will be needed to deliver meaningful change.

Background

The aspiration to deliver 'net gain', in England, was detailed in the Government's 25-Year Environment Plan (HM Government 2018). This identified a commitment to *'embed an 'Environmental Net Gain' principle for development including housing and infrastructure'* to help restore natural habitats and reverse

biodiversity decline. In essence, this involves identifying habitat restoration measures that do more than just offset the effects of future developments. These measures need to be additional to the mitigation hierarchy requirements which offset residual impacts and those which cannot be avoided or mitigated.

The addition of a net gain commitment to future developments, is designed to leave biodiversity in a better state and to secure wider benefits for people and the environment. The extent to which this goal is achieved though will depend on how it is implemented and especially on how the net gain metrics are applied to calculate the habitat creation and restoration commitments that will be needed.

The Environment Bill, which will officially mandate the use of net gain in most planning decisions, is currently going though the parliamentary scrutiny phase (after being re-introduced in January 2020). However, as best practice, net gain has already been implemented on a non-statutory basis for terrestrial and freshwater habitats over the last few years. In 2012, Defra developed a Biodiversity Metric enabling the impact from losses of these habitats to be quantified so that the offset requirements can be defined (Defra 2012). An update to this metric, the Defra 'Biodiversity Metric 2.0' was then published in 2018 (Natural England 2018) with further guidance and advice also being produced in recent years.

The principles and practices of using net gain are therefore well advanced for projects on land (see the CIEEM Spring Conference in March 2019 and the June 2019 edition of CIEEM's *In Practice* which focused on this subject). However, its application to developments affecting the marine environment has lagged behind. To address this situation, last year Natural England developed a new 'intertidal biodiversity net gain' metric. ABPmer was part of a 'sounding board' advising Natural England on this metric development but, in advance, we also independently produced two 'white papers' that made the case for marine biodiversity net gain (ABPmer 2019a) and set out a simple metric for delivering it (ABPmer 2019b).

Practical marine habitat restoration

What is both exciting and fascinating about implementing marine net gain and developing the metric is that it forces all of us who work in marine habitat restoration to think carefully about how to integrate the need for enhancement with the practical realities of carrying out restoration work. It challenges us to agree what success really looks like when it comes to habitat restoration. It also means we need to consider the risks and uncertainties that prevail when seeking to deliver different habitat types.

When it comes to practical approaches to habitat creation, there is now a wealth of real-world experience both nationally and internationally. This is particularly the case for intertidal mudflat or saltmarsh habitat. In the UK alone, the last three decades have seen dozens of coastal wetlands created through the managed realignment of sea defences. ABPmer's online database of these projects (www.omreg.net) records at least 100 that have been implemented across Northern Europe, of which 51 are in the UK.

While the main driver for these realignment projects has largely been to provide compensatory measures under the Birds and Habitats Directives, their successful delivery now provides a vital empirical evidence base for net gain. These projects demonstrate that marsh and mudflats creation can be done effectively as well as showing how much they cost (ABPmer 2017) and how much societal benefit they provide (NCC 2015).

By contrast, we have less experience and confidence in the process of creating and restoring other lower intertidal and nearshore subtidal habitats, certainly not at any large scale. However, the last few years have also witnessed an increasing drive among regulators and nature conservation bodies to see other habitats created and protected. The Environment Agency is currently leading two programmes: REMEMARE (REstore MEadows, MArshes and REefs) in England and REACH (Restoring Estuarine and Coastal Habitats) for the North East Atlantic to support restoration of seagrass and oyster beds as well as saltmarshes.

In January this year, Natural England also launched the £2.5 million 'Recreation ReMEDIES' project with the aim of protecting and recreating seagrass beds. Also, several projects are underway to restore native oyster beds including the Essex Native Oyster Restoration Initiative (ENORI) and the Blue Marine Foundation projects in the Solent. There is also an increasing impetus to see dredged sediment used to protect and restore deteriorating marshes or recharge shingle islands (RSPB 2018). A new national steering group has been set up to help guide such 'beneficial use' projects and new strategic regional initiatives are being pursued to identify suitable restoration sites (e.g. the Beneficial Use of Dredging in the Solent (BUDS) project being led by the Solent Forum).

We have lots of experience of small projects and large intertidal restorations but much still to learn about restoring other habitats at a scale that will create a material change. In view of these uncertainties, as well as the scale and connectivity of marine ecosystems, it is unlikely that a piecemeal approach to restoration based on individual developments alone will work. Instead a centralised, strategic and co-ordinated approach to marine habitat restoration will be needed to deliver greater environmental benefit. Indeed, given the challenges of getting consent for interventions in multiple-use coastal and marine areas, it may be better to have a system of developer contributions that are used to fund a strategic programme of publicly managed projects. There are precedents for this approach, albeit of a smaller scale, such as the strategic fund set up to address the impacts of recreational disturbance on birds in the Solent (Bird Aware 2017).

Net gain metric approaches and aspirations

Natural England has recently circulated their newly developed intertidal biodiversity net gain metric. In response, feedback was received from a range of interested parties and sector representatives. This included a view from ABPmer which cites a range of concerns. At the present time, Natural England is examining the evidence received with a view to further evaluating the metric and the parameters and scorings which

underpin it. This includes considering aspects such as the timings for habitat creation and the assessments of condition and distinctiveness.

If it is to work effectively, this intertidal metric will need to be clear and useable while also delivering realistic goals. The metric, in its current form, however, contains some approaches that are likely to make it impractical to implement. The concern ABPmer has on this topic is not just that there might be problems with its early-stage implementation in this form but, more seriously, a problematic start now might stymie our ability to achieve greater ambitions for net gain in the future.

Our advice is that the metric needs to be revisited and tested against case examples. Doing this will highlight the issues more clearly. It will provide both sensitivity and reality checks for the approach and for the assumptions underpinning the metric parameters. To illustrate this point, and the general principles associated with applying the metric in the marine environment, we have compared the initially-derived Natural England metric and the approach suggested by ABPmer (2019b) using a theoretical case example (see Box 1). This example shows how the outcome is sensitive to the approach taken. It indicates that if a hectare of mudflat was to be lost and saltmarsh was to be the replacement habitat, anywhere between 3 and 14 ha of marsh would be required to achieve the required 10% net gain based on the approaches tested. This shows how the metric could, depending on how it is developed, have a major effect on the scale, cost and feasibility of future enhancement measures.

Another key issue when considering the application of marine net gain is that most nearshore areas are protected (e.g. under the Habitats Regulations and the Marine and Coastal Access Act). Around 80% of UK estuaries and 50% of coastlines lie within designated Marine Protected Areas (MPAs). The existing legal protections to MPAs and their interest features will need to be complied with as a priority. These existing protections will limit the application of any intertidal metric. However, the main value of net

Box 1. Marine Net Gain Comparison

Marine Net Gain Metric Comparison: To illustrate how net gain outcomes are sensitive to the methods, assumptions and parameters used, the two metric approaches are compared here using two theoretical scenarios. In each case it is assumed that 1 ha of intertidal mudflat will be lost and that saltmarsh will be created either nearby (onsite) or far from (offsite) the damage.

1) The proposed approaches for calculating the habitat baseline and habitat creation units are:
NE Baseline Units = (Area x Distinctiveness x Condition) X (Connectivity x Strategic significance)
NE Creation Units = [(Area x Distinctiveness x Condition) X (Difficulty of creation x Time to condition) X (Connectivity x Strategic significance) x Offsite risk]
ABPmer Baseline Units = (Area x Distinctiveness x Condition)
ABPmer Creation Units = (Area x Distinctiveness x Condition) X (Difficulty of creation x Time to condition x Offsite risk)
The distinction here is that the ABPmer exclude connectivity and strategic significance for deriving a marine metric

2) The individual parameters and values used in these two metrics are as follows:

Parameter	Natural England Baseline Mudflat	Natural England Created Saltmarsh	ABPmer Baseline Mudflat	ABPmer Created Saltmarsh
Distinctiveness	High - 6	High - 6	High - 6	High - 6
Condition	Good - 3	Good - 3	Good - 3	Good - 3
Strategic significance	Low - 1	Low - 1	N/A	Low - 1
Connectivity	Low - 1	Low - 1	N/A	Low - 1
Difficulty of creation	-	High - 0.33	-	Medium - 0.67
Time to good condition	-	20 years - 0.49	-	10 years - 0.70
Onsite multiplier	-	Onsite - 1	-	Onsite - 1
Offsite multiplier	-	Offsite - 0.5	-	Offsite - 0.5

The distinction here is that NE anticipate large difficulties and delays (20 years) with creating saltmarsh. ABPmer considers marsh creation to be easier and assumes, for this analysis, that the process takes 10 years. ABPmer's experience indicates that this is a worst-case scenario and that newly created marsh is, typically, functional within just 1 to 4 years.

3) The outcome: Both approaches identify the baseline value of 1 ha mudflat as being **18 units** (inclusion of connectivity and strategic significance by NE does not alter this because these parameters are assigned a low value of '1' in this scenario). The outcome of the NE metric is that almost **7 ha** (nearby/onsite) and **14 ha** (distant/offsite) saltmarsh are required to offset damage and deliver 10% net gain. For the ABPmer metric, the outcome is closer to **3 ha** and **6 ha** respectively. ABPmer also suggest that 'offsite' means located in another marine plan area whereas NE propose it means within an adjacent local planning authority area. The need for larger offsite marsh creation work is therefore more likely with the NE metric.

gain will be in how it might change the *status quo* and whether it can be extended beyond intertidal areas and outside MPAs to encompass wider marine habitats and possibly also mobile species. It could also include broader activities that affect the marine environment especially those that are not currently licensable such as commercial fishing and land-based sources of pollution.

For any wider application of marine net gain, it will need to be recognised that many subtidal habitats, and some intertidal ones, are difficult to recreate. It is likely, therefore, that the concept of irreplaceability will need to be modified to reflect marine circumstances. It is anticipated also that intertidal gains will probably be needed to offset subtidal impacts. There may even be some scope in the future to include species impacts and temporary impacts as part of a marine metric, although both are potentially challenging to frame and implement.

Achieving such future benefits across the wider marine environment will require changes in policy as well as vision and ambition. However, it is recommended that such aspirations, as well as the distinctiveness of the marine environment, remain at the forefront of thinking as net gain starts to be applied.

Conclusions

Net gain offers a valuable opportunity to tackle biodiversity loss in the marine environment. However, there is a danger that problems will occur if we develop metrics that are complicated, opaque or, even, potentially unjust. It is also a concern that we are currently only focussing on applying 'intertidal net gain' to areas down to the low water mark. This is being done because intertidal areas are covered by the planning system but this focus will mean that opportunities will be missed to also apply 'marine net gain' to open seas and marine species.

It is recognised, however, that marine net gain is complex. There will be uncertainties going forward, and we cannot expect to start with a perfect system at the outset. Instead, an adaptive process of experimentation, evaluation and adjustment will be required to develop and improve the metric over time. This adaptive process will have value in its own right because it will provide a mechanism for objectively capturing the lessons that are learned from the many different restoration projects that are pursued. As for the metric itself, it will also be better to begin with a sensible approach, have a long-term vision for what we want to achieve and then improve it over time. This is much better, obviously, than doing nothing and maintaining the *status quo*.

About the Authors

Colin Scott MCIEEM is an Associate Consultant at ABPmer with 25 years' experience in coastal ecology, environmental impact assessment and monitoring work. He specialises in advising on major coastal adaptation and habitat restoration initiatives. This includes overseeing their design and securing permissions for such projects as well as evaluating, and communicating about, their performance and value.

Contact Colin at: crscott@abpmer.co.uk

Vicky West has over 6 years' experience in the marine sector with specialist knowledge of marine and coastal ecology. She routinely conducts ecological surveys and carries out a wide range of work relating to marine policy and spatial planning. She specialises in marine net gain and in 2019 was an advisor on Natural England's 'Biodiversity net gain coastal and intertidal sounding board'.

Contact Vicky at: vicky.west@abpmer.co.uk

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Stimulating Representation of BAME People in the Ecological Professions

Hannah Williams ACIEEM
WSP

Questioning and exploring

When I saw a LinkedIn post on the work of the Royal Academy of Engineering and the Association for Black and Minority Engineers in relation to engineering and Black, Asian and Minority Ethnic (BAME) groups I was really pleased to see the activities they were doing to enhance career opportunities for this group. It got me thinking, what about ecology? I realised that quite often I was the only person of colour in a room, even at big CIEEM conferences. The representation of BAME people in England and Wales is 14%[1], Scotland 8%[2], and Northern Ireland 1.8%[3] according to the last census in 2011 (although the percentages in Scotland and NI look comparatively low, these have significantly increased since the 2001 census), so I started to wonder why. Before going further I would like to acknowledge that the use of the term 'BAME' is an ongoing debate in itself (most recently seen in the news with Priti Patel[4]), but I use it here as currently it is the most widely accepted term, and there are other limitations in the use of alternative terms. I do occasionally use alternate terms due to this same issue, as facts are reported under a range of different terms. I would encourage the reader to look into why this is as part of the exploration of this subject. I also draw on my own experience widely here as, in the end, this group is broad and I wouldn't possibly speak for everyone. Instead I make some attempt to illuminate on structural bias.

Why is it important to look at how BAME people are included within ecology practice? Apart from the moral case, if the business case were used, then £24 billion per annum to Britain's GDP could be generated if full BAME representation was achieved in the labour market[5]. As simply put in the McGregor Review, *"diverse organisations that attract and develop individuals from the widest pool of talent consistently perform better"*[6], where companies can overperform their peers by as much as 33% where ethnic diversity is fully represented[7]. Therefore, what is happening within careers and organisations within ecology to ensure this sector benefits from the full diversity of the UK?

CIEEM does not currently collect data on ethnicity alongside other diversity-related parameters. This has been a conscious decision, because under General Data Protection Regulations it has been considered that there might not be justification for storing it. Many organisations do but possibly they are storing it only to comply with legal requirements rather than to use it to inform improved practice. BAME university students have a larger representation in higher education than the general population[8] but this does not seem to follow through to the ecology workplace currently. It has previously been reported that only 0.6% of Visual Ethnic Minority (VME; i.e. excluding white ethnic minorities) are environmental professionals[9], and I conjecture as much that they are under-represented from my experience.

Sharing my story

In my own experience, as someone who is mixed white British and black Caribbean, there appears to be a few obvious factors to me: educational, cultural, socio-economic, generational and finally anything from unconscious bias to racism.

I grew up in inner-city Birmingham in the borough of Sandwell and Dudley, which at the time of my schooling had the worst secondary education attainment in the country[10]. BAME have mixed attainment at school in STEM subjects, with some sub-groups performing above and others below the national average[11]. Significantly, an Asian woman was my science teacher at secondary school and her presence was crucial in providing me with the confidence that I could pursue science in higher education.

Though my poorly performing borough didn't stop me from doing well at primary and secondary school, my geographical location was a direct barrier to my original choice of degree, veterinary science, because I did not have access to the farm environment. This can be related to ecology, as lack of access to green spaces and the rural part of the country could limit both awareness, aspiration and access to nature conservation careers. However, in my case, my white British grandma lived by the sea, which allowed me regular access to more rural areas than Birmingham every school holiday. Even my white school friends had never seen these landscapes by the end of their primary years. BAME people are significantly represented in urban locations, with the West Midlands and London being key centres[12], where BAME children visit natural spaces less frequently than their white counterparts[13]. Both ethnicity and socio-economic status are likely to affect access to nature conservation careers.

My grandad was part of the Windrush generation. He was invited to the UK to work in the '50s as an unskilled worker. My dad, benefiting from my grandad's hard graft, became a skilled welder and went on to get a degree later in life. From the black side of the family, I was one of the first (my youngest aunt was the first) to go directly to university after school. This family story is a common story of the immigrant (though strictly my grandad was a British subject which points to the crux of the matter of the Windrush Scandal), requiring time to integrate and access the opportunities afforded to those long-standing in the country. This is a consideration, as different ethnic groups are at different points in their social history in the UK, and thus will have differing requirements to access nature conservation careers.

In my early years, I would say we were in a low socio-economic bracket, though we were not on free-school meals and my mum owned our little red-brick terrace house. Socio-economic status does impact students' engagement with science[14]. I felt this began to affect me by the time I was school-leaver age (as I tried to get into veterinary as above). I also felt this keenly once I was at university, where BAME are over-represented[6]. I nearly dropped out in the first year of university because I was struggling to pay for necessities, I didn't know how I could fund it and knew my parents couldn't (BAME attend lower tariff universities[15]). In the first couple of years my grades were poorer than I would have liked. I got by on small jobs, hardship grants and exemptions from fees at in my last year of my four-year Scottish degree. I got a 2:1 in the end. Notably BAME obtain fewer first-class degrees[10]. Funding pressures take their place as a relevant factor among a spectrum of factors.

As a graduate, my parents were in a better position to allow me to take on poorly paid part-time jobs (and live rent free at home) and therefore allow me to direct my funds to running a car and volunteer in conversation activities. I sustained this for about 18 months (I was told this was expected for me to have a chance of getting into ecology) before getting a grant-funded traineeship at Warwickshire County Council. This is a known barrier in ecology to all from disadvantaged socio-economic backgrounds, though, due to other factors discussed above, this could be compounded for BAME people. Apprenticeships could be another route into nature conservation careers, potentially helping those particularly from more difficult socio-economic backgrounds. At the same time, caution should be exercised so that BAME are not disproportionately encouraged to opt for this route, as has been shown elsewhere, particularly for those identifying as black[16].

Cultural dimensions

The UK is a global leader in both environmental practice and animal welfare. This may not be the case in other countries and so those who have come in from these countries may have other attitudes, which may filter down to first and second generations. For example, in the other country of my heritage, Nevis, West Indies, animals do not tend to be kept so much as pets but as working animals that sleep outside. This is contrary to many I know that will readily admit to letting the cat or the dog share their bed now and then! Could this anecdotal evidence point to real cultural differences and an attitude I have inherited? Could culturally inherited attitudes to nature play a role in consideration of ecology as a career choice? Certainly bias has been seen in those BAME students seemingly choosing 'solid' professions of engineering, medicine, biomedicine and dentistry with only 7% choosing to study conservation ecology in 2014-2015[17]. Though this may more likely be because of a perceived security that the former professions provide financially and socially. This makes sense in the context of the immigrant story of trying to integrate and establish in what can and has been an unwelcoming environment.

Bias and racism

I view unconscious bias as a lead to racism. Unconscious bias is the result of favouring those who are in the image of ourselves. This can occur at the individual or organisational level, which unwittingly can easily lead to racial discrimination. Unconscious bias training is being rolled out in organisations more and more, but it should be noted that measures like these on their own are not enough when there is structural bias, illustrated by my story. Whilst I have not experienced the kind of racism my grandad and dad faced it has still fundamentally affected my life from my starting position and subsequent barriers (as above) through life. It has also directly affected my confidence, which I believe has resulted in self-limiting beliefs. I believe this is why BAME people report seeing BAME people as role models in senior and mentoring positions as important to career progression[5].

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Kickstarting change

The structural barriers facing BAME people are deep, and need addressing at every stage of development, from the first day at school to university to the workplace. So what can nature conservation organisations do? Organisations can help at every level. Where partnering with schools and universities, thought can be given to how BAME personnel could help with a range of activities. At the workplace, recommendations from a 2017 report by the Chartered Institute of Personnel and Development[5] and the McGregor-Smith Review[6] would be well worth reading in full, consideration should be given as to how these might be applied, and then action may be taken. Many organisations do not know how they are performing in this area, when *"no company's commitment to diversity and inclusion can be taken seriously until it collects, scrutinises and is transparent with its workforce data"*[6]. We may look to another, older discipline we often work closely with for direction, as mentioned in the beginning of this piece. The Royal Academy of Engineering has done extensive work in this area and provides resources for those looking to do the same. As a leader in the work of advancing the profession, it is reasonable to expect that CIEEM would see themselves as leading in this area also. CIEEM recognises, that at the least, this could be to collect and analyse anonymised data on BAME professionals (and for that matter other diversity-related parameters). This would provide a picture of the profession for BAME people, inform professionals under its umbrella and provide a starting point for targeted action.

Acknowledgments

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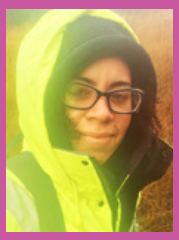
About the Author



Hannah Williams ACIEEM is a Principal Ecologist with over nine years of experience within the consultancy sector. Her work centres on large-scale infrastructure projects, with expertise in terrestrial plants and habitats. Most recently she has been specialising in the area of Biodiversity Net Gain, where she leads the Scottish team at WSP.

Contact Hannah at:
hannah.williams@wsp.com

Membership Update

Stuart Parks
Head of Membership and Marketing, CIEEM

I very much hope that as you sit reading this edition of *In Practice* you, your loved ones and your colleagues are safe and well. I am writing this in the seventh week of the UK 'lockdown' and have been trying to reflect on what has been happening in that time. Once the scale of the crisis started to become clear we had to swiftly relocate CIEEM's entire operation to various homes around the UK and get used to communicating with each other entirely online (for a while we have been able to be largely paper-free as an organisation, but the majority of our small team still works together in Winchester). It has soon become apparent just what challenges our colleagues working from their respective homes in Wales, Scotland and Ireland face on a daily basis, and for some of us, as I suspect is the case for some of you, the transition to this way of working has presented a steep learning curve.

Just before the scale of the outbreak became clear we welcomed two new colleagues to the Membership team. Laura Wilson has joined us as a Membership Officer, with the primary responsibility of looking after our Chartership processes. Natalie Harvey was welcomed the following week as the new Membership Administrator, taking over the reins from Katie Allen who is settling into a new role as CIEEM's Systems Coordinator. Laura and Natalie have risen to the challenge of starting a new role and then working from home admirably (in fact it was only Natalie's second day when we closed the office). This does mean that by and large, albeit with some of the team working reduced hours, the Membership and Marketing team continues to function as usual. With the continued support of our amazing volunteer assessors we have been processing applications to join CIEEM and, importantly, an increasing number of applications from current members looking to upgrade their membership. It seems that many of you are taking the opportunity to fill some unexpectedly spare time with upgrading your membership and we know that some of you are actively encouraging your teams to do so too. To that end, the Governing Board agreed that we should allow members to upgrade without some of the fees usually associated with this process in anticipation that this will help those of you in periods of financial uncertainty. We also recently ran a popular free webinar on the upgrade process and this is available to view via the CIEEM website.

In addition, and to reflect the very different circumstances many of you find yourselves in, we have taken a number of other steps as your professional body to try to support you. The dedicated 'Covid-19' webpages are being updated almost daily as new information and clarification becomes available to us. We have seen from the recent survey that so many of you responded to (thank you) that these pages have proved to be both useful and important to you and 78% of respondents saw this as a key way in which we can provide support. It was clear from your comments that the majority of respondents recognised the challenges of interpreting the differing amounts and the variations in the degree of clarity of the guidance received from the UK Governments, but encouraging that 92% of respondents were satisfied with CIEEM's response to this crisis so far.

In practical terms, having had to suspend almost our entire field- and classroom-based training programme, an encouraging number of you have been making use of the additional online resources we have been producing, signing up for webinars and even joining our first online conference. Hundreds of you have registered for the online directory of sub-contractors in order to take advantage of opportunities to pick up work more locally, and the number of members signing up to become either mentors or mentees through the new online platform is growing rapidly. Importantly, the Governing Board also agreed to bring forward the planned launch of a Member Assistance Programme so that members and their dependents can now get free access to advice and support, including structured counselling sessions where necessary, on issues ranging from debt management to mental health and resilience. We know that some of you have already started to make use of this support and we are pleased to have been able to secure this for you. The Governing Board will shortly be considering options related to membership subscriptions in the light of current events. I will make sure that members are updated as soon as plans have been approved.

Contact Stuart at:
StuartParks@cieem.net

Ethical Dilemmas

This is our new series of problems and conundrums that can face members during their professional practice. The purpose of the feature is to encourage you to reflect on and explore scenarios that you may face during the course of your work and to consider the appropriate ways to respond to ensure compliance with the *Code of Professional Conduct*.

In the March 2020 issue of *In Practice* we set out a dilemma for a consultant ecologist whose Ecological Impact Assessment report (EcIA) is being used by a developer in support of a planning application. However, prior to the planning application being determined the developer has instructed the Project Manager (PM) to arrange removal of a 20m length of hedgerow, with the landowner's consent, to ensure subsequent site access. Your report has identified that this work should take place outside of the bird nesting season and that an ecologist should be on site during any removal works, as the hedgerow supports slow-worms and hedgehogs, amongst other species. The PM has asked you to oversee the work and, if questioned, say that you are working for the landowner and the hedgerow removal has nothing to do with the proposed development. What do you do?

Here is the Professional Standards Committee's thoughts.

What do you do?

Firstly, is it acceptable to remove the hedgerow before planning consent has been granted?

In some cases it might be from a legal perspective, but in the majority of cases it won't. There are a number of issues to be considered:

1. Is the hedgerow covered by the Hedgerows Regulations 1997?
    - These apply (in England and Wales only) to hedgerows growing in or adjacent to common land, protected land or land used for agriculture, forestry or the breeding or keeping of horses, ponies or donkeys, provided that the hedgerows is a continuous length of 20m or more or is directly linked to other hedgerows at each end.
    - The Regulations also apply to a section of less than 20m, where the overall hedgerow meets the criteria above.
    - Planning consent effectively allows the removal of hedgerows. However, where planning consent has been granted, the landowner must submit a hedgerow removal notice to the local planning authority. They must receive written permission from the local planning authority to remove it, or may remove it after 42 days have elapsed since the removal notice was submitted if no response is received.
2. Does removal of the hedgerow require a felling licence?
    - This is dependent on the size of trees that need to be felled and the amount of timber that would be removed.
    - In relation to trees above a certain specified size, it is an offence under the Forestry Act 1967 to fell more than five cubic metres of timber in a calendar quarter (or two cubic metres if the timber is sold) without a licence authorising the tree felling.
3. Could other protected species be present, and therefore risk a breach of legislation?
    - Hazel dormice, for example, are present in hedgerows in some parts of southern England, which are protected under the Conservation of Habitats and Species Regulations 2017 (as amended).
    - Slow-worms might be present in the base of the hedgerow, and could therefore be affected; slow-worms are protected under the Wildlife and Countryside Act 1981 (as amended.
4. Is the hedgerow part of a designated nature conservation site?
    - Some hedgerows may be designated as local wildlife sites, for example, which would give them some additional protection.

Irrespective of whether it is permissible or not, it is important to remember that the proposed development does not yet have planning consent. It doesn't matter how likely the PM thinks it is that consent will be granted, there is no guarantee that the development will go ahead. To remove the hedgerow would be very damaging to the site's biodiversity and therefore shouldn't happen before consent is granted. And, of course, the determination of planning applications can take much longer than expected. A hedgerow might be removed far earlier than was necessary, resulting in the loss of a resource for longer than need have been the case.

Secondly, are there are other options, and would they help avoid some of these issues?

If the reason for removing the hedgerow is to avoid a possible constraint associated with nesting birds, then could the developer trim the section of hedgerow concerned so that it is unlikely to be used by birds for nesting, but could equally re-grow? Some hedgerow tree or shrub species will obviously re-grow after being coppiced, and may actually benefit, whereas others might fare less well – the extent of the trimming would therefore require some discussion.

By avoiding actual removal of the hedgerow this approach should avoid a potential breach of the Hedgerows Regulations 1997 (although CIEEM advises you to confirm that yourself). It doesn't, however, guarantee avoidance of the other issues discussed above. These would still need to be considered.

A developer might push for netting as an option, but this should be avoided, given the problems with it (see CIEEM's position statement on this).

Finally, this dilemma asked for your response to the PM's 'requirement' that

you tell anyone challenging you during the work, that you are working for the landowner and that this work has nothing to do with the proposed development.

This 'requirement' is putting you into a situation where you may have to lie. This could well be found to be a breach of CIEEM's Code of Professional Conduct, which includes a requirement to: "Act at all times with professional integrity, avoiding or managing any conflicts of interest and avoiding actions that are inconsistent with my professional obligations and the Objects of CIEEM."

Of course, it is possible that the developer will undertake the work in any case, and you may feel that it is better that an ecologist is present if it does.

Nevertheless, CIEEM's advice is that you avoid this situation by explaining to the PM that you aren't willing to lie on their behalf and that this would be the same for any other member of CIEEM.

It would also be worth pointing out to the PM that you are already known to the local residents and they are aware that you are working for the developer, and that removal of the section of hedgerow in the location of the access would be a blatant act to facilitate the development.

You should also highlight that there is the, less damaging and less controversial, option of trimming the hedgerow but retaining it (assuming that this is acceptable, given the questions raised above). Whilst this is likely to require additional trips to site for contractors, and is therefore likely to be more expensive, it is more likely to be acceptable to the council.

So, now for this issue's dilemma.

An NGO has received funding from sponsors for a piece of habitat restoration work designed to aid recovery of two rare species. This is the first such funding from the sponsor. They have indicated that they are very keen to support the work of the NGO and this is the first tranche in what could be a long-term funding relationship. You are a new project manager brought in to take over the work from a previous project manager who has now left the organisation.

You discover that the last two funding reports to the sponsor have significantly overstated the results to date. Whilst there has been a small population recovery in relation to one species, the other has shown very limited success, although there have been some positive benefits for other non-target species. The previous reports indicate much more positive results for both target species.

You are tasked with writing the next (and penultimate) report. You report your findings to your line manager who is extremely concerned about the implications of losing the funder by reporting that the project is unlikely to achieve the intended outcomes. The NGO has some significant plans for future related projects and some colleague's roles could be affected by a shortfall of funding.

What do you do? How can you mitigate the impact of this situation?

Add your thoughts to the CIEEM LinkedIn group discussion at: www.linkedin.com/groups/4306428/

Complaints Update

Breaches of the *Code of Professional Conduct*

At a hearing on 26 February 2020, Miss Georgina Starkie MCIEEM was found to be in breach of clauses 3 & 4 of the *Code of Professional Conduct* having failed to meet the required standard of ecological survey reporting and failing to adequately use professional judgement in undertaking her work. Miss Starkie was given a reprimand with conditions related to future improvement.

At a hearing on 6 May 2020, Dr Peter Webb MCIEEM was found to be in breach of clauses 3 & 4 of the *Code of Professional Conduct* having failed to meet the required standard of ecological survey, assessment and reporting. Dr Webb was given a reprimand with conditions related to future improvement.

Copyright Considerations in Ecological Reports

We have received a number of queries as to the issue of copyright of data in ecological reports once a) they are released into the public domain as part of a planning application or b) a client commissions a second consultant to undertake further works as part of the same project. We have asked for some legal advice from Freeths LLP to help members navigate their way through this potential minefield.

Copyright arises automatically in original literary works and belongs to the author unless it is licensed or assigned to somebody else. An effective copyright assignment needs to be in writing and signed by the assignor. Copyright only applies to the original elements of a work and will not apply to any generic elements, for example it will not apply to the layout of an industry standard report but only the contents that are original.

Nobody is entitled to copy, reproduce or adapt the copyright work without the owner's permission, otherwise they are committing a copyright infringement.

If a copyright work is created in the course of employment, the employer will be the copyright owner. This is not the same for a consultant and will instead depend on the terms on which the consultant has been engaged. It may be that under the terms, the consultant assigns the copyright in the report to the person instructing him/her or they may remain as the copyright owner and provide a licence to the person who has instructed the report to use it for one set purpose or multiple purposes.

Whilst copyright protection arises automatically in a creative work (such as the original elements of a literary work), once a work is in the public domain it may be that someone looking at it does not realise that it benefits from copyright protection and unknowingly copies the work. To prevent this, we would recommend that any reports are clearly marked with a copyright notice at the beginning of the report. It is sensible for this notice to include express wording as to what the report may be used for, for example, in support of the application for planning permission and what it may not be used for. Copyright also applies to individual elements of the report such as charts or graphs and these cannot be copied or taken without the author's permission. Database rights may also arise in certain parts of the report.

Good practice

Considering that certain surveys can only be conducted at certain times of year, it is understandable that a developer may want to rely on a previously conducted survey to prevent delays to the development process. It will depend on the terms that the original survey was instructed on as to whether it can be used for adjoining land or by a new consultant. It might be possible for a new consultant to take a paid licence from the first in order to use their survey. However, to ensure the accuracy of the results, where possible a consultant should be conducting their own survey.

It is of paramount importance to ensure that a consultant is engaged on clear terms by the party instructing them, whether this is an individual, a developer or a company.

Breach of contract

Setting out the terms of engagement clearly in a written contract may give rise to a breach of contract claim where a party is in breach of these terms. For example, where a consultant remains the owner of the copyright and they provide a licence to one party (e.g. the contractor) to use the report for a specific purpose and the contractor then shares the report with a second consultant who uses the contents. Or, where a consultant assigns the copyright in the report to the person instructing them and then the consultant uses the contents of the report for a new purpose. A breach of contract claim offers a further cause of action in addition to any copyright or database right infringement claim. There is also little argument for a party to claim they were unaware of the terms if they are clearly written in a contract that has been signed by each of the parties.

Defences

In certain circumstances there are defences to copyright infringement available. The relevant defences include 'Criticism and Review' and 'Quotation'. However these defences will only be available in circumstances where (i) the work has previously been made available to the public, (ii) the dealing (i.e. the use made of the work) is 'fair' and (iii) the dealing is accompanied by sufficient acknowledgement.

For the dealing to be considered 'fair', various factors are considered including: the amount taken; the use that has been made of the work; the impact that the use of the work has had on the market for the work – for example, are the parties in competition with one another and has use of the initial report prevented further work being commissioned; whether the work is published; how the work was obtained; the motive; and whether the purpose could have been achieved by different means. Sufficient acknowledgement means identifying both the work and the author of the work. (If you are planning on making reference to another consultant's work within your own work, it would be courteous to contact the original consultant and let them know.)

Therefore, if a consultant is analysing and clearly referencing an earlier report as part of a discussion around their own findings, this is likely to fall under the criticism and review defence. This will not be the case if a consultant takes parts of an earlier report and submits them as their own work.

Remedies

The remedies available for breach of contract include an injunction and damages. The remedies available for copyright and database right infringement include interim and final injunctions, damages or an account of profits and delivery up or destruction of the infringing items.

Disclaimer

Please note this article does not constitute substantive legal advice. Please contact Freeths LLP for more information in relation to copyright or database rights, or if you would like any terms of engagement to be reviewed or drafted.

Mapping and Preliminary Status Analysis for Likely New Endemic Orchid Taxon in Turks and Caicos Islands

B. Naqqi Manco
Terrestrial Ecologist, Department of Environment & Coastal Resources, Turks & Caicos Islands Government

The Turks & Caicos Islands host nine species of endemic plants, and share over 30 more limited only to the Lucayan Archipelago (Bahamas and Turks & Caicos Islands). Five species of *Encyclia* orchids have been documented from the Turks and Caicos Islands, including the endemic Caicos Encyclia orchid *Encyclia caicensis*. This species was originally described by Sauleda and Adams in 1978 from South Caicos, where it grows as a trunk epiphyte of shrubs and palmettos in sparse scrubby habitat. Since biodiversity cataloguing work began on Middle and North Caicos in 2000, a population of orchids that keyed out to *Encyclia caicensis* on Middle Caicos were noted to have a wider variety of colours and forms, as well as a six-month difference in bloom time than the species description indicated. Upon sharing photos and discussing with the author, it was realised that this population does not fit the species type description, and is taxonomically different. Publication of its taxonomy has been on hold to allow time for genetic analysis of it in comparison to other *Encyclia* species in Turks & Caicos.

Lithified dune in preferred Caicos *Encyclia* orchid habitat sometimes reads as road during imagery analysis.

This taxon grows only on Middle Caicos, primarily in one population in a coastal scrub habitat on partially-lithified dunes on Middle Caicos. The canopy is open with only 55-70% cover and is rarely higher than 1.0m. The orchid is epiphytic on shrub trunks just above the ground surface, and its roots spread between the leaf litter and humus layer and sand surface under its phorophytes. The leaves' tips usually only barely emerge above the canopy, but the inflorescences can spike to 2.5m high, forming a seasonal emergent canopy in the habitat. Spikes begin emerging in late April and flowers open in late June or early July, throwing an intense perfume during daylight hours that is reminiscent of vanilla, chocolate, and cloves. Bloom cycles will persist into late August. At least two pollinators for the taxon have been noted, a *Mizinum* wasp and a metallic green beetle, both found with pollinia affixed to their heads. A crab spider, coloured identically to the lip petal, has also been observed in the flowers. A second population of the taxon, with much darker flowers, grows in a more elevated coastal habitat on western Middle Caicos with similar but denser vegetation. Locally, all five known *Encyclia* species are called 'wild shallot' due to the plants' superficial resemblance to spring onions. Historically, the pseudobulbs were used to make a cooling drink to combat heat exhaustion on Middle Caicos, but this is rarely, if ever, still practiced. There has been interest in seasonal tourism to view the flowers, but there is concern over possible theft of plants and international smuggling as

A. Caicos Encyclia orchids blooming in habitat, July.

B. Junel 'Flash' Blaise of DECR looks for signs of pollinators and camouflaged crab spiders in a Caicos Encyclia orchid bloom.

C. Two specimens of Caicos *Encyclia* orchid growing adjacently demonstrate some of the wide colour variety within the population.

D. Caicos *Encyclia* orchids are most commonly yellow-tan with magenta striping, but colour can vary considerably from nearly pure white to deep red-brown.

E. A group from Turks & Caicos Islands and beyond visits the blooming Caicos *Encyclia* orchid population with cameras at the ready.

there are no known specimens of this plant in cultivation outside the Turks & Caicos Islands, except for a small conservation collection held at Royal Botanic Gardens, Kew. The smaller population is in an area frequented by tourists and flower spikes are often seen removed there during the bloom season.

Both populations are threatened by coastal development, and all occur outside of the Protected Areas System on private land, most which has been subdivided for villa lot sale. This type of piecemeal development is especially threatening to taxa of limited range in the Turks & Caicos Islands because environmental impact assessments are generally not required for individual housing developments not adjacent to protected areas.

Visually, the habitat where most individuals of this taxon occur is easily discernible from aerial imagery, but it shows up more faithfully with more advanced imagery analysis. As part of the Darwin project DPLUS081 Mapping for Evidence Based Policy, Recovery and Environmental Resilience (a joint project between Environment Systems Ltd, the Joint Nature Conservation Committee, the Government of the Turks & Caicos Islands – Department of Environment and Coastal Resources (DECR) and the National Parks Trust of the Virgin Islands) Sentinel2 imagery was used to identify the habitats with a combination of the Normalized Difference Vegetation Index (NDVI), infra-red, and blue bands. Following statistical analysis of the imagery a manual quality assurance was carried out referring to field work experience. A total area of target habitat was calculated, giving a total potential habitat for this taxon as only 7.03km^2. Given this information and known threats to the habitat where they grow, a provisional IUCN Red Data Listing status could be run for the taxon. The preliminary run-through of criteria leads to output of Critically Endangered – CR: A2ce; B2ab(i,ii,iii,iv,v); C1.

The Department of Environment and Coastal Resources (DECR) is working with Royal Botanic Gardens, Kew on project grant applications that seek to carry out genetic work on this and related taxa and to identify Tropical Important Plant Areas in the Turks & Caicos Islands. These areas can then be considered for listing under the new Protected Area status Critical Habitat Reserve, and potential habitat without the taxon present can be considered for protection and range expansion. Further work is also needed in investigation of similar habitat on nearby islands outside of Turks & Caicos, such as the Inagua Islands, Mayaguana, and Crooked and Acklins Islands in the Bahamas, as well as cays off Cuba and Hispaniola. Mature plants respond well to relocation, but it is yet unknown what fungal symbiotic partner is required for the seeds to germinate. Ideally, arrangements could be made with landowners and developers to protect the orchids *in situ* during and after development, and relocate those that are in construction areas to suitable habitat elsewhere.

About the Author

B Naqqi Manco has been working in botany, ecology, and biodiversity conservation in the Turks & Caicos Islands for over 20 years in both NGO and government sectors. His current work, as Terrestrial Ecologist for the Department of Environment and Coastal Resources, allows for a broad-based approach to terrestrial biodiversity study and protection. His professional interests are the endemic species of the Turks & Caicos Islands, particularly reptiles and plants, especially orchids.

Contact Bryan at:
mbryan@gov.tc

Reporting Wildlife Crime: Part 2 – Practical Considerations & Achieving Best Possible Outcomes

Mike Oxford CEcol FCIEEM, Martin Sims and Sally Hayns CEcol MCIEEM
(on behalf of the CIEEM Professional Standards Committee)

Keywords: wildlife crime, police action, prosecution and sanctions, practical and professional considerations, legal enforcement, regulator.

This article explores how to report wildlife crime and who you should report to depending on the circumstance, including situations where you might wish to either stop actions currently taking place or report a suspected crime that has already occurred. The likely purposes behind reporting a crime are therefore examined along with identifying how to achieve the best possible outcomes for biodiversity. The article also touches on the different status you, as an individual reporting a crime, may have under different scenarios.

Introduction

In a previous article on this topic, published in September 2016[1], we explored some of the key issues likely to impact on a member's decision to report a wildlife crime. We examined how you might feel obligated or motivated by CIEEM's *Code of Professional Conduct* to report a suspected wildlife crime. However, we also outlined what other considerations should be taken

into account, such as any contractual arrangements you may have with a client or employer, that might make the decision to report a suspected crime more difficult and/or complex for you.

We strongly recommend that you read that article first, so that you are fully informed around the wider issues that you should be aware of before deciding to report a suspected wildlife crime.

If, after reading the article, you do wish to report a suspected wildlife crime, this article runs through the options you have available and indicates which might be most appropriate in any particular circumstance. A brief summary of the previous article – under the section 'Professional Issues' is provided at the end of this article.

What to consider – practical issues

Inconsistency and variation across the UK and the Republic of Ireland

In writing this second article, the authors are very aware that wildlife protection laws are different across the four nations of the UK and different again in the Republic of Ireland. For those of you working even further afield, the situation is likely to be more varied (although hopefully some common principles will apply). Also, the capacity, priority and consistency of enforcement over wildlife crime varies between different police forces and statutory bodies. This article therefore sets out the generic issues involved; we would then advise readers to check specific details for their geographic location with the relevant enforcement bodies[2].

Being clear over the purpose of reporting

An individual wishing to report a wildlife crime may have different reasons for doing so. To be most effective, it is therefore important that they are clear about what they wish to achieve by reporting the suspected offence.

The decision to report suspected unlawful activity is likely to fall into one of three main categories, where the purpose will be:

a. Stopping – as quickly as possible – ongoing activities that are believed to constitute an offence.

b. Instigating some form of investigation and enforcement (sanctions) following actions that constitute an offence (i.e. have caused damage).

c. Seeking agreement to enter into an *enforcement undertaking* to enable an offender to restore or remedy any environmental damage they have caused.

These three options are obviously not mutually exclusive, and one may lead to another.

What should be reported?

Irrespective of who you are reporting to, always be very specific and provide details of the following:

- The activity that has taken place/is taking place that has caused damage/harm
- The result of the action taking place e.g. harm to species or damage to habitat
- The date and time of the alleged offence
- The location (consider using the 'what3words' app on your mobile phone – this is accurate to within 3m)
- The persons believed to be responsible (e.g. client, contractor or 'other' party)
- Why you believe the action constitutes an offence (wherever possible, cite specific sections or regulations within relevant legislation that you believe have been breached)
- Supporting evidence available (e.g. wildlife surveys, photos, maps, written notes, recorded statements and witnesses)
- Your own contact details

Key considerations

Any citizen can report what they believe is criminal activity and the normal perception is that this would usually be to the police. However, for a professional ecologist, when faced with the decision over whether or not to report an alleged wildlife crime, they should consider carefully:

1. Their professional role in relation to the suspected offence – i.e. are they employed by a public body with a remit to enforce wildlife protection or are they a private consultant contracted by the alleged perpetrator of the wildlife crime?
2. The means of achieving the best possible outcome for biodiversity in the long run – i.e. is prosecution the best outcome or are other remedies (e.g. civil sanctions) more appropriate?
3. The role and function of the body to whom the incident is reported – i.e. what do their powers enable them to do and are they best suited to take necessary action?

In addition, members working in the private sector should also consider:

4. Any professional issues that may be relevant arising from their relationship with their client who may, from a police perspective, also be the formal 'suspect' (see section on 'Professional Issues' at the end of this article).

Distinctions in reporting between private and public/NGO sectors

Reporting wildlife crime can be potentially much more complicated, and scattered with far more professional dilemmas, for a member in the private sector than it is for a member working in the public sector. This is because of the more complex working, contractual and commercial relationship that the former are likely to have with their client (see Box 1 and previous article on wildlife crime). In contrast, a member working in the public sector is more able to report wildlife crime through established means that exist within their organisation, which in turn is likely to have its own powers of enforcement (see below). Indeed, some members in both the public and NGO sectors may act as 'inspectors' with a formal responsibility for monitoring legal compliance.

Practical issues – initial response

In the first instance, where damaging activities are currently ongoing, a consultant ecologist should report their concerns to the person(s) currently responsible for those activities (e.g. a contractor on site). In other words, attempt first to stop further harm from occurring.

If on the other hand, the damage has already taken place, a consultant may wish to report first to their client rather than directly to the client's contractor. The exact sequence is a judgement call and will depend on the circumstances.

If the consultant is an employee within a private consultancy, they should also immediately inform their line management; in fact, protocols may exist within the company so that they do this first, enabling more senior staff to report to the client.

It will often be a measure of last resort that a consultant decides first to report any potential offences directly to the police (see section below on how to report to the police). The decision to do so is likely to depend on their relationship with their client and any contractual obligations that exist between them (see Box 1 for risks associated with breach of contract and confidentiality). Ultimately, reporting to the police is a matter of professional judgement and one that needs to be weighed under CIEEM's *Code of Professional Conduct*.

Box 1. Summary of issues covered in previous wildlife crime article (*In Practice* Sept 2016).

CIEEM's Objects are to:

1. There is no direct legal or professional obligation on a CIEEM member to report wildlife crime.
2. Action to report wildlife crime should be considered against CIEEM's *Code of Professional Conduct*.
3. Consultant ecologists should consider carefully any intention to report a client's alleged wildlife crime, especially if they are bound by contractual obligations to maintain client confidentiality irrespective of an offence being committed. Breach of such a contractual clause risks legal action against the consultant.
4. An example of suitable clauses within their *Terms and Conditions of Appointment* so that a consultant is able to achieve safeguard against breach of confidence action by a client.
5. Risk of reputational damage to a CIEEM member and/or their client arising from wildlife crime.
6. A review of what constitutes public disclosure – whistleblowing and acting in the public interest – considerations for both individuals and their employers.
7. Other considerations for CIEEM members who are not consultants (e.g. those working in the public or NGO sectors).

On the other hand, while there is no legal obligation to report wildlife crime to the police, a consultant may feel bound professionally to take such action, especially where no other remedy (see below) or course of action with another body, appears available. However, where other more proportionate options exist, these may be a preferred choice – or at least to be explored initially (see Civil and Specialist Sanctions below under the SNCO section).

Reporting wildlife crime to the Police

The police have powers of entry, investigation, arrest and prosecution and are the primary enforcement body for all wildlife crime, including illegal trade in endangered species and poaching.

To report ongoing unlawful activity (i.e. a crime is in progress), call the police on 999.

For all other situations, report suspected offences to the local police force online or by phone on 101. If you wish to remain anonymous, call Crimestoppers on 0800 555 111.

Ask for a police incident number to follow up on the report and to ensure that the suspected wildlife crime is reported in national crime statistics.

The person making the report must be very specific about where they believe the offence has taken place. To this end, it is suggested that your mobile devices have the, 'what3words' App installed. This is because the App has the whole world mapped out in a three-metre square grid. As it links to GPS, it will provide you with three unique words that you can pass to the Police, enabling them to accurately plot the location of the offence. Many Police Forces now have this App as part of their command and control system.

Policing wildlife crime is rarely prioritised by most forces in the UK and varies around the country. While some are excellent (e.g. Kent, Derbyshire and North Yorkshire; M. Sims pers.comm. April 2020), most officers and control room staff in other forces will have received very little training in wildlife crime. In all cases, therefore, ask if the case can be referred to a Police Wildlife Crime Officer (PWCO) for investigation – where one exists (Note: PWCO contact details may be on the Force website).

When contacting a Force Control Room, don't be surprised if it appears that this is the first time the call handler has heard of such a crime or the legislation. Therefore, be as explicit as possible over what crime has occurred, what evidence there is to support that allegation and what legislation has been breached. Many forces, on their websites, have pages relating to wildlife crime. In a conversation with a call handler reference to these pages can be helpful and this should greatly assist individual officers when they respond. Details of information to provide to the Police are given near the start of this article.

Ideally, the report should be passed to a trained wildlife crime officer. This could be either a Police Officer (who has warranted powers) or a Police Community Support Officer (who only has very limited powers and certainly not for arrest). Again, subject to which Force this relates to, will dictate what service you might receive, based on an officer's knowledge, experience and capability.

If you are reporting the crime then it is likely that you will be treated as a witness for any possible court proceedings further down the line, especially if an investigation results in charges being brought against individual/s. A statement is likely to be required and any evidence that you put forward as part of the investigation will need to be provided as your exhibits. There have been a number of incidents where Proceeds of Crime Act confiscation orders have been pursued by the courts. In such cases ecologists who have had involvement with the project are best placed to provide evidence relating to the financial benefit that may have accrued as a consequence of not following lawful process.

Working with the Crown Prosecuting Service

Once an alleged wildlife crime has been reported to the Police, the Police are able to consult early with the regional Crown Prosecution Service (CPS) lawyers. This would not ordinarily happen (other than for major crime) but because of issues from the past and the complexity of some wildlife legislation, the Police are permitted to seek advice from the CPS's regional wildlife lawyers. This means that officers can get advice from a CPS lawyer if they fear they might make a mistake or are unsure of the investigative route to take on a case. It is also likely that the CPS lawyer

would then be the person representing the Crown in court and prosecuting the case.

In 2015, the CPS established a national wildlife lead for wildlife crime and this has resulted in a twice yearly meeting where all the CPS regional wildlife lawyers come together with the Police and representatives from many of the national wildlife NGOs in order to improve service for the prosecution of wildlife crimes.

For any ecologist who has any doubts about how an investigation may be progressing, they can ask the police whether they have or are considering taking early advice from the regional CPS wildlife lawyer. A quizzical response might suggest that they do not know this service is available and you can tactfully suggest this might be useful.

Reporting wildlife crime to local authorities

Under S.17 of the Crime and Disorder Act 1998, local authorities have a duty to exercise their various functions with due regard to the likely effect of the exercise of those functions on, and the need to do all that they reasonably can to prevent, crime and disorder in their area. This includes wildlife crime.

In addition, local authorities have powers of enforcement under their relevant planning legislation; these powers provide the means to control or stop development operations through:

- Stop notices
- Breach of condition notices
- Injunctions through the courts

Local authorities also have powers of prosecution under S.25 of the Wildlife & Countryside Act 1981. As such, they are able to prosecute any individuals or organisations that they believe have committed a wildlife offence, whether it is planning related or not. They also have powers of enforcement under the Hedgerow Regulations 1997 where a hedgerow has been removed unlawfully.

Reporting wildlife crime to a local authority will be most effective if they have an in-house ecologist who will be familiar with their area, what constitutes an offence, what is actionable, and which enforcement body is best placed to respond. They should also be able to assist their own Council colleagues in any possible enforcement action using the authority's

planning powers. As a minimum, a local authority ecologist should have contact details for their local Police Wildlife Crime Officers (PWCOs). In the absence of an in-house ecologist, it will be worth reporting your concern to the planning department (ideally a case officer responsible for the site in question if the alleged offence is part of new development). In this latter case, make sure you refer to the local authority's duties under S.17n of the Crime and Disorder Act as well as requesting that they take action through their planning powers. Be prepared for a planning office to be unfamiliar with this 'territory'.

Reporting wildlife crime to Statutory Nature Conservation Organisations (SNCOs)

Criminal Sanctions

An SNCO's enforcement powers most likely to be of most relevance to CIEEM members include responsibility for:

- Breaches of the Environmental Damage (Prevention and Remediation) Regulations
- Damage to Sites of Special Scientific Interest (SSSIs)
- Breaches of the Heather and Grass Burning Regulations
- Environmental Impact Assessment for uncultivated land and semi-natural areas
- Breaches of species licences

Natural England are responsible for enforcement action where a protected species licence that they have issued is breached. Elsewhere in the UK arrangements are in place for these matters to be investigated by the police. Where offences against protected species are committed by those without a licence enforcement action is undertaken by the Police.

Breaches of general licences issued by SNCOs are enforced by the police. Report these and any other offences against protected species to your local police force (as discussed above).

If the incident is on-going, report it to the police on 999.

You may be able to report a suspected breach of a species licence by email to the licensing team within the relevant SNCO.

Civil and Specialist Sanctions

In addition to criminal sanctions, SNCOs also have access to a broad suite of both civil and specialist regulatory enforcement sanctions. Examples of the former include: Compliance and Stop Notices, Fixed Penalty Fines through to Enforcement Undertakings and Restoration Notices; and an example of a specialist sanction is a Prevention and Remediation Notice. The last three of these sanctions allow offenders to volunteer steps to remedy a potential or actual offence including ensuring future compliance, restoring harm, giving up a financial benefit, or providing restitution to affected local communities. If the agreed steps are taken, no civil or criminal sanctions follows.

CIEEM members might become involved in negotiations over civil or specialist sanctions where their client:

- wishes to be proactive and self-report a suspected offence; or
- is reacting to an offence where the SNCO has notified them that it intends taking criminal or civil action against them.

For further information on sanctions:

https://www.gov.uk/guidance/enforcement-laws-advice-on-protecting-the-natural-environment-in-england#enforcement-undertakings

Reporting wildlife crime to NGOs

NGOs do not have any statutory remit or powers with regard to wildlife crime, but the RSPB, the RSPCA and the League Against Cruel Sports do investigate crimes against wildlife and can pursue private prosecutions. Other NGOs, such as the Bat Conservation Trust, do not undertake investigations but do provide assistance and guidance to investigators and prosecutors.

There are some distinct advantages of reporting wildlife crime to NGOs, not least is the fact that the police do not include wildlife crime in their reporting statistics – so there is no official record of how much wildlife crime there is. The NGOs are attempting to step in to fill this gap and to record all wildlife crime.

NGOs often employ ex-police officers so may have expertise available to advise somebody thinking of reporting a wildlife crime to the police.

NGOs may also have contact details for local wildlife crime officers who can then be contacted directly.

A reminder – professional issues to consider

In the previous article on wildlife crime, CIEEM identified a number of key professional issues that should be considered prior to a member reporting an alleged wildlife offence; a summary of these is outlined in Box 1.

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Notes

1. Strike, E., Oxford, M. and Hayns, S. (2016). Reporting of Wildlife Crime – Professional Issues to Consider. *In Practice: Bulletin of the Chartered Institute of Ecology and Environmental Management*, **93**: 53-56.

2. Contact details for law enforcement bodies in the UK can be found on the Partnership for Action Against Wildlife Crime (PAW UK) web site: https://www.gov.uk/government/groups/partnership-for-action-against-wildlife-crime

Also, for Scotland, Wales and Northern Ireland: PAW Scotland, PAW Northern Ireland and PAW Cymru

These look at wildlife crime problems in their own countries and at ways to tackle them.

About the Authors

Mike Oxford is Technical Director at Burton Reid Associates.

Sally Hayns is CIEEM's Chief Executive Officer.

Martin Sims is ex-head of the National Wildlife Crime Unit and currently Director of Investigations at the League Against Cruel Sports.

EcoWorks: Whistle-Stop Problem Busting for Nature-Based Solutions to the Climate Emergency and Biodiversity Crisis

John Box CEcol CEnv FCIEEM

The EcoWorks pilot scheme for members of the Ecological Restoration and Habitat Creation Special Interest Group (ERHC SIG) (Box 1) is being extended for a further six months with a wider scope starting in July 2020 (TBC). During the pilot scheme last year, SIG members could request specialist advice on habitat restoration, creation or translocation. The extended EcoWorks scheme will in addition be a source of advice for SIG members on nature-based solutions for mitigation and adaptation to global heating and the changing climate, as well as Biodiversity Net Gain and actions to deal with the biodiversity crisis. Habitat restoration and creation are key tools to deal with the climate emergency as well as the biodiversity crisis.

Box 1. Ecological restoration and habitat creation Special Interest Group

The focus of the ERHC SIG is the restoration of degraded ecosystems, rehabilitation, reclamation, habitat creation and habitat and species translocation. Its aim is to develop and promote the creative skills and knowledge of ecologists in design and implementation applied to: mitigation and compensation; re-establishing ecological processes and ecological networks; reconnecting people and nature (health, wellbeing and education); urban and post-industrial regeneration; living landscapes and seascapes; green and blue infrastructure; bioengineering; and management of land, coastal and marine resources. Join the mailing list for the SIG by updating your personal preferences in My CIEEM on the website.

Figure 1. Salvage translocation of small ecological features, such as hedges, will help deliver Biodiversity Net Gain policies because replacement habitats with the same maturity, structure and ecological functions cannot be created quickly. Photo credit John Box.

The aim of EcoWorks is to give up to 15 minutes of pointers and suggestions over the telephone from a member of a panel drawn from the SIG Committee in response to a query emailed to a dedicated email address. There may be more than one telephone discussion as new data is generated by the enquirer (for example, NVC assessment, soil chemistry, land management history). A follow up email will be sent summarising the advice together with key references, other data sources and professional contacts.

The extension of the scope of EcoWorks this year will include species restoration and species translocation in addition to the focus on habitats in last year's pilot scheme. EcoWorks will now include habitat creation, habitat and species restoration, and habitat and species translocation as fundamental processes. In addition, EcoWorks will cover larger landscape scale

Figure 2. Young scrub and rough grassland developing well some 15 years after intensive mowing ceased in Telford Town Park. There are clear biodiversity gains and habitat is being created that can absorb more CO_2 than mown grassland. Photo credit John Box.

projects such as the joining-up of sites as envisaged by John Lawton in *Making Space for Nature*, coastal retreat, rewilding, river engineering (for example, restoration of straightened watercourses to their original landforms and work with beavers).

There were 11 enquiries to the EcoWorks pilot scheme between April 2019 and January 2020. Creation, restoration and translocation of habitats were all involved, mainly in rural locations but also in urban fringe and urban sites. Habitats included grassland, woodland, wetland and blanket bog, as well as a stockpile of granite fines. One enquiry involved the translocation of stoneworts and another involved invertebrate monitoring. Feedback resulted in 10 scores of 'Excellent' and one 'Very Good' on a 5-point scale together with very encouraging responses to the scheme (Box 2).

Extending the scope of the EcoWorks service this year will allow EcoWorks to be linked to Action 2030, which is how CIEEM is addressing its declaration of a climate emergency and biodiversity crisis. Action 2030 is a programme that will see CIEEM reach net-zero carbon emissions by 2030 and lead the way for our professions in taking urgent action to address the climate emergency and biodiversity crisis. Action 2030 has two main strands. Firstly, actions that can be taken by CIEEM itself and the Secretariat (for example, offsetting travel, purchasing energy from green energy suppliers). Secondly, advice for our members on effective actions they can take. Linking Ecoworks to Action 2030 will make EcoWorks relevant to a wide audience amongst our members while addressing the two crucial issues of global heating and biodiversity losses. This will help all of us make the links between these two inter-related issues and empower members to feel part of the solution.

Figure 3. Restoring blanket bog hydrology with *Sphagnum* beginning to colonise new pools created to raise water tables in drying and gullied peat. National Trust, Featherbed Moss, Peak District. Photo credit Penny Anderson.

Box 2. Quotes from feedback survey of those using EcoWorks

- *"The response I received was exemplary! Way beyond expectations, I was just hoping for some pointers."*
- *"By making sure that it is more than just a trial. It is a great service and in my opinion it is really needed to improve the standards in ecology surrounding habitat creation proposals. Somehow we need to make ecologists more willing to own up to not having all the answers and make it acceptable to seek advice when such critical matters are at stake, just like they would for protected species issues."*
- *"More accessible web presence – potentially a standard online web form that can be filled in rather than an email address. Wider advertisement/promotion of this valuable service by CIEEM - understand this is in a trial period so would expect these things to be brought forward as the scheme develops."*
- *"It was a very quick and informative procedure."*
- *"My experience was good, no specific suggestions for improvement."*
- *"Retaining the service past its trial date."*
- *"Yes, an invaluable resource that more people need to tap into."*
- *"I would definitely recommend EcoWorks: I would say it was an essential service for freelance ecologists."*
- *"It is a free service. Valuable for those who don't have easy access to experts."*

About the Author

John Box has over 40 years' experience as an ecologist and environmental manager. He is a past President of CIEEM. He is a member of the UK Urban Ecology Forum which is linked to the UN Human Settlements Programme (UN Habitat) which promotes socially and environmentally sustainable towns and cities. John has particular experience of habitat creation, restoration and translocation.

Contact John at:
john.box@knowlebox.co.uk

Steps to Net-Zero: How We are Tackling the Climate Emergency and Biodiversity Crisis

Amber Connett GradCIEEM and **John Box CEcol CEnv FCIEEM**

We, as an Institute, have declared a climate emergency and biodiversity crisis, acknowledging that these two issues are inextricably linked, and have determined that urgent action is needed at all levels. But a declaration means nothing without action. That is why we have launched Action 2030: a project which will see us reach net-zero emissions by 2030 and lead the way for the profession in tackling these joint crises.

A key action has been to set up the member-led Action 2030 group to devise ways in which CIEEM can achieve net-zero by 2030, and to provide advice to members on how to address the climate emergency and biodiversity crisis through their professional work.

Environment policy

Our Environment Policy is at the heart of what we are doing to tackle these crises. The key principles behind it are to **reduce** the use of energy and resources, **reuse** materials wherever possible, **recycle** all that can be effectively, **avoid** materials and products where there is doubt concerning environmental impacts, and **encourage** members and suppliers to adopt similar practices.

Energy supply

Our electricity and gas at our office in Winchester is supplied by Engie. They provide 100% renewable electricity, which is certified by UK Renewable Energy Guarantees of Origin (REGOs). Our 'green gas' is sourced from biogas from anaerobic digestion or landfill gas and is documented by Renewable Gas Guarantee of Origin (RGGO) certificates, externally verified through the Green Gas Certification Scheme. All electricity and gas supplied is fully traceable.

Due to the way in which gas and electricity is supplied in the UK, this 'green energy' is not actually what we are using in the office. The green energy feeds into a 'grid average'. However, the current UK Government advice is that purchasing gas and electricity from renewable sources means we can report zero carbon emissions from gas and electricity and a small emissions factor associated with providing electricity via the National Grid.

We continue to record our energy use, as reducing consumption of energy is important.

Procurement

When purchasing goods or services, we endeavour to use suppliers and contractors with a demonstrable commitment to environmental good practice. For example, we procure goods from suppliers who use minimal and biodegradable/recyclable plastic packaging and use external printers who use environmentally friendly practices. For events, we also request fair trade, organic food and drinks that are largely plant-based and locally produced as far as is possible.

Finances

We have chosen ethical banks for all of our accounts: Unity Trust, Triodos Bank, and Ecology Building Society. These banks fund and invest in socially responsible organisations that aim to bring about positive societal change.

Our pension provider, TPT Retirement Solutions, offers an ethical option for the Secretariat which avoids investments in coal mining and oil sands, as well as other social issues. TPT also reports on the carbon footprint of funds annually. The Action 2030 group asked that we write to TPT requesting further information on how they are working towards the legal requirement of net-zero carbon emissions by 2050 and how they are considering investments to halt global biodiversity loss.

Offsetting

Our primary aim is to reduce our carbon dioxide emissions as much as possible, but due to the nature of our work, there will be some emissions that we cannot remove.

For four years, we have calculated the cost of offsetting our carbon dioxide emissions for Secretariat travel and travel by members of our Governing Board and formal committees, along with the electricity and gas usage at the office in Winchester, using the calculator provided by CarbonFootprint.com. More recently, we have begun providing conference delegates with the opportunity to add their travel to our offsetting fund.

CarbonFootprint.com provides the opportunity to offset the cost by funding an 'offsetting project' which are largely international and social in nature. These projects are extremely important, but we have decided to support sound environmental projects in Great Britain and the island of Ireland by making an equivalent donation to offset our carbon emissions, prioritising projects that provide long-term carbon sequestration.

We have donated to a Plantlife project in England, an ancient woodland restoration project on the island of Ireland and a tree planting project in Scotland. This year will be a project in Wales. Projects are chosen in discussion with our outposted Country Policy Officers.

Action 2030 challenges

The Action 2030 group has been pushing us to go further. Their advice covers five key areas: helping us to reach net-zero carbon emissions by 2030; leading change in the professions of ecology and environmental management; providing advice to members; promoting the use of nature-based solutions; and building relationships with others.

Reaching net-zero by 2030

Figure 1 shows our net-zero carbon monitoring. CIEEM follows the standard reporting methodology of Scope 1, 2 and 3 emissions of carbon dioxide which respectively relate to direct emissions from gas boilers or vehicles, indirect emissions from electricity purchased, and emissions produced through procurement and business travel. We hope to produce a webinar and a blog on the reporting of emissions of carbon in the coming months.

The Action 2030 group is encouraging sustainable travel, home working, video- and tele-conferencing wherever possible. Action is already being taken on their suggestion to green the office in Winchester by creating wildflower window boxes and filling the office with plants.

The Action 2030 group agreed that simply providing plant-based foods at conferences and events to reduce our carbon footprint is not enough. The food must be locally sourced to reduce import emissions, and those that have a significant impact on global biodiversity must be avoided, for example, palm oil production is responsible for considerable deforestation in tropical regions.

Leading the change

The Action 2030 group has presented a range of ideas (Figure 2) for how we could lead changes in professional requirements in ecology and environmental management. These are recommendations by the Action 2030 group and are being considered by CIEEM in terms of the practicalities. Any

Scope 1	Scope 2	Scope 3
Direct emissions: arising directly from equipment owned or controlled by the organisation, such as in boilers or cars and vans. These are on-site emissions and those from vehicles normally based at the site.	Indirect emissions: from purchased energy or hired vehicles. This is typically from electricity used, supplied via the National Grid.	Other indirect emissions: the embodied CO_2 within goods and services in the supply chain, emissions due to staff commuting, waste management and various other upstream/ downstream categories.
None (see 'Energy Supply' above)	None (see 'Energy Supply' above)	• National Grid Emissions Factor • Delegate Travel • Staff and Committee travel to meetings • *In Practice* production • Catering for events • Staff commuting • Waste management • Energy usage of venues • Use of couriers • Water usage

Figure 1: Our scope for net-zero carbon emissions by 2030.

Figure 2. Recommendations from the Action 2030 working group on how CIEEM could lead changes in professional requirements for ecology and environmental management.

Continuing Professional Development (CPD) requirements would relate solely to a member's professional work.

The Action 2030 group has also been considering the use of more sustainable materials in field work such as ecological surveys and mitigation.

What can you do?

Please keep an eye on our weekly eNewsletter, blogs and webinar series for advice for members on addressing the climate emergency and biodiversity crisis through your professional work. We will also be including at least one article on the climate emergency and biodiversity crisis in each edition of *In Practice*.

We urge you all to carry forward the advice of the Action 2030 group, assessing the impact of your organisation, and encouraging suppliers and pension providers to make changes. As we stated in our declaration on the climate emergency and biodiversity crisis, action is needed from every government, every business, every organisation and every individual.

Notes

Our full Environment Policy can be viewed at: https://cieem.net/resource/cieem-environmental-policy/.

Our declaration *Climate Emergency and Biodiversity Crisis: Declaration and Call to Action* can be viewed at: https://cieem.net/resource/climate-emergency-and-biodiversity-crisis-declaration/

The associated briefing note *Climate Emergency and Biodiversity Crisis: The Facts and Figures* can be viewed at: https://cieem.net/resource/climate-emergency-and-biodiversity-crisis-briefing/

About the Authors

John is an experienced ecologist and environmental manager who has worked in both the public and private sectors. John chairs the Action 2030 working group and is a past President of CIEEM.

Contact John at: john.box@knowlebox.co.uk

Amber is CIEEM's Policy and Communications Officer. She is coordinating the Action 2030 group to help to deliver CIEEM's actions on the climate emergency and biodiversity crisis.

Contact Amber at: AmberConnett@cieem.net

Policy Activities Update

Amber Connett GradCIEEM
Policy and Communications Officer, CIEEM

In recent months, our focus has been on supporting our members through the Covid-19 outbreak and social distancing measures. We have set up and regularly update a dedicated webpage for our advice to members in light of the pandemic (cieem.net/i-am/covid-19/). We have also published *Advice on COVID-19 and Undertaking Site-Based Ecological Work* and contacted the Chancellor of the Exchequer to argue for wider support mechanisms. We have also published *Guidance on Ecological Survey and Assessment in the UK During the Covid-19 Outbreak (Version 1) (7 May 2020)*.

In March, the Action 2030 Working Group's Chair, John Box, met with our Governing Board to present the recommendations so far for getting CIEEM as an organisation to net-zero carbon emissions by 2030, leading change in the profession and providing advice to members on how they can address the climate emergency and biodiversity crisis through their professional work. An update on this work so far can be found on page 66.

Our Strategic Policy Panel met in March to continue their strategic planning of our policy activities. The group discussed localised carbon offsetting mechanisms and how this could fit into wider environmental net gain; our policy priorities of land management, marine environment and the climate emergency and biodiversity crisis; the importance of the profession and engagement activities for the Convention on Biological Diversity COP15.

UK and England

The All-Party Parliamentary Group (APPG) for Nature was successfully relaunched with an event in Parliament. Barry Gardiner MP was re-elected to Chair the group, whilst Officers include Steve Double MP (Conservative), Caroline Lucas MP (Green), Kerry McCarthy MP (Labour) and Baroness Barbara Young (Labour). The event was joined with an event on nature and mental health. We have also opened the opportunity to become an Associate Member of the group. More details are available at: www.cieem.net/i-am/influencing-policy/appg-for-nature/

At the time of writing, progress on the Agriculture and Environment Bills has stalled due to Parliamentary closures. Before scrutiny of the Bills paused, we published a statement on the Environment Bill in advance of its second reading and published a response to the Agriculture Bill calling for the Bill to fully support land managers to deliver public benefits, protect biodiversity and ensure a just transition on our journey to net-zero.

Sally Hayns (CIEEM CEO) has continued our engagement on the implementation of Biodiversity Net Gain in England's planning system by attending a workshop run by the

Department for the Environment Food and Rural Affairs on the skills needed to deliver the new system.

Scotland

We have recently been invited to be part of the Scottish Biodiversity Stakeholder Group which is a joint initiative between Scottish Government and Scottish Natural Heritage (SNH). At the time of writing, the group has not yet met due to Covid-19, however, we are looking forward to being involved.

Annie Robinson (CIEEM Scotland Project Officer) and Caroline McParland (CIEEM Vice President Scotland) met with Craig McLaren, Director of Scotland and Ireland, Royal Town Planning Institute to discuss how we can work together on topics such as Biodiversity Net Gain. Annie and Caroline also met with Paul Sizeland, Biodiversity Net Gain Lead at SNH, in February.

Caroline recently attended a National Planning Framework 4 workshop in Glasgow organised by Scottish Government and RTPI Scotland. This was a hands-on workshop to discuss ideas and solutions for the new national tier of the development plan.

The Scotland Policy Group recently met and are now working on a follow up to the 'Biodiversity Net Gain in Scotland' briefing paper (cieem.net/biodiversity-net-gain-in-scotland/) on implementation for local authorities.

Wales

We have recently initiated biannual strategic meetings between CIEEM and NRW, with the inaugural meeting being held in March and attended by Jason Reeves (CIEEM Head of Policy and Communications), Diana Clark (CIEEM Wales Project Officer) and Penny Lewns (CIEEM Vice President, Wales). The purpose of these meetings is to help us work better together in a supportive partnership as well as to act as critical friends to each other. The first meeting was largely introductory but subsequent meetings will have a more formal agenda. If you have any points you wish us to raise at these meetings, please get in touch with Diana at dianaclark@cieem.net.

Diana has also been running a number of presentation/discussion workshops about CIEEM membership at NRW offices, including one at St Mellons in January, and two via Skype in March and May. If you missed these, again please contact Diana.

In January Diana attended NRW's event 'Making the Connections' at the Senedd, sponsored by the Minister for the Environment, Energy, and Rural Affairs Lesley Griffiths AM.

In March, Jason and Diana also participated in a Welsh Government workshop on environmental governance.

The Wales Policy Group and Welsh Section Committee are working together on a position statement on the climate emergency, particularly in relation to the recent flooding events in Wales. They will also be reviewing NRW's Area Statements now that they are published.

Ireland

In March, Elizabeth O'Reilly (CIEEM Project Officer, Ireland) and Will Woodrow (CIEEM Vice President, Ireland) met with the Irish Planning Institute (IPI) to provide IPI with information on CIEEM and its work, gain an understanding from IPI on their perspective on the ecological and environmental profession in Ireland and any need for support of IPI members on ecological/biodiversity decision issues, and to explore opportunities for future work between IPI and CIEEM.

The Ireland Policy Group recently met to discuss CIEEM's response to Covid-19 in Ireland, the All-Ireland Pollinator Plan and upcoming consultations. The group will be drawing together guidance from the All-Ireland Pollinator Plan and highlighting technical issues for members.

Consultations

We have recently responded to the following consultations:

- Use of Peat in the Horticultural Industry (DCHG; Republic of Ireland)
- Scottish Forestry Corporate Plan Consultation (Scottish Government)
- Planning performance and fees (Scottish Government)
- Clean Air Plan for Wales (Welsh Government)
- National Planning Framework 4: Call for Ideas

Future priorities

Our priorities for the next few months will include: supporting members during the Covid-19 pandemic with a regular webinar series and engaging with Statutory Nature Conservation Organisations, continuing engagement on the Environment and Agriculture Bills when possible, begin publishing advice from the Action 2030 group (keep an eye on *In Practice*, blogs and webinars!), getting a full programme of events underway for the APPG for Nature when possible and engaging with post-2020 biodiversity activities.

Contact Amber at:
AmberConnett@cieem.net

CIEEM is grateful to the following organisations for investing in our policy engagement activities:

ARCADIS Design & Consultancy for natural and built assets
RSK biocensus EXPERTS IN ECOLOGY
EPR
Stantec

Rachel Hoskin MCIEEM (1975-2020)

Rachel Hoskin passed away suddenly and unexpectedly on 16 February 2020 as a result of a heart aneurysm. Many members will have come across her through her Habitats Regulations Assessment (HRA) or Biodiversity Net Gain (BNG) work, training courses or at CIEEM conferences. Her evident strong commitment to environmental causes, her enthusiasm and her big smile meant that she was remembered by those who met her.

Following a BSc in Environmental Science (with a Diploma in Arctic Studies, involving a year in Lapland) and a MSc in Conservation Biology, Rachel started her career as Assistant County Ecologist for Suffolk County Council. She then headed back northwards for a stint as Conservation Officer for English Nature in the Peak District and a spell as a Planning Ecologist for Doncaster Metropolitan Council.

In 2005, Rachel started work with David Tyldesley and Associates in Nottingham as a Senior Environmental Planner. Here, Rachel's cheerfulness and determination to do the job well endeared her to everyone. Her work with David included call-off contract work for statutory conservation bodies in England, Scotland and Wales, providing specialist advice on complex and high risk casework (particularly in relation to HRAs) plus work for numerous local authorities. It also included facilitating the development of the embryonic strategic mitigation schemes for European sites (such as the Thames Basin Heaths and Dorset Heathlands).

Around 2009 she moved on to work for Natural England (NE), swiftly moving up the organisation to become a senior specialist on planning and biodiversity. During this time, she provided expert advice on difficult planning casework to many of her NE colleagues. She also devised and delivered an HRA training programme attended by hundreds of NE staff across the country. Rachel's talent for engaging with people and clearly explaining the more complex elements of HRAs was reflected in the overwhelmingly positive feedback received about the programme. Rachel went on to roll the training out for Planning Inspectorate and Forestry Commission staff to help improve their own HRA capability and skills. She was also NE's biodiversity offsetting lead and worked closely with Defra to reinvigorate the approach to achieve BNG through the mitigation hierarchy and to take the initiative forward with local authorities and infrastructure providers, embedding biodiversity valuation into spatial planning and infrastructure projects. Rachel co-authored the NE review of HS2's approach to no net loss. Her support and enthusiasm were instrumental to the voluntary adoption of BNG by industry, and she played a key role in the development and publication of the UK's Good Practice Principles on BNG in 2016.

In 2016, Rachel returned to consultancy work, joining Footprint Ecology. She led Footprint Ecology's planning related work, again focussing on HRAs and BNG, and became a Director in 2018. Her experience of local authority and statutory agency work was invaluable. She led commissions for multiple authorities at a strategic level (including Liverpool City Region and Greater Exeter), as well as strategies focussed around areas of high biodiversity value (such as Cannock Chase, Dorset Heaths, Solent, South Pennines, Thames Basin Heaths, Suffolk Coast, and New Forest). In the week before she died, she had just run an HRA training course for CIEEM.

Rachel also continued to focus on BNG while at Footprint Ecology. Building on her experience at NE, she was involved in developing the BNG Good Practice Guidance for CIRIA, CIEEM and IEMA, and she developed and ran training courses across the UK. She worked for BREEAM in the preparation of the new Ecology Assessment and inputted to the forthcoming British Standard on BNG having previously helped write BS 42020, the British Standard for Biodiversity. Rachel was part of a small-steering group that helped NE update the Defra Biodiversity Metric and was working with a range of local authorities to implement BNG, again being instrumental in advancing the practice within the planning system.

Rachel's career spanning local authorities, statutory agency, and consultancy gave her an understanding of how planning and nature conservation could fit together.

Rachel's passion for the natural environment was reflected not just in her work but all aspects of her life and lifestyle. She found a natural home in ethical consultancy and a natural empathy with HRA work and BNG. Her worked shaped the national agenda, and wildlife will be better off because of Rachel and her work.

Rachel was always such a pleasure to work with. Although perfectly capable of holding her ground when needed, she was never adversarial or dogmatic. Her cheeky grin and her genuine care for those around her meant she had the knack of making friends wherever she went. She will be sorely missed by us all.

Durvyn Liley, with contributions from colleagues at Footprint Ecology, along with Julia Baker (Balfour Beatty), Tom Butterworth (WSP), Steve Clifton (Natural England), Sue Hooton (Place Services), Nick White (Natural England) and David Tyldesley (DTA Ecology).

CIEEM Welcomes New Fellows

CIEEM Fellows are role models and ambassadors for CIEEM, inspiring others and often having a strong track record of having given back to the profession. They are highly respected and have reached a demonstrable level of professional excellence within the disciplines of ecology and/or environmental management. CIEEM's Fellows help to shape and set the strategic direction of our Institute and more widely through the professional careers and varied roles. Fellowship matters, both to the individual and the Institute.

Thinking of applying for Fellowship?

It is important that we have a strong Fellowship and we recognise that becoming a Fellow should bring personal reward and accolade. Becoming a Fellow is a public statement that you are recognised by your peers as having made, and continuing to make, a significant contribution to addressing the ecological and environmental management challenges facing people and ecosystems around the world. It is an endorsement of your leadership, knowledge and skills.

Does this sound like you?

Find out more and apply for Fellowship.

www.cieem.net/fellowship

Two members have been awarded Fellowship of the Institute in the past six months and that that is worth celebrating. So here they are, in alphabetical order:

Phil Sterling FCIEEM

Phil Sterling has worked as a practising ecologist in private industry and the public sector for over 30 years, alongside his life-long passion for Lepidoptera and their conservation. He is currently the lead at Butterfly Conservation for 'Building Sites for Butterflies', a national programme which sets out to demonstrate that it is practicable to create and manage biodiversity in greenspaces.

At Dorset County Council (DCC) he instigated opportunities for the creation of grassland habitats within engineering operations, culminating in 2009-2011 in the creation of 7ha of calcareous grassland road verges within the construction of the A354 Weymouth Relief Road. The Relief Road cuttings have been a spectacular success, with 30 species of butterfly (over half the UK species) recorded on the slopes in less than 10 years. The Weymouth example also demonstrates that habitat of conservation significance can be created at scale in the built environment, and at lower cost in comparison with standard prescriptions for landscaping.

On behalf of Building Sites for Butterflies, Phil has given numerous presentations to a wide range of stakeholders at a high level of policy- and decision-making. He made a significant contribution to writing *Managing Grassland Road Verges: A Best Practice Guide* published by Plantlife in 2019, and to CIRIA's forthcoming Phase 2 guidance on Delivering Green Infrastructure along Linear Assets. Also, in 2019 he co-organised the first conference on wildlife on road verges since the 1960s.

Jon Davies CEcol CEnv FCIEEM

Jon Davies has been involved in biodiversity research, policy-making and implementation for 30 years. Whilst at the Natural History Museum in London, he carried out research into beetle diversity in various parts of the tropics and co-authored several chapters of a DoE publication entitled *Biodiversity Assessment: A Guide to Good Practice.* He has since applied his experience in biodiversity conservation in a UK context, co-authoring Biodiversity Action Plans for Jersey (1993) and the Highways Agency (1998). Whilst seconded to National Grid, he co-authored their Options Appraisal Guidance, a methodology aimed at ensuring that the environmental, socio-economic and sustainability implications of major projects are properly addressed in the selection of route options or sites, alongside technical and financial considerations.

As a consultant for over 23 years he has specialised in Ecological Impact Assessment (EcIA), Habitats Regulations Assessment (HRA), protected species and invertebrates. More recently he advised the Welsh Government on their National Development Framework.

Jon is committed to sharing his knowledge and experience through teaching, conferences, webinars and workshops, as well as through technical review of colleagues' work. He has taught EcIA and HRA both to students (Hull and Bristol Universities) and to fellow professionals, as well as presenting papers on subjects as varied as bat mitigation, dormouse bridges and invertebrates in EcIA.

British Ecological Society

A Family Stretching Across the Oceans

Like many sciences, tropical ecology is multidisciplinary, and establishing large projects requires collaboration, not just across nations, but also between people who bring different expertise to conservation research. Collaboration and empowerment are at the core of field courses run by the Tropical Biology Association (TBA), discovers Emma Atkins of the British Ecological Society, and students go on to benefit for the rest of their lives.

Photo credit K. Wallace, Tropical Biology Association.

The TBA has been running month-long field courses in tropical ecology since the 1990s, and the British Ecological Society (BES) has supported them right from the start. Students are immersed in a tropical habitat and carry out expeditions, take part in workshops, have expert talks and learn new techniques like surveying birds or running transect surveys of frogs.

Unlike most Western ecology expeditions, the TBA selects half of students from Europe and half from the host region, either Africa or Asia. The 50/50 placements enrich the experience, and both students and teachers say it is the best thing about their time away.

"We were from so many different backgrounds which gave us learning opportunities on so many levels," says Chigusa, a student at the University of Zurich.

Esther, a student from the Netherlands, agrees, *"and not only knowledge about ecology and conservation, but also about life."*

Assumptions about who holds the most expertise about conservation are quelled through this sharing of knowledge. Host region students often begin the course feeling that the European students will be at a higher level. By spending time together, they realise this is not true. *"It's the reason why I have continued to teach on TBA courses over the past 16 years,"* reveals Professor Ara Monadjem from the University of Eswatini.

Empowerment through sharing of knowledge is a defining characteristic of the TBA course. Rosie Trevelyan, Director of the TBA, emphasises that learning through different perspectives is infinitely valuable.

Not only does the field course give places to students on a 50/50 basis from the host region and Europe, it also does the same for teachers. Moreover, local conservationists show all the students first-hand how conservation works in the area, what the real challenges are and how people overcome them. *"It is done in a way that encourages any future research to be in collaboration with the local experts and not as exploitative as it often was in previous decades,"* emphasizes Arvid, a student at the University of Lund, Sweden.

These unique approaches have seen the TBA forge a vibrant community of ecologists across continents with connections that last a lifetime, and impact the students' personal as well as professional lives.

"The networks go on to serve students throughout their careers," says Dr Daisy Dent from the University of Stirling, who taught on a recent course in Asia. *"They leave with friends and colleagues from more than 15 countries around the world."*

With over 1,800 students completing their field courses over the past two decades, around 90% have remained in the biological field in some form, whether in research, teaching or conservation. Rosie Trevelyan sees this as one of their biggest successes. *"Conservation is so critical right now worldwide, we need more conservationists,"* she says.

Kickstarting ecological careers and retaining them complements the BES's strategic goal to foster a strong, global ecological community. Every year, the BES funds scholarships for the European students to attend the TBA field courses. The TBA supports all students from the host regions in Africa and Asia, but without the BES contribution, European students would have to pay in full.

It is a question of access and mobility, Rosie adds. *"Students have enough financial pressures already and without the funding, we would have a narrower pool of students able to come on the courses."*

The TBA 'family' stretches across oceans, and despite the distance, both TBA alumni and the organisers never forget their experiences.

"What I love is that it's very rare for me to go to an international meeting somewhere and not meet a TBA alumnus," says Rosie. *"At the BES Annual Meeting in 2018, I met both European and African alumni who came up to me to tell me what they've been doing since. That is a wonderful experience."*

Member Network News

With regional Section Committees across England and national Sections in Wales, Ireland and Scotland, as well as Special Interest Groups (SIGs) focussing on specific topics, we have something for everyone.

Each network is run by a committee of volunteers, providing opportunities to share knowledge, meet like-minded people and learn more about the science and practice of our profession.

There are currently about 170 Member Network volunteers doing amazing work all over the UK, Ireland and beyond. If you'd like to find out about what they get up to and how you can get involved, please visit www.cieem.net/member-networks.

Academia Special Interest Group

Working with CIEEM to Support Staff and Students in Universities

The impacts of the Covid-19 pandemic are being felt in all areas of our profession, including by the students, the ecologists and environmental professionals of the future. Higher Education institutions are rising to the challenge, rapidly moving teaching, assessment and support for students online to comply with lockdown conditions whilst continuing to provide students with the skills and knowledge they will need when they graduate.

In April the ASIG held a focus group, chaired by Rev. Paul Rooney, Liverpool Hope University/ASIG Vice Convenor, to explore ways CIEEM could support academic and student members moving into the 'new normal'. The outcome has been combined with those from a meeting on the same subject involving staff teaching on accredited programmes and are available at: https://events.cieem.net/Portal/VolunteeringwithCIEEM/Academia_Special_Interest_Group.aspx

Have you been moving your teaching online? It seems different platforms are being used with varying degrees of success. How have 'virtual field courses' worked?

We'd really like to hear your experiences, whether you are a student or lecturer. We could be in this situation for a while and if you email ASIG at membernetworks@cieem.net we'll share ideas on the ASIG page.

South East England Geographic Section

Britain's rarest lizard – Sand Lizard reintroduction, Eelmoor Marsh SSSI

CIEEM South East Section members had a rare opportunity last year to visit an amazing site near Farnborough: Eelmoor Marsh SSSI. This site is a closed site with no access to the general public as it is own by QinetiQ, who carry out secret squirrel-style stuff for the government and impose a lot of security around the area. Eelmoor Marsh is 79 hectares of exceptional and precious habitat, which has been under management and restoration for over 20 years. In association with Marwell Wildlife, low intensity grazing with Przewalski's horses and Highland cattle has helped to restore ecological processes. Mechanical methods have also been used to remove invasive trees and modify the hydrology to retain water. The restoration has created a rich complex habitat made up of wet, humid and dry heath, species-rich grassland, mire, and woodland communities and now supports over 400 species of conservation concern. This site also has sandy areas, which are perfect for Britain's rarest lizard, the sand lizard.

Since 1989, Marwell Wildlife has contributed nearly 2,000 sand lizards to various reintroduction projects through a captive breeding programme in partnership with the Amphibian and Reptile Conservation Trust (ARC) and Natural England (NE). In September 2017, 80 juvenile sand lizards were released at Eelmoor Marsh, with a further 80 individuals released in 2018 and 2019. The project was to be monitored and

recorded over the three years by Rachel Gardner, a PhD student at the University of Southampton in association with Marwell Wildlife. Within two months of the initial release 15-20% of the population was seen on the majority of post-release surveys by Rachel. By monitoring the behaviour of the animals, it has given a unique insight into what the sand lizards required from the habitat and confirmed dispersal distances from 1m to more than 100m from the original release site.

In June 2019, a small group of CIEEM members from the South East England Section had the opportunity to participate in a free guided tour of the site with Rachel Gardner. I was grateful that the weather stayed fine for us. During the tour, Rachel went into great detail about the site management and sand lizard reintroduction project, and the successes of the project so far. We were able to visit the areas where the monitoring of the sand lizards was taking place, but unfortunately did not see any of the very elusive, cryptic animals themselves. Rachel was in the process of applying for further funding to extend her research. Watch this space, as I intend to keep in contact with Rachel and arrange another site visit – hopefully for 2021.

Ruth Holland ACIEEM

South East England Geographic Section

Great crested newt district level licensing seminar

During 2019 the Section aimed to provide a range of workshop/seminar events, focusing on 'hot topics' and encouraging engagement between different sectors of the ecological and environmental management community.

We kick started this with a seminar on Great Crested Newt (GCN) District Level Licensing (DLL) in July; scheduled to follow the main GCN survey period when mitigation approaches and options were likely to be uppermost in our consciousness.

During the first half of the seminar a wide range of speakers made presentations about existing DLL schemes already in operation in the South Midlands region, including representations from NatureSpace and the South Midlands Newt Conservation Partnership, with the Local Planning Authority perspective being put forward by South and Vale District Council.

The second half of the seminar was led by Natural England who provided an update on their own DLL scheme, which came online in Cheshire and Kent in 2019 and provided an overview of the assessment and application process, as well as an idea of how and where the scheme could be rolled out next. We also heard about the first case study of a successful DLL in Kent, from the consultant's perspective.

The message emerging from these presentations was the importance of a well thought out and evidenced based strategic approach to mitigation, with a suitable mechanism to ensure that compensatory habitat creation is delivered in the right location, functionally linked, available upfront in advance of development impacts and that long-term management and monitoring is secure and robust. There are obvious benefits for developers, in terms of reduction in upfront survey costs and reduce liability of managing mitigation land, but case studies demonstrated that one size doesn't fit all and that DLL won't always be the cheapest, more expedient or most ecological sound option for every project. The scheme will however provide another option for developers to consider, and potentially provide long-awaited

funding for strategic landscape scale mitigation – allowing us to work towards 'more, bigger, better and joined up' as advocated by the Lawton Review.

There was plenty of opportunity for questions and open discussion, and at times some lively debate! Key topics included the quality of baseline data used to inform the DLL metrics, how compensatory habitats would be delivered, managed and monitored, and how Natural England proposes to deal with the 'licence to kill' perception and measures to be implemented on site to reduce potential killing/injury impacts to individual GCN.

Overall the seminar event was very well received by our members who really valued the opportunity for open discussion with Natural England, conservation partnerships and local authorities delivering DLL, with the event promoting a greater understanding of the process involved. It is good to see that Natural England have been continuing this theme of engagement, by running a series of GCN DLL webinars in association with CIEEM over the past few months. This has given those ecology professionals who will be dealing with the DLL process clearer guidance and insight to the application process required for DLL. It is my perception that this greater level of transparency has been welcomed by many, even if some still have reservations about the soundness of the scheme, and as such regional networking and interactive knowledge sharing events can be a useful tool.

As we steam head towards the traditional GCN survey season, in some areas of the country, DLL will certainly be a consideration - although I am sure there will be plenty of ecologists still opting to get their wellies on and conduct traditional surveys until the success of DLL scheme has been proven! Further updates with regards to GCN DLL monitoring results will be welcomed to provide assurance that such strategic level approaches are successful and appropriate.

Following on from the success of the GCN DLL it is hoped that a follow up event can be run later in 2020. Please contact Clare if you would like to contribute or have any ideas for further event that you would like to see delivered in the South East region.

Clare Caudwell CEcol MCIEEM is Associate Ecologist at CSA Environmental (Sussex) and currently Vice Convenor of the CIEEM South East England Section.

Contact: clare.caudwell@csaenvironmental.co.uk or southeastengland@cieem.net

Irish Geographic Section

The British Ecological Society held their Annual Meeting in December 2019 in the Titanic centre in Belfast. The CIEEM Irish Policy Group, supported by the Irish Project Officer, submitted a proposal and were delighted to organise a lunchtime workshop *– Ecologists Without Borders: Confronting Challenges in Cross-Border Biodiversity Management*.

Ecosystems do not respect political borders. Borders, however, frequently present challenges to managing biodiversity in cross-border sites, catchments and species populations. This workshop looked at some cross-border projects in Ireland to examine the challenges and solutions in biodiversity management across jurisdictions that differ in policy and practice.

We were delighted with the engagement we received. With approximately 50 people we were able to split into groups and generate some interesting discussion. We hope to build on this workshop and provide more support to our cross-border working members moving forward.

South East England Geographic Section

Ancient woodland ecology and archaeology tour

During 2019 the Section aimed to provide a range of events, including workshops/seminars and field visits. In June we ran an ancient woodland themed field visit that covered several areas of interest: botany, woodland management, archaeology and heritage, invasive species and a host of other topics that were discussed during the day.

The event was led by John Morris of the Chiltern Woodlands Project at Pigotts Wood, a woodland in South Buckinghamshire that he has studied for many years. After a quick introduction with tea and biscuits (a very important part of every event!) we headed out to make the most of the fantastic June weather.

John started the tour by introducing us to some of the prior human activity and industries that took place in the wood. These included the famous Chiltern 'bodgers' making chair legs and other furniture along with charcoal makers, general timber processing and the related firewood processors. Chalk and flint have also been quarried in the woodland. A multitude of scrapes, hollow, one sided excavations and deeper pits still exist in the wood and John explained the purpose of each one and how the support from the Heritage Lottery Fund had allowed for detailed mapping of these from LIDAR images of the wood, gathered from bespoke flyover surveys. This imaging penetrates the tree and scrub cover and captures the small topographical variations that can be hard to see even when stood in the wood observing the area.

Although cultural heritage of Chiltern woodlands is a speciality of John's and the Chiltern Woodlands Project, we also enjoyed a fantastic botany walk and learnt from John and each other as we walked through the wood and discovered various ancient woodland plants, including violet helleborine *Epipactis purpurata* which is very characteristic of the beech woodland on chalky and clay soils in the Chilterns and even a non-botanist like myself was interested to see a good specimen.

The group expanded on some really good short talks started by John about the impact of grey squirrel, deer and edible dormouse on the Chiltern woodlands. The was an excellent example of the knowledge sharing that goes on at Section events and we benefitted from members knowledge on grey squirrel damage to trees, deer browsing damage and the effects on the natural regeneration of native woodland and some particularly interesting points about edible dormouse damage to nesting birds and hazel dormice.

Woodland management explained with historical information was fascinating. Understanding how management with hand tools and no mechanisation would have largely prevented the felling of mature standard trees – and consequently led to regular felling of smaller trees and creating a much more open canopy – opened a few eyes as we stood under a dense canopy of mature beech trees. LIDAR and historic maps also showed that potentially this ancient woodland was entirely open 600+ years ago – although this is a concept that the Chiltern Woodlands Project is still researching.

The woodland walk without the talks would have been fascinating in itself – just finding trees like the distorted wild cherry pictured below, walking in dappled sunlight and chatting to other interesting members was a great use of a day.

Look out for upcoming events in your area and keep up to date with what's been going on at www.cieem.net/member-networks.

New Members

The decision on admission is usually taken by the Membership Admissions Committee or Registration Authority 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 and Chartered members:

ADMISSIONS

Chartered Ecologist (CEcol)
Corey Cannon, Thomas Flynn, Vivienne Greenough, Claire Pooley, Jonathan Seller, Nicholas Westerman

Full Members (MCIEEM)
Dr Rosalie Callway, Karen Cunningham, Simon Dowell, Elizabeth Hancocks, Louise Hutchby, Cath Jackson, Katy Perry, Victoria Price, Dr Nicola Rivers, George Sayer, Thomas Smith

Upgrades to Full Membership (MCIEEM)
Emmanuelle Amiral, Samuel Bacon, Daniel Best, Owen Crawshaw, Jack Cunningham, Christopher Dennis, Kimberley Gallaher, David Harvey, Charlotte Houlker, Dr Timothy King, Gemma Linacre, Michelle McGinn, Joe McLaughlin, Owen O'Keefe, Stephen Parnwell, Elizabeth Pimlott, Gail Rainford, Jenny Ross, Amy Smith, Porscha Thompson, Charlotte Wevill

Associate Members (ACIEEM)
Jennifer Chambler, Niall Currie, Kathryn Duff, Steven Duncan, Michael Gardner, Jack Halpin, Claire Hands, Ben Jenkinson, Adam Jessop, Rob Lamb, Dale Mortiboys, Fionn Murphy, Michael Neep, Warren Packer, Lindsey Roberts, Wardaan Sallhab, Matthew Thurlow, Dr Damiano Weitowitz, Fleur Wilson, Jonathan Wood, Ian Woodman

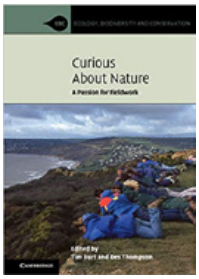
Upgrades to Associate Membership (ACIEEM)
Clare Cashon, Zoe Courchene, Martino Ginepro, Marion Gohier, Ross Harding, Freya Johnson, Susan Medcalf, Nicola Morton, Linda Pryke, Amelia Reddish, Caroline Ritchie, Emma Robson, Alexandria Shaw, Alejandra Toledo, Katherine Wright, Jessica Yorke, Rachel Young

Qualifying Members
Solomon Akinnawo, Benjamin Anscombe, Ben Arkless, Conor Aynsley, Amy Berry, Amelia Brogan, Connor Bush, Cameron Campbell, Laura Carter, Maria Ciruelos, Eoghan Concannon, Emily Cooke, Iseult Cummins, Leanne Deighton, Elvin Delaney, Dr Eleonora Di Cuffa, Julie Douglass, Dara Dunlop, Dominic Eddie, Katie Farmer, Hollie Fisher, Liam Gaffney, Jennifer Gibson, Jonathon Gregson, Nicole Gullan, Lauren Hale, Abigail Hamer, Zara Hanshaw, Nicole Hawkings, Reuben Hayden, Will Horlock, Ming-Hung Huang, Byron Humphries, Daniela Imbimbo, Kristina Jenkins, Namrata Kaile, Suzanne Law, James Leonard, Daniel Lock, Benedict Macmillan, Ptolemy McKinnon, Callum Miller, Nicholas Mullan, Amanda Murphy, Dáire O'Hare-Doherty, Luke Osman, Callum Pearson, Katie Pender, Jordan Porter, Miranda Proctor, Max Robards, Ciaran Rowett, Nina Rygh, Douglas Sands, Louise Sawrey, Lewis Sheridan, Michael Smith, Laragh Smyth, Adam Sneath, Laura Stock, Christopher Sulston, Andrew Taylor, Shane Thomas, Jordanne Thompson, John Totterdill, Saskia van Dongen, Daniel Watson, India Wedge, Elliot Williams, Melissa Wilson, Emma Wright

Upgrades to Qualifying Membership
Kathryn Fraser, Roisin Jones, Katrina Salmon

Student Members
Louise Aparo, Lowenna Baggaley, Nathan Baker, Megan Barr, Jade Bateman, Adam Bell, Nishant Bhardwaj, Maisie Biggs, Samuel Binks, Rebecca Blackman, Eleaner Broadley, Rachel Brown, Tomaso Carucci, Christopher Chapman, Esther Christie, Marise Collie, Amelia Collins, James Cooke, Ben Coulson, Rachel Cox, Rebecca Cox, Jonathan Craven, Edward Cullen, Bevan Dell, Elliot Denham, Max Dimes, Yanqian Ding, James Disney, Chris Edwardson, Grace England, Jamie Everett, Julija Fediajevaite, Richard Fensom, Roisín Foran, Jessica Fox, Lewis Gething, Arianna Gialletti, Jessica Goldring, Sophie Gooding, Claire Grahame, James Gretton, Lauren Hadfield, Christopher Haimes, Mazey Hall, George Hand, Reuben Harris, Mhairi Henderson, Katrina Herman, Lucy Hutton, Sydney Jacus, Rhiannon Jensen-O'Brien, Christine Judd, Hannah Lawson, Darren Lloyd, Rosie Mackenzie, Jemma Maguire, Robert McArthur, Will McDonald, Jordan Mckinstry,Emily McLean, Gemma McMullan, Maxine McNaughton, Rachel Milburn, Fiona Miller, Josep Montane Willis, Jason Moore, Lucy Moorhouse, Sophie Morris, Clare O'Reilly, Caitlin Page, Weronika Pasieczna, Jonathan Reavley, Ben Reed, Sian Rennie, Carrie-ann Riddleston, Heather Ridgway, Gary Roberts, Joseph Roby, Jodie Ross, Andrew Scoon, Katie Scott, Ollie Shotton, Oliver Stanford-Mellis, Andreea Stroia, Patrick Summers, Pantelina Syrimis, Euan Talbot, Daniel Taylor, Dorota Tulacz, Judy Tung, Elizabeth Upson, Claudia Vieira Ferreira, Lilian Wadle, Hannaya Watts, Sacha Welsh, Elise Williams, Harriet Wootten, Melanie Wright, Marx Yim

Recent Publications



Curious about Nature: A Passion for Fieldwork

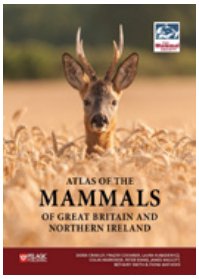
Editors: Tim Burt and Des Thompson

ISBN: 9781108448642

Price: £25.95

Available from: www.summerfieldbooks.com

This book provides an overview of the diversity, impacts and importance of field work. Forty contributors, including CIEEM members, capture the excitement and importance of fieldwork through a wide variety of examples, from urban graffiti to the Great Barrier Reef.



Atlas of the Mammals of Great Britain and Northern Ireland

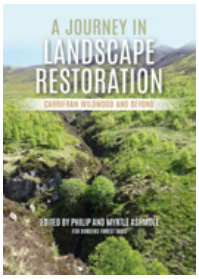
Author: D. Crawley *et al.*

ISBN: 9781784272043

Price: £35.00

Available from: www.pelagicpublishing.com

Based on over 1.8 million records, this Atlas provides information on the current distributions of terrestrial and marine mammals in the UK, Channel Islands and the Isle of Man. It includes grey squirrel expansion, pine marten recovery and water vole decline. Data are also presented for feral species, vagrants, and cetacean strandings.



A Journey in Landscape Restoration: Carrifran Wildwood and Beyond

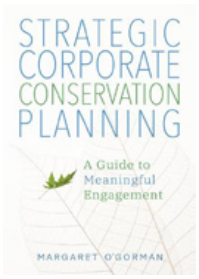
Authors: Philip Ashmole and Myrtle Ashmole

ISBN: 9781849954723

Price: £18.99

Available from: www.nhbs.com

After 20 years of work Carrifran Wildwood in the southern uplands of Scotland has become an inspirational example of ecological restoration. Forty contributors describe the challenges of carrying forward bold initiatives requiring close cooperation with local communities as well as funders, authorities, landowners and partners. 'Before and after' surveys are also included, along with descriptions of changes in vegetation, bird populations and invertebrate animals, and descriptions of the rich communities of fungi and mosses.



Strategic Corporate Conservation Planning: A Guide to Meaningful Engagement

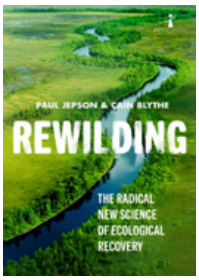
Author: Margaret O'Gorman

ISBN: 9781610919401

Price: £22.99

Available from: www.blackwells.com

Industries that drive economic growth and support our comfortable modern lifestyles have exploited natural resources to do so. But now there's growing understanding that business can benefit from a better relationship with the environment. This book offers fresh insights for corporations and environmental groups looking to create mutually beneficial partnerships.



Rewilding: The Radical New Science of Ecological Recovery

Authors: Paul Jepson and Cain Blythe

ISBN: 9781785786273

Price: £8.99

Available from: www.nhbs.com

Practising ecologists Paul Jepson and Cain Blythe explore the ongoing scientific discoveries that are emerging from the field of rewilding where, instead of conserving particular species in nature reserves as 'museum pieces', frozen in time, the thinking now is that we should allow landscape-sized areas to 'rewild' according to their own self-determined processes.

Leaving Space for Nature: The Critical Role of Area-Based Conservation

Authors: Nigel Dudley and Sue Stolton

ISBN: 9780367815424

Price: £22.74

Available from: www.routledge.com/

This book provides the first contemporary assessment of area-based conservation and its implications for nature and society. With many people calling for half the earth's land surface to remain in a natural condition, this book taps into the urgent debate about the feasibility of such an aim and the ways in which such land might be managed. Case studies are also included.

Free downloads that may be of interest to members:

- Porras I. and Steele P. (2020) *Making the market works for nature: How biocredits can protect biodiversity and reduce poverty*, IIED Issue Paper, London: IIED. Available at: https://pubs.iied.org/16664IIED/
- Cremers K., Wright G. and Rochette J. (2020) *Strengthening Monitoring, Control and Surveillance in Areas Beyond National Jurisdiction*, STRONG High Seas Project. Available at: https://www.iddri.org/en/publications-and-events/report/strengthening-monitoring-control-and-surveillance-areas-beyond
- Gjerde K. and Wright G. (2019) *Towards Ecosystem-based Management of the Global Ocean: Strengthening Regional Cooperation through a New Agreement for the Conservation and Sustainable Use of Marine Biodiversity in Areas Beyond National Jurisdiction*, STRONG High Seas Project. Available at: https://www.prog-ocean.org/wp-content/uploads/2019/12/PB_Ecosystem-based-management_191213.pdf

Modelling the functional connectivity of landscapes for greater horseshoe bats *Rhinolophus ferrumequinum* at a local scale

Domhnall Finch *et al*.

Landscape Ecology 2020, 35: 577–589 (Open Access)
https://doi.org/10.1007/s10980-019-00953-1

Assessing the movement of species tends to rely on radio-tracking or GPS evidence, which is difficult and costly to gather. This study examined functional connectivity of greater horseshoe bats at a local scale using Circuitscape software. Results show functional connectivity models could be created using bat activity data. Models had the ability to be transferred between roost locations, although site-specific validation is strongly recommended.

Correspondence: https://link.springer.com/article/10.1007/s10980-019-00953-1/email/correspondent/c1/new

Direct and indirect effects of noise pollution alter biological communities in and near noise-exposed environments

Masayuki Senzaki, Taku Kadoya and Clinton D. Francis

Proceedings of the Royal Society B, 287: 20200176
https://doi.org/10.1098/rspb.2020.0176

Although decades of research have documented a variety of negative impacts of noise to organisms, there is still a lack of understanding as to how noise affects different taxa within a biological community and how effects of noise propagate across space. In this study, researchers experimentally applied traffic noise pollution to roadless areas and quantified the impacts of noise on birds, grasshoppers and odonates. Results suggest that noise pollution not only affects acoustically oriented animals, but that noise may impact the wider biological community.

Correspondence: masayukisenzaki@gmail.com

Operationalizing ecological connectivity in spatial conservation planning with Marxan Connect

Rémi M. Daigle *et al*.

Methods in Ecology and Evolution, 11(4): 570-579 (Open Access)
https://doi.org/10.1111/2041-210X.13349

Fishing for mammals: Landscape-level monitoring of terrestrial and semi-aquatic communities using eDNA from riverine systems

Naiara Guimarães Sales *et al*.

Journal of Applied Ecology, 57(4): 707-716
https://doi.org/10.1111/1365-2664.13592

Environmental DNA (eDNA) metabarcoding has been applied widely in marine and freshwater systems, however, for semi-aquatic and terrestrial animals, the application of this technique remains relatively untested. This study shows that eDNA metabarcoding can be used to generate an initial 'distribution map' of mammalian diversity at the landscape level. If conducted during times of peak abundance, carefully chosen sampling points along multiple river courses provide a reliable snapshot of the species that are present in a catchment area.

Correspondence: a.mcdevitt@salford.ac.uk

Informing marine spatial planning decisions with environmental DNA

Alessia Bania *et al*.

Advances in Ecological Research, 62: 375-407
https://doi.org/10.1016/bs.aecr.2020.01.011

Decisions about where and when to establish marine management areas are currently hampered by the uncertainties of incomplete, or overly general, information about biodiversity. Environmental DNA (eDNA) analysis can provide information on biodiversity over spatial-temporal scales that are currently prohibitive in spatial planning studies. This study presents directions to develop robust approaches to integrate eDNA and spatial planning processes, aiming to provide guidance to underpin tool development.

Correspondence: M.Beger@leeds.ac.uk

Chipper: Open-source software for semi-automated segmentation and analysis of birdsong and other natural sounds

Arthur D. Middleton *et al*.

Methods in Ecology and Evolution, 11(4): 524-531 (Open Access)
https://doi.org/10.1111/2041-210X.13368

A critical analysis of the potential for EU Common Agricultural Policy measures to support wild pollinators on farmland

Lorna J. Cole *et al*.

Journal of Applied Ecology, 57(4): 681-694 (Open Access)
https://doi.org/10.1111/1365-2664.13592

With the aim of decreasing the environmental impact of agriculture, the 2014 EU Common Agricultural Policy (CAP) defined a set of Ecological Focus Areas (EFAs) farmers could select from as a requirement to receive basic farm payments. To inform the post-2020 CAP, the authors performed a European-scale evaluation to determine how different EFA options vary in their potential to support insect pollinators under standard and pollinator-friendly management, as well as the extent of uptake.

Correspondence: Lorna.Cole@sruc.ac.uk

Escape responses of terrestrial and aquatic birds to drones: Towards a code of practice to minimize disturbance

Michael A. Weston *et al*.

Journal of Applied Ecology, 57(4): 777-785
https://doi.org/10.1111/1365-2664.13575

The recreational use of drones is widespread and increasing, yet laws and codes of practice which aim to manage deleterious impacts (e.g. negative interactions with wildlife) are reactionary, unscientific and inadequate. Researchers measured avian escape responses to an approaching drone to inform the development of a code of practice to manage drone-induced disturbance. Results found no drone take-off closer than 100 m, and no flight within 100 m would eliminate most escape responses by birds.

Forthcoming Events

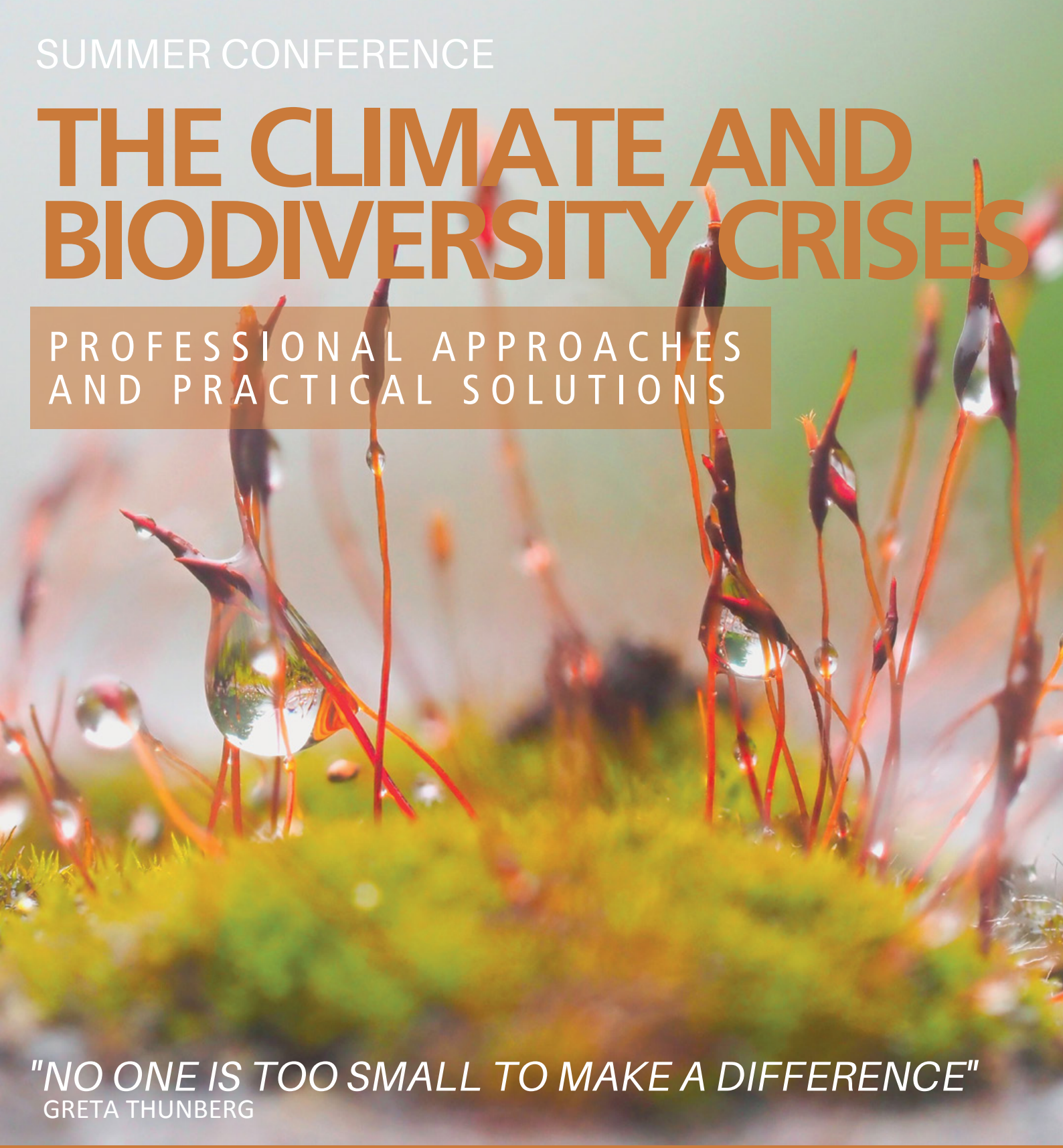
For information on these events please see *www.cieem.net*.

Conferences		
Date	**Title**	**Location**
21 July 2020	**CIEEM Summer Conference 2020** – The Climate and Biodiversity Crises: Professional Approaches and Practical Action	Online
22 September 2020	**CIEEM Welsh Conference 2020** – The Well-Being of Water: Bringing our Rivers Back to Life	Online
27 October 2020	**CIEEM Scottish Conference 2020** – Land Use in Scotland: Changes, Challenges and Solutions	Online
1-2 December 2020	**CIEEM Autumn Conference 2020** – Time to Change: Putting the Environment at the Heart of Social and Economic Well-Being	Bristol

SUMMER CONFERENCE

THE CLIMATE AND BIODIVERSITY CRISES

PROFESSIONAL APPROACHES AND PRACTICAL SOLUTIONS



"NO ONE IS TOO SMALL TO MAKE A DIFFERENCE"
GRETA THUNBERG

- THE ROLE OF DISPARATE HABITATS IN CARBON SEQUESTRATION
- HOW THE PROFESSION CAN TACKLE THE INTERLINKED CLIMATE AND BIODIVERSITY CRISES

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