CIEEM in practice

Issue 115 | March 2022

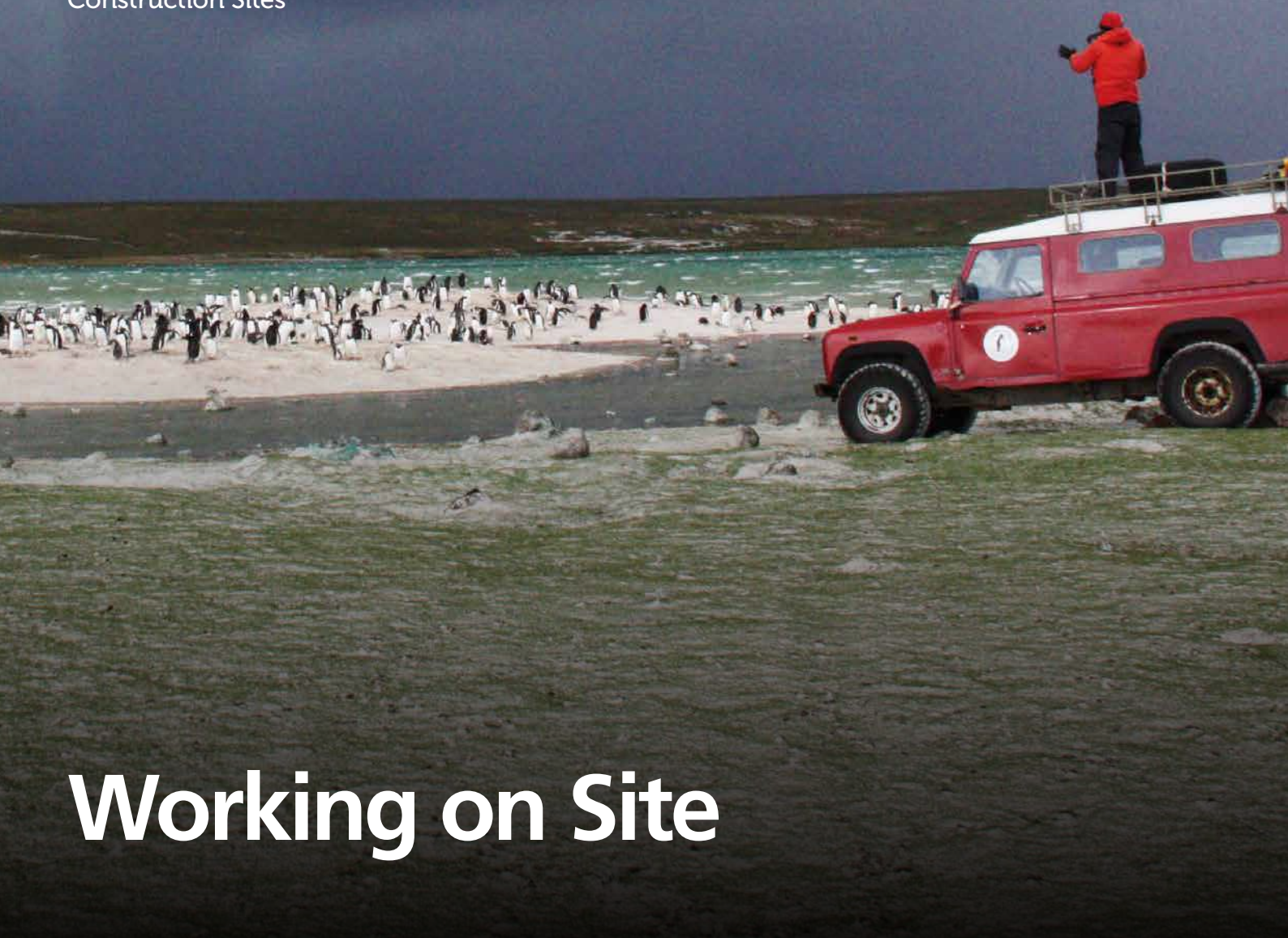
Bulletin of the Chartered Institute of Ecology and Environmental Management

ECoWs on Large Infrastructure Projects: Lessons Learned

Women on Site: Reflections from the Field

Using Technology for Ecological Surveys During COVID-19

Five Practical Tips for Ecologists Working on Construction Sites



Working on Site

EARLY CAREERS TRAINING PROGRAMME

CIEEM

Autumn 2022 Intake

Don't miss out again!

There was so much interest in the launch of the programme that we've opened up bookings for the next cohort early to allow people to secure their places now and plan for the year ahead.

So, if you're an early career ecologist or environmental manager who wants to develop your skills in core areas, or you're a manager with junior staff that could benefit from learning on the job, then keep reading!

Comprised of 12 days of training to be taken over a 18-24 month period, the programme will involve a mix of core modules and a range of optional modules for delegates and employers to choose from based on their interests and specific areas of work.

Core modules

Introduction to professional practice, professional ethics, ways of working and communication skills	2 days residential in-person	Sue Bell CEcol CEnv FCIEEM
Introduction to UK nature conservation legislation	1 day online	Dr Alina Congreve & Professor Anthony Gallagher
Habitat survey and mapping (including Phase 1 and UK Hab)	2 days in-person	Paul Losse MCIEEM
Introduction to Preliminary Ecological Appraisal	1 day online	Mike Dean BSc MSc CEcol CEnv FCIEEM
Introduction to Ecological Report Writing	1 day online	Mike Dean BSc MSc CEcol CEnv FCIEEM

A full list of modules (core and optional) can be found at: www.cieem.net/early-careers-training-programme

At just £990 for the programme, this is a fantastic opportunity to invest in your staff to help them gain a good foundation in ecology and environmental management.

Please note that additional costs for attending the residential part of the course will apply

Delegates will also benefit from:

- Learning from well-established trainers
- Networking
- Peer to peer learning
- Receiving a certificate on completion of the programme

We only have 16 spaces available

and based on the success of the previous launch of the programme, we recommend expressing your interest quickly.

For more information please visit www.cieem.net/early-careers-training-programme or email training@cieem.net to reserve your place.

Editorial

Welcome

Neither triumph nor despair. Progress, but still not with the urgency needed. Such were many people's thoughts on the outcomes of Climate COP26. As you're reading this, Biodiversity COP15, the 15th meeting of the Conference of the Parties to the Convention on Biological Diversity, is potentially just weeks away from a face-to-face meeting in China. I wonder how we as ecologists and environmental managers will feel at its conclusion. Optimism or pessimism?

In the last edition of *In Practice*, our new President, Richard Handley, spoke of his hope for the future. I share his hope, despite the disappointments and let-downs familiar to anyone working in this sector for any length of time (remember Biodiversity 2010?). And I see lots of opportunities coming our way.

I am hopeful because we seem to be in a moment of time when words have a greater chance of being turned into sustained action. November's Ipsos Issues Index showed the environment and climate change to be the biggest concern for the British public; more businesses are realising that their resilience is undermined by biodiversity loss; the critical role of nature and nature-based solutions in addressing climate change is increasingly recognised; more and more landowners are embracing regenerative agriculture and rewildling; and towards the end of last year the Environment Bill was finally enacted. Better late than never.

COP15 needs to build on this momentum. It is well past time for governments globally to show – through dialogue, commitments and action – that they understand the impact and urgency of biodiversity loss, for nature and for people. CIEEM will be represented, adding its voice to the debate.

Closer to home, for many of us, the Environment Act means change and opportunity. One of the most controversial policies is Biodiversity Net Gain. I welcome it and we are already applying it to our own construction projects on Anglian Water sites. There has been much said about it, including within *In Practice*. In my view some criticisms are unfair, accusing the approach of not doing something it was never intended to do, such as addressing the needs of particular species. This is where other areas of legislation and policy come in. But some concerns are legitimate, and it is our responsibility to use evidence and experience to ensure it is applied to deliver the outcomes for which it is intended. Challenges we can help overcome include improving the quality and consistency of habitat assessments and use of the Biodiversity Metric, advising developers on net gain strategies that genuinely support nature recovery, and ensuring long-term governance is in place, so commitments are delivered. No doubt these issues and others will be discussed at our forthcoming Spring Conference.

I am particularly hopeful for the impact of Local Nature Recovery Strategies. They will give us a coherent country-wide spatial plan for nature, built up from the local level. Their statutory footing will give them greater weight and influence than what has gone before, such as regional biodiversity opportunity maps. For them to be successful, we will need to work collaboratively, and take an environmental net gain approach to ensure benefits for communities as well as nature.

The environmental performance of my own sector, the water industry, is under the spotlight more than it ever has been before. This is welcome, and timely, as water companies get underway with business planning for 2025–2030. The climate and biodiversity crises are a key driver; natural capital and nature-based solutions are central to discussions between companies, regulators and stakeholders, and companies are likely to have an industry-wide performance commitment on biodiversity enhancement. These present other opportunities for our sector, and the new Water Special Interest Group will help members interact and develop their skills and understanding of water-related issues.

Chris Gerrard CEnv MCIEEM

CIEEM Vice President (England)

Conference Dates For Your Calendar!

22 March 2022

BOOK NOW
FINAL FEW PLACES

Taking Biodiversity Net Gain from Theory to Practice

Birmingham, England — 1 full day

Our 2022 Spring Conference will explore the extent to which development and land management is working in a way that enhances and protects biodiversity. How confident are we that we can really deliver net gain? What are the key outstanding issues that need to be addressed before BNG becomes mandatory in England? This conference is ideal for anyone working with landowners and developers to learn from the experiences of others in delivering projects that provides net benefits for biodiversity.

26 & 28 April 2022

BOOK NOW

Sector Symbiosis - The Art of Interdisciplinary Working for Ecological Benefit

Online — 2 half days

The need to develop skills to work effectively with professionals from other disciplines to protect and enhance our natural environment is widely recognised within the sector. The 2022 Irish Conference will explore examples of ecology and environmental professionals working with those from different sectors; engineers, architects, planners, farmers and construction staff, to name a few, how mutualistic working relationships can be formed, and communication approaches to avoid.

13 July 2022

REGISTER YOUR INTEREST
training@cieem.net

Facilitating Nature's Recovery Through Environmentally-Friendly Farming

Online — 1 full day

The advent of new approaches to agri-environment funding and a growing awareness of how farmers and farming can be supported to adopt more environmentally-friendly land management practices is a cause for optimism. The role of the farm environment adviser will be crucial in helping farmers and other land managers to access funding and adopt practices that deliver better outcomes for nature and the environment. Our Summer 2022 Conference will explore how the role of the farm environment adviser is changing and adapting in line with national and regional policies, priorities and funding opportunities.

Book your tickets now: www.cieem.net/events

CIEEM

In this issue

Cover photo: An example of an extremely remote site location: in a summer snow squall on the Falkland Islands during the Annual Seabird Monitoring Programme of gentoo penguin (*Pygoscelis papua*) counts. For more, see page 18.
Photo credit: Julie McInnes.

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CIEEM News

CIEEM member recognised with prestigious design award

Dr Mike Wells CEnv FCIEEM has been appointed as a Royal Designer for Industry (RDI) by the Royal Society for Arts, Manufactures and Commerce (RSA) for his pioneering and influential work in ecological design. He received this prestigious award in November 2021.

Dr Wells co-founded Biodiversity by Design, a Bath-based international environmental consultancy, in 2006 expressly to engage in promoting truly sustainable exemplar development projects, multifunctional landscapes and global biodiversity conservation. He is the author of many papers and articles on ecologically informed design and is a Visiting Research Fellow at the Bath School of Architecture and Civil Engineering where he teaches examined courses exploring the relationships between ecology, masterplanning and architecture.

The RDI award was established by the RSA in 1936 to recognise outstanding designers of all disciplines, to raise the profile of the design profession and to promote the important contribution of design in manufacturing and industry. Today the RDI is conferred to citizens of the United Kingdom whose work successfully demonstrates sustained excellence in design, aesthetic value and significant benefit to society. The RDI is the highest accolade for designers in the UK. Only 200 designers can hold the title. Those who hold the title are pioneers or exemplars who have consistently pushed the boundaries of their respective fields. Among the things they have designed are the jet engine, the iPhone, the Harry Potter films and the world wide web. Those receiving the honour have included designers as diverse as Eric Gill, Barnes Wallis, Lucienne Day, Jonathan Ive, Richard Rogers and Vivienne Westwood.

Recent webinars

We continue to run a full and varied series of webinars for members and the sector. Readers may be interested in the below recent webinars that are available on the CIEEM Resource Hub.

- Influencing Policy for Ecologists and Environmental Managers
- Plastics Innovations: Research Projects & Solutions
- Considering Nocturnal Pollinators: CIEEM and the All-Ireland Pollinator Plan
- An Introduction to Policy and Practice: Understanding how policy and law is made and opportunities
- Biodiversity COP15: Biodiversity Threats, Conservation and Restoration (Part 1 of 2)
- Biodiversity COP15: Resources, Finances and Business Engagement (Part 2 of 2)
- Natural England Nature Recovery Network
- STEM: Inspiring the Next Generation
- Early Careers: Moving on from Qualifying Membership
- Early Careers: Top tips on how to use social media for your career development
- Science Communication for Ecologists

Past webinars are available in the CIEEM Resource Hub (https://cieem.net/i-am/resources-hub/). Also look out for future webinars in events and training listing on the website (https://events.cieem.net/Events/Event-Listing.aspx).

Recent blog posts

Recent blog posts on the CIEEM website (https://cieem.net/news/) include:

- CIEEM Launches 2022 Employment and Salary Survey
- Mapping Your Science Stories – by Vicky Bowskill
- Could You Be Our Next Mentor?
- Making 2022 A Year of Action for the Climate Emergency and Biodiversity Crisis – by Amber Connett ACIEEM
- What does Transformative Change mean? – by Diana Pound CEnv FCIEEM
- Ecology and Environmental Professionals in the Changing Sustainability Landscape: Mineral Resources and the Energy Transition – by Karen Nash MCIEEM

If you would like to contribute your own blog, please contact SophieLowe@cieem.net.

In Practice digital editions

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.

CIEEM Conferences 2022

Date	Title	Location
22 March	2022 Spring Conference – Taking Biodiversity Net Gain from Theory to Practice	Birmingham
26 & 28 April	2022 Irish Conference – Sector Symbiosis: The Art of Interdisciplinary Working for Ecological Benefit	Online
13 July	2022 Summer Conference – Facilitating Nature's Recovery Through Environmentally-Friendly Farming	Online
November	2022 Autumn Conference: Nature, Carbon and People	Edinburgh

Find out more: https://cieem.net/events

In Practice Themes and Deadlines 2022

Edition	Theme	Article submission deadline
June	Nature-based Solutions	n/a
September	Bryophytes and Lichens	20 May 2022
December	Non-themed (submissions welcome on any topic)	19 August 2022

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

Did You See?

Climate Change Committee report on COP26 outcomes and next steps

A new independent assessment of COP26 and the critical next steps for the UK has been published by the Climate Change Committee, recommending the UK focus on strengthening its strategy rather than increasing gaps between ambition and implementation.

www.theccc.org.uk/publication/cop26-key-outcomes-and-next-steps-for-the-uk/

Consultation on Biodiversity Net Gain Regulations and Implementation launched

Defra has launched a public consultation on how biodiversity net gain will work in practice. The consultation sets out proposals about how biodiversity net gain will be applied to Town and Country Planning Act development, and, at a higher level, Nationally Significant Infrastructure Projects. The deadline for responses is 5 April.

https://consult.defra.gov.uk/defra-net-gain-consultation-team/consultation-on-biodiversity-net-gain-regulations/

SEPA launches new River Basin Management Plan for Scotland

River Basin Management Plans (RBMPs) set out a framework for protecting and improving the benefits provided by the water environment across Scotland. SEPA has now published the third RBMP which aims to deliver "up to 51 new restoration projects that have the potential to improve the ecological condition of rivers in Scotland's towns and cities."

https://cieem.net/sepa-launches-new-river-basin-management-plan-for-scotland/

Government unveils new farming schemes

Defra has unveiled two new environmental land management schemes that will reward farmers and landowners for actions which benefit the environment, supporting sustainable food production alongside vital nature recovery and work towards net zero. These schemes join the previously announced Sustainable Farming Incentive.

https://cieem.net/government-unveils-new-farming-schemes/

Birds of Conservation Concern 5

The British Trust for Ornithology has published the fifth edition of *Birds of Conservation Concern*. Eleven species have been Red-listed for the first time in 2021, six due to worsening declines in breeding populations. Two species moved directly from the Green to Red List: Greenfinch and Ptarmigan. Five previously Red-listed species have moved from Red to Amber.

https://cieem.net/birds-of-conservation-concern-5/

Budget announced for 2022-23

The Scottish Government has published its budget for the year, which includes £53 million to protect and restore the natural environment, including peatlands, and a further £69.5 million to create and sustain woodlands.

www.gov.scot/news/scottish-budget-2022-23/

Woodland Opportunity Map 2021| Map Cyfle Coetir 2021

Welsh Government has updated its Woodland Opportunity Map which provides a general guide to land managers, and aims to identify areas of Wales which are most suited to new woodland creation using spatial data and GIS. It includes data to show sensitive habitat areas and signposts further guidance on consultation with the appropriate authority.

https://datamap.gov.wales/maps/woodland-opportunity-map-2021/

https://mapdata.llyw.cymru/maps/woodland-opportunity-map-2021/

Biodiversity funding for Local Authorities increased to €2.1m in Ireland

Malcolm Noonan TD, Minister of State for Heritage and Electoral Reform, has announced that the Local Biodiversity Action Fund will receive funding of €1.5 million in 2022. Minister Noonan also announced that €600,000 will be made available next year to support the roll out of a Biodiversity Officer Programme in local authorities around the country.

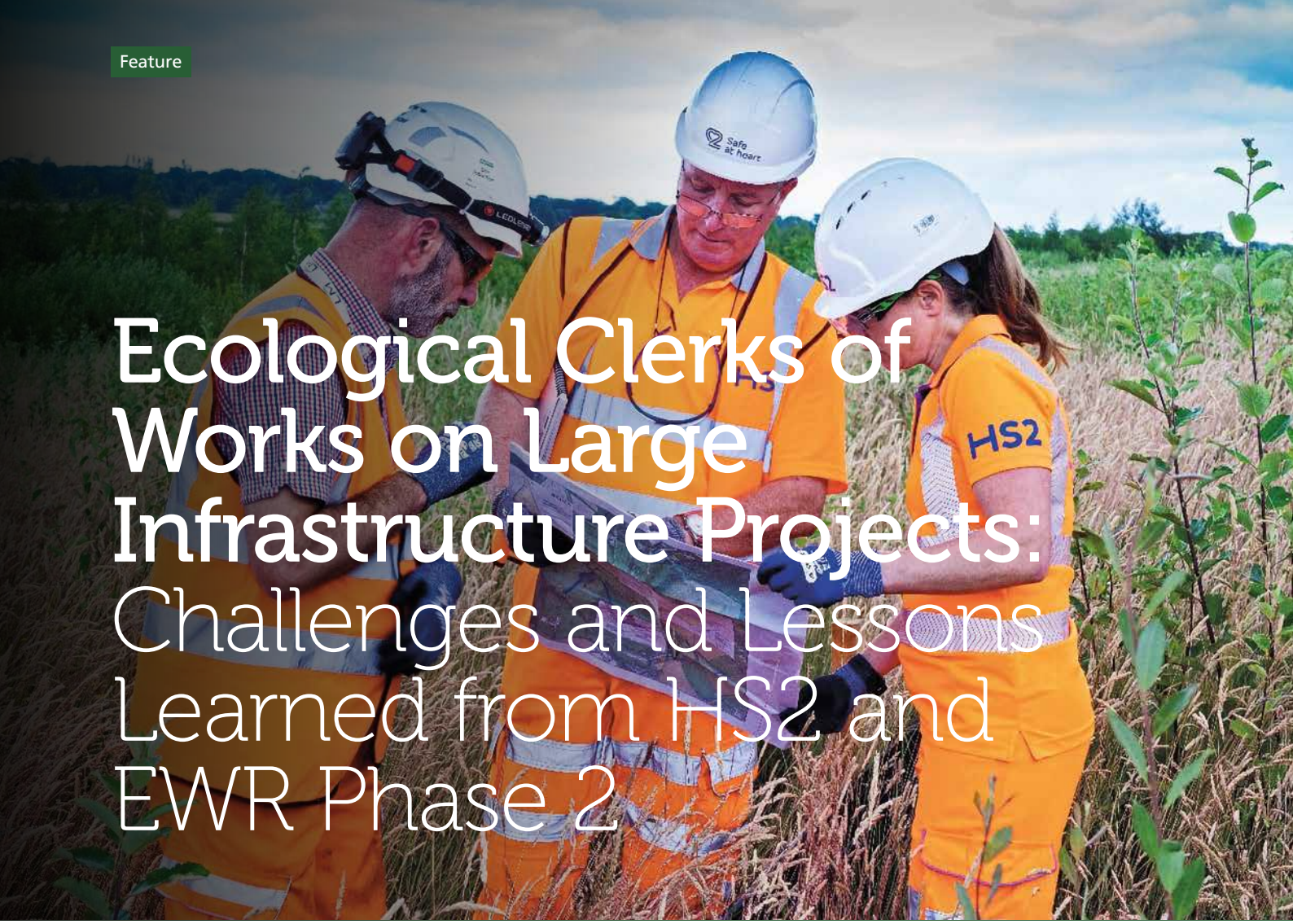
www.gov.ie/en/press-release/7152d-biodiversity-funding-for-local-authorities-increased-to-21m/

Using airborne DNA to monitor insect biodiversity

Scientists at Lund University have discovered for the first time that it is possible to detect insect DNA in the air. Using air from three sites in Sweden, insect DNA from 85 species could be identified, including bees, wasps and ants.

www.britishecologicalsociety.org/the-skys-the-limit-using-airborne-dna-to-monitor-insect-biodiversity/

Feature



Ecological Clerks of Works on Large Infrastructure Projects: Challenges and Lessons Learned from HS2 and EWR Phase 2

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EWR Alliance

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Atkins

Keywords: construction, GIS, large projects, permit

Ecological Clerks of Works (ECoWs) perform a critically important role during construction projects. Working on large, complex infrastructure projects to limited budgets and timescales can present challenges for the ECoW. This paper presents an overview of some of these key challenges and solutions employed by the teams working on High Speed 2 and East West Rail.

Introduction

High Speed 2 (HS2), as the largest infrastructure project in Europe, is expected to employ more Ecological Clerks of Works (ECoW) than any other construction project and will continue to have the single largest requirement for ECoWs across the ecology industry for several years. Other large infrastructure projects such as East West Rail Phase 2 (EWR2) also demand suitably qualified and experienced ECoWs.

ECoWs perform a critically important role, ensuring, as a minimum, compliance with environmental legislation, protected species licensing conditions, planning (or equivalent) conditions, project technical standards

and contractor method statements. A competent ECoW effectively oversees the management of the risks on construction sites associated with managing biodiversity and helps ensure a smoother path to overall project success. Appropriately trained and qualified ECoWs are therefore an essential part of a development.

The role of the ECoW on large infrastructure projects is critical to reduce risk of delays and cost increases, avoid legal offences that could lead to prosecution and reputational damage and avoid a poor reputational outcome. ECoWs also have a role to play in ensuring the best outcomes are achieved for wildlife and helping to reach project and Biodiversity Net Gain ambitions. There are significant benefits when ECoWs interact with and can engage ecology design teams, as they can often identify opportunities for biodiversity.

Ecology can be a major challenge on large projects where ecological mitigation is undertaken alongside a pressured construction programme. Large infrastructure projects can receive enormous scrutiny from the public and environmental stakeholders and ecology can be a particularly emotive topic. Against this backdrop the ECoW can be in a pressured position and presented with many challenges.

Challenges

Notable challenges to ECoWs on large infrastructure projects include the following.

- **Scale**: the size and complexity of the project, the number of people and the team structure in which ECoWs operate can be daunting. For example, in the team at HS2 contractor Fusion there is an in-house team of seven ecologists, four ECoWs, 15 supply-chain ECoW plus a permit team who need to interact with site delivery teams, sector teams and project managers.
- **Responsibilities and communication**: the scale and complexity of projects require clarity about roles, responsibilities and reporting lines. On HS2 there are different ecological roles including design ecologists, construction ecologists and specialists working under organisational licences, who may all be performing ecological functions on the project. A major challenge facing ECoWs is how they fit into this structure and whether they are advisory or if they have the authority to stop works: this is often not clearly defined.
- **Facing conflict**: this can be with construction teams or with protestors and can be stressful and upsetting. Very few ECoWs receive training on how to manage conflict or its aftermath.
- **Resource and consistency**: on large projects it can be difficult to maintain personnel who are consistent with their approach and have a broad range of construction site experience. Lack of a large pool of ECoWs available at short notice can also lead to time pressure, although it is important to make time for work such as walkovers to check, for instance, that exclusion zones are maintained.

> **“Ecology can be a major challenge on large infrastructure projects where ecological mitigation occurs alongside construction, with enormous public scrutiny. The ECoW can be presented with many challenges.”**

- **Over-reliance on systems**: large projects can have an enormous amount of third-party data in different formats on ecological surveys, design and programme and an ECoW may need to rely heavily on a geographic information system (GIS). Whereas GIS data can be invaluable there can also be over-reliance on the data, determining what is on site by what a computer tells you rather than site conditions, and it can be difficult to ensure digital data are up to date.
- **Documentation**: there can be a lot of documentation for an ECoW to reference on large projects. A smartphone or tablet screen is often not suitable for reading documents, but it is not practical to carry hard copies of all documentation.
- **Subjectiveness**: on large projects with many ECoWs there can be a range of opinions on ecological approaches, which can lead to inconsistency.
- **Permit systems**: it is important to have clarity on processes to allow site teams to work around ecology constraints (or opportunities). On larger projects these processes may change between different contractors, making it difficult for ECoWs who work for more than one contractor.
- **Constant change**: rapidly moving schedules make planning and reviewing data challenging. This can give insufficient time to review data, ecological constraints, working methods and documentation prior to starting works.
- **Knowledge of construction methodology**: not only are ECoWs required to understand detailed construction terminology, they need an understanding of how infrastructure (such as a new bridge) is built, including permanent and temporary land requirements.

Lessons learned and some solutions

Many of the above challenges led the ECoWs and the project teams on HS2 and EWR2 to develop systems and tools to overcome them and to work more effectively. The contractors came together in 2021 to share good practice and solutions to some of the key challenges, and these are summarised here.

The solutions have been grouped into four key areas: teams and resources, digital systems and tools, permit systems and change control. It is recommended that these items, and associated processes, are captured in an official project document such as an ECoW manual or management plan that is available to the whole team and which can act as a quick reference guide.

Teams and resources

It is important on large projects to manage and maintain a *core ECoW team* who can lead a changing cast of ECoWs. This will help maintain core knowledge and links to the wider project team while making use of broader resources when required. Experienced ECoWs are a limited resource, and teams may need to pool their knowledge of different scenarios to develop pragmatic solutions. For example, an experienced bat ECoW may need to team up with an ECoW with knowledge of a construction technique such as piling to understand the potential effects on a bat roost. On EWR2 it is the responsibility of the person planning the task to start the risk assessment process. This identifies the controls needed and the ECoW resource required. Ensure enough experienced ECoWs and licensed ecologists are available at each site according to the programme of works. One contractor on HS2 employed between one and two ECoWs per woodland during felling works as well as a bat-licensed ecologist and an assistant to record evidence of licence compliance per felling team.

To maintain *clear reporting lines*, set out clearly designated role descriptions which are available to the wider site teams with responsibilities for each role, including whether the ECoW has the power to stop work. It will also help to *assign a geographic patch to an individual ECoW* or group of ECoWs; this helps with knowledge of the area and to build rapport between the ECoWs and local site teams.

Early 'shadowing' is recommended for any new staff on site as even experienced ECoWs might struggle initially on large projects to get to grips with locations, processes and relevant team members. A forum to provide opportunities for group chats between ECoWs is encouraged. HS2 has an ECoW Forum where ECoWs from all contractors can share issues, solutions, best practice, training and tools across the project via regular video meetings and a shared online resource. This forum has offered well-being sessions and talks by external specialists.

Digital systems and tools

A single '*on-boarding session*' or *induction pack* will make it easier for all ECoWs to work consistently. The reference pack should ideally contain standard toolbox talks (standard briefings given on a specific ecological topic that can be easily updated with local details) and ECoW record forms and can be left in each site office, and made available to download on a shared platform. An 'ECoW pack', containing standard approaches, useful contacts, location of resources, organisation charts and locations of welfare was created for the EWR2 and was useful in the effective induction of new ECoWs.

Consistency of physical markers placed on site by ECoWs to denote ecological risks or exclusion zones is paramount. Everyone on site needs a basic understanding of ecological constraints and limitations and where works are covered under licence or not. This overview can be captured in a single document together with constraints maps in site cabins showing buffer zones as 'no go areas' such as around identified birds' nests, which are updated at least weekly. For example, Fusion's ECoW Management Plan contains advice on works in relation to badger setts which is also summarised via a decision tree. Morning briefs and end-of-day debriefs on site should include representatives of all contractors. In one ancient woodland on HS2 an active bird nest was identified and suitable buffers were set up alongside cameras to monitor fledging of chicks with a live stream back into the site cabins, both to monitor activity and to engage the site team. The authors recommend simple colour-coded roping systems for visual barriers and the adoption of a universal system of marking trees for levels of bat potential (negligible to high) prior to felling (Figure 1).

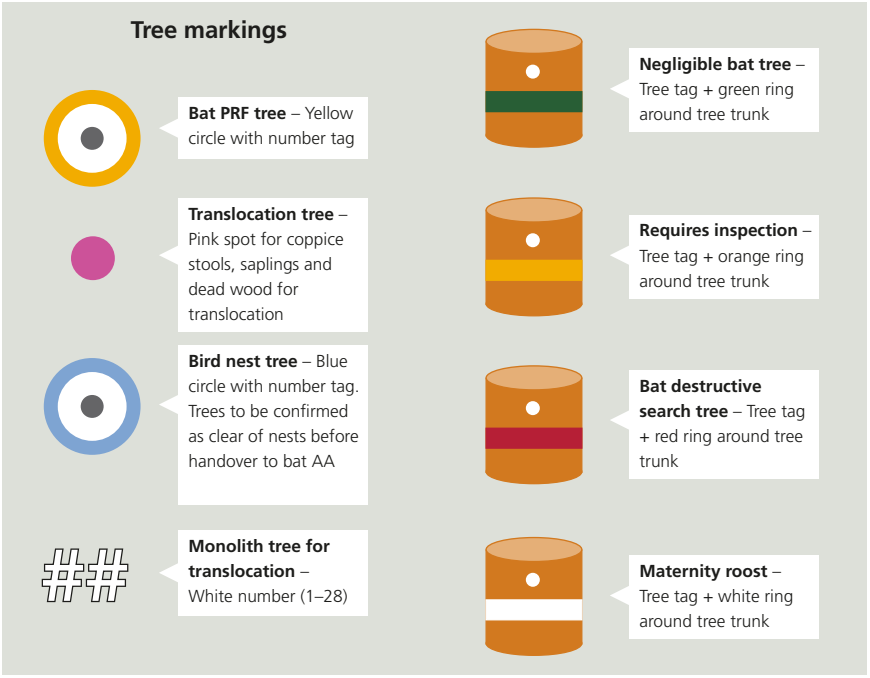

Figure 1. Marking system used on HS2 for trees in relation to potential bat roost features before tree felling.

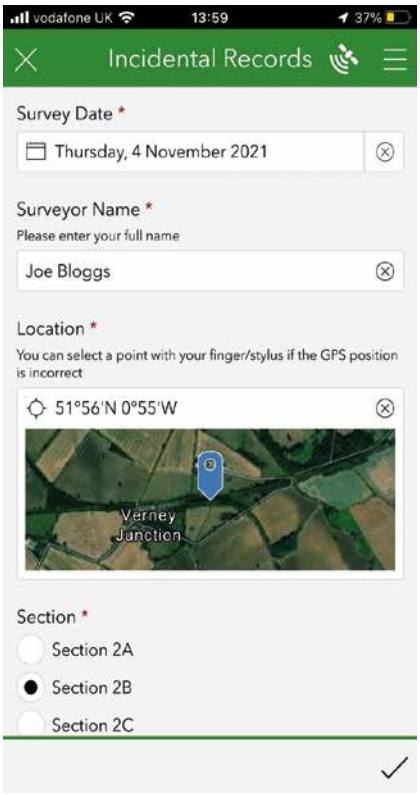

Figure 2. Survey123 app in action, submitting incidental records on EWR2. Records are quality checked before inclusion in the GIS as a resource for ECoWs and other stakeholders. Sensitive records can be kept confidential.

A *rigorous digital recording system* is recommended, particularly for where work is carried out and decisions are made under a protected species licence. Good records and daily logs in a consistent format and in a single filing space are essential to evidence works done and in responding to public enquiries or queries from stakeholders. It is important on large projects such as HS2 and EWR2 to be able to respond to information requests quickly. A live GIS with the ability to upload incidental records and for all in the field to access these records also gives up-to-date data on potential constraints (see Figure 2 for an example of the EWR2 GIS, and Hicks and Mould 2021).

Permit systems

A clear permit system usable by all parties and with a team to manage it is essential to provide assurance for decision-making on-site. The ECoW should be engaged in this process. A good permit system can avoid events that can halt work and needs to:

- work within the wider project systems
- create a workplace culture for all team members to follow the permits
- be clear on their use; for example, a permit system which covers ecological or arboricultural constraints should be not used to enable works in areas of other constraints, such as site access, consents or engagement
- cover a manageable defined area and time frame: a permit system should not be used to blanket cover works in a large area or over a long period of time as this makes it difficult to manage change (Figure 3).

Fusion have used an Ecology and Arboricultural Permit (EAP) for works on HS2. As of September 2021 Fusion had processed around 2500 EAPs and have a dedicated team working with ECoWs for producing and processing these permits.

The EWR2 project uses combined Environmental and Ecological Permits to Proceed (EPP), which refer to an overarching Environmental Risk Management Process document, to avoid overly long or onerous permits. These concise documents, which utilise a red, amber, green risk system, can be easily understood by ECoWs and works teams alike. EWR2 has produced over 1500 of these permits to date. The process of producing the permits has been continuously improved and refined and much of the process is now automated, with works planners able to submit a task through the Construction GIS map, which is then automatically distributed to the relevant members of the environment and ecology teams as an auto-filled permit. This draft can then be reviewed and updated, if required, by the environment and ecology team before issue to the relevant personnel.

> **“Many of the challenges led the ECoWs and the project teams on HS2 and EWR2 to develop systems and tools to overcome them and to work more effectively. The contractors came together in 2021 to share good practice and solutions to some of the key challenges.”**

Change control

Change is inevitable on large projects. Permits to work should have a finite scope, geographical area and time frame to make change control more manageable and to identify when the permits need to be updated or a new one issued.

A programme of walkovers should be scheduled as an ongoing assessment for incidental finds or changes to site conditions (such as badgers moving back into previously excluded setts). This is essential for large, complex

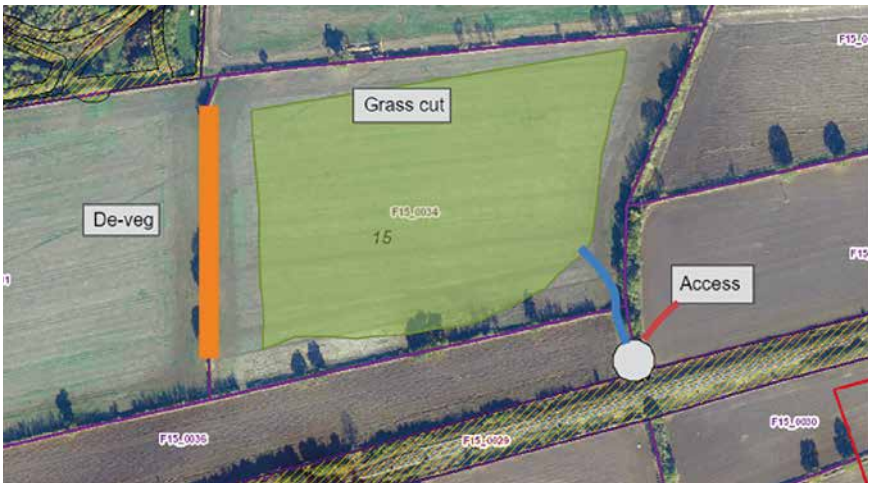

Figure 3. An example of a small manageable area covered by the Fusion Ecology and Arboricultural Permit (EAP) process for vegetation management activity in a single field and adjacent hedgerow. Map shows an area of proposed grass cutting (green) and hedgerow removal (orange) and the clearance contractor's proposed access route (blue).

“On EWR2, experienced ECoWs avoided impacts on badger setts with short-duration works allowed under watching brief rather than closing setts and disturbing the badgers.”

infrastructure projects where there might be long periods between different work stages. The capture of comprehensive daily site diaries to keep a record of decisions made and actions taken greatly helps in tracking change control as well as identifying protected, notable or invasive species records that may impact future works.

Conclusions

Performing the role of ECoW and managing ECoW teams can be a complex task on large infrastructure projects. To get the best results for the ECoWs and the project it is important that ECoWs feel part of the delivery team. The teams working on HS2 and EWR2 sought to address challenges by implementing efficient ways of working: improvements related to permits, change control, systems and tools. The authors hope that other projects can benefit from these solutions. See Box 1.

Box 1. Examples of project savings created by an experienced ECoW

Cost saving from avoidance of unnecessary ecological surveys: an experienced, senior ECoW, from one of the HS2 main works civil contractors, worked with the construction team and our Enabling Works Contractor to scope out a series of precautionary ecological surveys that had been planned because of possible disturbance impacts on wildlife. The ECoW applied his extensive construction and ecological expertise to only scope in surveys that were necessary for construction and temporary works, saving up to £1.5 million.

Avoidance of impacts to designated sites and protected species: in 2019, works at a large HS2 construction site were to stop because of ecological constraints within the vicinity of construction including a Site of Special Scientific Interest (SSSI) and the presence of protected species. A senior ECoW from a HS2 main works civils contractor directed guided excavations for slip trenching to inform the exact locations of soil nailing and fence installation. This enabled construction to continue at a complex construction site, with the underground tunnels extending beneath the SSSI, thus avoiding impacts on the SSSI and protected species. Delays to work to obtain a protected species licence would have been in excess of £100 million from stand-down of staff and machinery (including the tunnel boring machine) and from the added pressure to the already tight construction programme.

Reducing effects on badger setts: on EWR2 the experienced ECoWs used their extensive knowledge of badger clans to avoid impacts on setts, with short-duration and impact works often being allowed under watching brief rather than closing setts and disturbing the status quo of the badgers. This avoided unnecessary time, costs and programme impacts involved in licensing.

Reference

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Five Practical Tips for Ecologists Working on Construction Sites

Ann Deary Francis MCIEEM

Keywords: early career, ECoW, working on site

This article presents some ideas to help site work go more smoothly, from someone for whom things have often gone a bit wrong.

I've worked in ecology and environmental management for over 20 years, including work on large-scale infrastructure projects. An Ecological Clerk of Works (ECoW) provides advice about ecological and environmental issues during the construction of a development. For many ecologists, working alongside construction teams is a big part of the job. This is how we ensure that the recommendations we make for avoiding harm and mitigating impacts on biodiversity are carried out. An ECoW may be on site before development starts, during the work and afterwards, carrying out a range of tasks including supervising works such as demolition or vegetation clearance, performing tasks such as checking surveys or working alongside a team to install habitat features.

Tip 1: Check that the teams on site have what is needed to do the job

An informal site motto is "You can't check anything from height unless you can get up high." This is a very simple yet often overlooked element of site work for an ecologist: ensuring that the right equipment is available. One would assume that the contractor and the client have read your report, the recommendations and the planning conditions and are fully briefed on the requirements. They often haven't done any of those things.

So, check that there is a means for working at height before you arrive on site. Also, check that the builder/contractor's company policy allows other contractors, including ecologists, to work from height, and that your own insurance covers you to do so. Every ecologist I know has spent hours sitting

in the site cabin waiting for the hastily arranged mobile elevating work platform (MEWP, or cherry picker) to show up. I did this last Monday. Note: make sure the cherry picker is capable of reaching the bit of the building you need to reach. They come in different sizes.

This tip also applies to the right sort of buckets for excavators, hand tools and even the right drill bits for removing things that need to be removed under your supervision. Demolition contractors, in particular, have a set of tools they use often. These are usually very big, very noisy and very destructive. If you need a more subtle approach make sure that they know about your requirements in advance.

Tip 2: Build rapport on the first day

Essentially, ecologists are on site to police the way the work is done. Often, from a site foreman or site worker's point of view you're going to slow the job down, tell them off and be a hassle. For time-limited jobs such as rail projects being done under stoppages or possessions (periods when normal trains are stopped) this can be a major headache for builders and contractors.

First impressions count. Be professional and authoritative, but friendly. Acknowledge the hassle but explain why it's important. Turning up with a packet of biscuits to share, having a cup of tea and an informal chat before the toolbox talk (that is, the training element of your job when you describing the actions that need to be taken for ecology) never fails to break the ice. Ask to see the site induction and request for anything that isn't in there to be included.

I'm from a family of builders and grew up in a northern steel town. I modify my language on site as if I'm chatting to my uncles or my dad. Don't use fancy or overly technical language; nothing that could be construed as talking down. Keep it simple, clear and concise.

Also, assume that most people just skim read anything they're given and then sign the attached sheet. Make points clear, so that they can be read and understood quickly. Write in plain English (clearer for all) and avoid jargon or explain your terms when necessary. Keep messages simple, especially verbal ones (see tip 3).

"First impressions count. Be professional and authoritative, but friendly. Explain why the ecology is important."

My rule of thumb is to assume the site team want to do the right thing, and I only tell people off or threaten to report actions when it's absolutely necessary. There is no need to start off with confrontation and fear. Such instances can be a training opportunity for contractors. I keep a pot of bat droppings to show the site team. I explain that it's a good thing to stop when you find droppings rather than carrying on and finding bats.

Start any preliminary briefing or toolbox talk with questions for the team: have any of them worked with an ECoW or under a protected species licence before? This is a good way to figure out what experience and knowledge they already have and to find your allies in the team. Adjust your approach to suit: I've worked in older buildings where the builders and stonemasons have more experience of working with bats than I do. Do what you need to do for the legal side of things and then leave them to it.

A lot of construction sites have a high turnover of subcontractors and staff, so you may have to give your introductory talk a few times. Either ask to be told when there is a big changeover or deliver regular updates.

Tip 3: Manage the conditions and check the practicalities

My first infrastructure project as environmental manager (the person on site responsible for making sure all of the environmental protection measures relating to the project are in place) was covered by a Development Consent Order (DCO) with 500 separate environmental protection conditions attached to it, to be delivered by a veritable library of sub-documents. We discovered in the first 2 weeks that some of these conditions and documents had been written by people who had never been to the site or tried to build a railway.

The engineers wanted it kept simple. In the end we settled on "don't kill anything, don't pollute the river", which was actually very effective. This was by no means sufficient to discharge all of the conditions or protect the biodiversity on the site, but it did break the ice, gave everyone a laugh and provided a very memorable site motto. Judge your audience for this one, though.

The work we do as ecologists to get planning permission or other consents isn't always the same work we do to deliver projects. The approach is very different, although the best ecologists feed their experiences on site into their work on Ecological Impact Assessment to make their mitigation better and more deliverable. The engineers, builders and site teams delivering the job rarely have any input into the planning process, and this can lead to conflict and opposition.

Some things such as European Protected Species licences (e.g. for bats or great crested newts) aren't negotiable because your licence provides an absolute requirement for what you must do, but use the expertise of the site team to figure out *how* to do it practically and efficiently. If you get the chance, review the ecological work plan you have, take advice from the site team and figure out if you can tweak things or amend the approach to better suit the job in hand and use the expertise of those around you. Never to be afraid to bring in extra help or seek advice from another ecologist.

A site team may want to do something different to their planning conditions. If so, make it clear they will need to vary their conditions with a formal application to the planning authority and leave the choice to them. There are always options but it is worth pointing out the new option might create more work or cause delay.

Tip 4: Build trust

You're going to be working with a team and it may be for some time. It will be much more enjoyable if you're considered to be, and act as, part of the team. Learn everyone's names and enjoy getting to know them. I tend to join teams on tea breaks and at lunch and have a chat.

On my sites, I often stay in a reasonably priced hotel and have expenses for meals. The teams I work with often don't. The gulf between management and contractors on sites is huge. Contractors on my sites are often in boarding houses or caravan parks with a strict allowance for expenses, away from homes and family for long periods working hard jobs and long hours under pressure to deliver on time and in budget. This is especially true on rail jobs where possessions are strictly time limited.

Ecology won't be the only restriction the teams have to deal with. Health and safety, whether they have an up-to-date ticket for whatever vehicle they're using, spot checks and pressure from management can create a stressful environment. The managers will be the ones meeting you on site the first time and signing off your invoices but the banksmen, demolition contractors and labourers will be the ones you need to work alongside. If you can, be on their side and support them. If they do good work make sure their managers know it. If they've stopped work to deal with a random slow worm or newt give them credit and help them deal with it quickly. Similarly, if the team have done a good job for you, say thank you. I've provided cake, an enormous pot of stew and even the odd crate of beer to say thanks.

Building sites can be robust environments with some interesting Anglo-Saxon language and questionable humour, including testing the humour of newcomers. I have had plastic snakes, furry hats and toy bats brought to me in boxes with a sorry tale of how Dave (there is always a Dave) ran it over by accident. I am regularly referred to as 'batwoman'. I enjoy it – for me it's one of the fun things about working on sites. It is usually good natured and all about building camaraderie. Occasionally the good humour crosses a line. Racist, sexist or offensive language is never OK. In most circumstances, if you challenge bad behaviour it will stop, especially if the site foreman backs you up. You need to be clear what *your* boundaries are and stick to them. Never be afraid to leave any situation that makes you uncomfortable.

Tip 5: Make the site a wildlife-friendly one

The most important thing about building trust is that you empower people to use their judgement, to be aware of and look for wildlife as they work and to do the best they can in unexpected situations. The biggest site I ever managed had slow worms and grass snakes. They'd been excluded but a few had eluded the previous ecologist's best efforts and it was impossible to exclude them from the railway tracks.

We avoided doing work in the hibernation period but a brief cold snap in April led to an unexpected discovery. The banksman who found 80 sleepy slow worms in a half-excavated ballast bank during an overnight possession acted quickly, filling a large water cooler bottle with soil and carefully lifting the slow worms out of harm's way. It was a shock to arrive the next morning to be told there was a bucket of slow worms for me to deal with. They were safely moved to a hibernaculum in the refuge area, slightly confused but unharmed, and most importantly not killed or injured. The delay to the work during the possession was 20 minutes. It could have been a disaster, but the experience taught the team that the reptiles weren't a huge threat to the progress of the project, just another site constraint that we could manage effectively.

Most people don't want to hurt animals (I recall one driver close to tears after running over a slow worm, the only recorded casualty on the site) and are fascinated by seeing wildlife up close. Use that. Stag beetles in particular really bring out the spectators with their camera phones.

On the same site, after the slow worm incident, we had 'animal ambulances' at every site cabin, labelled with ID cards. Every notice board had information about wildlife. Everybody working on the site knew they were to call me if they found anything, and if the animal was in danger or I was away, they were allowed to carefully put the animals in a safe place until an ecologist arrived to help. These weren't often used but it gave everyone security and a sense we were all working together. We had refuge areas and back-up plans for unexpected discoveries that let the job continue while keeping wildlife safe.

A positive experience of a job with a number of ecological constraints gives builders, engineers and contractors a set of skills they can apply to protect wildlife on all future sites.

Conclusion

I hope these tips come in handy for when you are working on site. It can be a really rewarding and fun part of the job where you get to see real gains for biodiversity delivered. Some of the people I've worked with on site are my friends a decade later and still get in touch when they find something interesting! If you haven't been on site yet, ask to shadow another ecologist when they go out. CIEEM offer a number of training courses on being an ECoW and an Accredited Ecological Clerk of Works scheme is in development.

Acknowledgement

Many thanks to Rachel Hepburn ACIEEM for additional observations. The views expressed in the article are the author's own.

About the Author

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Women on Site: Reflections from the Field

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Keywords: Clerk of Works, contractors, ECoW, experiences, feminism, site work

This article aims to start a conversation on how conditions and respect for female-presenting ecologists has changed on site over the last 15 years. Four ecologists discuss some of their experiences from their first years working on site as an Ecological Clerk of Works in order to see whether conditions are actually improving as much as we hope they are.

Introduction

Site work is an integral part of being a consultancy-based ecologist working in development and the role of Ecological Clerk of Works (ECoW) is often required by planning or licencing conditions to oversee biodiversity features and impacts on site during construction. Evaluating situations and implementing directly applied mitigation, including animal rescue, is invariably demanding, high-stress and fast-paced. Decision-making has to be rapid, almost always while others stand close by, often less than patiently. There is no doubt that this is a skill that develops over time and it does not suit everyone. As women, however, issues on site can be more difficult, tainted by attitudes and preconceptions. The question is whether working on site has changed for women in recent years. Although we can't speak for all women on all sites, in this article four ecologists at Temple talk through some of the events of their first years on site.

We hope that these stories can open conversations around how everyone can work together to challenge issues and change site conditions so that, in another 15 years, there can be ECoWs who don't have similar tales to share.

Becky, 15 years ago

I don't remember it like it was yesterday, because there have been a lot of shifts since then, but I do remember being nervous. The senior ecologist on site was very helpful and talked me through everything. Each of us was treated as the 'green and keen' newbie that we were and it was everything I could have hoped for starting out in an ECoW role.

As for the contractors I was working with, sadly this was a different matter entirely. I'd worked in bars at university, so I was used to 'banter', but this was on a completely different level. A lot of the contractors were staying on sites in caravans and I was frequently invited back for drinks when my male colleagues were not: there were lads' mags and calendars in the kitchens and welfare vans … and don't get me started on the portaloos! I did my best to play along to a certain extent: I was sporty and could hold my own in conversations about football. That got me far enough that they would keep to the rules and engage with me. If I had to put my foot down and demand that they do what I told them, they had to listen. My use of an unexpectedly stern voice probably led to comments behind my back, but if they pushed me that far they knew I meant it.

However, the one situation that sticks in my mind as something that I really hope would *never, ever* happen now was a conversation over breakfast rolls about tattoos. When I was asked if I wanted to see this chap's new tweety pie tattoo, a vaguely affirmative response led to trousers, and undergarments, being dropped and a certain piece of his anatomy being wafted in my direction. I'd like to say it was the only set of male genitalia I saw on that site, but sadly not.

Sarah I, 10 years ago

I started working as an ECoW in 2012 and have mixed experiences of working as the only female staff member on site. My most positive times were from regularly working with an in-house highways team. This allowed me to develop good working relationships, build respect and foster an understanding from contractors about my role on site. I found that it helped them understand my role better when I encouraged them to ask questions and showed them the species I was there to help protect. The team regularly worked with female ECoWs, and knew that their job required them to have good long-term working relationships with all staff on site. I also found it helped promote further positive

behaviour when I provided written feedback to the team's managers about their professionalism, something which I think we often neglect to pass on.

In contrast, I've also dealt with contractors who have been aggressive or who have made sexual comments. I've been screamed and sworn at by those who saw my presence as a hindrance to getting the job done quickly and who objected to taking instruction from a woman. I've also had contractors discussing getting me a high-vis bikini after mentioning how uncomfortable it was working in full PPE during the middle of summer. When I first started, I often found myself trying to laugh off or ignore inappropriate comments like this, or trying to avoid situations that could cause conflict. It was only when I gained more experience and confidence in my role that I directly challenged this behaviour, firstly by discussing it as being inappropriate with the contractor and then by raising with senior management if it persisted.

In my efforts to promote the good and challenge the negative behaviour I've encountered on site, I hope it's made it slightly easier for other female EcoWs. But we still have a lot of progress to make.

Sarah R, 5 years ago

My first years on site were certainly interesting. It's difficult enough starting a new project with new people, let alone knowing that you will be the only female. While there aren't usually photos of half-naked women on the walls, it's still very much a boy's club. For me, the experiences I have personally had of most male contractors usually sit in one of two groups:

1. Group 1 – men who hit on you
2. Group 2 – men who treat you differently based on the assumption that you are a 'delicate little flower'.

Of the two, perhaps surprisingly for some readers, it is the latter group that infuriates me the most. It is almost a given to experience the former and usually there is in invisible line most will not cross; that is, the kind that involves a formal complaint to either their company or my own. I know where I am with this group, even if they are hard to deal with. The second group is more difficult. The assumption I struggle with is that I am 'effectively useless' and need 'looking after' or that I am unable to do my job if it involves anything dirty/thorny/steep or any lifting at all. It is usually dressed up as kindness, with the expectation that I will be 'pleased' that I am being looked after like a child. A particularly memorable example was being told during an induction that it would be very sad for my husband (the one I don't have) if I died in a site-related accident. The underlying message was that I had no value apart belonging to a man who didn't even exist. It is usually quite difficult to persuade Group 2 men that, yes this is my job and yes I am good at it.

Sometimes I seriously wonder if it would make my life easier to let them get on with their preconceptions about me, because it is very tiring trying to challenge inherent sexism while having a job to do. Before anything can change, first, the sexism and attitudes towards women in construction need to be acknowledged as endemic and, second, women's experiences should not minimised or dismissed.

Celia, last year

I won't deny that working as an ECoW has been far from smooth sailing! I'm sure my fellow women in construction and I could shock you with our stories of site work, from light-hearted, sexist 'banter' to physical assault. Sadly, this narrative is not so different from other typically male-dominated industries and is rooted in the societal issues of sexism and gender equality. That said, my aim is not to scare people away from construction. I've found that it can be a great environment to learn and collaborate with some amazing people.

Helping to coordinate and lead teams across large, ecologically sensitive sites each day for 6 months was definitely a challenge, never mind trying to get my introverted self heard in a marquee filled with more than 40 people. However, I wouldn't change it for anything as it has really forced me out of my comfort zone. Society has literally taught us to be agreeable, so learning that it is okay to say no to people has been challenging! Thankfully, this does become easier with time. Although it can be tricky to navigate, I've found that maintaining good working relationships with my site team has allowed me to feel more confident when it comes to speaking up about any issues.

The construction industry is challenging and occasionally uncomfortable, but I've had some really great times on site. The most rewarding experiences have been when I've had the opportunity to share my knowledge with other site contractors. I've been pleasantly surprised by the amount of interest shown in ecology once a site team understands my role. All of my experiences of site work have helped me to grow a great deal, both personally and professionally, and I hope I have shown just how much it has to offer.

Support for CIEEM members

Diversity and Inclusion Working Group: made up of staff and members, including a focus on gender-based issues (contact enquiries@cieem.net for more information)

Mentoring Platform: for those who would like to offer or receive advice from other women in the sector (www.cieem.net/mentoring-platform/)

Member Assistance Programme: where members can receive free and anonymous advice and support on a wide range of concerns (see the Members' area of the CIEEM website)

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Celia Brailsford is an Assistant Ecologist at Temple and has been working in consultancy for 2 years. She has worked on a variety of rail, housing and railway projects, providing ECoW services and conducting a range of habitat and protected species surveys. Currently a Qualifying member of CIEEM, Celia remains focused on becoming a generalist and working cross-divisionally within Temple.

Feature

On-site, Off-radar: Delivering Environmental Projects in the Falkland Islands

Figure 1. A farming settlement on West Falkland showing its remote setting. Photo credit: Andrew Stanworth.

Andrew Stanworth MCIEEM
Falklands Conservation

Keywords: remote working, restoration, survey methods, UK overseas territories

Supporting much of the UK's globally significant biodiversity, the remote and often small island groups that are the Overseas Territories may seem far removed from the complex bureaucracy that can influence environmental work in the UK. However, they have their own particular challenges, which can often make things harder rather than easier to deliver. The Falkland Islands in the South Atlantic are no exception; with a small population, capacity, expertise and resources are often limited and decision-making frameworks are not fully progressed. Developing applicable standards, relevant guidance and innovative techniques is critical for good environmental decision-making and outcomes.

Introduction

In issue 113 of *In Practice* the Overseas Territories Special Interest Group highlighted the high biodiversity value of the UK Overseas Territories and some of the challenges faced by the habitats and species found there (Boulter *et al.* 2021). The Overseas Territories are a group of 14 territories all with constitutional links to the UK. They are widely spread, with Pitcairn in the Pacific, the British Antarctica territory in the far south and the British Indian Ocean Territory out on a limb to the east, although most are in the mid-south Atlantic and include the world's remotest community at Tristan de Cunha. Some are barely populated but in total they are inhabited by approximately a quarter of a million people and cover approximately 1.7 million km^2 (mostly due to the British Antarctic Territory). Most UK Overseas Territories are remote island groups and, perhaps unsurprisingly,

the environmental challenges faced are not limited to those directly affecting the fauna and flora. Thus, delivering environmental projects in the territories, and in this particular case the Falkland Islands, can be less than straightforward.

The Falklands were first claimed by the British in 1765. They are located in the South Atlantic and consist of two main islands and approximately 750 others, covering around 12,730 km^2 (a little larger than Northern Ireland) with a population of about 3000 people. The islands probably have the highest proportional peat area of any jurisdiction in the world, and the associated landscape is dominated by heath and grasslands. Rocky ridges and outcrops, along with hillside rivers of boulders (locally called stone runs), create a striking landscape of open skies and big views, with an occasional small farming settlement thrown in (Figure 1).

Coastal colonies of penguins, albatross and seals, as well as whales and dolphins in surrounding inshore waters, are all flagship species for the islands. But many other species, including an ever-increasing count of endemic lower plants (such as mosses and algae), invertebrates and other taxa, are all important components of these islands' ecosystems. There are around 30 different habitats currently recognised, some identified as threatened or vulnerable. Between them they support around 180 native vascular plants of which 14 are endemic, and some globally and nationally threatened. Over 220 species of birds have been recorded: 21 are resident land birds, 18 waterbirds, 22 breeding seabirds, 18 annual non-breeding migrants and at least 140 are occasional visitors. There are 18 National Nature Reserves, 17 Important Plant Areas, 22 Important Bird and Biodiversity Areas and 17 terrestrial Priority Key Biodiversity Areas (KBAs). However there is only one marine KBA, and no marine protected areas.

Falklands Conservation is a Falkland Islands-based charity with a vision for a well-functioning environment managed by those living closest to it. It delivers its own strategic conservation objectives while providing occasional environmental consultancy services, generally to non-commercial bodies such as the Falkland Island Government and Ministry of Defence (MoD). The largest conservation charity in the islands, Falklands Conservation currently has 14 staff, which includes those delivering specific projects on peatlands, whales and seabirds, as well as those working with the community and the Watch Group, its younger members.

The Falklands' remoteness is part of its beauty, and, due to the low level of human access and few development opportunities, is likely the reason much of the biodiversity persists. So isolation is certainly an advantage in many ways. However, this remoteness makes gathering information for sound environmental decision-making costly, and a lack of labour force for fieldwork (there is current no unemployment in the islands) means that delivering mitigation and restoration work can come with huge logistical and economic headaches, actually making them unachievable in many cases. It can drive innovation in survey and methods, but also can make difficult the application of accepted standards and guidance developed elsewhere.

Fieldwork challenges

Simple preparation for projects can be complex. Supply chains are very limited, and replacing equipment can take weeks or months, needing to be ordered by boat or air via the UK resupply ship or from South America, at greater cost than on the mainland UK. Site – or, indeed, any – information is often quite poor. Previously documented surveys of a site are definitely a bonus, but some site visits are still occasionally the first on record. Transport using 4×4 (Figure 2), plane/helicopter or small boat/yacht, or indeed all three, may be required to reach locations.

"The Falklands' remoteness is part of its beauty but also makes environmental decision-making costly. A lack of labour force for fieldwork means that delivering mitigation and restoration work be a logistical and economic headache."

Increasingly useful but internet-/mobile-network-needy devices, such as data recording apps and remote logging devices, are unlikely to function on-site and communications are scant. Risks are higher: there is little or no emergency support, some sites are several hours from search-and-rescue helicopter arrival, if it is operational. Close encounters with larger wildlife, such as southern sea lions (*Otaria flavescens*;

Figure 2. The traditionally Falklands-favoured 4×4: Land Rovers have been key to accessing Falklands Conservation's survey sites for more than 30 years. Photo credit: Andrew Stanworth.

Figure 3. Southern sea lion (*Otaria flavescens*): a relatively common observer of offshore island fieldwork. Photo credit: Andrew Stanworth.

Figure 3), are not uncommon on island sites, particularly with any venture into a forest of tussac grass (*Poa flabellata*) on offshore islands. It is possible to be almost on top of nearly half a ton of sleeping bull sea lion without knowing it is there. Following the Falklands War in 1982, when the islands were temporarily invaded and occupied by Argentinian forces, unexploded ordnance or minefields were until recently risk considerations, although all have now thankfully been cleared.

On top of this, climate is a very significant factor. It really is four seasons in one day, and snow can occasionally occur in the middle of summer (Figure 4). Average wind speed is 27 km/h or 5 on the Beaufort scale, so wind, or lots of wind, is to be expected. Cancelled attempts to get both to and from sites are not unusual; survey methods, such as drone use, are often impacted; and equipment can disappear over the horizon or be damaged. And, finally – irrespective of the forecast, it will be necessary to put on sunscreen – the Falklands is one of those places you can probably simultaneously get hypothermia and sunburn!

These are some of the basic fieldwork challenges. Wider conservation challenges are highlighted by the following examples.

Conservation challenges

Falklands Conservation owns 20 or so islands/islets through both gift and purchase, many of which support globally significant biodiversity, breeding seabirds, rare habitats and key populations of threatened endemics. They range from small vegetated rocks of a few hundred square metres to New Island, which is approximately 2363 ha and the only site with a small settlement, being occupied by two wardens in the summer season. Motley Island, a designated Important Plant Area, supports probably the largest global population (several hundred plants) of the endemic and globally endangered hairy daisy (*Erigeron incertus*), four other endemic plants, five species of orchid and large swathes of nationally rare bluegrass (*Poa alopercurus*) habitat. North Island supports probably the largest global population of the endemic and globally vulnerable Falkland rockcress (*Phlebolobium maclovianum*), alongside several thousand globally vulnerable southern rockhopper penguin (*Eudyptes chrysocome*) breeding among about 25,000 black-browed albatross (*Thassalarche melanophrys*). They are incredible islands.

Cat Island was visited for the first time on record only last year, while The Mot (a small island adjacent to Motley Island) had its first recorded survey visit only a few years previously, discovering a

Figure 4. Summer snow squall during the Annual Seabird Monitoring Programme of gentoo penguin (*Pygoscelis papua*) counts. Photo credit: Julie McInnes.

new sooty shearwater (*Ardenna grisea*) colony. Transport availability, safe access and time ashore are constant pressures on site visits. At many sites there is much more to be discovered.

Common threats to island sites are invasive species (rats, mice and sometimes cats) and continuing habitat degradation initiated by historic overgrazing and burning since settlement of the islands in the last 200 years. This has led to extensive wind-driven soil erosion (Figure 5). Of the 750 or so islands, probably few have ever remained ungrazed, although fewer of the smaller offshore islands are now stocked. Agricultural burning, the burning of habitats for harvest to drive out sea lions (which occurred in the past), and natural fires can quickly destroy thousands of years of peat formation. Attempts at restoration are difficult in a semi-arid and drying climate. It is costly to get any work force to the sites: there are no seed suppliers and the limited options for sourcing plants often means sourcing tillers (rooted sections of native tussac grass) on one island and planting them on another. Natural regeneration can struggle to keep pace with soil erosion and drying, and in some cases simply doesn't occur at all. In many cases little is known about the species-specific preferences or the best propagation techniques: the most recently discovered endemic vascular plant species in the islands was found less than 10 years ago. Falklands Conservation and other local horticulturalists are furthering propagation techniques, examining successful soil mixes, seed viability, vernalisation requirements, and seed, tiller and cutting approaches, but there is still much to learn.

Figure 5. Wind erosion risk. A remnant peat hag shows the original ground level before it was stripped down to clay. Photo credit: Andrew Stanworth.

The MoD has responsibility for a number of remote mountain-top sites in the islands. High-altitude sites are key for rarer cushion plants, ferns and endemic nassauvias and are perhaps less grazed due to higher exposure. The MoD has actively engaged Falklands Conservation for site surveys, ecological assessments, Clerk of Works roles and guidance to put ecological information in the hands of their decision-makers during recent development projects. Combining fairly ill-fitting relevant UK legislation (which is applied to MoD projects in the islands) and somewhat poorly developed and dated local wildlife legislation provides an odd decision-making framework. For example, the stronger principles and intentions of UK legislation can be countered by local legislation which provides a high degree of exemption from the law for the site owner in the undertaking of their normal activities. However, in this case, a positive approach to applying, where possible, the UK accepted standards has led to successfully mitigating impacts on vulnerable habitats and protected endemic plants for MoD projects. Opportunities for restorative work as part of this process are being examined but as yet there is no previous knowledge of, or tried-and-tested methods for, delivering habitat restoration at remote mountain-top locations in the islands. With shipping containers that are 12 m in length having been blown off similar mountain-top sites, retaining and restoring bare substrate is more than just sowing a few seeds or planting a few tillers.

> **"A positive approach to applying, where possible, the UK accepted standards has led to successfully mitigating impacts on vulnerable habitats and protected endemic plants for MoD projects."**

Clearing the last of the minefields from the 1982 War has been a recent milestone for the islands. Those left until last were sensitive key biodiversity sites. Falklands Conservation provided guidance on working approaches to de-mining that would avoid impacts on burrowing penguin species and other penguin colonies, as well as habitats. The presence of mines clearly meant there was no site access, so remote ecological assessments of large areas were made using drone footage only. Guidance was provided to de-mining staff as Falklands Conservation personnel could not directly oversee the work. Clearing mines on beaches among penguins certainly was a first for the de-mining teams, and possibly a first and hopefully the last as a project. These areas have been unofficial nature

reserves for nearly 40 years, but in many cases are now being opened by the Falkland Islands Government to public access or returned to farms for agriculture. Poor management of public access, particularly during the tourist season, could certainly result in increased risk to some wildlife in these areas. With the current hiatus in tourism due to the coronavirus pandemic, the government's approach of providing information rather than restriction or legislation for avoiding impacts has not yet been fully tested. Falklands Conservation has provided consultation feedback on management planning approaches for publically accessible areas, has been involved in baseline data collection on key plant and seabird populations and continues to advocate for stronger management measures at these sites.

The last few years has seen decades of hydrocarbon exploration culminate in the potential for extraction in the North Falklands Basin, an area of ocean approximately 250 km to the north of the islands. The Falklands Offshore Minerals Ordinance provides basic structures for Environmental Impact Assessment (EIA) process, but until the recent submission of an extraction proposal, the ordinance had never really been tested. Up-to-date information, assessment techniques and interpretation of offsetting requirements all provide significant challenges for industry, Government and Falklands Conservation (which provided critical assessment of the industry proposals through stakeholder engagement and public consultation). Requirements for updating key species (e.g. seabird/cetacean) data in appropriate time frames were strongly debated. Ultimately, economic uncertainty along with financing issues for supporting fossil fuel extraction has meant a recent cessation in oil development activity, with some of the issues left unresolved.

This large-scale development option has now been overtaken by recent proposals for an inshore open-pen salmon farming industry. With an essentially pristine inshore environment in the Islands, this industry has huge potential for impact. At this stage there has been little public information on proposals; however, as opposed to hydrocarbons development in the offshore environment, which has EIA legislation, inshore aquaculture falls under different control under which EIA is discretionary and for which there are no legal requirements. While a public consultation on EIA is likely, the process and obligated components of it would be much less defined. Going straight to EIA would also skip a vital, more strategic, consideration of the overall impacts of aquaculture development across the islands, as well as missing the opportunity to obtain community feedback on not just risks associated with a single proposal, but open-pen salmon farming in general. Proposals for open-pen salmon farming have already caused strong tension in the community and a Salmon Free Falklands group has been established. Falklands Conservation has advocated strongly against allowing inshore open-pen salmon farming given the huge potential for environmental risks and the loss of the near-pristine inshore environment which underpins much of the current economy.

Conclusion

The Falklands support globally significant and endemic biodiversity with undoubtedly more to be discovered. Delivering environmental work in the Falkland Islands can be challenging and frequently costly (sometimes to the point of being prohibitively so). Industry proposals and attempts to apply UK standards/approaches have highlighted shortfalls in the existing Falkland Island legislation and the need for Falklands' versions of established standards. Logistics and survey can be demanding and require extensive risk management, methods need to be adaptive and often newly established/trialled, and decision-making frameworks are under-developed. Falklands Conservation continues to develop mitigation and restoration approaches, as well as knowledge on species and habitats, through support from the UK government (such as through the Darwin Plus Initiative), the Falkland Islands Government and US philanthropic support from Springcreek Conservation.

Through meeting with publicly elected Members of the Legislative Assembly (MLAs) and government officials (including our young Watch Group members who questioned MLAs over their recent achievements), we continue to advocate for improved policy and legislative frameworks for environmental protection and for better strategic and environmental impact assessment processes. These are currently inadequate for robust determination of industry development proposals, such as recently for oil and potentially ahead for aquaculture. Falklands Conservation also engages the community in its activities in order to keep it informed of environmental challenges and to build support for positive change. Many community members are increasingly expressing concerns about environmental threats and taking action. There is still a lot to do, but changes to oil development proposals, new environmental legislation, designations of KBAs and a very environmentally focused election have all been recent positive outcomes. Falklands Conservation welcomes CIEEM interest in the Falkland Islands and the opportunity to create and drive better standards for ecological assessment, survey methodologies and environmental management because large-scale environmentally unsustainable development is one of the biggest threats to the Falklands' amazing biodiversity.

Acknowledgements

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Ecology Input into Construction Environmental Management Plans: Writing in Construction Speak

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Keywords: BS42020, CEMP, construction manager, method statement

The ecology section of a Construction Environmental Management Plan or CEMP is a vital link between the recommendations set out in an Ecological Impact Assessment and the delivery of those recommendations on the ground. The primary audience should be the Construction Manager. However, ecology input to CEMPs is often poorly integrated into wider construction works and may use language and structure more suited to the planning authority ecologist than the construction team. CEMPs must make sense to non-ecologists, or the required mitigation is unlikely to be implemented properly, potentially leading to poorer outcomes for nature and undermining the impact assessment process. This article sets out a process for translating the structure and ecological terminology of the impact assessment into more accessible text suitable for a CEMP.

Introduction

A Construction Environmental Management Plan (CEMP) is a document that sets out construction-stage environmental mitigation in sufficient detail to allow it to be incorporated into the construction programme and to be implemented on the ground. Such detail may not have been available or necessary at the planning application stage but may be vital at the construction stage. The production of a CEMP will often be required by a planning condition and even if not, a CEMP may be advisable to secure the delivery of mitigation and to reduce the risk of legal infringements. Ecologists typically input to wider CEMPs that include disciplines such as water, air quality and noise, or a CEMP may be entirely ecology-focused, in which case it may be referred to as a Construction *Ecological* Management Plan or a CEMP-B (with the B referring to biodiversity). It can also be known by various other acronyms.

Guidance

Section 10 of British Standard BS42020, *Biodiversity: Code of practice for planning and development* (BSI 2013), provides guidance on the scope and content of ecological input into CEMPs. It includes some pointers on how to produce a CEMP (i.e. a list of considerations, including risk assessment of potentially damaging construction activities, biodiversity protection zones, practical measures, responsible persons, role of the Ecological Clerk of Works, etc.) and gives some examples of protection measures. BS42020 notes that the level of ecological detail required in a CEMP should be proportionate to the scale of development and the potential risks to biodiversity.

The considerations listed in BS42020 don't work well as headings in a CEMP document. Although these considerations should be covered by the document, a simpler structure, one that is based around a series of method statements, is much more helpful to the construction manager. This is particularly important for projects where there is no ecologist on the team to interpret and enact the CEMP, as is typical for all but the largest or most complex developments.

Use construction speak, not ecology speak

A CEMP leads on naturally from the Ecological Impact Assessment. However, a well-written CEMP needs to do more than just add detail to the mitigation already specified. It should be a translation of the ecological aspirations in the impact assessment, which are written and set out in terms that ecologists understand (*ecology speak*), into discrete actions or work projects, described and organised in a way that is clear to construction managers and their staff: that is, written and set out in *construction speak*. Construction speak sets out what the construction team need to know to carry out the work: instructions for actions, ordered in a way that fits with the construction project, without excessive background information. A CEMP that is not written in construction speak, but remains in ecology speak, may well cross the first hurdle, sign-off by a council ecology officer, but then create considerable confusion and frustration for both developers and their ecological consultants at the implementation stage.

Translating into construction speak

A CEMP written in construction speak should set out a series of actions or projects, cutting across ecology topics as necessary. Vegetation clearance is one such topic. Grouping mitigation by ecology topic (e.g. badgers, reptiles, nesting birds, etc.) works for Ecological Impact Assessment as it ensures each species or habitat is properly considered in turn, but these ecology topics often do not directly relate to discrete mitigation actions. Therefore, a CEMP structured by ecology topics can be highly confusing to the construction manager. Instead, in a CEMP written in construction speak the section on clearing vegetation would group mitigation for nesting birds, reptiles and other fauna together, as the focus is on vegetation clearance, not the ecological reasons behind those actions. An approach to translating mitigation into a series of separate actions is shown in Table 1.

Table 1. Structuring a CEMP: translating ecology speak into construction speak, with some examples.

1. List mitigation from Ecological Impact Assessment	**2. Separate the self-contained actions**
ECOLOGY SPEAK	
Reptiles Create receptor site, create hibernacula, trap-out and translocation, destructive search, protective measures during construction	Habitat creation
	Hibernaculum creation
	Trap-out and translocation
	Destructive search
	Protective measures during construction
Badgers Pre-construction survey, precautionary measures during construction	Pre-construction survey for badger
	Badger protection measures during construction
Nesting birds Clearance of woody vegetation prior to breeding season, precautionary checks by an ecologist thereafter	Clearance of woody vegetation prior to breeding season
	Nesting bird checks in any remaining woody vegetation
Habitats Retention of boundary vegetation	Install protective fencing
	Check and maintain fencing

Taking this logic further, where a CEMP covers disciplines other than ecology, the ecological mitigation would, ideally, be fully integrated into the document, within a series of multidisciplinary actions arranged by construction stage, avoiding the need for a separate ecology section at all.

While structuring is the key difference between ecology speak and construction speak, there is also a need to use an appropriate vocabulary, referring to, for example, specific types of fence or construction vehicle, and to specific digging depths and vegetation cutting heights. To promote accessibility to non-ecologists, construction speak should also avoid ecology-specific terms. For example, I prefer action, reptile habitat and habitat pile to prescription, receptor area and hibernaculum.

Method statements

The CEMP should provide a method statement for each of the actions that have been identified. In fact, at its most basic, a CEMP is just a collection

3. Combine and re-order actions based on project programme	4. Add details, avoiding ecology-specific terms
CONSTRUCTION SPEAK	
Pre-construction	
Pre-construction badger survey	Timing, method, area to be covered
Winter clearance of woody vegetation	Method, equipment, timing, cutting height
Grassland and scrub creation	Ground preparation, seeding (seed mix and sowing rate), timing, shrub planting, layout, location
Habitat pile creation	Number and dimension of habitat piles, materials to be used, instructions for any digging or turfing or supervision required
Reptile translocation	Materials and layout of fencing and traps (show on a plan), method, timing, staff experience
Install protective fencing	Timing and type (e.g. Heras, post-and-rail), show location on a plan; specify any vegetation clearance or ecologist supervision needed for installation
Ecology supervision of turf-stripping	Equipment, method, timing
Construction	
Nesting bird checks in any remaining woody vegetation	Timing, procedure, requirement for ecologist on site
Ecology protection measures during construction	Specify badger protection measures and fence checks; set out timing, specify who each measure is to be carried out by

of such method statements. These method statements should describe the activity itself, when it should take place, who should carry it out, what equipment and materials should be used (e.g. digger size, seed mixes, etc.), any involvement of the ecologist and any checking, monitoring or sign-off requirements. Discussing these matters with the construction team is usually necessary prior to finalising the CEMP, to ensure it will be workable. It may also be useful to provide a sentence on why an action is required (e.g. "to avoid damage to active nests, which would be in contravention of wildlife legislation").

Each method statement should ideally be one side of paper, or two at the most. If the measures cannot be captured clearly and simply, there is far greater scope for misinterpretation. Method statements should be as self-contained as possible, so that they can be taken to site individually and implemented. Reference to best practice, roles, training and communication should be included in individual method statements where necessary, but try to avoid general statements of aspiration, commitment or compliance unless backed up by specific actions.

Structure of the CEMP

The main body of the CEMP should typically comprise a works schedule (e.g. a Gantt chart) listing a series of actions, arranged chronologically by construction stage, followed by a series of method statements and a plan showing the locations of actions (e.g. locations of fences, setts for closure, new wildflower meadow, bat and bird boxes, etc.).

The introduction should only cover essentials such as who the document was prepared by and for, and the planning application reference number. If there have been significant changes in the project programme or design, or significant time has elapsed and update surveys have been necessary, then a summary of the baseline and a risk assessment of potentially damaging activities may be unavoidable. These items, aimed primarily at the local planning authority ecologist and to show due process, should be included in appendices and should not interfere with the main document. Wherever possible, provide links to online planning documents rather than repeating information.

Conclusion

A CEMP should be written for the construction manager as the primary audience. The main task in writing one of these documents is a process of translation of the ecology speak in impact assessment reports into construction speak. This needs careful thought to create a series of distinct, practical tasks or actions, each described by a short method statement, which should be arranged by construction stage and not by ecology theme. CEMPs set out in this way will make life much easier for ecologists and their clients on site and will help to ensure that the ecologist's vision gets properly implemented on the ground.

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About the Author

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Does the E in EnvCoW Stand for Evolution?

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Keywords: drip trays, Environmental Clerk of Works, environmental management, mitigation, proportionality

Environmental management on construction sites is a varied, diverse and fascinating aspect of the industry and one where direct involvement of environmental professionals, including Clerks of Works, can achieve great benefits. However, through perhaps a lack of understanding, mentoring or cross-discipline learning, opportunities are being overlooked and – worse still – lost in a sea of overly generic, standardised 'mitigation'.

In 2022 it will be the one year anniversary of my involvement with the management committee of the Association of Environmental Clerks of Works and being appointed to a newly created role at JBA Consulting: Discipline Lead for Construction Environmental Management and EnvCoW. I feel it's a good time to reflect on the evolution of environmental management on site and the role of the Environmental Clerk of Works (EnvCoW). It is important to distinguish an EnvCoW from an Ecological Clerk of Works, or ECoW. An ECoW provides on-site ecology support whereas an EnvCoW focuses primarily on compliance.

A quarter of a century since my first site-based environmental role, I have been privileged to work in some amazing and challenging environments with some wonderful and a few very challenging people.

I dictate this Viewpoint through freely available voice-recognition software on a laptop with more processing power than our entire design team's PCs back then. This, and the advent of the digital Environmental Impact Assessment and digital Construction Environmental Management Plan, illustrates how much technology has evolved and how much we now take for granted in day-to-day environmental management. But is this evolution reflected in what we encounter on site and in our discipline?

In the mid 1990s I produced my first environmental constraints plans for a cross-country pipeline project. This was a project I had known from the start: I'd undertaken Phase 1 habitat surveys, interdisciplinary route finding, and landscape and visual impact assessments, all undertaken by walking the site and surrounding environment. We produced environmental mitigation documents, assembled contractual clauses and chose the winning tender.

Creating the environmental constraints plans was not a complicated task, it was just the logical thing to do to portray the environmental message for the project site team. It consisted of numbers, letters and circles on a series of plans which showed what the main restrictions were, *distilled from the supporting documents.* It was a simple, site-specific and effective approach. It worked.

What I hadn't realised at the time was this was actually quite revolutionary, and an on-site environmental advisor was more revolutionary still. My initial 2 week posting became 8, which became 52, as the value of that on-site environmental role became clear to those working on the project. I realised then that site environmental management was my ideal habitat: the combination of understanding what was specified and also having an influence on its implementation and solving problems ticked all the boxes for me. The key to success when it came to audits was keeping communication clear and targeted. I guess this was the dawning of EnvCoW as a discipline.

Back then, it was generally accepted that the contractor would sweat the last minute of workable time out of the equipment they owned. The accepted wisdom was that pumps and plant (that is, construction equipment) leaked oil, fluids and fuel. The solution was adopted from the workshop: a drip tray. A drip tray was a shallow-sided metal or plastic tray placed beneath engines to contain any spilled or leaked oil, basically like a large roasting dish. It was a simple way to stop the pollution, but, with rain, drip trays can fill up and overflow. We then had environmental maintenance crews who were responding and emptying and gathering tens or hundreds of litres of oily water for disposal as hazardous waste at vast cost, but we accepted it and it became part of the routine. The battle line with hydrocarbons had been drawn.

Over the last 25 years, drip trays have evolved. We have interceptors, with a secondary containment area that holds hydrocarbon but allows rain water to flush through; we have interceptors with covers; we have water-permeable, hydrocarbon-absorbing products; and we have oil-absorbing pads, nappies, sausages, rolls, pillows, sheets, duvets and rags. All are deployed on sites to continue the hydrocarbon war. Some site stores are beginning to look like soft furnishings departments.

Plant has also evolved: there are bunded engines, which are enclosed in a leak-proof housing; we also have double-skinned tanks to prevent leakage, integrated drip trays and smaller, more efficient engines that hold less of the pollutants. Fluids and fuels are now based on vegetable oil and there are clauses in contracts which limit the age of plant that can be used. Plant is now much more likely to be hired as required from specialist hire companies. Gone are the days of crews gathering oily water for disposal.

And yet we often still see brand new plant and equipment parked over some form of secondary drip tray or absorbing product, as if somehow during a rest period it will suddenly discharge the content of its fuel tank, or throw out its hydraulic system. Many of these secondary drip trays or absorbing products are rendered ineffectual by site conditions: many of these products

have been developed in workshops and factories where the natural environment is held at bay. They work a lot less well when sitting in a puddle, or clogged up with silt; they are, however, brilliant when used correctly.

So why do we still have this situation, where we continue to provide 'mitigation' to plant that doesn't need it or, worse still, 'because it leaks'? (If it leaks, remove it from site as it is not fit for purpose.) Or is it, as I believe is the situation, that the drip tray ghost has been haunting site procedures without challenge for decades? I'm not suggesting that we stop using emergency response provision or grab bags to clean spillages or any other controls required to deal with an unforeseen event, or that drip trays and absorbents don't have a valid place. But as an industry we need to discuss why we are still apparently blindly repeating the drip tray mantra.

I recently visited a site where a brand new 12 tonne tracked excavator was parked up over an absorbent pad with a capacity of around 2 litres. When I asked why the pad was there I was told "in case a hydraulic hose bursts". After discussion on the risks associated with parked plant and also how, for it to be suitable, the pad would need to absorb probably 100 times that capacity, it transpired that the pads were deployed because it "says so in the environmental documents". I thought that may have been the case.

Drip trays and absorbent pads are a way of illustrating what I feel is becoming increasingly prevalent in our perceived management of a whole range of environmental aspects on site: the inclusion of standardised, generic terms and phases copied from guidelines and best practice documents without full understanding or consideration of the implications or reasons behind them. This, in turn, leads to the implementation of inadequate or irrelevant mitigation which deflects and dilutes the real environmental management message.

So, let's be honest, how many of us undertake audits where we arrive on site on a prearranged day to find carpets of bright new absorbent pads under machines and plant, and double-bunded fuel tanks? Let's be even more honest: how many of us tick the audit box against "are plant situated on drip trays or secondary containment or absorbent pads"? But how many of us feel empowered enough to ask the site manager what happened to the pads that were here yesterday, and please can they show you the hazardous waste storage provision and provide the documents for the duty of care and waste transfer file?

Why then, with a new generation of fresh young minds entering the industry, have we seemingly forgotten over the decades that it is OK, nay encouraged, to reduce the amount of generic information making its way through the project stages to be enshrined in site procedures? We have overlooked that due process is to refine and focus the message, and not simply copy the last stage over.

I see standardised mitigation for a range of aspects set out at the early stages of project development and carried through, without interpretation or challenge, to later stages. It is copied into unwieldy, cumbersome, impractical and in some cases useless on-site management systems. Is there a perceived need to have vast tomes of management documents? More specifically, is there a perceived risk of 'missing something' rather than undertaking robust assessment of risks and providing specific, tailored mitigation? Is there a reluctance to be absolute?

Is this a direct consequence of the digital approach, whereby there are fewer human brains involved in the process and geographic information system (GIS) wizardry is expected to interpret the relative risks associated with each of the featured layers? Or have we forgotten that no number of algorithms will replace experienced, trained, rational human thought when it comes to managing environmental risks and mitigation? Is there a perception of 'risk' and that risk must also be banished in the same way as hydrocarbon spills: to absolute zero, no matter how impractical the proposals will be?

In truth, I believe we have forgotten that the more simple and precise the message, the more accurate the results will be. We have forgotten that the reports, the GIS and the designs – all perfectly laid out digitally and downloaded onto the latest viewing device – are actually something in the real world. This is a place where water will only flow down hill unless it is pumped, a place where protected species haven't read the guidelines and a place where the environment is the ultimate client.

This brings me back to the environmental constraints plans a quarter of a century ago. They contained tailored information specific to the site: there was no information 'just in case'. They summarised the agreed environmental aspects. They were, in essence, definitive and they evolved as the project developed.

It is crucial that site-based aspects of environmental management are considered in the early design stages, at that initial site walkover. They need to be developed alongside the evolving design and involve all disciplines. At each stage the relevance of the previous stage assessments should be discussed and challenged: refining methods, designing out risks, discussing mitigation measures, assessing appropriateness and the associated risks, and considering whether any mitigation is required at all.

We, as environmental professionals working in the construction industry, must empower our new recruits through all disciplines and encourage them into this interesting and dynamic part of the sector. We must mentor and educate them, take designers to sites, take site engineers to design offices, take ecologists to construction sites and take engineers on ecological surveys. We must explain project and construction processes, and plan and programme routine education and awareness site visits, looking at the long-term advantages of integrated design not the short-term perceived financial cost of a day on site. We must teach the team to assess environmental risks (and opportunities) and develop practical, achievable, focused mitigation. We should promote the integration of holistic environmental management throughout the whole project story, starting at the initial site walkover. To quote George Fleming, founder of the Association of Environmental Clerks of Works: "we must get engineers to think like environmentalists and environmentalists to think like engineers". When we get this balance and understanding the E in EnvCoW will certainly mean evolved, and perhaps also efficient.

About the Author

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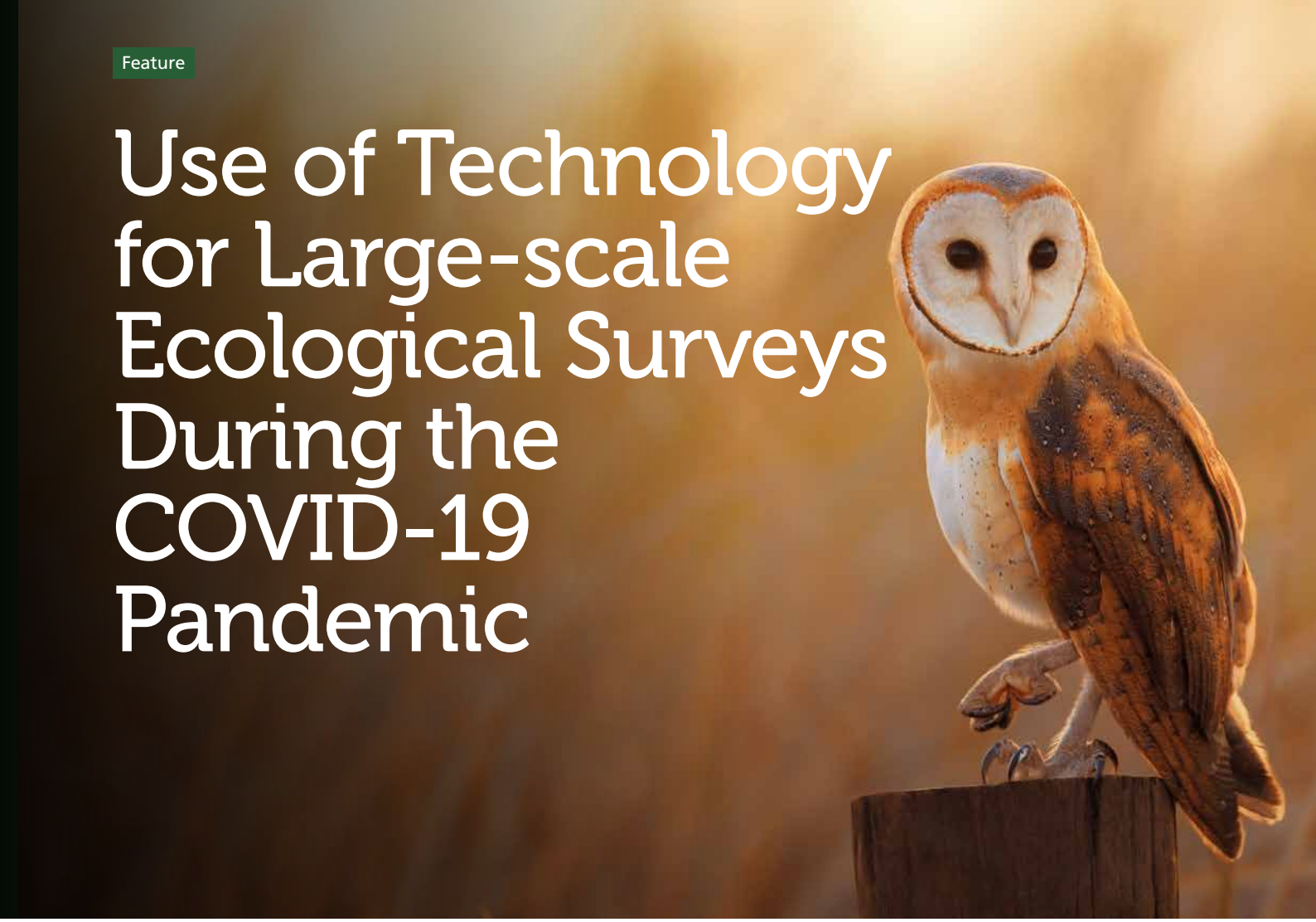
Feature

Use of Technology for Large-scale Ecological Surveys During the COVID-19 Pandemic



Caroline Jewell MCIEEM
Binnies

Keywords: CDE, common data environment, GIS schemas, large-scale ecological surveys

Undertaking 5,500 summer surveys during a global pandemic was challenging but by making use of digital approaches and health and safety protocols it was feasible, as this article explains.

Introduction

Binnies UK Ltd, on behalf of Laing Murphy Joint Venture (LMJV), undertook 5,500 ecological surveys across Phase 1 North of the HS2 route as part of LMJV's enabling works contract in summer 2020. The surveys undertaken were bat roost assessment, bat emergence and water vole, otter, great crested newt, white-clawed crayfish, barn owl and reptile surveys. This article sets out the methods Binnies used to manage this wide-ranging suite of survey types over the year in which the COVID-19 pandemic started in the UK, including the use of a common data environment (CDE) to assign surveys and collect quality data.

Planning

Following lessons learned from the HS2 ecological survey work carried out in 2019, the Binnies Data Products and Services (DPS) and Environmental Services teams worked together to create a bespoke survey data platform called Onsite. Using this approach helped Binnies to increase the number of ecological surveys undertaken from fewer than 1,000 in 2019 to 5,500 in 2020, despite the impact of the COVID-19 pandemic. The new system enabled us to receive, process and assure 200–300 surveys in a week. Previously, this process took more than a month.

Onsite uses Environmental Systems Research Institute (ESRI) products to enable users to view and edit collected spatial data to produce a geographic information systems (GIS) deliverable, based on a template (the LMJV HS2 schema) provided to us by LMJV. A schema is a model for describing the structure of information, which in the case of this project was made up of a series of tables linked with unique identification numbers. The system was

designed by our Ecological Technical Authority and the DPS team to ensure that the resulting product was fit for ecologists to use while removing the need for Microsoft Excel worksheets that can introduce error into the final deliverable. All data generated and collected by the survey work were to be stored in a CDE. The CDE is the single source of information for a project, which holds the survey assignment and submitted survey data for each survey, linked by a unique identification number. Alongside the assignment and survey data, information on progress through the quality assurance process is also held.

Species leads were assigned to each survey type. Surveyor briefing notes were set out by each species lead based on survey guidance provided by LMJV. The species lead specified the fields required to create forms for each unique survey type. Our GIS team then created survey forms using an ArcGIS Survey123 form (an ESRI product). The forms were designed to satisfy the LMJV schema exactly; drop-down fields were used where there was only a limited number of permitted answers to a question and field lengths were restricted where required. After testing by the species leads, the forms were linked to Onsite. Figure 1 shows a screenshot of a bat emergence survey form used for the 2020 surveys.

Binnies used a dedicated scheduling team to schedule the surveys. We were also responsible for managing the land access requests and again set up a dedicated land access team. Surveyors received a Binnies bespoke induction to the project before completing any surveys. The induction involved background to the survey, specific known hazards, procedures to follow and how to collect and submit the survey data to the CDE.

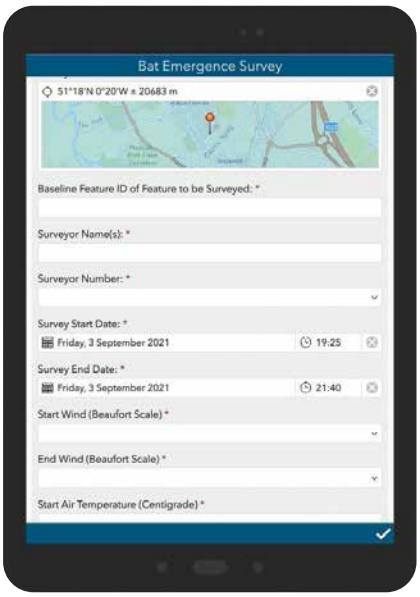


Figure 1. Survey123 form for a bat emergence survey.

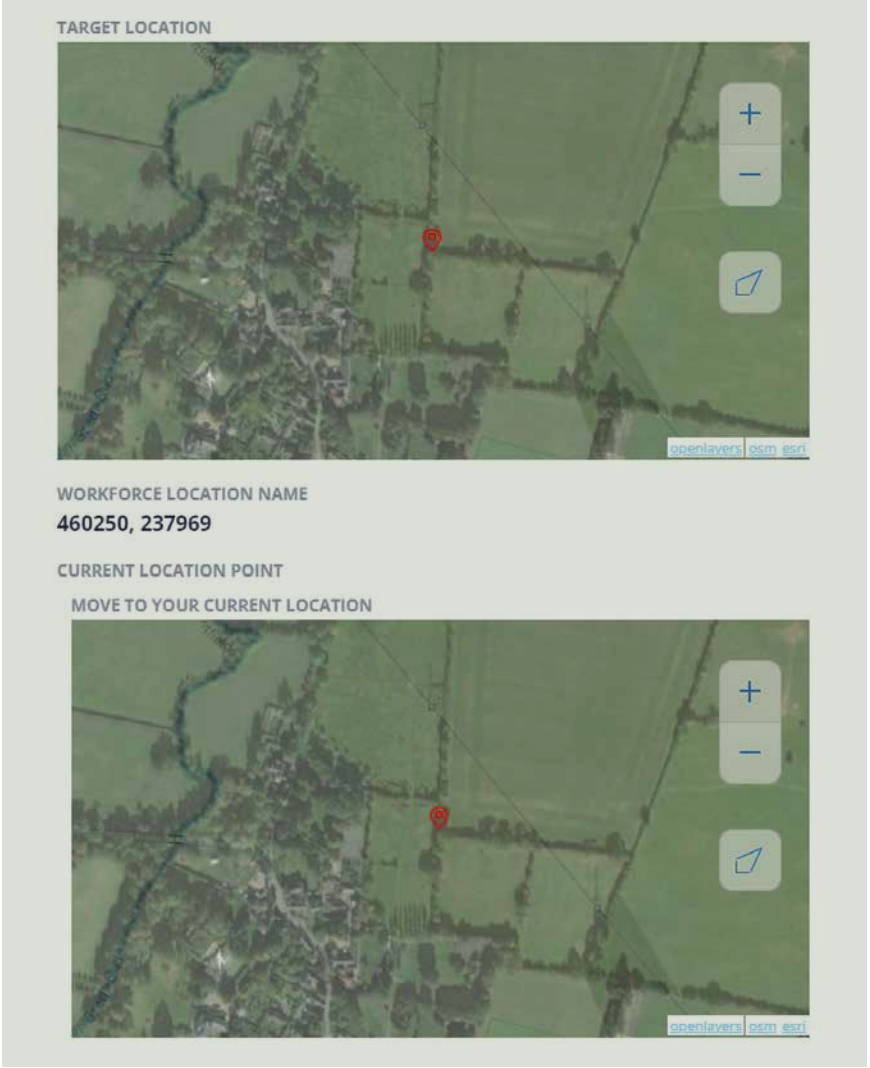


Figure 2. Graphic from Onsite showing the target location the surveyor was assigned by Workforce and the current location point, which is set by the surveyor. If the surveyor is in the right place then the locations should match, as they do here. Aerial imagery is provided by Maxar Microsoft (www.maxar.com/products/satellite-imagery).

Assigning surveys

Assignments for all the surveyors were sent out with target locations using the ESRI product Workforce, which was linked to the Binnies CDE. Workforce was loaded by our GIS team using a scheduling spreadsheet; the schedule was based on what surveys could be completed, factoring in the resource available, optimal timings of surveys and any spacing of replicate surveys as per standard survey guidance (for example English Nature 2001, Collins 2016).

Workers logged into Workforce each week to access their assignments using tablets. Workforce provided them with a geographic pin of the feature to be surveyed along with specific details on that feature, such as historic data, hazards to the survey, controls in place for their safety and parking suggestions. Workers could then open their survey form for that unique assignment from Workforce.

The geographic pin set by the survey generated on Workforce fed into the Onsite view as the 'target location' so that it could be easily compared to where the worker was located during the survey ('current location point'), as shown in Figure 2.

Health and safety

To manage the volume of surveys LMJV needed to undertake in 2020, a team of subconsultants and in-house and freelance ecologists was established. The lead surveyor completed a separate Site-Specific Risk Assessment (SSRA) for each survey so that information on identified hazards was passed to future survey teams and it was clear that measures to control these had been implemented. Once complete, the SSRA form was submitted to the CDE and was embedded as a separate form on Onsite. This meant it was directly linked to the unique survey, so that health and safety hazards and the controls required were flagged immediately following submission. These could then be passed to the next survey team on that site to keep the surveyors safe. If a survey was deemed too unsafe to continue, the surveyors had the option to discontinue the survey and instead complete an aborted survey form, which was submitted to the CDE.

Managing the COVID-19 pandemic

Planning for the surveys commenced in winter 2019/2020, with a start on site planned to coincide with the great crested newt season. However, COVID-19 restrictions were placed on the country in March 2020 with all the Binnies office support staff required to work from home if possible. Then followed a period of IT set-up in people's homes while trying to start the surveys. The HS2 project was classed as a critical infrastructure project by the UK government, so the surveys could continue.

We risk-assessed the best way of delivering survey logistics during the pandemic and this resulted in negotiating the exclusive use of the two hotels close to the main survey area for our site support team and surveyors and developing an extensive set of COVID-19 mitigation measures in the hotels; for example, breakfast and dinner for the surveyors initially being provided to rooms (or collected from reception) to reduce contact.

A dedicated site support team was also set up to deal with the additional COVID-19 logistics. Its role included:

- procurement of COVID-19 personal protective equipment (PPE): sanitiser, masks, gloves, etc.
- cleaning of survey kit between teams, as well as all the standard survey logistics
- being a constant source of support, both technical and pastoral, to surveyors working away from home at this difficult time.

The site support team was on site, living and working out of the two hotels, for the best part of seven months. Some members even stayed there voluntarily over the weekends to avoid the risk of transmitting coronavirus between home and site.

Twenty different types of ecology survey were risk-assessed to ensure they could be undertaken safely during the pandemic. Once this was completed, we developed COVID-19 method statements and risk mitigation for each survey type. A COVID-19 survey protocol was produced and circulated to all site staff and surveyors. Measures in the protocol included travelling separately to each survey, maintaining social distancing during the survey and implementing infection control measures. Our health and safety team carried out twice-weekly survey audits to ensure that COVID-19 protocols were followed.

We also provided separate mobile toilet blocks in a fixed location with COVID-19-safe protocols for our surveyors, as the availability of safe public facilities was vastly reduced during the lockdowns. Each surveyor was issued with an Essential Travel Letter that they carried at all times in case they were challenged when they were working. There were no reports of challenges to our surveyors during the survey period.

We transferred inductions and training for all surveyors and staff online.

"Onsite allows a clear audit of survey data, with access to photos, maps and bat sound files, all in one editable view."

"The approach helped Binnies to increase the number of ecological surveys undertaken from fewer than 1000 in 2019 to 5500 in 2020, despite the COVID-19 pandemic."

Approximately 150 staff and surveyors were inducted through this COVID-19-safe method, across more than 10 different subcontractors.

By placing health, safety and welfare of our staff and subcontractors' staff front and centre, in line with LMJV and our work practice culture, we ensured the ecological surveys could be completed safely despite the pandemic, so that the enabling works programme could continue as planned. No one on the project knowingly contracted COVID-19 from undertaking the surveys.

Survey data

Once the survey was completed and the surveyor was happy with the data recorded on their survey forms, they were submitted and became directly viewable and editable on Onsite. A two-stage quality assurance process was followed before the data were ready to convert into the LMJV GIS schema.

Onsite provides a clear platform to audit survey data from the surveyors, including weather details, limitations, survey results and comments from surveyors to the species leads on the surveys' validity. Auditors could access photos (e.g. Figure 3), sketch maps and bat sound files, which were all stored on the CDE against the unique survey but in one editable view on Onsite. This enabled rapid quality assurance as the need for Excel documents and shared drives was eliminated and with it the potential for error. Any survey that was considered invalid (mainly due to suboptimal weather or the full extent of the potential roosting feature not being possible to survey as per survey guidance and thus requiring alternative methods) was picked up quickly and rescheduled so that we could fulfil LMJV's survey scope. Of the 5,500 surveys undertaken, fewer than 5% were found to be invalid.

Figure 3. Examples images from Onsite and stored on the CDE, associated with the survey for which they were uploaded. Left: a tree climber undertaking an internal bat inspection of a tree. Centre: a barn owl survey; the arrow was included by the surveyor to clearly show the cavity, which the species lead could then check for validity. Right: sketch map for an emergence survey; the sketch provides the location of the surveyor in relation to the tree being surveyed and the location of other surveyors.

Conclusions

The year 2020 was challenging for the implementation of ecological surveys; however, Binnies undertook 5,500 surveys during the pandemic. In the previous year fewer than 1000 surveys were undertaken on this project. The increased scale of the survey effort was made possible by using our CDE for assignments and the collection of data.

The Onsite platform was set up to view various data stored on the CDE in one accessible format. This meant that once a submission was received, our quality assurance team could confirm that it was surveying the correct feature and the survey was undertaken as per the guidance. Quality data and summary reports could therefore be issued to the client rapidly, so they knew where protected species were located and could thus develop mitigation schemes and obtain any required licences quickly to maximise the work that could be completed during the appropriate season.

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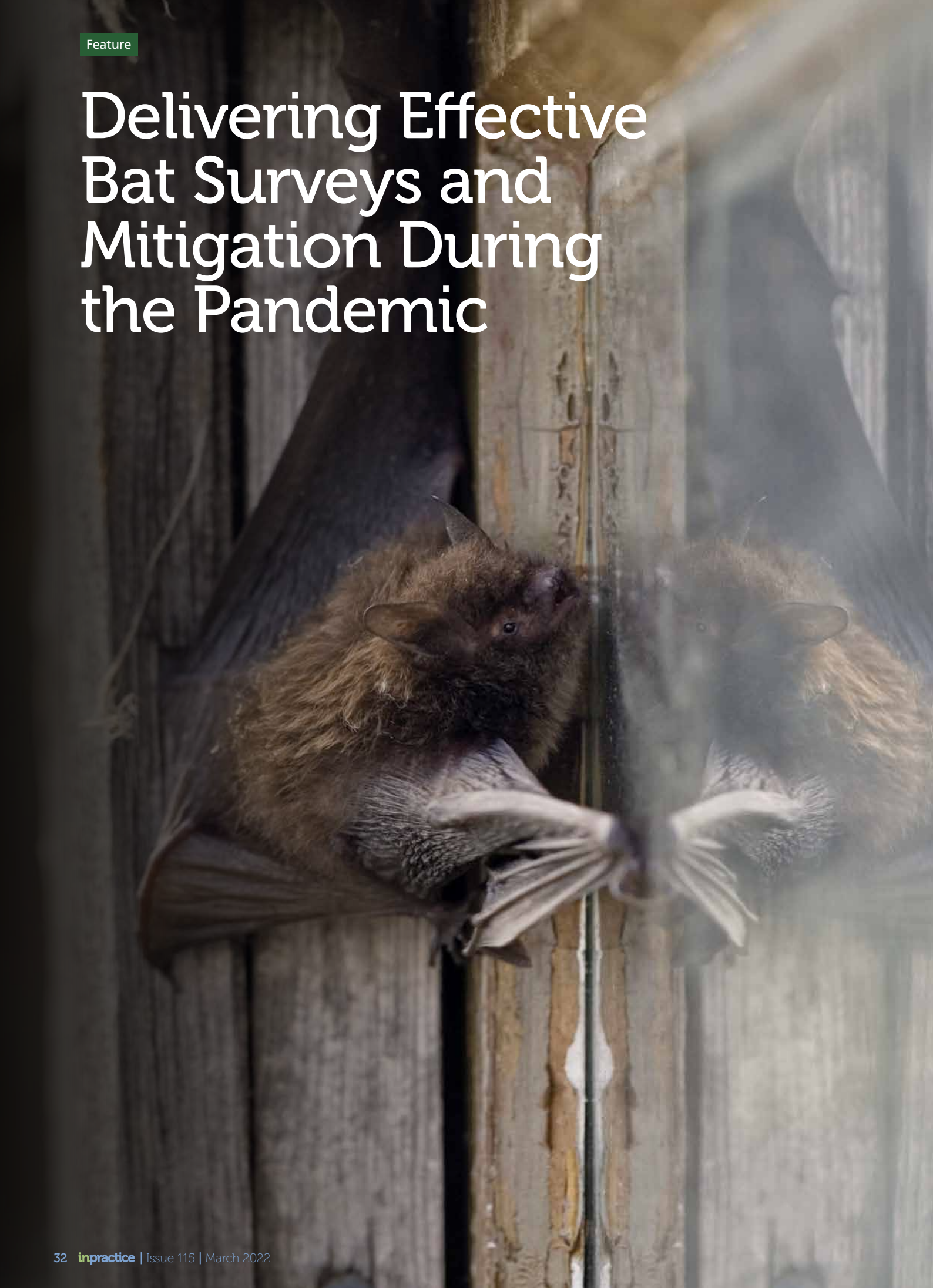
Feature

Delivering Effective Bat Surveys and Mitigation During the Pandemic



Erin Grieve MCIEEM
Jacobs UK

Keywords: bats, coronavirus, COVID-19, mitigation, survey design

For those of us in the sector, bat work can be complex at the best of times. As bats are highly mobile animals that can occur virtually anywhere and which have with complex life cycles, specialised knowledge is required. Add to this a global pandemic and things can become truly difficult. However, with difficulty comes opportunity. The following is an example of how being adaptable and understanding the job in question allowed us to adapt our survey and mitigation design in response to COVID-19 restrictions while still obtaining reliable baseline data and delivering appropriate mitigation.

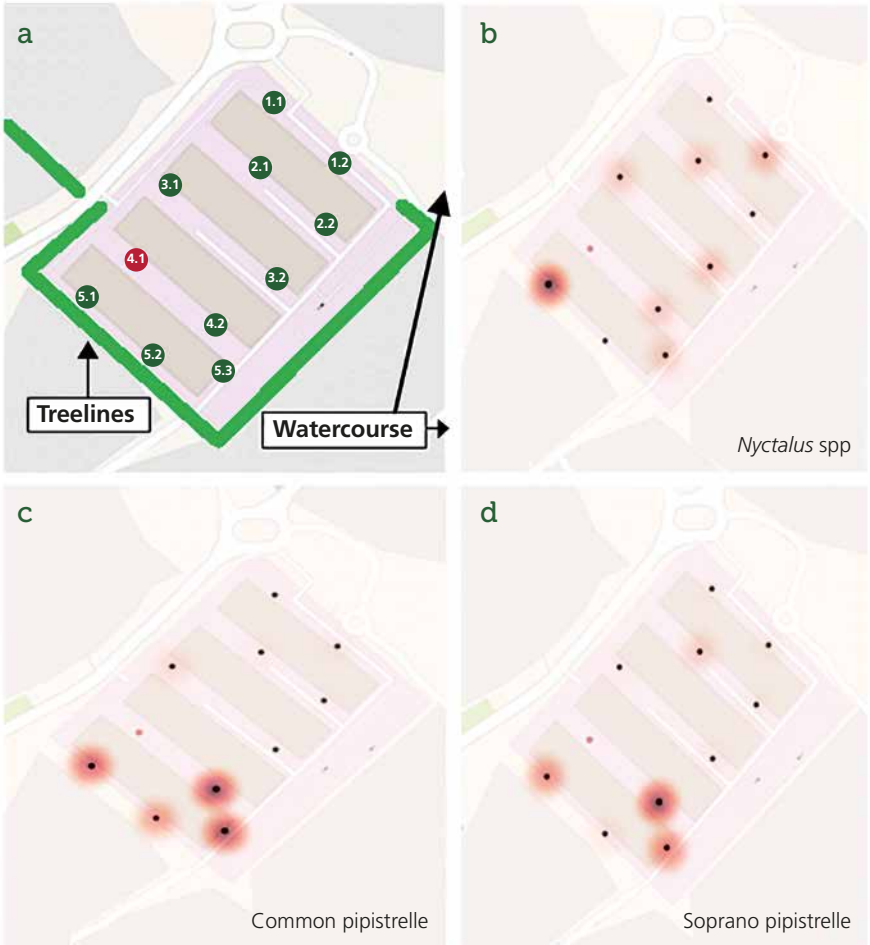


Figure 1. (a) Layout of the site and location of passive detectors and (b–d) heat maps showing distribution and bat pass abundance of the main three bat species found on site: (b) *Nyctalus* spp, (c) common pipistrelle (*P. pipistrellus*) and (d) soprano pipistrelle (*P. pygmaeus*). Note that intensity cannot be compared between maps as each species had a varied number of total calls and the scale of each is relative to its own dataset.

Introduction

The project involved the decommissioning of a 6.2 ha industrial building complex located in the central belt of Scotland in a semi-urban location. The site comprised four large two-storey warehouses/factories with office spaces, two storage sheds and a gatehouse. A minor watercourse was present with connected treelines (Figure 1a) that provided connectivity to wider landscape including urban and rural locations. The intention was to commence decommissioning works in October 2020 followed by demolition.

This large and complex site proved challenging for several reasons. As the site was undergoing decommissioning, several different contractors and activities were present on site simultaneously. Asbestos cement sheeting was present in the roofs of many of the buildings which limited some areas for inspection and access. The size and construction of the buildings (cavity walls, insulated false ceilings, capping stones) paired with difficulty in accessing features, even with a mobile elevated working platform, made surveying difficult. Due to the size of the site, surveys were going to be resource-heavy in terms of the number of surveyors and/or time required.

The buildings were assessed as having between moderate and high potential for summer-roosting bats and high potential for winter-roosting bats; based on the type of features present it was assessed there was a higher likelihood of *Pipistrellus* spp. being present on site but poor roosting opportunities assessed for *Nyctalus* spp., *Myotis* spp. and *Plecotus* sp.

The original survey design was to follow best practice and conduct two winter hibernation surveys followed by multiple emergence/re-entry (ERE) surveys during the summer.

Winter survey (pre-COVID-19 restrictions)

In January and February 2020, Jacobs undertook two, week-long, at-height winter hibernation inspections of all the buildings on site. The site (Figure 2) contained in excess of 400 potential roost features within the buildings, but tree roosting opportunity was extremely

limited. Single bat droppings were identified at three separate areas during the winter surveys but were not in locations that could confirm roosting. Due to the location and limited number of droppings these samples could not be sent for DNA analysis to determine species.

Bat surveys during the coronavirus pandemic

In March 2020, lockdown officially started throughout the UK. In Scotland, active construction sites did not have to fully close but did have to implement various controls to prevent the spread of COVID-19. This included development of a specific Health and Safety Plan taking into account Jacob's policies, the client's management plan and Scottish Government guidance in addition to standard health and safety protocols (e.g. reducing non-essential travel and staff on site). As a result of the required measures, Jacobs' ecologists were not able to attend site again until July 2020.

With restrictions, new logistical considerations (e.g. accommodation and methods of transport) and the rapidly changing situation, undertaking a standard best practice (Collins, 2016) survey design could not be justified under the government guidance. As such, a restricted summer survey and data analysis strategy was developed in discussion with the relevant stakeholders, including the local council biodiversity officer, project team and the client. In addition, the CIEEM guidance for undertaking surveys during pandemic was used to inform our survey and mitigation design and implementation (CIEEM 2020). This adapted strategy balanced the requirements for robust assessment, health and safety, and the client programme.

"With the rapidly changing situation, undertaking a standard best practice survey design could not be justified. A restricted survey was developed using CIEEM guidance."

Figure 2. Context photograph of a small section of the site showing the types of buildings, conditions, types of features and lighting on site.

Adapted survey methodology

The adapted strategy shifted the emphasis to passive monitoring that could be undertaken by a limited number of staff and largely remote data collection, thereby minimising travel and site visits. To achieve adequate site survey coverage, a continuous month-long passive deployment was undertaken in a grid layout (Figure 1a), covering the full site between July and August 2020. The passive data were used to:

- assess the level of bat activity across the site
- assess the level of bat activity throughout each night to identify activity that would indicate the presence of roost(s)
- keep survey design iterative by selecting the best locations for limited manual survey effort based on the findings from the passive monitoring.

Manual back-tracking surveys (total of four surveys undertaken over two site visits) were undertaken across the site to provide context to the static data and identify locations where ERE surveys may be needed. This involved multiple surveyors deployed in a grid across the site with full-spectrum bat detectors and walkie talkies during emergence and re-entry times. The surveyors were instructed to follow any bats in their grid to record bat behaviour and identify any roosting or potential roosting points. The walkie talkies were used to capture and convey all bat sightings in real time to the wider team. Based on hot spots of activity identified by the passive and back-tracking data, additional targeted ERE surveys were undertaken at two separate locations (loading bay area with sheds and at the gate house).

A total of four targeted ERE surveys were completed, aided by full-spectrum bat detectors and infrared cameras with the data used to identify any potential roosting locations and record any incidental notes on other activity.

In addition to standard COVID-19 protocols, further controls were implemented that included: all survey sheets were inserted into individual poly-pockets after the survey and were left untouched for at least 72 hours; equipment was issued to individuals and cleaned prior to and after use; key worker accommodation was secured near site which provided access to non-shared bathrooms; a private hire car per person and all site work including briefings held outside.

The passive data identified the following on site in descending order of number of passes (Figure 1): common pipistrelle (*Pipistrellus pipistrellus*; 1939 total bat passes), soprano pipistrelle (*Pipistrellus pygmaeus*; 205 total bat passes), *Nyctalus* spp. (likely Leisler's bat, *Nyctalus leisleri*; 62 total bat passes) and *Myotis* spp. (two total bat passes). Apart from one passive location which was deemed invalid due to noise

interference, low levels of calls (2412 cumulative passes across all detectors on all nights) were detected throughout the 29-night deployment period. During the back-tracking and ERE surveys, only low levels of pipistrelles were detected (peak count three bats at any given time) and no emergence or re-entries were recorded.

The main areas of activity for all bat species present (Figure 1) were shown to be the southern treelines and loading bay area with some feeding buzzes and social calls detected. Very little activity was detected across the remaining site. This was confirmed during the back-tracking surveys which assessed the activity around the treelines as low levels of sporadic activity (peak count three bats at any one time). The rest of the site was assessed as having either no bat activity or low sporadic activity (peak count one bat at any one time); the latter largely associated with commuting over the site between the north east and south west of site.

The total bat passes per hour over the entire deployment showed that 99.2% of all passive calls recorded occurred between 00:00 and 00:59 hours, which is well out of the ERE times (sunset was between 20:38 and 21:28 during this period) expected by the species recorded on site and indicates that these bats are travelling from further afield.

No evidence of roosting or roosting behaviour was recorded throughout the active surveys. A large and aggressive herring gull (*Larus argentatus*) colony located on the roof of the southern building (with the highest roosting potential) was observed to impact bat behaviour; when the gulls were settled, bats would travel over the grass around this building but when the gulls were active or agitated the bats hugged the treelines.

Based on the passive, back-tracking and ERE data, it was assessed that no maternity colonies were present and any roosting on site would likely be no more than opportunistic by a small number of pipistrelle species. The eastern and southern treelines were assessed as moderately important commuting routes. The building with the highest likelihood of summer roosting bats (southern factory) was also unlikely to be used for more than occasional opportunistic roosting at best due to the presence of the gull colony in the summer.

Lessons learned

The survey design employed at this site deviated from standard best practice (Collins 2016) to meet government guidelines in that it heavily relied on passive data collection augmented with targeted surveys to give confidence in detecting rooting bats.

Good communication to keep all stakeholders informed of our approach in response to the pandemic was vital to ensure this atypical survey approach would be accepted. The local council biodiversity officer was receptive and responded positively to this communication.

There were several key lessons in successfully undertaking this bat survey under unusually difficult circumstances. By clearly understanding the aim of the surveys and the ecology of likely bat species present on site, as well as a good understanding of how the data would be analysed at the survey design stage, we were able come up with a flexible, non-standard but robust survey design. Pairing the continuous 29-day passive deployment in a grid with back-tracking and ERE surveys provided information not only in localised areas but for the site as a whole and over time. This allowed us to have a high degree of confidence in the data collected and provided a more holistic view. Additionally, the survey design resulted in findings that would not have been detected without this dual approach. Benefits of the approach included the following.

- Increased species detection: both the *Myotis* spp. and *Nyctalus* spp. were detected through the passive data only outwith their ERE times. The 2021 draft Bat Mitigation Guidelines (CIEEM 2021) now include a requirement to identify all species on site when assessing the value of a habitat for bats.
- Heat maps: these allowed the identification of key hot spots of activity over time and areas with low or no activity per species, which in turn informed targeted ERE surveys. In addition, they proved an effective way of visually interpreting the data and communicating the results to non-ecologists.
- Long-term deployment: this allowed survey of both localised areas and across the site and identification of the nightly activity trends for the duration of the passive deployment, which proved to be a key piece of evidence in showing that over 99% of all bat calls were produced outwith expected ERE times for roosts close by. Additionally, key indicators of bat behaviour (e.g. social calls, feeding buzzes and increases in abundance of calls) could be identified for each species across the site. Lastly, long-term deployment allows use of tools such as Ecobat (a free online tool for comparison and interpretation of bat activity data) to put site results in a national context.
- Back-tracking and ERE surveys: although reduced to two site visits, the use of back-tracking surveys in a site-wide grid allowed 'ground truthing' of the passive data; ensuring that data collected remotely were a true reflection of what was happening on site. This provided context to the passive data.
- Reduced resource requirements: the reliance on only two separate site visits, and the use of auto-identification as an aid for the passive data, greatly reduced the surveyor hours required while also allowing government COVID-19 guidance to be followed.

Main works and mitigation

Decommissioning of the building followed by full demolition commenced in October 2020 and was scheduled to continue throughout winter. As there was still a residual risk that bats could be injured by works, mitigation was required.

Due to the complex nature of the site some standard mitigation was not considered practical (e.g. exclusions were not feasible due to the location, abundance of and access to roost features, and the extensive presence of asbestos on site). As such, it was initially planned that a long-term Ecological Clerk of Works (ECoW) presence would be required to supervise works and to undertake localised pre-work

> **"The techniques used will be useful after the end of COVID-19 restrictions, providing useful data at relatively low cost for robust assessments on large sites."**

inspections. However, the COVID-19 restrictions, particularly around social distancing, severely impacted this mitigation strategy.

The amended mitigation strategy reflecting COVID-19 restrictions are outlined below.

- Toolbox talk: a document highlighting key biodiversity issues on site was provided, including agreed method statements for general works and some specific work tasks. The document and discussion were included as part of site inductions for all operatives.
- Reduced site visits: an initial site walkover with the lead bat ecologist and contractor was undertaken to develop a practical strategy for works, and to establish agreed controls and where ECoW presence was required. Regular communication with the contractor was essential and questions were asked and answered in the form of photographs, emails, phone calls and video calls. Throughout works a bat-licenced ecologist was available to attend site within 24 hours should it be required.

The two areas with the greatest potential for hibernating bats was within the upper sections of cavity walls and in the insulation of false ceilings. Special arrangements were required to balance protecting bats and to follow social distancing guidance and to reduce the number of staff on site. The following mitigation was undertaken as much as possible prior to the hibernation period.

The four main factory buildings had double-skinned walls with a cavity with several bat features present allowing access inside. In addition, three of the factory buildings contained extensive false ceilings with insulation foam which could be utilised by pipistrelle bats for hibernation roosts (Mitchell-Jones and McLeish 2012). In both cases, an initial site visit with the contractor was undertaken to discuss and agree methods for removal.

The coping stones along the top course were removed by hand to open up the cavity to the elements, reducing the risk of bats choosing to roost before the main demolition and to allow inspection. In lieu of an ECoW on site permanently, the lead bat ecologist and the site manager produced a written method statement and toolbox talk for undertaking this work. The lead bat ecologist then undertook one-to-one training sessions with the operatives, followed by hour-long watching briefs to ensure the correct methods were followed and to provide further guidance. Once safe social distancing protocols could be established, fortnightly site visits, with access at height for the lead bat ecologist, were undertaken to inspect opened or partially opened features and to conduct further direct inspections.

As well as toolbox talks and method statements, static bat detectors were deployed prior to and during the ceiling removal works and continuing until demolition commenced in each building. To reduce the overall number of site visits but ensure quick detection of any possible bat recordings, the site manager was trained by the lead bat ecologist on how to download and send data and re-deploy the static detectors on a weekly basis. The lead bat ecologist also undertook an inspection of all internal roof spaces on site during each fortnightly site visit.

No bats or signs of bats were found during the mitigation phase of the project.

Conclusions

This project presented a challenge due to the size and complexity of the site. With the added difficulties of COVID-19 there was a real possibility that the project would not progress on schedule. Maintaining a good working relationship with honest, effective communication between the ecology team, contractors, project team, client and local council biodiversity officer was vital for ensuring the methods were implemented effectively, avoiding harm to bats and maintaining the project programme. By clearly understanding the issues involved, Jacobs were able to design and implement a safe, bespoke survey design and mitigation strategy that was cognisant of best practice guidance but tailored to the situation and circumstances in question and adhered to the various government COVID restrictions in place throughout the year. The decommissioning has now been successfully undertaken with the level of bat protection being proportional to the site and no bat or bat roosts identified.

This project has highlighted that the techniques used would be equally useful after the end of COVID-19 restrictions as they can provide extremely useful data at relatively low cost for undertaking robust assessments, particularly on complex or large sites. As such, it is a method that we at Jacobs are likely to apply on other projects where appropriate.

Acknowledgements

I would like to thank Matt Pannell CEnv, MCIEEM and Chris Kerfoot CEnv, MCIEEM, both from Jacobs, for their assistance in the writing of this article.

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About the Author

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On-site Rare Barbastelle Maternity Roost and the Impacts of COVID-19

Barbastelle (*Barbastella barbastellus*).

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Tetra Tech

Laura Holmes MCIEEM
Tetra Tech

Keywords: Anabat Express, bats, camera trap, Grade II listed building, licensing, Natural England, satellite maternity roost, static detector

Obtaining a bat licence for the second only known building maternity and satellite barbastelle roost in the UK was challenging enough but this project had the added complexity of the coronavirus pandemic hitting midway through the mitigation works on site.

The onset of the pandemic changed both site and home-based working practices for us all, and this article describes how for this project we had to react quickly to the ever-changing guidance as work continued throughout the initial lockdown.

Introduction

In August 2019 Tetra Tech's bat specialists were contacted regarding a bat roost in a Grade II listed building at a care home in Northamptonshire that required urgent underpinning works to retain the building for future use and potential expansion. Information from the client indicated a bat roost was present under the cladding of the building and our licensed bat ecologists conducted a visual check with endoscopes. This identified a colony of the rare Annex II species, barbastelle bat (*Barbastella barbastellus*). This was a surprise as barbastelles are usually only ever found in woodlands and according to Natural England's records this was only the second ever confirmed case of a barbastelle maternity roost, where pregnant females gather to give birth and raise pups until they are independent. Such roosts are typically occupied between May and August. In the building's roof there was also a satellite maternity roost, a smaller maternity colony that remains close to the main maternity roost during the maternity season. The other case of a maternity roost was in a barn in East

Figure 1. Droppings and feeding remains of brown long-eared bats in the roof void. Photo credit: Elizabeth Sanders.

Anglia. The bats were tucked under plasterboard cladding in a sheltered corner of an internal courtyard. Due to the limited programme for the works to be completed we carried out a further emergence survey that evening, with 24 barbastelles recorded flying out from a gap the width of a finger. In addition, three more common species – that is, common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*) and brown long-eared bats (*Plecotus auritus*) – were recorded to have emerged from the roof voids (Figure 1) and crevices in the thick stone walls.

Next steps: planning permission and the licence

Following the surveys, the production of our accompanying reports and consultations with the local planning authority ecologist, planning permission for the underpinning works was granted. Through our report we demonstrated that works to underpin the building and carry out repair works could proceed with minimal disturbance to the barbastelle roost by careful timing of the works. Following planning consent, the next step was to obtain the mitigation licence from Natural England to allow these works to proceed safely and within the constraints of wildlife-related legislation. Natural England do not usually receive applications to undertake mitigation works that may impact barbastelle maternity roosts, let alone ones in buildings. Unsurprisingly, on receipt of the application they immediately got in touch to discuss the project and asked to visit the site, with a meeting held at the end of January 2020. We quickly formed a good collaborative relationship as we worked through the options to agree a workable approach that met the client's end objectives and resulted in the protection of the bats. The agreed approach was for works to be timed outside the maternity period (the maternity period typically extends from 1 May to 1 October) with daily checks prior to any works taking place on site to make sure that the maternity colony had not started to gather and had not taken up residency in the building. This involved the options below, with Natural England requesting at least one of these to be carried out daily.

- Two camera traps were located at agreed positions to capture any barbastelle bats entering the roost or in flight in the courtyard. One camera trap was located immediately adjacent to the roost, on a drainpipe, and was set to video mode and record 10 second periods of activity once triggered. The other camera trap was set directly below the roost, facing upwards (Figure 2).
- An Anabat Express static detector captured any barbastelles in flight that may be returning to the roost.
- Checking the roost location with an endoscope to make sure that bats hadn't avoided the camera trap and the static detector on their return.

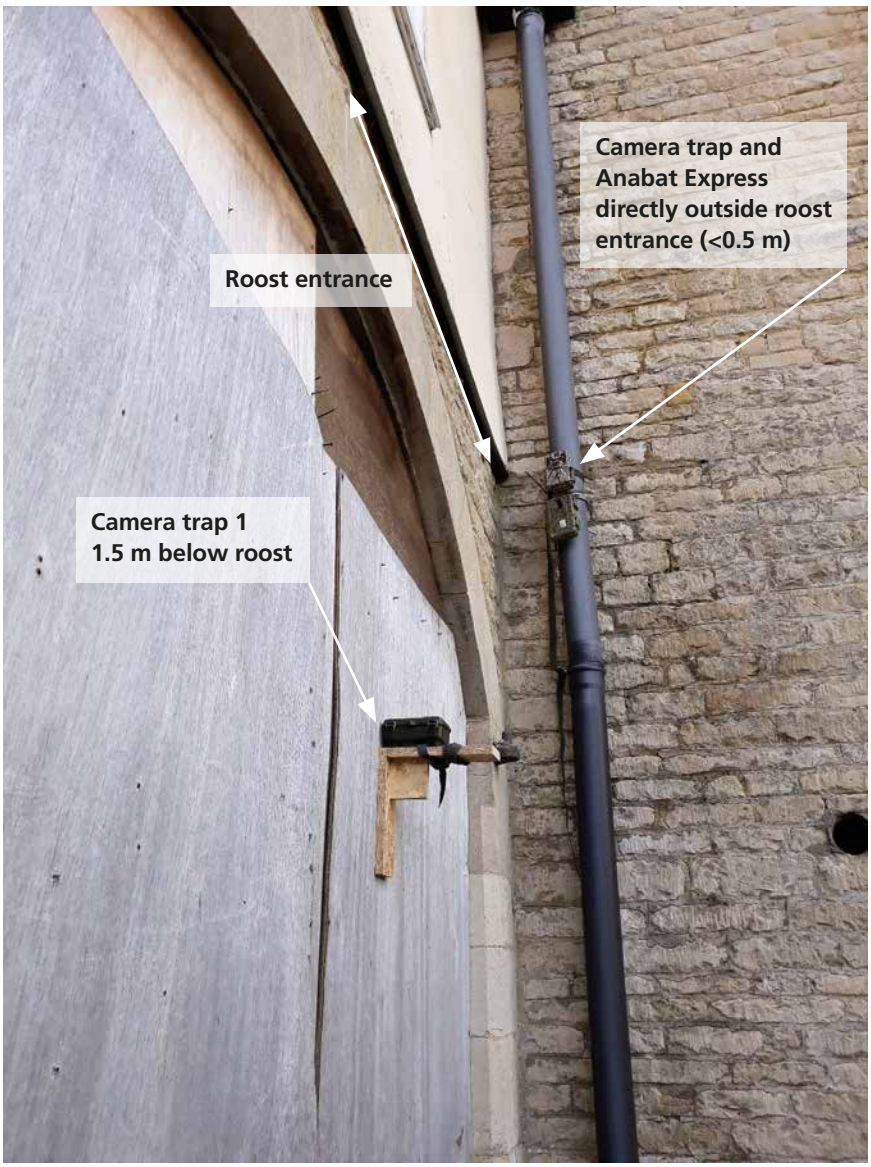

Figure 2. Roost location behind cladding, with static and camera traps deployed. Photo credit: Laura Holmes.

Figure 3. Installing bat boxes to provide alternative roosts for bats to use. Photo credit: Laura Holmes.

Often all three of the above options were used to make sure that bats had not been missed by one of the other techniques. For example, if a barbastelle was recorded on the static detector then, in agreement with Natural England, all works would likely have stopped as the colony may have been starting to gather and could occupy the roost location at any time.

The mitigation licence was granted in February 2020 so we could meet the tight timescales for the underpinning works. All other works which were included in the licence, repairs of window frames and door frames and re-pointing of stonework, were planned for later in 2020.

“The approach was for works to be timed outside the maternity period with daily checks prior to any works taking place.”

The Ecological Clerk of Works (ECoW)

To meet the tight programme the works started on site quickly in February 2020, to get the works completed before the barbastelle maternity roost returned. Two maternity bat boxes were installed to provide alternative roosting sites for the brown long-eared bats and barbastelle bats in the unlikely event they were disturbed or found to be present during works. Two hibernation boxes were also installed for any hibernating bats which may have been found in the stone walls, including brown long-eared bats. The boxes were installed on the day that works commenced, on surrounding trees (Figure 3). As agreed within the licence we also immediately started fitting exclusion devices (one-way gates of either plastic sheet or angled poly pipe allowing bats to leave the roost location but not re-enter) to the roosts identified in the stone walls.

The stone walls were required to be excluded due to the presence of bat roosts which may be impacted by the underpinning works through noise, vibration and possible dust. This type of work wouldn’t normally be carried out in February, but we only had 6 weeks to do all work before the barbastelles’ potential return. As the weather had been mild, with reasonable daytime and night-time temperatures, Natural England agreed that we could proceed, subject to favourable weather. Thanks to our collaborative relationship with Natural England we managed to fit the required exclusion period in just before the underpinning works started with ongoing supervision through February and March.

We checked the vacant barbastelle roost before the underpinning could start each day in case these highly sensitive bats returned early. Each morning, the site was visited to check the trail camera footage, check any overnight static detector recordings

“Bespoke risk assessments and working methods were produced in line with government and CIEEM guidance. This enabled effective COVID control measures (for site personnel and bats!) while allowing the works to proceed prior to the bat roost congregating.”

and to complete an endoscope check under the cladding, just to check no bats had returned undetected. We would have daily discussions with the contractors regarding the findings, what was required for the day and to make sure everyone was still working to the required methods. Everything was going to plan but then COVID started hitting the headlines!

The arrival of COVID-19 and modifications to works processes

By mid-March 2020 the government had announced that the SARS-CoV-2 virus had reached our shores and that a national lockdown may be imposed. This meant rapid changes in the way everyone worked from office working to home working and, the now familiar use of video calling and other online communication. However, to enable the project to continue the project team worked closely with the client, Natural England and the wider Tetra Tech health and safety team to produce bespoke risk assessments and working methods in line with government and CIEEM guidance. This enabled social distancing and effective COVID control measures (for both the site personnel and the bats!) while allowing the works to proceed and meet the tight timetable prior to the bat roost congregating.

Tetra Tech bat ecologists were now arriving on site early before any contractors started work, so that we were not in close contact with each other, and buildings were accessed alone to check static data so that there were no ventilation issues and less risk of transmission of illnesses. Further control measures included use of full PPE and briefing of contractors by phone and email. Once full lockdown hit, we agreed with Natural England that the project was ‘essential work’ and continued with daily reviews of the risk assessments with updates according to the ever-changing guidance provided.

The remaining works to replace or repair window and door frames and re-point the stonework were not considered essential and were postponed.

All’s well that ends well

Despite the best efforts of the bats and COVID-19 the underpinning was completed before the 27 March 2020 deadline agreed in the licence. This was thanks to continued communication between the Tetra Tech ecologists and the rest of the project team, and the underpinning contractors throughout the 6 week period. The roost is still there for barbastelles, unchanged.

Upon leaving the site in March 2020, when the care home went into full lockdown and we were no longer allowed to attend, we agreed to leave a static detector and a camera trap on site close to the roost entrance to capture any early activity and signs of continued use. As we left, discussions were had regarding the remaining repair works planned for later in 2020. These discussions were to be picked up once lockdown was lifted. As we didn’t know how long lockdown would be, we thought we would still be able to return in person for a dusk monitoring survey in the summer and to continue the remaining works! How wrong we were: summer came and went with no survey allowed due to the care home still being in full lockdown, despite us ecologists being able to continue site visits where appropriate measures could be put in place. The static and the camera trap were finally collected in September 2020, with the camera trap having continued to record well into June. This meant we saw some bat activity from 3 April, indicating that the roost was still in use. A successful end to a difficult year!

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Why are Ecologists Missing the Deadwood for the Old Trees?

Figure 1. A veteran oak with 6.2 m girth. The pronounced basal flare, hollow trunk, fruitbodies of the brown rot *Fistulina hepatica* and beginning of retrenchment are clear signs of the tree's age. Photo credit: Tom Dale.

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Keywords: ancient woodland, arboriculture, decay, National Planning Policy Framework, NPPF, veteran trees

Veteran trees are iconic features of the landscape: a dendrological expression of time. We all understand how important they are, but, in practice, are we ecologists doing our part in protecting them? Here we highlight that inconsistent legal protection, difficulties in defining veteran status and the confusion created with responsibility for veteran trees falling on multiple disciplines are all contributing to a lack of awareness among ecologists in identifying and valuing veteran trees.

Large, old trees can be referred to as keystone structures because they have a disproportionate value to biodiversity relative to the space they take up (Lindenmayer *et al*. 2014). Their importance is underpinned by the myriad of microhabitats: decomposing wood at different stages of decay each supporting a different community of invertebrates, the structural cavities used by nesting birds and bats, or the tannin-leached, deep-fissured bark important for rare lichen (Figure 1).

Beyond this they are important cultural, historic, amenity and landscape features that help to define our sense of place. But in spite of this, veteran trees often appear to be neglected by ecologists. Here we suggest why this might be and how we may progress.

Protection for old trees

The loss of a veteran tree can be a disaster for its associated species. This point was made in the excellent *In Practice* article on delivering Biodiversity Net Gain (Wilson 2021). Richard Wilson points out that legal protections for species have affected how ecologists focus their surveys and interpret ecological importance, noting "an old-growth tree lacking evidence of a bat roost receives limited legal and policy protection". It is true that old-growth trees – that is, ancient and other veteran trees – are not protected in primary legislation for their inherent biodiversity value, but the situation is complex (Figure 2).

Where planning permission is not required, tree felling, with some exceptions, requires a felling a licence under the Forestry Act 1967. Felling licensing has a minimum volume threshold that allows for unlicensed "personal allowance" and this does not exclude veteran trees. This means, as Wilson (2021) suggests, that unless covered by a Tree Preservation Order or supporting a bat roost, there is little to prevent the felling of these valuable trees.

However, where works require planning permission, the policy protection for veteran trees through planning policy is considerable. The National Planning Policy Framework (NPPF) states "Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists" (NPPF paragraph 180; exceptions include infrastructure projects "where the public benefit would clearly outweigh the loss or deterioration of habitat"). The specific mention of ancient and other veteran trees as an example of irreplaceable habitat means that this strong policy protection covers them, whether they are in an ancient woodland or other setting. A similar policy exists in the National Policy Statement (NPS) on National Networks (e.g. roads and railways), although the language is markedly softer. Together this leaves a statutory dichotomy for veteran tree protection: strong policies for veteran trees that protect them from development and almost no specific protection elsewhere. This lack of clear and consistent protection may be contributing to a lack of awareness by ecologists, particularly, for example, when compared against the clear boundaries set out for certain species under the Habitat Regulations 2017.

Figure 2. An ancient beech pollard in arable farmland. The hollowed trunk and relatively small limbs do not support a bat roost and so the tree carries limited protection despite its immense biodiversity and cultural value. Photo credit: Matt Wainhouse.

Problems defining veteran trees

Ageing is a process and so defining which trees should be classified as veterans and with what criteria is not straightforward, but, with policy protection in mind, correct definition could make the difference between fencing off or felling.

It has been widely accepted for some time that it is not just the age or size of the tree that should define veteran status, although these can be the most obvious characteristics. Instead, it is the number and variety of veteran features that are key to identification (Lonsdale 2013; see also Box 1). However, even this partial definition has recently been contested. In a planning appeal last year, the Planning Inspectorate accepted the classification of veteran trees using an 'in-house' system based primarily on tree girth rather than old-growth features. This was in spite of opposition from the Ancient Tree Forum and Woodland Trust (Planning Inspectorate 2021). The worry is that this alternative interpretation in the NPPF further restricts the protection to large veteran trees only. Moreover, whatever identification system is used, notable trees on the edge of any veteran tree definition may be excluded entirely.

Decay processes in trees can take an exceedingly long time. It may be 200 years before an oak tree begins to develop heart-rot and only after 400 years is hollowing assured (Ranius *et al*. 2009). With such long-time scales in the development of critical habitat features, the definition of veteran trees and the policy protection they receive should arguably be extended to those trees with some veteran features but perhaps falling short of the definition. The term transition veteran (Fay and De Berker 1997) is perhaps a useful one in such circumstances. It recognises that veteran features may have been hundreds of years in the making. Such trees are easily overlooked, and often felled without second thought, but can provide critical bridging habitat for

Figure 3. A 'transition veteran' oak: the extent of valuable heart-rot habitat is only visible after the tree was felled. Photo credit: Matt Wainhouse.

"Decay processes in trees can take an exceedingly long time. The definition of veteran trees and their policy protection should arguably be extended to trees with some veteran features but perhaps falling short of the current definition."

deadwood biodiversity and should be flagged in site assessments (Figure 3). We are not aware of any clear guidance or case law on whether the policy protection should apply to transition veterans or not. However, the precedent set by the Planning Inspectorate's 2021 appeal decision to allow a size-based definition may weaken the case for preserving transition veterans.

Falling through the gap?

The separation of arboriculture and ecology into separate disciplines with their own professional bodies (the Arboricultural Association and CIEEM, respectively) has no doubt compounded the issue. We should also never assume that the local planning authority has the technical expertise available to identify veteran trees themselves from information scattered between the ecology and arboriculture reports.

Responsibility for veteran trees straddles both arboriculture and ecology disciplines (as well as heritage and landscape) and such trees risk falling through the gaps between disciplines without effective collaborative working. A collaborative approach is especially important for trees that might qualify as either veterans or transition veterans where assessment requires a range of specialists to verify their importance. Even within ecology, specialists might be needed to fully understand the value of a veteran tree. The level to which veteran features provide suitable saproxylic habitat for invertebrates requires detailed specialist assessment from an entomologist. The qualitative and quantitative value of wood decay may relate not just to progression of decay but to the formation of the decay, including such aspects as hydration, exposure and elevation. Such habitat

Box 1 Old-growth attributes

It's not just age or size that define a veteran tree, but rather the old growth features (Figures 1 and 3). Recognising these features can aid identification (adapted from Lonsdale 2013):

- large girth for the tree species
- trunk and branch cavities and hollowing
- fungal fruitbodies that indicate heart-rot (Figure 4)
- exposed decaying wood
- epiphytic plants and lichen
- crown retrenchment and deadwood in the canopy
- sap runs
- bark loss and exposed wood
- physical damage to the trunk and fallen limbs
- an 'old' look
- context of the tree in the wider habitat/landscape
- high aesthetic/landscape value.

Figure 4. Emerging bracket fungi indicate valuable heart-rot habitat hidden within the tree, giving a clue to age and veteran status. Some species like *Buglossoporus quercinus* can indicate habitat continuity. Photo credit: Matt Wainhouse.

“Consistency in veteran tree legislation and policy is needed. There is a role for sector-led leadership on the issue, particularly by raising awareness and promotion of best practice.”

heterogeneity requires assessment by those with specialised knowledge of such habitats, entomology, mycology and decay processes. Hence a far greater level of collaboration between arboriculture and ecology disciplines is needed for a more robust identification and classification of these trees.

Where next?

Consistency in veteran tree legislation and policy is needed, with closing of loopholes and strengthening of protections. The Environment Act 2021 could have been a good vehicle for this, but the measures to strengthen protection for veteran trees and ancient woodland introduced in the House of Lords were rejected by the Government. The Ancient Tree Forum and Woodland Trust continue to lobby for this, but in the meantime there is a role for sector-led leadership on the issue, particularly by raising awareness and promotion of best practice.

The publication of a British Standard would certainly be welcome in affirming the criteria for defining veteran trees and where responsibilities lie. This would also help to capture those transition specimens that deserve more protection than the current British Standard (BS5837:2012) for trees allows in relation to development, where the best they can hope for is a high-quality (Category A) grading. A British Standard for veteran trees may also reduce the conflict that will arise from differences of professional opinion (e.g. the 2021 Planning Inspectorate appeal decision).

As Wilson (2021) points out in his article, ecologists must recognise their role in the protection of veteran trees. It is incumbent on us all to reflect on this and raise awareness of this issue and build up our knowledge. In summary, we make the following suggestions.

1. Remember that veteran trees carry high policy protection and that we must act accordingly.
2. Defining a veteran tree is not straightforward: if in doubt, flag up and discuss the case, remembering the time it takes for veteran features to form.
3. Don’t assume an arborist will identify a veteran tree or make the case for protection: work together and recognise that others’ input, including that from landscape and heritage colleagues, may also be needed.
4. Recognise the value of transition veteran trees for deadwood biodiversity.
5. Refresh your veteran tree knowledge with the excellent and freely available resources on the VetCert (www.vetcert.eu/training-products) and Ancient Tree Forum (www.ancienttreeforum.org.uk/resources/) websites.

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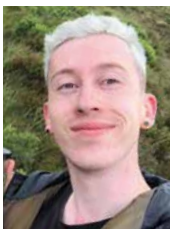
Re-introductions for the Conservation of Rare and Extinct Plants in North West England



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Keywords: botany, re-introduction, translocation

Declines and local extinctions in regional floras are a major conservation issue. The North West Rare Plant Initiative seeks to address this through the re-introduction of selected species to restored sites. The early results may be of interest to consultants who are planning translocations as part of development mitigation.

Introduction

Our native flora is under significant threat. Historically, an English county loses one higher plant every two years (Natural England 2010). Over 20% of Great British vascular flora is red-listed as Vulnerable, Endangered or Critically Endangered and therefore at risk of extinction (Stroh *et al.* 2014). Many of these species are declining due to land-use intensification, abandonment of traditional management practices, eutrophication and climate change, and are therefore being highlighted as priorities for conservation action (Walker *et al.* 2017).

Habitat loss and associated plant extinctions in the north west of England have been particularly severe. As the cradle of the Industrial Revolution, large parts of the region were impacted in the 19th century by rapid industrialisation and urbanisation, with associated severe air and water pollution. This was followed in the 20th century by agricultural intensification, including the drainage and exploitation of peatlands, with 98% of lowland bogs in the north west having been destroyed or damaged. Greenwood (1999) listed 91 vascular taxa that have become extinct in vice-county 59 (South Lancashire), an area that includes most of the major conurbations of Great Manchester and Merseyside. Remaining plant populations became increasingly isolated in islands of deteriorating habitat with little chance of natural recolonisation or enhancement. For example, the area of occupation of marsh gentian (*Gentiana pneumonanthe*) has declined in the region by over 95% in the last two centuries, while the distribution of lesser bladderwort (*Utricularia minor*) declined by 80% (BSBI 2020). By 2018, the population of the latter species in Lancashire and Cheshire was restricted to a tiny area of less than 200 m^2 of wetland surrounded by commercial forestry.

Restoration of habitats and the introduction of appropriate management on protected sites in recent years provide an opportunity to bring back some characteristic plants, recreating floral communities last seen 150 years ago. The North West Rare Plant Initiative (NWRPI; see Box 1) seeks to achieve this by re-introducing selected at-risk plants to restored habitats that are managed for nature conservation in the region.

Box 1 The North West Rare Plant Initiative

The North West Rare Plant Initiative (NWRPI) is a regional conservation programme funded by Chester Zoo and Lancashire Wildlife Trust. It operates across the north west of England and works with some of the region's most at-risk plants. The main aim of NWRPI is to create self-sustaining plant populations by carefully planned and recorded re-introductions and reinforcements of non-viable populations. Starting in 2017, the programme has targeted over 40 species that have become either regionally extinct or endangered. Examples include peatland specialists like great sundew (*Drosera anglica*; Endangered in England) and white-beak sedge (*Rhynchospora alba*; Near Threatened in England), together with sand-dune taxa like dune wormwood (*Artemisia crithmifolia*), the British population of which consists of five plants in Crosby, Merseyside (see http://nwrpi.weebly.com/).

Methods

The methods that enable translocations of plants closely follow available best practice guidance, as established by the IUCN and, more recently, Defra (IUCN 2013, Defra 2021). Although these guidance series, coupled with other available literature on the re-introduction of plants, have greatly assisted the development of strategies for the translocations of target species, they are not prescriptive on methodology given the significant differences in plant species' ecological requirements. Both experience and knowledge of species' ecology have been essential to maximise likely success for plant re-introductions, alongside detailed assessment of the habitat suitability of receptor sites. Meanwhile, post-release monitoring ensures that populations and potential impacts of translocations on recovering habitats are well documented. Before translocations are attempted, liaison takes place with landowners, site managers and Natural England to obtain agreement in principle and necessary permissions.

The application of methods and initial results of two translocations are detailed in Boxes 2 and 3.

Discussion and conclusions

Since late 2017, NWRPI has initiated over 50 plant re-introductions, involving 24 species, to a variety of habitats. Monitoring has shown that 13% of these translocations are declining or were not found, 31% are established or increasing, while 56% are recent introductions for which there are no results as yet or show no measurable change. It is difficult to predict the long-term outcomes of translocations; unexpected problems can arise, as in the case of heath cudweed described in Box 3. However, other species translocations may be highly successful, improve the conservation status of at-risk species and also contribute to the overall functionality of a given habitat, as is the case for many re-introductions of peatland flora.

Pearman and Walker (2004) question the overall effectiveness and appropriateness of plant translocations, suggesting that many are 'akin to wildlife gardening', often diverting resources away from habitat conservation. They cite a large number of translocations; some were successful but others failed and, in some cases, cost a great deal for little apparent benefit. They point out that there are almost no legal measures to control this 'ever increasing tide of translocation in the UK'. Among the problems that arise, they claim, is loss of biogeographic integrity, as it becomes increasingly unclear what is native and what is introduced. They advocate that plant translocations should only be used as a last resort. While translocation may be justified for some taxa, habitat management provides a much more cost-effective and sustainable strategy for a majority of species.

While acknowledging the disadvantages, carefully planned and well-recorded translocations can play a role in conserving species that are regionally extinct, critically endangered or declining rapidly towards that status and where there is little prospect of natural re-colonisation. Such action may also have a role as part of wider habitat restoration. A further role of translocation can be to mitigate losses due to development (Smith and Lockwood 2016). However, the success of these projects depends crucially on the favourable condition and location of receptor sites and the ability to maintain that habitat in the future.

Box 2 Case study: success with lesser bladderwort (*Utricularia minor*)

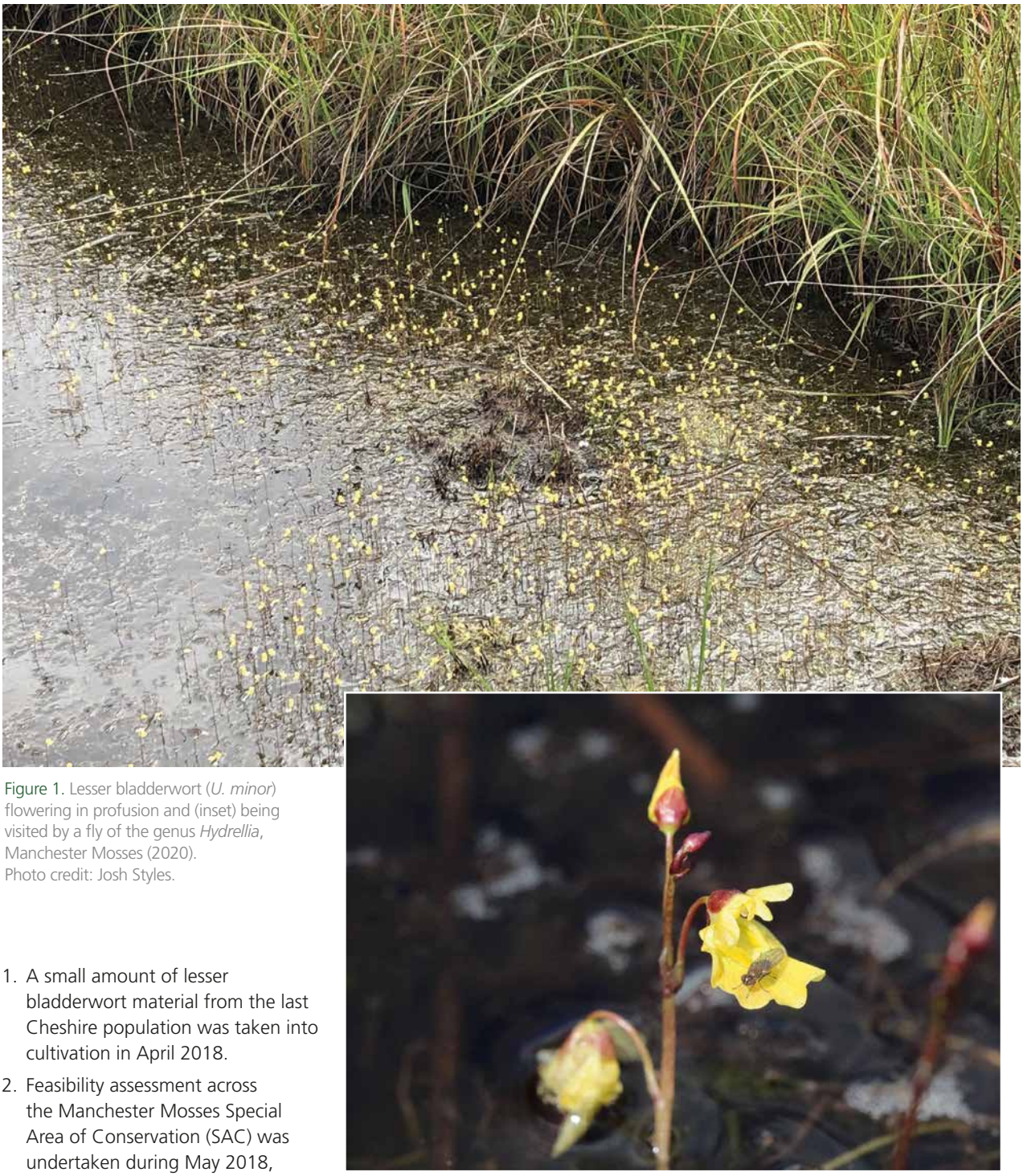

Figure 1. Lesser bladderwort (*U. minor*) flowering in profusion and (inset) being visited by a fly of the genus *Hydrellia*, Manchester Mosses (2020). Photo credit: Josh Styles.

1. A small amount of lesser bladderwort material from the last Cheshire population was taken into cultivation in April 2018.
2. Feasibility assessment across the Manchester Mosses Special Area of Conservation (SAC) was undertaken during May 2018, which involved assessment of open water bodies for communities which favour this species and similarity between potential receptors and the donor site.
3. Following consent from relevant stakeholders 60 individuals grown in cultivation were released in restored bog pools in Manchester Mosses, where the plant was last recorded in 1859.
4. Subsequent monitoring including a once yearly population estimate found that in 2019 a population exceeding 24,000 plants was established on the Mosses. In 2020, this increased to about 200,000, while in 2021 it reached approximately 2.3 million.
5. In addition to the conservation benefits to this species, which has been lost throughout most of its historical English range, other benefits observed on the Mosses at occupied sites include the provision of a pollinator resource and habitat for a number of aquatic invertebrates that no other vascular plants are able to occupy.

Box 3 Case study: failure with heath cudweed (*Omalotheca sylvatica*)

Figure 2. Heath cudweed (*O. sylvatica*) in flower after re-introduction on a Sefton dune heath (2019). Photo credit: Josh Styles.

1. A number of seeds were donated to NWRPI by Brian Laney from the nearest extant site for the species. Several hundred plants were successfully grown in cultivation.
2. Feasibility assessment was undertaken across two Sefton and two Greater Manchester sites, each with sustainable management regimes in place and agreed with land managers.
3. Re-introduction of 40 plants per site was undertaken across the period September 2018 to April 2019 following consent from all relevant stakeholders.
4. Extreme weather conditions in the spring of 2019 drastically decreased the number of plants at all sites, although sites had plants that successfully produced seed later in 2019.
5. A change in mowing at one Sefton site and destruction of the second Sefton receptor through highways maintenance, including path extension and use of lime chippings encroaching onto Site of Special Scientific Interest dune heath (see Figure 3), resulted in no seed set during 2020.
6. No recruitment of young plants was observed in 2020, while no plants were located in 2021.
7. It is likely that this re-introduction has failed for a variety of reasons which relate to climate, habitat suitability and management.

Figure 3. Damage to a Sefton dune heath through path extension and the application of lime chippings (2020). Photo credit: Josh Styles.

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A New Era for Farm Environment Advice?

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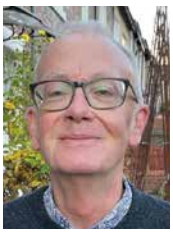

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Keywords: accreditation, agri-environment, competency framework, farm environment advice, training

The provision of farm environment advice is in the spotlight as the four countries of the UK develop new legislation, policy and funding schemes to incentivise land management practices that help tackle the climate emergency and biodiversity crisis. This article reports on the outcomes of stakeholder engagement to better define the role of the Farm Environment Adviser in terms of relevant competencies. The implications for training and accreditation are also discussed.

Introduction

With 70% of the UK's land surface used for agriculture, the importance of the farmed landscape's contribution to combatting climate change and delivering nature's recovery cannot be over-estimated. Engagement in sustainable management practices by farmers and land managers – the on-site decision-makers – underpins the delivery of desirable environmental outcomes. The provision of high-quality and effective advice is crucial in making the most of the opportunities available.

Back from the Brink (https://naturebftb.co.uk/) was an innovative collaboration between seven species environmental non-governmental organisations (eNGOs) and Natural England, to turn the tide for our most threatened species and inspire the next generation to care for our most vulnerable wildlife. Colour in the Margins was a project within Back from the Brink, focusing on rare arable wildlife. As part of this project, Plantlife contracted CIEEM to develop new guidance on delivering advice to farmers and land managers and a draft competency framework for the role of the Farm Environment Adviser. This article summarises the work and argues that we need to re-think the role of Farm Environment Adviser if we are to have any chance of realising the environmental ambitions encapsulated in post-Brexit policy and legislation.

Farm environment advice in the UK

The development of farm environment advice has encompassed a series of disjointed initiatives and a smorgasbord of statutory and non-statutory organisations, working within a framework of government-funded, charitable and commercial advisory services. This included the establishment of the Farming and Wildlife Advisory Group (FWAG) over 50 years ago (Eagle 2017) and the Demonstration Farms of the Countryside Commission (Lloyd 1979). Alongside the evolution of agri-environment schemes, many of which included free or subsidised advice (Winter 1996), was the free environmental advice linked to the implementation of the first mandatory Nitrate Vulnerable Zones that were designated in 1996. A wider range of organisations including eNGOs, consultancies and higher education institutions now provide advice and training on farm wildlife conservation to advisers, farmers and land managers.

The rationale for change

Our approach to this work was informed by consultation with a wide range of Farm Environment Advisers, stakeholder organisations (including eNGOs, statutory nature conservation bodies and training providers) and land managers. It was clear that there are many different approaches to the provision of such advice depending on the provenance and priorities of the adviser.

Most farmers draw on the expertise of trusted advisers to guide their decision-making. This is a business decision. Payment for advice is expected to deliver a financial return through an increase in income and/or a reduction in costs. Environment advice often falls into a different category. In many cases it is provided for free or at a significantly subsidised cost, or it may be provided as a small part of a suite of wider agri-business advice by someone with limited environmental knowledge. It is important that environmental advice is not provided in isolation to the constraints and opportunities provided by other aspects of the farming business and also takes account of the priorities of the farmer, commercial or otherwise. It must also be focused on maximising the potential environmental benefits from changes to management practices rather than solely meeting the requirements of agri-environment funding schemes.

Farmers' core business is to grow food. Doing so in ways that help to address the climate emergency and biodiversity crisis is attractive but needs to make good commercial as well as environmental sense. Farm environment advice needs to be framed in the context of financial, environmental and social imperatives, which requires a sound understanding of the farm business model and how environmental advice integrates with, and may conflict with, other on-site activities.

Farm Environment Advisers, including those that are independent of an organisation, might typically come from an eNGO or statutory nature conservation body (SNCB) background. Others might have a stronger agricultural, agronomy or rural chartered surveying background. Their backgrounds may shape their thinking and formulation of advice, the primary objectives behind the advice and their relationship with the farmer. Anecdotally, there is evidence that this creates (from the farmer's perspective) a confusing advice landscape with conflicting information and a variable quality of information. It also means that opportunities to influence land management practices in ways that can deliver better outcomes for nature and climate change mitigation can be limited.

The authors believe that farm environment advice should become a much more widely available paid-for service. Free and/or subsidised advice may seem attractive but is likely to be short term (depending on the availability of funding), limited in its focus and arguably less valued by an uncertain farmer. For farm environment advice to be routinely paid for, the adviser must be able to demonstrate their value to the farm business. That requires a step change in approach for many current advisers, underpinned by new approaches to training and, potentially, accreditation that can lead to a register of competent professionals that the farming industry can have confidence in.

A new competency framework

Plantlife asked CIEEM to define the role of the Farm Environment Adviser in terms of the knowledge, understanding and skills (i.e. the competencies) that they should have. Our initial approach was to produce a draft competency framework. This formed the basis of an online consultation of 48 consultees, together with virtual face-to-face interviews with 28 individuals drawn from sectors including SNCBs, training providers, farmer/landowner representatives and those currently providing farm environment advice, including eNGOs, seed suppliers and agricultural valuers. The feedback around the idea of a competency framework to more clearly define the role of an adviser, and about the draft competencies themselves, was broadly positive.

In summary, the consultation showed that, to be effective, farm environment advice must, as well as demonstrating a good understanding of factors influencing biodiversity outcomes and wider ecosystem services, be communicated appropriately and must meet three core needs.

1. It must be predicated on an understanding of the farmer's or land manager's objectives for their farming practice and their attitude towards delivering environmental outcomes. Farmers need to make a profit to generate an income. Understanding the objectives for the farmer, and respecting their knowledge, is key to having a positive interaction and creating a win-win outcome in terms of profit and environmental benefits.
2. It must integrate with other sources of advice that the farmer receives. There will inevitably be some conflicts but the adviser should help resolve them by identifying compromises or alternative approaches. This requires the adviser to have sufficient knowledge of farming practices and economics to be able to predict where conflicts may occur. It is not enough to see the adviser role as providing ecological advice (however good) without understanding the context in terms of the farmer's implementation of measures to achieve other objectives.
3. It must include realistic and sustainable advice regarding ongoing management and be aligned to local, regional and national priorities and green financing opportunities regarding biodiversity maintenance, enhancement and achieving net zero greenhouse gas emissions.

We used the feedback to revise the competency framework and align it more closely to the CIEEM Competency Framework with three levels of competence:

1. Trainee (equivalent to Basic)
2. Proficient (equivalent to Capable)
3. Advanced (equivalent to Accomplished).

Sixteen competencies were identified, as shown in Table 1. The revised framework allows for those learning the role of the Farm Environment Adviser to be placed at Trainee level and to see how they can progress further. The Advanced level of competence recognises those with more in-depth or specialist knowledge in one or more relevant areas. The Proficient level of competence reflects the generalist Farm Environment Adviser. The full framework can be seen at https://cieem.net/i-am/current-projects/farm-environment-advice/.

Implications for training and accreditation

The development of a competency framework provides the opportunity to design a training syllabus that can provide a route into farm environment advice roles. The current most common approach of 'on the job' training is valuable as the employer can share their expertise but can lead to a 'narrow lens' with the trainee taking on the perspectives and prejudices of their employer or mentor. There is also a lack of opportunities at entry level, and few mentors, as many seasoned senior advisers are either moving into roles that are desk-based and managerial or retiring. A comprehensive modular training

Table. Farm Environment Adviser competencies.

Competency	What this covers (short summary)
FEA1 Farm management practice	Application of knowledge of farming and land management systems, types of crops/livestock present and associated management activities to understand drivers for farmer/land manager decision-making. Able to use this knowledge to identify potential opportunities, conflicts and implications of the advice provided.
FEA2 Farm economics	Application of knowledge of main sources of costs relevant to farming system to understand potential financial implications of environmental enhancements. Understanding of impact of externalities (e.g. market trends, subsidies, legislation and regional and national policies) on farming practice and profitability.
FEA3 Finance and funding	Understanding and communicating the range of current and planned sources of finance for environmental land management. Supporting farmers and land managers to access appropriate finance and funding opportunities.
FEA4 Physical environment survey and resource protection	Identifying, classifying and evaluating the influence of the physical characteristics of the site (that affect the range and complexity of the habitats and species present and the farm management practices). Providing advice on resource protection to deliver better environmental outcomes.
FEA5 Habitat survey, mapping and assessment	Identifying, classifying, mapping and assessing habitats in accordance with a recognised system of habitat classification (e.g. UKHab, JNCC Phase One, NVC, EUNIS) and at appropriate spatial scales.
FEA6 Species survey and identification	Application of knowledge of species ecology and desk-based studies to set appropriate objectives for farm wildlife surveys for one or more taxonomic groups (e.g. flowering plants, birds, mammals, butterflies, amphibians). Fieldwork skills and species identification and evaluation for one or more taxonomic groups.
FEA7 Technology	Application of knowledge of IT and GIS (e.g. The Land App, QGIS, ArcGIS) systems to access, interrogate and use them effectively and to upkeep data quality and standards.
FEA8 Environmental assessment	Assessing the current and potential environmental value of the farm/estate and opportunities for enhancement in the context of local, regional and national conservation initiatives.
FEA9 Interpretation and reporting	Interpreting outcomes from habitat/species surveys and combining with an understanding of farm management opportunities and constraints to produce reports and recommendations.
FEA10 Providing advice on habitat/species management and/or habitat creation	Providing evidence-based technical advice to farmers and land managers on habitat creation and restoration, including ongoing management requirements. Providing advice in the context of funding opportunities, resource requirements, local/regional/national habitat and species priorities and climate change adaptation.
FEA11 Design and preparation of management plans	Establishing baselines and setting objectives for habitat/species management and enhancement plans. Designing effective sustainable environmental management solutions while identifying and resolving complex or conflicting constraints. Designing schemes to monitor management outcomes and planning for remedial actions where these may be required.
FEA12 Legislation, regulation and policy	Providing advice and encouragement to farmers in both interpreting and applying current environmental legislation, policy and/or standards to ensure a high level of compliance.
FEA13 Effective communication, negotiation and influencing	Building credible and trusted relationships with farmers and landowners. Communicating key information to farmers and land managers using appropriate language. Able to successfully advocate for changes to land management practices.
FE14 Customer care	Understanding the farmer/land manager's objectives in engaging with you and ensuring your work significantly contributes to achieving those objectives.
FEA15 Health and safety	Demonstrating a positive approach to health, safety and well-being in a farm environment and complying with both relevant legislation and good farm practice.
FEA16 Professional conduct	Demonstrating a good understanding of and adherence to relevant good practice standards and demonstrating appropriate ethical behaviours.

EUNIS, European Nature Information System; GIS, geographic information systems; JNCC, Joint Nature Conservation Committee; NVC, National Vegetation Classification.

programme that covers all areas of the competency framework could be adapted to provide learning opportunities to fill gaps in knowledge and understanding for practitioners coming from different backgrounds and career stages.

The opportunity was also taken to gather views on current and future training provision and the value of accreditation. There was interest in using the competency framework as the basis for developing a Level 7 apprenticeship for Farm Environment Advisers. This would enable employers to take on apprentices for 18–24 months and provide workplace learning alongside delivery of the training programme from an approved training provider.

The prospect of accreditation of Farm Environment Advisers was welcomed by over 80% of the 28 interviewees and 48 online consultees. Many expressed concern about the variable quality of farm environmental advice and how it undermines farming industry confidence. Accreditation was seen by many as a positive way to address this, provided the assessment process was proportionate, robust and cost-effective. It should also be sufficiently adaptable to reflect the types of farming practice/environment that a candidate is providing advice for and to reflect national variation in policy, legislation and approach. Those who were less keen on the idea of accreditation were concerned about a lack of recognition for their experience, the cost of accreditation and who might administer it.

In our view accreditation, at least in the initial phase, should be targeted at the Proficient competence level, and subsequently extended to cover Advanced. It should lead to a recognised certification, such as Accredited Farm Environment Adviser, and inclusion on an appropriate register. Continuing registration would be subject to a periodic 'assessment-light' process to ensure that the adviser is maintaining their knowledge and skills. From CIEEM's perspective there is the opportunity to incorporate assessed competencies into our own membership/chartership assessment processes to avoid candidates having to go through two assessment procedures.

Guidance on 'how to'

Although the competency framework and associated training can provide advisers with an understanding of what their role covers, like any job it requires guidance on the how to do it effectively. New guidance has been produced on undertaking a farm visit, carrying out an initial farm assessment and communicating effectively with farmers. Further advice on management and monitoring of environmental interventions and dealing with cross-taxa conflicts has also been developed, together with a directory of habitat and species management advice.

All of this guidance has been published on the Farm Wildlife website (www.farmwildlife.info) alongside the existing extensive suite of resources for farmers and their advisers.

Why this matters

If we are to successfully address the climate emergency and biodiversity crisis, land used for agriculture must be part of the equation. Farmers are, by and large, keen to be involved, seeing themselves as custodians of the farmed environment and its wildlife. They need pragmatic, practical and effective advice on workable measures to benefit biodiversity, soils, water, carbon management and air quality. This will allow them to benefit both climate and nature while remaining profitable and providing the food we need. The desire for change from farmers continues to grow and the new agriculture policies and funding schemes on the horizon and in development will only accelerate this.

Well-trained, competent and confident Farm Environment Advisers, respected for their expertise and the added value they bring to the farming business, are essential if we are to assist farms transition to more sustainable practices, but their advice must be grounded in the realities of farm economics if it is to be accepted by farmers. The time has come to transform our approach and become part of the trusted circle of farm advisers alongside agronomists and experts in animal husbandry. To become part of the team.

About Plantlife

Plantlife is a British conservation charity working nationally and internationally to save threatened plants and fungi. Plantlife owns nearly 4500 acres of nature reserves across England, Scotland and Wales, and has 14,500 members. Find out more at plantlife.org.uk

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Biodiversity Decline: is the UK Government Doing Enough and Could the EU's Proposed Corporate Sustainability Reporting Directive be a Solution?

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Despite the existence of extensive environmental legislation to protect our natural environment, biodiversity in the UK has faced an unprecedented decline. Clearly, the existing approach in legislation has not succeeded in protecting or restoring our natural environment. This article discusses the significance of the recently proposed EU Directive on Corporate Sustainability Reporting (COM/2021/189 final) and whether, to conserve and restore biodiversity, the UK is sufficiently keeping pace with parallel developments in the EU.

The decline of biodiversity in the UK

Biodiversity has faced an unprecedented decline in the UK despite a comprehensive suite of domestic legislation attempting to provide legal protection for key habitats, key species, biodiversity and the natural environment. The legislation has tended to take a 'stick' (rather than 'carrot-and-stick') approach, using criminal sanctions and duties on public bodies as the key approaches. Examples in England specifically are the Wildlife and Countryside Act 1981, Natural Environment and Rural Communities Act 2006 and the Conservation of Habitats and Species Regulations 2017 (and its earlier iterations).

Nevertheless, the UK as a whole now has an estimate of only 53% of its biodiversity intact, a strikingly low proportion when compared with countries such as Canada, with almost 90% remaining (Natural History Museum 2021). The Natural History Museum's Biodiversity Intactness Index (BII) estimates the percentage of the original number of species that remain and their abundance in any given area, despite human impacts. The BII is averaged across areas to give the remaining biodiversity across that area.

The extent of deterioration is also reflected by the 2019 *State of Nature Report*, detailing how the abundance of 214 UK priority species has declined by 60% since 1970 (Hayhow *et al.* 2019). The UK Biodiversity Indicators 2021 publication (which incorporates data from each devolved nation of the UK) also elucidates how key UK species and habitats are continuously declining, with 14 measures showing a decline in the long term (out of 42) and 10 showing a decline in the short term (out of 39). Those deteriorating include UK habitats of European importance, UK species of European importance, farmland birds, woodland birds and fish size classes in the North sea (Defra 2021).

It is reasonable, therefore, to assume that the legislation adopted to date is not succeeding in protecting or restoring our natural environment.

The Environment Act 2021 includes a suite of different provisions directed

at further protection of the natural environment including a mandatory "at least 10% Biodiversity Net Gain" requirement for developers of land in England only. The Bill received Royal Assent in November 2021. These requirements may assist in England, but the Biodiversity Net Gain requirement is focused specifically on developers of land. Hence, other sectors with direct or indirect impacts on our natural environment are not covered by these requirements.

Are there other approaches which could complement the existing species/habitat/biodiversity protection approach? Would incentivising businesses to recognise and appreciate the value they are obtaining from biodiversity and the natural environment, by requiring them to report on their natural environment impacts, positively inspire them to protect it?

The European Union rules on corporate non-financial reporting

The EU's Non-Financial Reporting Directive (NFRD) (2014/95/EU) requires certain large companies and groups with over 500 employees to disclose non-financial information to provide investors and other stakeholders with a comprehensive representation of their development, performance and impact of their activities. These companies are required to provide a review of their business model, policies, outcomes, principal risks and key performance indicators (KPIs), including information on environmental matters, social and employee aspects, respect for human rights, and anti-corruption and bribery issues.

The 2014 Directive does not define what is meant by 'environmental matters' and therefore there is no legal requirement on any business arising from this Directive to report on its impacts on biodiversity and natural resources. Even the non-legally binding recitals within the Directive fail to mention biodiversity and natural resources. The recitals merely explain that the "statement should contain, as regards environmental matters, details of the current and foreseeable impacts of the undertaking's operations on the environment, and, as appropriate, on health and safety, the use of renewable and/or non-renewable energy, greenhouse gas emissions, water use and air pollution".

"The abundance of 214 UK priority species has declined by 60% since 1970. It is therefore reasonable to assume that legislation is not succeeding in protecting or restoring our natural environment."

The UK transposed the NFRD into national law through the Companies, Partnerships and Groups (Accounts and Non-Financial Reporting) Regulations 2016 (SI 2016/1245) by inserting new sections into the Companies Act 2006 (s414CA and s414CB). In relation to environmental reporting, s414CB is vague. It requires the contents of the non-financial statement to contain information on "(a) environmental matters (including the impact of the company's business on the environment)". Following the approach of the Directive, there is no specific requirement for environmental reporting to include reporting on biodiversity impacts or natural capital impacts.

The European Commission published guidelines to accompany the 2014 Directive on the disclosure of non-financial information which do in fact refer to biodiversity and natural resources (European Commission 2017, 2019). For example, the guidelines suggest "environmental matters" *may* include the use and protection of natural resources and the related protection of biodiversity, and that KPIs *may* include impacts and dependences on natural capital and biodiversity. Nevertheless, as this guidance is not mandatory and the 2014 Directive itself and the 2016 Regulations are silent on the issue of natural resources and biodiversity, there is no legal requirement in the UK for the large companies, which are subject to the 2016 Regulations, to report on their impacts on biodiversity and natural resources.

The *Dasgupta Review*

In early 2021, HM Treasury published *The Economics of Biodiversity: The Dasgupta Review* (Dasgupta 2021) led by Sir Partha Dasgupta, featuring an independent global review on the economics of biodiversity. The review stipulates that our current measure of economic success encourages society to pursue unsustainable economic growth. It asserts how we, as the collective human race, are destroying biodiversity as a result. Dasgupta encapsulates how, through the unification of economics and ecology, we can re-examine how we think, act and measure economic success to restore biodiversity.

Dasgupta concludes that our demands on the natural world far exceed supply, placing biodiversity under great pressure. As our economies and livelihoods depend on nature as our "most precious asset", this places future generations in danger. The institutional failure to recognise nature's worth to society has ultimately been enabled by the omission of natural capital from economic perspectives.

As a solution, Dasgupta proposes a measure of prosperity in favour of "inclusive wealth" which includes nature as an asset, as opposed to gross domestic product. The review emphasises that valuing and enhancing natural capital must hold more primacy, because "our economies are embedded within Nature, not external to it", suggesting that we must address the deficiencies of the UK's existing laws surrounding corporate biodiversity and natural capital reporting.

The government's response to the *Dasgupta Review*

The government has responded to the *Dasgupta Review* with a range of measures, some of which, as far as we understand, appear to be voluntary and others which may in due course become mandatory (but without any present time frame commitment).

In terms of voluntary measures, we have seen reference to three initiatives.

First, and in response to the *Dasgupta Review*, the government announced that the Treasury and the Office for National Statistics would collaborate to improve the incorporation of nature

into the UK's financial accounting practices to develop a broader measure of "inclusive wealth", incorporating natural, human and produced capital (HM Treasury 2021a).

Secondly, the government reported on how it has provided support since inception for the Taskforce on Nature-related Financial Disclosures (TNFD), which launched on 4 June 2021, consisting of a range of different groups such as governments, regulators and financial and business consortia, which together constitute the TNFD Alliance. The Taskforce at the centre of the Alliance consists of 33 senior executives from financial institutions, corporates and market service providers, representing 16 different countries. The TNFD is led by the Co-chairs, David Craig and Elizabeth Maruma Mrema.

The TNFD is designed to complement the existing Taskforce on Climate-related Financial Disclosures (TCFD) and the TNFD's objective is to provide a framework by 2023 for investors, banks, insurers and other similar companies to report and act on evolving nature-related risks, to shift "global financial flows" "toward nature-positive outcomes" and to align corporate reporting and financial spending to alleviate those risks (HM Treasury 2021a). The government announced that it would commit up to £3 million additional support to the development of the TNFD framework. The TNFD also aims to create a standard for nature capital disclosures. Co-chair, David Craig, suggests that although compliance with the TNFD may initially be voluntary, mandatory disclosure requirements are the "ultimate aim". Nevertheless, no timeline for the implementation of any mandatory TNFD disclosures has been confirmed.

The approach thus far in addressing the *Dasgupta Review* is not entirely consistent with the House of Commons Environmental Audit Committee's (EAC) report entitled *Biodiversity in the UK: Bloom or Bust?* (Environmental Audit Committee 2021). Although suggesting that enabling financial systems to recognise the value of preserving biodiversity will not be an easy task (as "the interconnected, complex and non-linear nature of biodiversity risks makes it difficult to model"), the EAC still makes recommendations for the government to commit to legislate for *mandatory* disclosure of nature-related financial risks once the TNFD framework has been produced. It is therefore evident that the existence of the TNFD alone is insufficient without further legislative force.

Thirdly, an Environmental Benefits from Nature Tool was launched (Natural England 2021). The tool, produced by Natural England to work alongside the Biodiversity Metric, applies ecosystem services values to habitats. This was designed to support the government's commitment to expand net gain approaches in England to include wider natural capital benefits such as flood protection, recreation and improved water and air quality. The tool is purely voluntary but planning authorities may encourage or request its use.

In terms of measures that are intended to become mandatory at some future point, we have seen reference to the introduction of sustainability disclosure requirements (SDRs).

These are discussed in the government's recently published policy paper entitled *Greening Finance, a Roadmap to Sustainable Investing* (HM Treasury 2021b). This paper reiterates Dasgupta's assertion that the financial system is crucial to achieving net zero and protecting the natural environment. *Greening Finance* provides information on the introduction of the SDRs, initially announced in July 2021. In essence, the SDRs will require companies to make sustainability disclosures and report on environmental impact using a new UK "green taxonomy." The SDRs will build on and "streamline" the requirements of the TCFD, covering corporate disclosure, asset manager and asset owner disclosure and investment product disclosure. The government has stated that the intention is to combat "greenwashing", where firms make misrepresentations about their environmental commitments, so as to enable sustainability to be central to investment. The government also acknowledges that, beyond climate, the data needed to drive wider environmental objectives are less developed, but that this is gradually changing through initiatives such as the TNFD.

> **"*Greening Finance* reiterates Dasgupta's assertion that the financial system is crucial to achieving net zero and protecting the natural environment."**

According to *Greening Finance*, the green taxonomy will constitute a set of criteria that can be used to ascertain whether an economic activity may be regarded as "sustainable" in the UK. The "protection and restoration of biodiversity and ecosystems" is listed in the policy paper as one of the six environmental objectives of the green taxonomy, and the taxonomy itself may assist companies in understanding their environmental impacts. However, the policy paper provides little reference to biodiversity or natural capital and the details on the specific reporting requirements, scope and timing of these requirements are opaque.

Therefore whether, when and the extent to which these requirements will mandate reporting of impacts on biodiversity and natural resources, and by whom, is not at all clear.

EU's proposed approach: mandating corporate reporting for natural environment impacts

In the meantime, the EU is moving towards introducing a legally enforceable system of biodiversity and ecosystem corporate reporting. Recognising the shortcomings of the EU's 2014 NFRD (2014/95/EU), the European Commission has taken a step forward in terms of corporate sustainability reporting for the protection of the natural environment through a recently proposed EU Directive on Corporate Sustainability Reporting (COM/2021/189 final) published on 21 April 2021 (European Commission 2021).

The European Commission's proposal envisages a new Directive which would expand the requirements of the NFRD in the following ways:

- removing the current 500-employee threshold and extending the scope to all large companies and all companies listed on regulated markets (except listed micro-enterprises)
- requiring that the reported sustainability information is subject to a limited level of audit assurance
- specifying in more detail the information that companies should report
- requiring reporting in line with mandatory EU sustainability reporting standards
- ensuring that all information is published in companies' management reports in a digital format.

Significantly, the proposal states that the new reporting standards will specify the information that companies are required to disclose in regard to environmental factors, *including biodiversity and ecosystems*. This is in contrast to the previous NFRD which, as explained, only referred to biodiversity in its non-binding accompanying guidance. Since the UK is no longer bound by EU directives, it remains to be seen how or whether the UK government will keep pace with these EU developments.

Important future opportunities

Although climate change remains at the forefront of government agendas, it is impossible to deny the relevance that the natural environment and biodiversity assume in the process of curtailing climate change and reducing emissions. Alok Sharma, serving as president for COP26, also reinforced that there is "no viable pathway to net zero" without "protecting and restoring nature on an unprecedented scale" (UK Government 2021).

It is thus crucial for the UK government (and, where relevant, for devolved administrations with responsibility for biodiversity policy) to reconsider its approach to conserving and enhancing the natural environment and biodiversity, "set an ambitious direction for the next decade" (Dasgupta 2021) and to align itself with the European Commission's clear plans for mandatory corporate reporting by a large range of companies of impacts on biodiversity and ecosystems.

Nevertheless, as the government's response to the *Dasgupta Review* merely represents the "next step" and not the "final word" in the pathway towards a nature-positive future, there is hope that more is to be unveiled soon.

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Defining Professional Competency Standards for Applied Soil Science

Dick Thompson
British Society of Soil Science

Keywords: professional competency, soil science, soil materials, training

Soils provide a range of ecosystem services and are an increasingly integral part of the environmental agenda. There is a need to ensure that those working with soil have the right training and skills to do so competently. The British Society of Soil Science has produced a set of Working with Soil professional competency documents outlining the skills that professionals need when undertaking roles in soil science.

Introduction

Soil is in the news, from the role that regenerative agriculture has in sequestering carbon from the atmosphere into soil organic matter, to the need to address soil degradation to help prevent erosion and damage from flash floods. But, do we have the trained and experienced soil scientists needed to meet the challenge and inform land use policy and practice?

The British Society of Soil Science (BSSS) was founded in 1947 and is an established international membership organisation and charity committed to the study of soil in its widest aspects. The society brings together those working in academia, practitioners implementing soil science in industry and all those working with or having an interest in soil.

The society promotes research and education, both academically and in practice, and builds collaborative partnerships to help safeguard our soil for the future. For the coming year this will include hosting the 2022 World Congress of Soil Science in Glasgow, where those with an interest in soil science can meet to discuss the critical global issues relating to soil. The society was granted observer status at the recent COP26 meeting on climate change.

Historically, the principal focus of soil science has been on agriculture and the soil–crop interface. Since the mid 1980s however, a policy shift away from the maximisation of food production to a growing concern over the state of the natural environment has broadened that focus. We are now concerned with the challenges that society faces in its management of the entire terrestrial environment.

Soil is the weathered surface layer of the planet and can be several metres deep. Its physical and chemical properties at any point in the landscape are a reflection of the interactions between climate, the organisms living both on and within the soil, relief, the geological parent material of the soil and time.

Box 1 When might I need a soil scientist?

Soil has been described as the engine room of the terrestrial environment. Its use and abuse have the capacity to influence freshwater and coastal aquatic habitats through the release of water, sediment, nutrients and agricultural chemicals from soils within catchments. Impact assessments of proposed developments, plans or policies affecting the natural environment in an area will often benefit from reference to the underlying soil resources. Attempts to create, alter or simply maintain and conserve terrestrial habitats should logically involve considerations of soil properties, processes and management. An initial soil resource survey will dictate future habitat creation options and may point to potential threats to existing or potential plant and animal communities. Ecological surveys, if they are to be comprehensive, will benefit from the inclusion as of at least some description of the relative richness or paucity of soil biota as these are the basis of many above-ground food webs. There are more species living below ground than there are above, especially under semi-natural and natural vegetation.

It is important to recognise soil as a living resource and that most soils contain far greater numbers of species and individuals than are present above ground. See Box 1, which outlines when a soil scientist should be consulted.

Soils provide a range of ecosystem services. We rely directly on their support for biomass production in the form of crops, timber and semi-natural plant communities. They store and filter rainwater before releasing it to either an underlying aquifer or the local river network. Soil is therefore influential in catchment hydrology and a factor in flood management. Soils store carbon as organic matter and their management has a part to play in future climate control. They also provide protection to archaeological remains and the foundations for buildings, roads and other infrastructure.

Despite these many ecosystem services, soil was a late arrival at the environment party. Unlike other environmental resources such as water, air and biota, soil as an environmental resource is largely unprotected by UK or European law. Despite widespread concerns over the state of soils across Europe, past attempts to establish a European Soil Framework Directive have been unsuccessful.

The Cinderella status of soil has led to a decline in the number of soil science graduates from UK universities: there are now no pure soil science courses on offer. This is despite a steady increase in the volume of work related to field soil investigation, evaluation and interpretation, which is in danger of outstripping the supply of adequately skilled soil scientists. Recognition of this led the BSSS and a former partner organisation, the Institute of Professional Soil Scientists (now incorporated into the BSSS), to establish a Working with Soil professional competency and training framework in 2011.

The Working with Soil professional competency scheme

The Working with Soil scheme was born out of a review of the main types of applied work outside of academic research and teaching being carried out by professional soil scientists in the early 2000s, which are listed in Box 2. The perception within BSSS was, and still is, that work of this nature is often conducted by individuals who lack the training, knowledge, skills and experience required to carry out the work to an adequate standard. A virtuous cycle or spiral was recognised with the aim of ever higher professional standards of practice in soil science and a well-managed and sustainable soil resource for future generations at its centre (Figure 1). The latter is at the heart of BSSS's objectives as a learned society and registered charity.

A standard format and structure was established for each professional competency document with a short background to the nature of and justification for the work. This was followed by sections on required qualifications and the minimum skills and knowledge needed. Each document was drafted by a recognised leading practitioner for that field of work and then peer-reviewed. Other professional organisations were invited to comment.

It was realised early in the design of the scheme that a set of foundational skills in field soil investigation, description and interpretation underpinned each

Box 2 Key sectors of employment for professional soil scientists in 2000–5 outside of academic research and teaching

- Agricultural Land Classification (England and Wales)
- Soil science in crop and livestock production
- Soil science in integrated soil and water management
- Soil science in soil handling and restoration
- Soil science in land evaluation and planning
- Soil science in the establishment, management and/or conservation of natural habitats and ecosystems
- Soil science in the application of organic materials to land
- Soil science in landscape design and construction

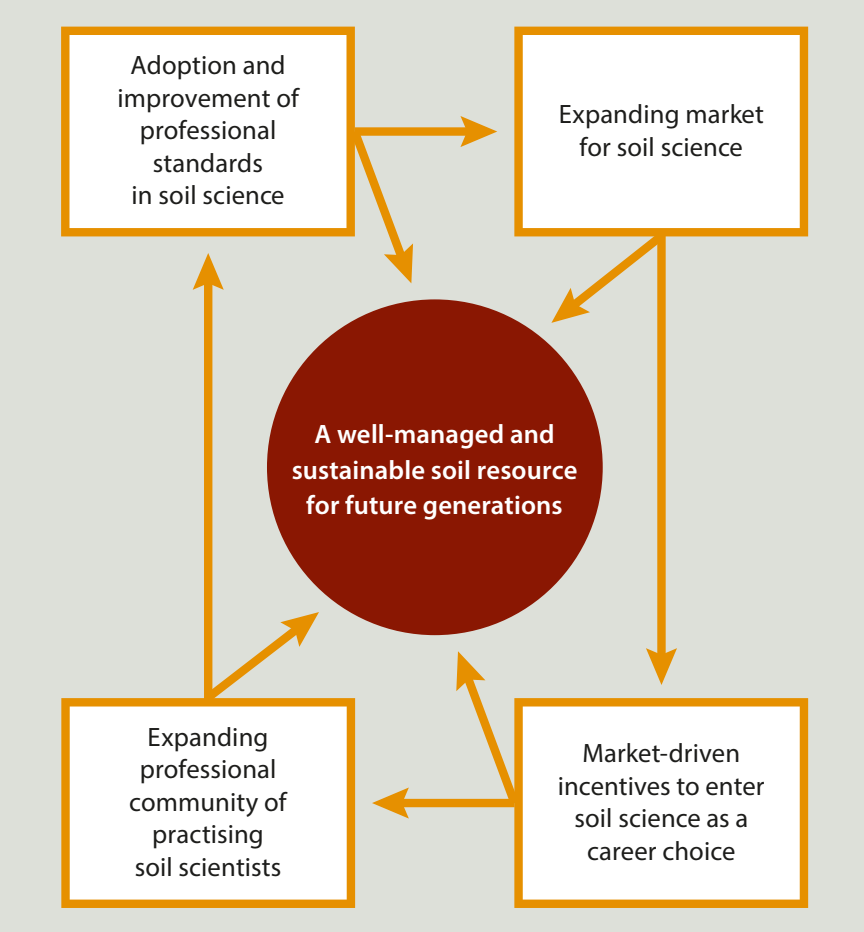

Figure 1. The Working with Soil cycle.

> **"The setting of competency standards is of limited value without the opening of training pathways to their acquisition."**

Figure 3. BSSS Working with Soil Professional Competency in Soil Science document 6: soil science in the establishment, management and/or conservation of natural habitats and ecosystems. See link in text for full document.

specialist field of work. A separate foundation skills document (Figure 2) was drafted and competence in these skills is a prerequisite for compliance with the more applied competency documents.

Figure 2. BSSS Working with Soil Professional Competency in Soil Science document 1: foundation skills in field soil investigation, description and interpretation. See link in text for full document.

Following discussions with Defra, a further competency document on research and development leadership was drafted with Defra's support. The intention was that this would be used in the evaluation of named principal scientists in bids to Defra soil research and development tendering competitions.

The full set of 10 two-page professional competency documents, along with accompanying values, aims and introduction, have just celebrated their tenth birthday and hold as much relevance now as they did when first conceived. The scheme has been reviewed since then and the updated documents are available at https://soils.org.uk/education/working-with-soils/professional-competencies/ (Figure 3).

Working with Soil Guidance Notes

BSSS has published three Guidance Notes with the intention of developing a series of concise advisory texts targeted at those who are not soil specialists. The first outlines a scheme for evaluating the quality of Agricultural Land Classification surveys and reports and is intended for use by development planning staff. The second is a comprehensive guide to online data sources about soil and land quality. The third targets the building and construction industry and provides advice on the management of soil resources on construction sites. All three are available to download from the BSSS website: https://soils.org.uk/education/guidance-and-science-notes/.

Current and future Working with Soil training initiatives

BSSS provides 1 and 2 day laboratory and field-based training courses on elements of the foundation skills and on Agricultural Land Classification (England and Wales). The coronavirus pandemic has prevented field courses from running, but the Agricultural Land Classification course has been

delivered online for the first time. Further information on future courses is available by sending an email to admin@soils.org.uk.

The setting of competency standards is of limited value without the opening of training pathways to their acquisition. Short course training opportunities will only ever make a limited, albeit valuable, contribution. Having the basic knowledge and then learning to apply it appropriately are key stages in the acquisition of competency.

Soil science is a broad subject and comprises five classical sub-disciplines (Box 3) (Kosaki *et al.* 2020). However with limited study opportunities at undergraduate and postgraduate levels, and comparatively few short training courses on the subject, those choosing soil science as a career find it difficult to receive a grounding in the full theoretical and practical breadth of the subject.

Students with a latent interest in soil science are poorly served by current national curricula across the UK and by existing offerings at undergraduate and postgraduate levels. BSSS recently commissioned a review of the national curricula to establish current soil-related content. There is very little content that relates to soil and the society is now seeking ways to address the issue and to raise the profile of soil in primary-, secondary- and tertiary-level education.

Box 3 The five sub-disciplines of soil science

1. Soil chemistry (physical, inorganic and organic)
2. Soil physics (soil mechanics, hydrology and thermodynamics)
3. Soil biology (biology, ecology and microbiology)
4. Soil mineralogy
5. Pedology (soil development, classification and spatial and temporal heterogeneity)

Following a survey of current member qualifications and perceived training needs, the society is also assessing the market for and feasibility of supplying postgraduate routes for training in soil science as part of its plan for the future of the Working with Soil initiative.

Relevant experience is a key component of most if not all professional competency schemes. How such experience is acquired is a significant challenge and requires the investment of senior staff time in the mentoring of more junior employees. The necessary transfer of knowledge and skills to early career scientists may benefit from a more formalised mentoring framework than is currently in place.

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Dick Thompson FI Soil Sci is the retired Director of the National Soil Resources Institute at Cranfield University. He has played a leading role in the establishment of BSSS's Working with Soil programme which includes maintenance of the Professional Competency standards and the development and delivery of a set of short training courses focused on basic field soil investigation skills. He sits on the society's Professional Practice and Education committees.

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What Does Biodiversity Net Gain Mean for You?

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Keywords: **Biodiversity Net Gain, competence good practice guidance, training**

Overview

Biodiversity Net Gain (BNG) is back in the headlines again, following the passing of the Environment Act 2021. It requires all development and planning applications (with a few exceptions) in England from late 2023 onwards to demonstrate delivery of a net gain of at least 10%, based upon 'biodiversity units' calculated using a government-sponsored metric.

Environmental policy and legislation are devolved responsibilities and while there is no statutory requirement outside of England to deliver BNG, there are various opportunities within existing and emerging policy and legislation that mean an adapted BNG approach could become more common elsewhere. The recently published British Standard (BS8683:2021)[1] is relevant across the UK and governments of devolved nations and some local councils are already requiring the enhancement of biodiversity for development projects, even where a mechanism to demonstrate net gain is not specified.

So, what does BNG mean for us as practitioners, our projects and for developers?

Biodiversity Net Gain is a "specific, quantifiable outcome of project activities that delivers demonstrable benefits for biodiversity compared to the baseline situation" (BS8683:2021). There are many details to be ironed out and hotly debated challenges associated with the implementation of a mandatory net gain. If it goes

well, there will be additional land and funding available for biodiversity-led management, which should result in tangible benefits for biodiversity in England. However, there are increasingly vocal concerns that the system being implemented may lead to unintended consequences (see, for example Phoebe Weston writing in *The Guardian* in July 2021[2]). So, how should ecologists and environmental managers prepare for this transformational change and help to avoid these unintended consequences?

Key Challenges

Stepping up to the challenge will require new skills, new ways of working and a far sharper focus on ecological issues at all stages of planning and delivering projects. We think there are three key challenges to consider, as follows.

Focus on avoidance as the key driver in project selection and design. In order to stand any chance of meeting net gain obligations, we need to design around irreplaceable and high-value habitats and difficult to substitute ecological features, to ensure they are not lost or otherwise diminished by project impacts. Simply put, if these resources cannot be avoided, net gain becomes far harder and more costly to achieve, if not impossible. Avoiding harm to such resources at all costs should inform project design from the outset and may require a fundamental rethink of some project proposals. Avoidance is best achieved early, so ecologists need to be involved at the earliest stages of project design and feasibility.

Embed green infrastructure and nature-based solutions within design from the earliest stages. The days of first designing the 'grey' functional components of our projects and then squeezing the 'green' into the spaces (and budgets) that remain are well and truly numbered. Well-designed green infrastructure can help to deliver net gain and also support water quality, storage and flood mitigation, contribute to carbon sequestration, and provide open spaces to support education, recreation and well-being. Such nature-based solutions typically need more space than alternatives, but this space can be multi-functional. Ecologists need to work closely with design engineers to deliver innovative solutions with multiple benefits.

Rethink the quality and future management of habitats created and enhanced through development and land management projects. Manicured lawns and lollipop trees, or statutory 5-year aftercare[3] for habitat creation on minerals sites, will not be sufficient to demonstrate net gain. Our design response should focus on restoration of damaged areas and the creation of well-connected habitats that are capable of delivering multiple ecosystem services over the long term. This means that where space within developments is constrained, other land-owning organisations will need to fill the gap. Whoever operates in this space will need robust biodiversity monitoring and financial mechanisms in place to ensure delivery and maintenance can be achieved in perpetuity.

Resources, training and support

The resources available to support practitioners have multiplied recently and will continue to be added to in coming years. We hope that the brief overview below will help professional ecologists design, assess and deliver high-quality projects that can ultimately achieve BNG.

Principles and guidance

To achieve BNG, a project must be able to demonstrate that it has followed all 10 of the Good Practice Principles. The Principles (Good Practice Principles for Development[4]) are supported by subsequent guidance and case studies (A Practical Guide[5]). British Standard 8683:2021 provides a specification for designing and implementing BNG.

The application of professional judgement is essential in interpreting the results of metric-based calculations. Natural England regularly publishes updates to their thinking on the topic, for example *Biodiversity Net Gain: more than just a number*[6]. Local authorities will be looking for ecologically meaningful outcomes, as stated in BNG Good Practice Principle 6, so it is critical that ecologists focus on this and do not 'design to the metric'. We must also remember that impact assessment is a separate process that will help to identify and address downstream and indirect impacts and ensure that other effects on biodiversity are fully considered.

Surveys

Natural England's Metric 3.0 guidance[7] states that field surveys must be undertaken by a "competent person". Surveyors will need to have good botanical skills, able to accurately identify indicators of different habitats and uncommon species. Survey season is also vitally important, especially for condition assessment[8], and it is strongly recommended that surveys are undertaken in the optimal season (generally April to September inclusive).

Field surveys should be carried out using UKHab[9] Professional Edition, which underpins Biodiversity Metric 3.0, and provides a robust tool for establishing a baseline for BNG. A robust and defensible baseline is critically important, as it underpins the value assigned to a site. CIEEM is in the process of finalising its competency standard for habitat survey and the Botanical Society of the British Isles Field Skills Pyramid[10] and Field Identification Skills Certificate[11] are ways in which

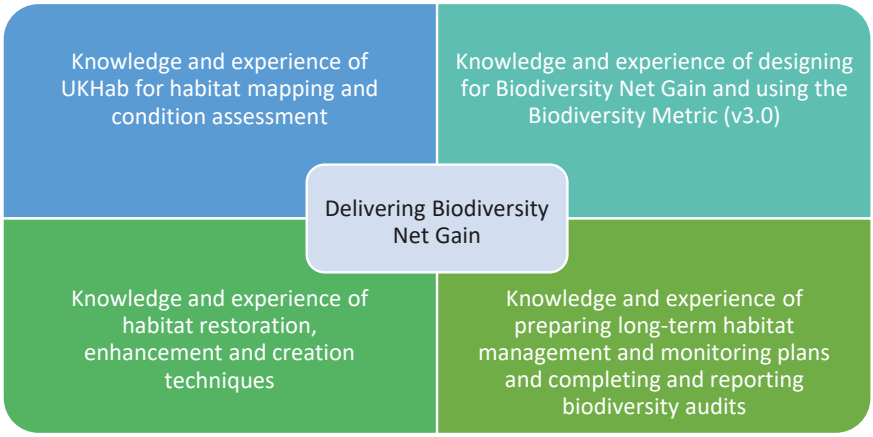

Figure 1. Areas of competence for delivering Biodiversity Net Gain.

you can assess your own field skills and those of people who conduct field surveys on your behalf.

Report writing

CIEEM recently published three report templates to assist practitioners with sharing information with stakeholders.

Feasibility reports are used to inform the developer and design team of the ability of a project to deliver BNG. The feasibility stage of BNG is covered in Clause 5 of BS8683:2021 and should include a preliminary assessment and state whether the project is able to deliver BNG or not. It should also consider on-site versus off-site delivery, BNG in the context of local and regional biodiversity plans, costs and programme, and stakeholder involvement. A feasibility stage report is unlikely to be sufficient to support a planning application.

Design stage reports are aimed at decision-makers and are likely to be produced alongside Ecological Impact Assessments (EcIA). These fully describe baseline conditions and provide a quantitative BNG assessment. They will be likely to include a Project Implementation Plan (PIP) and Management and Monitoring Plan (MMP), as per BS8683:2021. It may be appropriate for PIPs and MMPs to follow after permission is granted, for example through a planning condition, but where a Section 106 legal agreement is required to enable BNG delivery, these documents are likely to contain information critical to securing the commitment required to deliver BNG.

Audit reports measure outcomes and confirm that BNG commitments have been delivered. They describe project objectives, audit method, and compliance against BNG principles. Audit reports should clearly state where remedial action is required and state the mechanisms needed to ensure delivery of those actions.

Training

A number of organisations, including CIEEM, offer BNG training. It is recommended that professionals involved in BNG, whether conducting surveys, assessments and/or preparing reports undertake the requisite level of training and are adequately supported by more experienced practitioners, as required. We think that professional ecologists and environmental managers that advise on the delivery of BNG need competence in a number of different areas, which may require different training courses and experiences (see Figure 1).

CIEEM's Spring Conference (22 March 2022) will focus on Taking Biodiversity Net Gain from Theory to Practice[12] and will provide a useful forum for practitioners to share experiences and learn from others working in this area.

Conclusion

BNG is here to stay and much of the success of this policy will rest upon biodiversity professionals. After more than a decade to get to here, there are many eyes across the globe watching to see if England can make the BNG framework embedded within the Environment Act 2021 a success. We owe it to future generations to make BNG work; always remembering the Objects of CIEEM are to "further the conservation, management and enhancement of biodiversity."

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Level 7 Ecologist Apprenticeship – An Update

The Level 7 Ecologist Apprenticeship is up and running and the first cohort of apprentices are on track for completion in 2023. L7 apprenticeships offer a learning experience equivalent to a Master's degree and those candidates successfully completing their course have the opportunity to be awarded an MSC as well as passing their apprenticeship.

At the moment there is only one training provider but we hope that more will be offering the appropriate training programmes shortly. Here we hear from a training provider, an employer and an apprentice about their experience so far.

Apprenticeships are becoming an important vocational route into our profession and the more employers who show interest in supporting the scheme, the more training providers will come on board. Employers in England interested in taking on apprentices for the L7 Ecologist award can find out more about it at https://findapprenticeshiptraining.apprenticeships.education.gov.uk/courses/466 . The Government will currently fund 95% of the training fee – again further information can be found here https://www.gov.uk/guidance/how-to-take-on-an-apprentice.

The Training Provider – Mark Nason, Head of Eden Project Learning

We started running the L7 Ecologist apprenticeship in September 2021 in partnership with Cornwall College. In this first group we have apprentices from Cumbria to Cornwall, working in ecological consultancy, local government and with The Woodland Trust. Apprentices complete a Master's degree over 2 years, and in collaboration with their employers we provide opportunities to develop the knowledge, skills, and behaviours needed to work as an ecological scientist, consultant ecologist, or landscape ecologist.

Our apprentices join us at the Eden Project for four residential field courses over 2 years, and on the first one we had a lot of fun visiting heathland, temperate rainforest, tropical rainforest(!), post-industrial sites, dune, and grassland sites with employers. We collected wildflower seed with the National Wildflower Centre, undertook evening bat, barn owl, and beaver surveys, and provided social opportunities for apprentices to get to know each other and their job roles as it's really important to develop a cohesive group on such a challenging programme. The next field course focuses on GIS and mapping with apprentices spending a week surveying the vegetation and soils at a healthland restoration site, producing map outputs and a site management plan to share with site owners, Imerys. Between the field courses we meet for a morning each week online to deliver the theory component of the MSc, supporting our apprentices to complete written assignments and case study reports to build their understanding of project management, UK policy and planning, and international standards and best practice in ecological restoration.

I'm passionate about widening participation in Higher Education and about improving knowledge exchange between researchers, employers, and students. The apprenticeship represents a really exciting new way to work with ecology employers to provide the academic and practical experience required for our next generation of ecologists to lead the sector. We learn a tremendous amount from each other and provide the space to review cutting edge techniques so that they understand the difference between current and very best practice and are able to share learning with their employers. The work-based research project in the second year of the course is a really exciting opportunity for apprentices to scrutinise and improve the quality of processes within their organisation and potentially generate new business. All of us involved are already looking forward to seeing our first group graduate in 2023.

The Employer – Natasha Collings-Costello MEnvSci CEnv CSci MCIEEM, Cornwall Environmental Consultants (CEC) Ltd

The Ecology apprenticeship gave us the opportunity to take on a new employee who would genuinely be learning on the job. Given that this is a L7 MSc apprenticeship, our apprentice Emily brought plenty of transferable skills and experience from her previous employment which meant she could really hit the ground running.

The offer of an apprentice came at an ideal time for us, as we started working on a ground-breaking partnership project looking at the potential to create more space for sand dunes around our beautiful Cornish coastline. As luck would have it Emily had studied coastal habitats as part of her degree, and then had travelled the world as a mining scientist, developing her report writing and professional communication skills. As a result, we've been able to create plenty of shadowing and learning experiences for Emily to expand her ecological skills, whilst having the confidence to let her project manage and deal with clients pretty much from day one.

Thanks to the residential placements the MSc students attend Emily has also been exposed to a wide range of environmental issues, including in areas such as contaminated land and soil science. As we are a Wildlife Trust consultancy, we are hoping that Emily will be able to focus her MSc research project on a Cornwall Wildlife Trust (CWT) land holding, measuring the change in soil carbon as it transitions from pasture to woodland. As we are based in Cornwall Emily will be able to use the Eden Project labs to analyse her samples, making a valuable contribution to CWT's land management and giving her a really cutting-edge research project.

We have found the apprenticeship to be a three-way relationship. We offer Emily on-the-job training with our team of very experienced ecologists, so that she gains experience and knowledge of plant and animal identification, habitat and species surveying and functionality and habitat management. Emily brings to us her ecological knowledge and experience, alongside exposure to the latest developments in the environmental field, and field trips to some fascinating places we can then visit as a whole team. Finally, and importantly, we can also benefit from the link to academia and gaining access to recent research and laboratory equipment.

As we all know there are skills gaps in ecology and working with a placement supported by academia in this way we believe offers a really valuable opportunity to help bridge these gaps.

Apprentice – Emily Cooper, Assistant Ecologist, Cornwall Environmental Consultants (CEC) Ltd

Entering into an apprenticeship in my late 30s with a family in tow isn't something I had ever envisaged doing, but for a while I have had an underlying passion to further my studies and the L7 MSc Apprenticeship offered the ideal route back into higher education – and where better to base this than Eden?!

Having a background within the mining industry, I have seen countless examples of poor ecological restoration, not through lack of trying, but lack of understanding. Living on the outskirts of 'The Clays' area of Cornwall I have a vested interested in restoration for both its ecological and social benefits. Being on the MSc Land and Ecological Restoration Apprenticeship allows me to be on the forefront of development within the restoration field, be taught by leading academics and personally develop my knowledge and understanding of what constitutes effective practise.

Joining the team at CEC provided an ideal employer match. Their highly experienced ecologists mean that I am extremely well supported, I am gaining invaluable on the job experience and improving my field, technical and reporting skills all the time. CEC's connection with Cornwall Wildlife Trust (CWT) has meant I am well placed to get involved in a wealth of exciting partnership and conservation projects, stemming from the learning that I am doing on the course. Being involved in these kinds of projects, and (luckily for me) being within close proximity of Eden, has meant that I can start to develop thesis ideas which will be of value to CEC, CWT and their conservation efforts in the county.

The course has given me the opportunity to develop my skills and understanding of the principles that underpin ecological restoration and reporting, I am furthering my learning into biosecurity and the threats that it poses, and the residential week has allowed me to visit some truly unique projects. On top of this, our group of apprentices have formed an essential support network for each other. I am really looking forward to the next residential, catching up with the other apprentices who come from all corners of the country, and the exciting and engaging field visits that Mark has planned.

If you would like to find out more about the L7 Ecology apprenticeship training offered by Eden Project Learning and Cornwall College contact Mark at Mark.Nason@cornwall.ac.uk

Have You Considered Mentoring?

Craig Willcock
Professional Development Manager, CIEEM

Earlier this year, we marked International Mentoring Day with a blog (https://cieem.net/could-you-be-our-next-mentor/) to pay tribute to all our existing and previous mentors who volunteer their time to provide support and advice to other members through mentoring. In this article, we build upon this and look at the role of mentoring and how the CIEEM Mentoring Platform supports this.

A member benefit

CIEEM is committed to supporting the continuing professional development of members and, as part of this, a few years ago we launched our Mentoring Platform. The Platform connects those looking for support, the mentee, with a suitable mentor. CIEEM Members are able to use the Mentoring Platform as part of their membership.

Many members who signed up as a mentee, have benefited from the support provided:

- *"I'm glad I took part as it's been really helpful for my career progression."*
- *"Great experience and great advice from my mentor."*
- *"Definitely a massive help having someone to talk to about starting out in the sector."*
- *"Really useful and particularly helpful to contact another ecologist and get advice after I lost my job."*
- *"Was a very positive and enjoyable experience."*

Creating your future

Mentoring allows established professionals and less experienced professionals to meet and build a relationship with one another, offering both parties the chance to progress, learn new skills and reach an agreed goal. The relationship is built upon trust and confidentiality.

Whether you have just left university, joined from another sector or are in the later stages of your career, a mentor can help you gain a better understanding of yourself and improve your skills.

Maybe you feel stuck in your career and are not sure how you can move to the next level, are facing some difficult career decisions, want support upgrading your membership or applying for chartership, or are facing work challenges that you need to address. A mentor can be of benefit in all these situations.

Importance for career and personal development

A mentor can help you:

- by providing a different perspective and identifying new ways of working
- reach your goals and stay focused
- create a safe and confidential environment for you to discuss your aspirations, ideas and concerns
- identify your strengths, weaknesses, opportunities and challenges
- to continually challenge yourself
- be positive and motivated through open and impartial discussions
- become more self-aware and self-confident
- by providing valuable insights from another professional in your industry.

How the process works

Our Mentoring Platform has been designed to help you get the best out of a mentoring relationship. The first step is to register on our Platform as a mentee, mentor or even both. Once you have registered, you will be prompted to set up a profile. For mentees this is an opportunity for you to outline what you are hoping to gain from the relationship and any specific areas you would like to discuss or receive support with. For mentors, the information will help match you to potential mentees who are looking for your skills and experience.

After your profile has been created, you will be shown a list of potential mentors who match your criteria. You will be able to view profiles and approach them with a mentoring request. When a mentor receives this, they can contact you if they need to clarify anything before accepting or declining. When a mentor accepts a request, you will be notified and are encouraged to arrange the first meeting to set the basis of your relationship.

Throughout the mentoring relationship, both parties are supported by the various tools and resources within the Platform and automatic prompts.

Setting goals

The tools within the Platform help set SMART goals and your mentoring journey will progress you towards these.

Once you and your mentor have agreed that the goals have been achieved, the mentoring relationship can be formally completed, though many continue to have informal relationships beyond this.

Mentoring support

If you think you could benefit from having a mentor, or if you would be willing to share your skills and experience with others, then why not take a look at our Mentoring Platform to discover the support available and how to sign up at www.cieem.net/mentoring.

About the Author

Craig Willcock is CIEEM's Professional Development Manager. He leads on the development and organisation of our professional development programme, to support members and those working across the sector.

Contact Craig at: mentoring@cieem.net

CIEEM

Make 2022 a Year of Action for Climate and Biodiversity

Ecologists and environmental managers are at the forefront of action to address the interlinked climate emergency and biodiversity crisis. It is essential that we understand how we can reduce our own operational impacts and that we act as visible champions for change in society. We urge you, the members, to commit yourselves to visible and meaningful action.

We have launched member pledges for 2022 to highlight the many ways that you can increase your impact even further and show what you want to champion within your team, to your employers or in the projects you are working on. Head to our Action 2030 webpage to find out more and submit your pledge for 2022! **www.cieem.net/i-am/2022-member-pledges/**

Policy Activities Update

Amber Connett ACIEEM
Policy Officer, CIEEM

Through our policy work, we aim to be a powerful voice for our members in influencing nature conservation legislation, policy and practice in the UK, Ireland and Europe. Our Policy team and member-led policy groups achieved a lot in 2021; we have produced infographics to illustrate the work we've undertaken (available in the CIEEM Resource Hub).

UK and England

In December, we delivered two webinars which provided an overview of how policy and law is developed in the UK and Ireland, and where the opportunities lie for influencing outcomes as an ecologist or environmental manager. If you missed them, you can check out the recordings at the Resource Hub.

Last year we also attended fringe events at COP26 and published a blog – *COP26 Was Not the Success It Could Have Been* (cieem.net/news/) – which sets out the variety of agreements and announcements made at COP, what it means for the environment, and the role of CIEEM members.

The England Policy Group has started 2022 activities by focusing on the Biodiversity Net Gain Regulations and Implementation consultation run by Defra. The consultation closes on 5 April and our response will be available soon.

UK & ENGLAND POLICY ACTIVITIES 2021
4 Meetings with MPs and Peers, and Environment Minister Rebecca Pow's team on QQR7, Environment Bill, Habitat Regulations, planning reform and skills in environmental professions
2 Meetings with Defra on the value of the ecology profession and benefits of a regulated profession, and development of biodiversity targets for the Environment Bill
3 All-Party Parliamentary Group for Nature events held
Invited to join, and representatives attended meetings of, Defra working group on agriculture advice and training and the review of the UK Forestry Standard as a stakeholder organisation
6 Meetings with Natural England on Species Conservation Strategies, BNG metric, licensing, Nature Recovery Network and Nature Positive 2030
2 Position statements published on COP15 and COP26 and habitat creation and restoration for tackling the climate emergency
2 Documents published on Environmental Net Gain by the dedicated working group: a briefing paper and principles
New *Good Practice Requirements for Delivering Biodiversity Net Gain* (On- and Off-Site) published by our Biodiversity Offsetting working group
7 Consultation responses submitted
1 Letter to Minister Pow highlighting concerns on Biodiversity Net Gain Metric
Hosted summer Policy Intern who mapped current and future policy divergence across the devolved nations and Ireland
Attended COP26 fringe events and presented on panel on Nature-based Solutions and water
2 Webinars delivered on the Convention on Biological Diversity COP15: *Biodiversity COP15: Biodiversity Threats, Conservation and Restoration* and *Resources, Finances and Business Engagement*
2 Influencing Policy webinars delivered for Ecologists and Environmental Managers
4 Sector Streams webinars on a range of current topics
2 Environmental Policy Forum webinars on COP26 as panellists
1 Event co-hosted with Royal Society for Biology and the Institution of Environmental Sciences on Naturebased Solutions
4 Wildlife and Countryside Link working groups joined: Marine, Agriculture, Land Use Planning, and Equality, Diversity and Inclusion
Signed up to Wildlife and Countryside Link's statement *Environmental assessment: Proposition for a single robust and efficient framework* and joint Environment Links' response to the UK Marine Strategy 3 consultation
Supported Nature Nearby letter to Prime Minister, coordinated by UK Youth for Nature
Strengthened links with our Special Interest Groups by collaborating with Marine and Coastal SIG on policy priorities for the year
5 Policy positions included in external media
6 Policy statements issued on our website
4 Blogs posted on our website, on outcomes of COP26, what is in 2021 election manifestos, the Queen's speech and the environment, and World Environment Day 2021
1 interview with BBC Countryfile on green jobs
1 Nature's Architects podcast interview
2 External conference sessions delivered: at Chartered Foresters conference on Environment Bill and at WEET conference on Biodiversity and Species Protection in the UK
Signed up as a partner to Climate Innovation Forum linked to London Climate Week 2021
5 Quotes in ENDs report

Scotland

Our Scotland Policy Group has had a busy start to the year, continuing engagement with the development of National Planning Framework 4 (NPF4) and associated guidance. We have responded to the Scottish Parliament's NPF4 call for evidence, the government consultation on the draft document and NatureScot's consultation on Developing with Nature guidance.

The group has also delivered an event for Local Planning Authorities to discuss the emerging planning policy, challenges and positives it presents, and case studies of Biodiversity Net Gain implementation in Scotland. A write up of this event is available on our Resource Hub.

SCOTLAND POLICY ACTIVITIES 2021
2 Meetings with MSPs to discuss NPF4, Nature-based Solutions, Biodiversity and Environmental Net Gain, and green jobs
1 Introductory meeting with Scottish Government officials working in biodiversity and natural capital policy
Minister for Environment and Land Reform took part in panel discussion at Greening Our Grey CIEEM Scotland conference alongside CEO of NatureScot who was the keynote speaker
20 Tailored introductory letters to Ministers, MSPs and Scottish Government officials to build relationships
4 Consultation responses submitted
2 Briefing papers published on *Implementing Biodiversity Net Gain for Local Authorities*, and *Biodiversity Considerations and Developer Responsibilities in Relation to the New and Extended Permitted Development Rights*
Continued liaison meetings with NatureScot and engaged with them on positive effects for biodiversity and NPF4

1 Roundtable meeting with RTPI regarding the Government's NPF4 Position Statement
1 Co-hosted event with British Ecological Society '2021: Super Year for Nature' (on COP26 and COP15)
1 Meeting with RSPB planning staff regarding positive effects for biodiversity
Invited to join, and attended meetings of, the NPF4 Securing Positive Effects for Biodiversity Working Group for Scottish Government
Attended meetings of the Scottish Biodiversity Programme Stakeholder Engagement group
Joined Nature Champions initiative as host organisation for blanket bogs
Joined Scottish Environment Link Wildlife, Planning, Governance and Green Recovery
Presented webinar for Scottish Environment Link members, alongside RSPB, on Environmental Net Gain
Supported Scottish Environment Link's statement *30 by 30: Protecting Scotland's Land, Restoring Scotland's Nature*, Agricultural Transition in Scotland consultation response and NPF4 Interim Position Statement Consultation response

Wales

We recently met with the Minister for Rural Affairs Lesley Griffiths' team of advisors where we discussed the forthcoming Agriculture (Wales) Bill, environmental governance arrangements and considerations that should be made in tree planting schemes to ensure biodiversity is protected. We are also engaging with Wales Environment Link in preparation of the Agriculture Bill.

Our Wales Policy Group has continued working on a briefing for members on Welsh Government's approach to ensuring net benefits for biodiversity in consultation with Welsh Government.

WALES POLICY ACTIVITIES 2021
Worked with Welsh Government to produce advice on biodiversity enhancement for planners to be published soon
Issued a position statement on implementation of new agriculture schemes in Wales
1 Meeting with Minister for Rural Affairs' team on agriculture, governance and considerations in tree planting schemes
2 Letters sent to newly appointed Welsh Government Ministers to build relationships
3 Regular meetings with Welsh Government Officials
Set out our views on the proposed Agriculture (Wales) Bill
Responded to call for priorities for Climate Change, Environment and Infrastructure Committee
Promoted our Manifesto Statement to all major political parties (Cymraeg) calling for biodiversity and climate change crisis being at the forefront of decision making
4 Meetings with Natural Resources Wales (NRW)
1 Letter to NRW regarding our views on Area Statements
Joined Wales Environment Link and signed up to Land Use, Biodiversity and Governance working groups

Ireland

The Ireland Policy Group has recently responded to the consultation on a draft Northern Ireland Environment Strategy which will become the first Environmental Improvement Plan under the Environment Act 2021.

We have also signed up as a supporter of the second All-Ireland Pollinator Plan 2021–2025. As a supporter of the plan, we are committed to running an annual event where we consider how we, as ecologists and environmental managers, can undertake actions to protect our pollinators. Last year, we held an event on the importance of nocturnal pollinators and some of the considerations we could be taking into account. The recording of this webinar is available on our Resource Hub.

IRELAND POLICY ACTIVITIES 2021
1 Meeting with Irish Minister of State for Heritage and Electoral Reform to introduce CIEEM
Minister of Agriculture, Environment, and Rural Affairs and Minister of State at the Department of Housing, Local Government and Heritage spoke at 2021 Irish Conference
Asked to put forward a representative to sit on the National Biodiversity Forum
5 Consultation responses submitted
Became a supporter of the second All-Ireland Pollinator Plan (2021–25)
2 Direct invites to participate in a review of guidance for public authorities on the provision on Articles 6(3) and 6(4) of the Habitats Directive, and the development of Northern Ireland Environment Agency guidance on Bat Surveys for Wind Turbine Proposals
3 Relationship building meetings with Engineers Ireland and 1 with Irish Green Building Council (IGBC).
Began regular liaison meetings with British Ecological Society
Spoke at an Engineers Ireland event - *The Sustainability Grand Tour: Protecting Biodiversity – The Role of Engineers*
Invited to review Engineers Ireland Issues Paper.
Provided feedback on IGBC Home Performance Index guidance
Wrote to An Taoiseach Michel Martin requesting clarification on undertaking ecological fieldwork to inform planning permissions during COVID-19 restrictions
Joined Northern Ireland Environment Link and represented on Climate Coalition and Green Recovery working groups
1 Workshop delivered on *Considering Nocturnal Pollinators: CIEEM and the All-Ireland Pollinator Plan*
Supported Environmental Policy Forum workshops on Environment Bill governance arrangements in Northern Ireland
Identified priority actions on agriculture and land use, biodiversity in planning, and biodiversity and climate crisis work in 2022
5 Events attended to represent CIEEM and build relationships, including Dublin Climate Dialogue, EPA National Water Event, EPA Climate Change conference, NMNI roundtable, and Nature-based Surface Water Management and Urban Planning Webinar to Launch National Guidance

Future priorities

Our priority for the coming months will be responding to major consultations across the UK, including the Biodiversity Net Gain consultation, the forthcoming (at the time of writing) Nature Green Paper, planning reforms and post-Brexit agricultural support.

We will also be engaging with the UN Biodiversity Conference COP15 as the second and final part will be taking place this year.

All of our briefings and consultation responses can be found in our Resource Hub (www.cieem.net/resources-hub) under 'Policy Resources'.

About the Author

Amber Connett BSc, MSc, ACIEEM is CIEEM's Policy Officer. She is leading the Action 2030 project to help to deliver CIEEM's actions on the climate emergency and biodiversity crisis, alongside supporting policy activities, overseeing the Country Policy Groups and providing the Secretariat for the All-Party Parliamentary Group for Nature.

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Environmental Science Communication can be many things, including:

Talks and workshops
Blogs and articles
Social media posts
Photographs and videos
Creative writing and poetry
Arts and crafts

Capturing great images

Get to know your equipment.

Plan ahead for what you want to capture in the field.

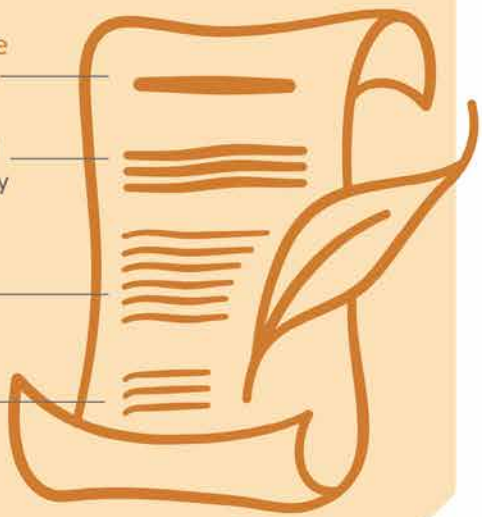
Light! Where is it coming from and what does that mean for your shot?

Framing. Portrait or landscape? What's in the background? What you leave out can be as important as what you include.

Sound. For videos make sure your microphone can cope with outdoor conditions.

Anatomy of a Blog

Informal voice: write it as you'd say it.



Provocative title
Hook your reader

Lead paragraph
Tell them why they should read on

Main body
Tell your story

Tail and bio
Summarise and tell them about you

The Science of Storytelling

Central to all effective communication is storytelling. We've been telling stories for 100,000 years, illustrating them for 27,000 years and writing them down for 3,500 years. Stories connect with our emotional brain and help us to remember information.

Craft your science story by mapping out the sequence of events. Make it compelling with a varied structure and strong visuals. Focus on the potential for positive action and give your audience something to care about to inspire them. Stories are best shared out loud, so find a test audience and get some feedback.

Getting started

Purpose
Why does this story need to be told?

Format and Platform
What format will best suit this story and where will you post it?

Audience
Who do you want to engage with this story? Be specific.

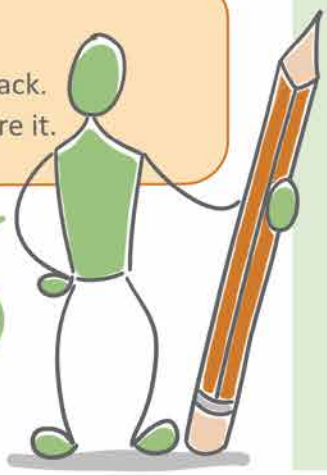
Key messages
What are the main points you want them to know about?

Call to Action
What do you want them to do as a result of seeing this?

Style and Tone
What style and tone would best suit this message?

Outcomes
How will you know if this has worked?

Draft and Design
Sketch out your draft and get some feedback. Then work up your finished piece and share it.



Remember to enjoy it!
Enthusiasm is contagious, pass it on

Accessibility and Inclusivity

Use plain language and avoid jargon

Pick accessible fonts, formats and colours

Add alt text, image descriptions subtitles and transcripts

Make your visuals and language choices inclusive

Copyright

Always check for copyright, attribution requirements and permissions.

Want to find out more?

This infographic was created by Vicky Bowskill and follows on from a CIEEM webinar on the topic in November 2021. Vicky is a PhD researcher in floodplain meadows at the Open University. She is also a writer and illustrator with a passion for science communication.

You can find out more about Vicky and her work at www.vickybowskill.com and access a recording of the webinar in the CIEEM Resources Hub at https://cieem.net/resource/cieem-webinar-science-communication-for-ecologists/

Ethical Dilemmas

This is our 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 December 2021 issue of *In Practice* we described a scenario where an experienced ecological consultant is placed in an awkward situation by their manager. The dilemma describes the commissioning of an ecological survey and assessment outside of the main survey season with no opportunity to update work in the correct season. Similar situations are all too common in consultancy, but our dilemma adds a new twist – with the advent of Biodiversity Net Gain (BNG) metrics, the assumptions made to address constraints relating to the survey season are likely to make a material difference to the 'cost' and feasibility of delivering BNG, i.e. the number of biodiversity units required to meet net gain will differ depending on the approach taken by the ecologist.

So, what should the ecologist do: take a precautionary approach to the completion of Condition Assessment scores in Natural England's biodiversity metric or use the site-derived scores from the out-of-season surveys?

Whichever approach is taken, there are some important principles to establish first of all, based on existing good advice for ecological practitioners. Clause 4 of CIEEM's *Code of Professional Conduct* states that a member shall: "*Exercise sound professional judgement in my work, identifying clearly the limitations and applying objectivity, relevance, accuracy, proportionality and impartiality to information and professional advice I provide…*" The same sentiment is reflected in the *BNG Good Practice Principles* (CIEEM, IEMA & CIRIA 2016), with Principle 4 – Address Risks – making it clear that contingency should be added wherever there are risks and uncertainty and Principle 10 – Be Transparent – stating that all activities must be clearly communicated with all stakeholders. British Standard 8683 goes further, with Clause 4(b) stating: "*surveys, impact assessments and mitigation design shall be undertaken in accordance with published best practice guidelines and standards and/or by competent persons (see 3.1.7) taking into account the importance of seasonality*", a project cannot claim compliance with this British Standard if it fails to do this.

So, first and foremost, whichever route is taken, the survey limitations and the assumptions made to address these must be explicit in all reports and assessments. Whatever judgement you make, you must be upfront about it, clearly explain, justify any implications it has for your work and be prepared to defend it to stakeholders. Another point worth making is the value of an unbiased professional review of your assessment by a practitioner experienced in BNG studies. A reliance on the review and views of individuals from other professions or a client may not provide you with the critical review of how well you have addressed the issues and applied industry good practice.

But how to address the apparent discrepancy between the different baseline situations? There are three possible baseline scenarios:

1. the baseline conditions recorded during a survey at the right time of year;
2. the conditions recorded on site at a suboptimal time of year; or
3. the conditions that can be inferred using a precautionary approach.

Ideally, you would base your assessment and design your mitigation based upon on scenario 1, or, where this is not possible, design your BNG approach with sufficient flexibility to allow a re-survey and to get closer to this situation.

If your assessment is based upon scenario 2, it is likely that anyone undertaking a repeat survey or audit in the correct season would find a different situation and there is a risk that any BNG compensation is insufficient.

Habitat classification and condition assessment, particularly for priority habitats, are often based upon indicators that are simply not visible outside of the optimum season – even field survey within the broadly stated April–September season may miss key indicators for priority grassland

and woodland habitats, for example. Statutory instructions for completing condition assessment (Natural England 2021) state that any limitations to surveys must be detailed and a precautionary approach taken (e.g. Sections 1.6 and 1.11j). The UK Habitat Classification (Butcher *et al*. 2020) advises that where a habitat patch cannot be confidently differentiated at a particular level in the hierarchy then it is to be recorded at a broader scale, e.g. Level 3 – broad habitat, and flagged for further survey. Natural England's Metric 3.0 (Panks *et al*. 2021) typically requires habitat classification at UKHab Level 4 and there is the additional risk that irreplaceable habitats could be missed. The risk that both habitat type and condition have been recorded inaccurately if out-of-season surveys are relied upon must be addressed. Many will argue that some habitat types are easily differentiated at any time of year, e.g. arable land and urban habitats. There is some merit to this argument, but we would advise caution – many annual plants associated with arable land are of conservation significance and would only be identified in the growing season, for example. Similarly, Open Mosaic Habitat on Previously Developed Land is a priority habitat that is notoriously difficult to characterise – only detailed surveys in the correct season are likely to correctly identify this habitat type.

Scenario 3 – taking a precautionary approach – is supported by guidance and provides the benefit to the client and stakeholders that contingency would be built into the compensation scheme.

Addressing the Environmental Impact Assessment (EIA) manager's concerns may be dealt with by reference to the good practice guidance cited above. It is also worth highlighting that meeting the typical percentage gains within a biodiversity metric is only a minimum and does not necessarily meet other BNG principles or other impacts within the scheme. Designing- in additional compensation is not 'over-mitigation' and may actually be required to address the risks identified. In this particular case, you may be able to engage with the local planning authority (LPA) before submission of the BNG assessment to agree the approach or, if necessary, this could be requested via a pre-application enquiry. It may be that you could agree to provide compensatory biodiversity units or *in lieu* fees[1] up to the maximum presented in the precautionary BNG, but with the final scheme based upon a pre-construction re-survey.

It will be the LPA making the decision on a planning application and to avoid significant delays with the determination of the application and/or pre-commencement conditions relating to biodiversity, sufficient information should be submitted. Most LPAs require best practice to be followed and will scrutinise the timing of surveys to ensure that accurate information has been provided on which to base a decision. Remember that the LPA will be considering how the development proposal accords with national and local planning policy, legislation, planning practice guidance and other guidance (e.g. the statutory guidance that accompanies the use of the metric). Being clear about deviations and assumptions that have been made as part of a BNG assessment is essential. For example, West Oxfordshire District Council's BNG guidance states: "*If the quality or status of the habitat is in anyway unclear (e.g. due to time of year of surveys or the need for further phase 2 surveys) then the precautionary principle should be applied and notes added to the relevant entry*."

The next dilemma

You are working on a major multi-disciplinary EIA project. The project team includes both your own company staff as well as a wider team of specialist subcontractors. To date the client has been less than helpful in providing complete and detailed information in a timely manner to stakeholders. This has resulted in changing timescales, altered designs resulting in changing agreements to mitigation lands and issues with accessing land to establish the ecology baseline.

A consultation meeting with stakeholders (including the statutory nature conservation organisation (SNCO) and other stakeholders) is planned and the client's instruction is that the client will lead the presentation covering all environmental matters and that the specialist consultants (including you as the named ecologist) will be available only for questions.

The project team provides detailed slides for the meeting including baseline, initial impact assessment and initial proposed mitigation plans to the client as part of a detailed briefing. As the client is leading the whole presentation, they compile the final edits and order of the slides.

During the presentation (all parties are present – client, SNCO, stakeholders, project team including you) you notice that items have been altered in your slides and the presentation gives a subtly different message than intended. The justification and rationale that has been presented for required ecology mitigation has been downplayed and does not tally with your briefing of the client or earlier consultations that you have had with affected stakeholders.

What do you do during the presentation?

What do you do after the presentation?

Note

1. An *in lieu* fee is typically where an LPA or other statutory body or third party implements a biodiversity enhancement scheme based on agreed biodiversity actions and priorities using funds supplied by developers. The use of *in lieu* fees in isolation is most appropriate for smaller scale projects where biodiversity impacts are low and there is limited potential for landscape or biodiversity enhancement within the site.

References

Butcher, B., Carey, P., Edmonds, R., Norton, L. and Treweek, J. (2020). *The UK Habitat Classification User Manual Version 1.1*. Available at http://www.ukhab.org/.

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Panks, S., White, N., Newsome, A., Potter, J., Heydon, M., Alvarez, M., Russell, T., Scott, S.J., Treweek, J., Butcher, B. and Stone, D. (2021). *Biodiversity Metric 3.0: Auditing and accounting for biodiversity – User Guide*. Natural England.

Welcoming New Fellows

At its meeting on 20 January 2022, the Governing Board was pleased to approve the nominations of two new Fellows.

Professor Robin Pakeman CEcol FCIEEM

Professor Robin Pakeman is one of the top applied vegetation scientists in Britain, having spent all his career from post-doc onwards in research institutes. Prof. Pakeman has an international reputation evidenced by his extensive outputs in international refereed journals, editorships and requests to examine, and sit on, European Professorial Appointment panels and PhD juries.

Prof. Pakeman was also instrumental in producing a good practice handbook for bracken control for Defra. This was universally praised and indeed adopted by Defra and thereafter in some form by all country conservation agencies.

The members of the Fellowship review panel particularly highlighted Prof. Pakeman's experience and expertise in the field of research and remarked on the fact that this research has been and continues to be multi-faceted, spanning coastal and upland/moorland habitats, impacts on nutrification, trophic ecology, herbivore impacts etc., and that all of it has practical application. The Governing Board was happy to welcome Prof. Pakeman as a Fellow with such practical research and methodological expertise at this level.

Mr Simon Boulter CEnv FCIEEM

Simon Boulter brings to the Fellowship extensive international experience and experience in developing national protocols, including contributions to national (BSI, CIRIA) and international committees (IUCN). In addition, Simon has spent the past 16 years assisting businesses and projects in identifying the ecological impacts and opportunities associated with their operations and developments. This has involved projects across many sectors (including housing, transport and energy) and around the world (including East Africa, Latin America, the Middle East and Eastern Europe), working under various host country policy and legislation to assist businesses in avoiding or minimising impacts, through application of the mitigation hierarchy, on ecological receptors.

For the last decade Simon has been instrumental in the design and delivery of the MSc Species Identification and Survey Skills degree at the University of Reading for aspiring ecological consultants. He enjoys teaching the next generation of ecological consultants, passing on what he has learnt and preparing them to 'hit the ground running' when they start their careers.

The Governing Board agreed that for an active consultant to be so deeply engaged in the creation of an MSc shows great commitment to the development of our profession.

Complaints Update

Breaches of the *Code of Professional Conduct*

At a professional conduct hearing held on 21 October 2021, Mr Ciaran Ryan MCIEEM was found in breach of clauses 3 and 4 of the *Code of Professional Conduct* in respect of the requirement to only undertake work within his competence and the standard of survey work and subsequent ecological reporting. Mr Ryan has been reprimanded with a requirement to undertake further training. Mr Ryan has resigned his membership.

At a professional conduct hearing held on the 1st February 2022 Mr Christopher Formaggia CEnv MCIEEM was found in breach of clauses 4,6 and 7 of the *Code of Professional Conduct* in respect of the standard of ecological reporting, a failure to appropriately train more junior staff and a failure to cooperate fully with the professional conduct inquiry process. As a result of these breaches and another recent breach, Mr Formaggia's membership was downgraded to that of an Associate member with the recommendation that he has the entitlement to the award of Chartered Environmentalist removed. Mr Formaggia has resigned his membership.

Membership Update

Stuart Parks
Head of Membership and Marketing, CIEEM

Unprecedented. It's a word that has been used a lot in recent times. But when I look back to review the last membership subscription year that ended on 30 September 2021, I make no apology for using it again. This time, however, it's a pleasure to use it as the last subscription year was indeed unprecedented for a number of reasons.

With the invaluable help of our volunteer application assessors we processed more membership applications than ever before; we welcomed a record number of new members to our Student and Qualifying grades, and we saw large numbers of you upgrading your membership to the Associate and Full grades. And the good news is that, as I write, the current subscription year has started in the same vein – although I'm not one to count chickens.

While all this is positive news, I am very aware that this record level of interest, though welcome, brings with it resource issues and despite our best efforts as a team of staff and volunteers we recognise that at certain times of year it has taken longer to process some applications than we would like. So alongside this work we have, with the support of the Membership Admissions Committee, been making changes to application and assessment processes in order to reduce overall time frames. So if you are thinking of encouraging others to submit an application, acting as a sponsor or even upgrading your own membership, the changes we've introduced should make the process simpler and mean that both you and our volunteers have a bit less work to do. In summary:

- Once you have successfully evidenced competence at a specific level in an individual competency, we can store this information against your record on our system. So if the evidence in a competence-assessed membership application falls short in a couple of areas you will only need to revisit those areas (supported by feedback) rather than submit a fresh application. This can help you build towards Chartered Ecologist status too.
- In response to applicant feedback, we have also reduced the task for your busy sponsors to make it simpler for them to endorse your application without the need for a statement and at the same time we have increased your permitted word count to provide more space for you to evidence your competence.
- And if all goes to plan in the next few weeks then by the time you read this we will be rolling out the first stages of a new online system for applications and upgrades, making the task that bit simpler for you and importantly freeing up some much needed capacity for the Membership Team.

It is also good to be able to report to members that we once again have seen so many of you renew your membership subscriptions so that you can continue to receive member benefits and, importantly, to support the important work we are undertaking as a Chartered Institute. Just over 98% of Full members renewed their subscriptions, with Associate and Qualifying members following closely at 96% and 90% respectively.

We are about to head into a new Operational Plan year so the Membership Team has been focusing on what key tasks will need to be undertaken over the next 12 months. In support of the work of the wider organisation we'll be looking at issues of equality, diversity and inclusion in our application and assessment processes. We will also be working to review the membership offering for professionals working in sectors currently under-represented in the total membership, as well as for members in or approaching retirement. Alongside this, I'm aware that many of our existing members are still unaware of all the benefits available to you so we'll be working hard to raise the profile of some of the areas of support that you can access and of which you may be unaware.

Please remember that however busy we may be, the Membership Team really values talking with you as members and dealing with your queries and issues. Many of the changes to processes and member benefits come from your engagement with the team and that sort of feedback is really valuable to us. Thank you for your continued support.

About the Author

Stuart has been working in membership and marketing roles in the non-profit sector for over 20 years now and enjoys finding new ways to improve the member experience. If you see him at a conference or event do say hi as he loves to chat with members.

Contact Stuart at: StuartParks@cieem.net

From the Country Project Officers

Annie Robinson – Scotland Project Officer

Hello everyone,

It's been a busy start to 2022. In January we held an event for Scottish Local Authority Ecologists and Environmental Planners to discuss the emerging fourth National Planning Framework (NPF4) and Developing with Nature guidance. With attendees from more than two-thirds of the Local Authorities in Scotland it was a great forum to hear directly from Scottish Government and NatureScot leads and share thoughts on how NPF4 Policy 3 and the Developing with Nature guidance can be implemented. See the event summary report at https://cieem.net/resource/a-summary-report-from-scottish-lpa-event-to-discuss-the-emerging-npf4-and-developing-with-nature-guidance/.

There are lots of other events planned in 2022 so do keep an eye out in eNews and the Scottish newsletter.

2021 was a busy year for the Scottish Policy Group as shown in the policy infographic https://cieem.net/resource/cieem-policy-activities-2021-scotland/ (see also pp. 67 and 68 of this issue). 2022 looks to be no different and as well as submitting committee evidence for NPF4 we will be responding to the consultations on Environmental Principles, Developing with Nature guidance and NPF4. There are some spaces on the Scottish Policy Group so do please get in touch if you would like to be involved.

As always let us know what events you would like to see happening in the Scottish Section and we look forward to seeing you this year.

Thanks, Annie

Contact Annie at:
AnnieRobinson@cieem.net

Elizabeth O'Reilly – Ireland Project Officer

Dia Dhaoibh/Hello everyone,

The Irish Section has hit the ground running heading into 2022. In January we welcomed our member Dr Fran Giaquinto to come talk to us about invasive fungal tree diseases. In February we were delighted to hear from Dr Ainhoa and Dr Riki about their research on Tiering in Environmental Assessment and we are very excited to welcome our speaker for our March event coming soon. These events are recorded and available for our members to watch back for free, so make sure to check them out.

The big excitement here in the Irish Section is the upcoming 2022 Irish Conference. The theme this year is *Sector Symbiosis: The Art of Interdisciplinary Working for Ecological Benefit*. Booking for this is now open and as always we welcome our fellow members from across the water to join us.

In addition to organising our Section events there has also been a great amount of policy activity undertaken by the Irish Policy Group. We have set up focused sub-groups looking at issues of: Land Use and Agriculture; the Biodiversity and Climate Crisis; and Biodiversity in the Planning System. Each sub-group has been working on strategically assessing how we, as CIEEM Ireland, can influence and benefit these areas. This work is ongoing and progressing nicely.

So, as we head into the second quarter of the year things are shaping up nicely here in the Irish Section. I look forward to updating you of our progress in the next issue.

All the best, Liz

Contact Elizabeth at:
Elizabeth@cieem.net

Mandy Marsh – Wales Project Officer

S'mae pawb/Hello everyone,

At the time of writing, at the end of January, we are in the final preparations for the Wales annual conference, *Invertebrates: Think Small to See the Bigger Picture*. Topics include projects to address insect declines and restore habitats, DNA metabarcoding, artificial marine refugia, cryopreservation and the problems of light pollution. Barring some huge disaster, I feel confident in predicting the future and saying that this line-up ensured a huge success, that everything went to plan and we had some interesting and thought-provoking discussions! The importance of invertebrates in global ecosystems cannot be overestimated and our challenge now will be to build on what we learn from the conference. Our heartfelt thanks go to all our speakers, our sponsors, and everyone who participated.

To follow that, we are organising a spring/summer programme of interesting talks and field trips, so keep on eye on our events pages and newsletters. If you have any ideas for subjects, please let me know.

CIEEM has a number of Special Interest Groups (SIGs) which would welcome members based in Wales, in particular our Student and Early Careers Focus Group, Professional Standards Committee and Wales Section Committee. If you would like to know more about what is involved just drop me a line and I'll be happy to explain.

Mandy

Contact Mandy at:
MandyMarsh@cieem.net

British Ecological Society

Setting Out the Grand Challenges for Ecology

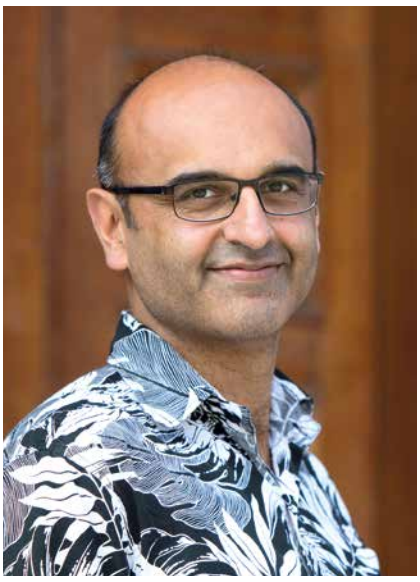
The British Ecological Society has launched a new project to set out the priorities for the future of ecological research in the UK. It will be built on ideas from across the diverse ecological community.

As ecologists, we know that our science has never been more vital. Ecology can provide the evidence we need to halt losses in nature and its biodiversity, help mitigate the effects of climate change and so much more. We're passionate about the numerous benefits that ecology can provide for our world, our well-being and prosperity.

There is increasing recognition of the need to restore nature among the public, and in political and corporate spheres too. This creates an opportunity.

"The next few years have the potential to be transformative," says Yadvinder Malhi, the new President of the British Ecological Society.

"There is broad awareness of the urgent need to protect and restore nature. And there is an opportunity to make ambitious plans – but they must be ecology-informed and evidence-rich."



Yadvinder Malhi, President of the British Ecological Society

Yadvinder is leading a new project that will examine what is needed to take our science forwards in the UK, canvassing views across the full breadth and diversity of our vibrant community of ecologists.

Grand challenges

The aim is to develop a unified vision of the grand challenges for ecology and how they can best be met.

It will be the first time, to our knowledge, that ecologists have come together in this way to collectively examine and map out the pure and applied research priorities for UK-based ecologists, as applied to a UK environmental context.

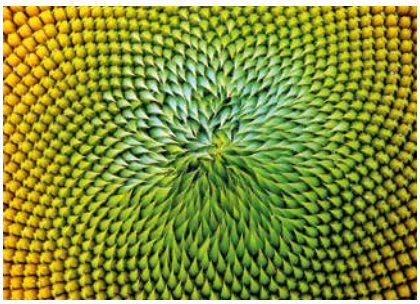
It can also provide funders with a clear understanding of future research needs.

Listening to ideas

Our first step was an initial call for ideas and insight from the whole community, seeking views on research priorities. We felt this was most important as a starting point: to listen to all ideas. We worked hard to invite submissions from all areas of ecology and related disciplines, all career stages and encouraged people from all backgrounds and under-represented groups to take part.

We received lots of great submissions, listing areas of research, problems or gaps in our understanding that need addressing.

There was a call for a new focus on urban ecology, given the impact these centres of production and consumption have on the environment, while another argued that molecular and evolutionary expertise exist too separately and bringing them closer could address several big questions. One submission identified the lack of evidence on what works in mitigating the impact of new infrastructure and developments on UK biodiversity. The opportunity of large-scale data collection techniques, for example in using robots and drones,



was made clear in another submission. More than one person brought up the economic value of nature, and others want to address the loss of connection with nature to improve health and well-being. And there were plenty more ideas covering a wealth of research and societal impacts.

Next steps

We are now convening workshops with ecologists from different backgrounds, drawing on these ideas and taking them further. We have a panel of experts to guide us in this process, and a draft statement or outline of the grand challenges for ecology will be produced. A further consultation and feedback process will help refine the draft statement and test its vision.

The final statement of the future priorities for ecological research in the UK and the impact for our world will be published late in 2022.

The international perspective

This project is targeted at the environmental context of the UK to make sure we retain a sharp focus and that the eventual report is meaningful and can have an impact.

We recognise that there is much to offer on international and global ecological priorities too. In the near future we plan to carry out a similar exercise examining international priorities.

Further information

You can find out more and keep up to date with the project on the BES website.

www.britishecologicalsociety.org/FutureEcology

By Members ForMembers

What do you really know about CIEEM Member Networks?

So much goes on behind the scenes of our Geographic Section Member Networks and Special Interest Groups, and there's never been a better time to join in!

Volunteers of CIEEM Member Networks and Special Interest Groups (SIGs) are champions of their regions or topics within ecology. All CIEEM member groups have the same ambitions: to provide opportunities for peer support, to exchange knowledge and to represent the voices of members of the group. On top of this, however, volunteers of CIEEM member groups have the chance to create a much wider sphere of influence by becoming more involved in other areas of the Chartered Institute. Did you know that our volunteer committees have the opportunity to contribute to the Chartered Institute's response to relevant national policy consultations? In addition, they are in a position to promote, and facilitate as appropriate, the development of evidence-based best practice guidance and advice documents for use by CIEEM members and supporters. Volunteers have the opportunity to share incredible case studies and showcase their work through the Chartered Institute's website blog, articles in *In Practice*, eNewsletters and social media and by contributing to the CIEEM Resource Hub.

CIEEM member groups also have a role to play in building stronger partnerships with external organisations. This includes running joint events, delivering collaborative working on projects and connecting with higher education institutions such as universities and colleges. The latter is a crucial role of Member Networks and SIGs, as they can attend careers fairs, and contribute to seminars and workshops that support students entering sector. CIEEM volunteers can provide vital career advice, explain the realities of working in different parts of the sector and illustrate the many pathways and possibilities within the ecology and environmental management world.

Does this sound like something you would like to be a part of? If so, take a look on the 'My CIEEM' area of the website, and get in touch if you see any volunteer vacancies you are interested in. We would love to have you on our team! Here's another brief snapshot of what our amazing member groups have been up to in recent months.

Ecological Restoration & Habitat Creation Special Interest Group

Woodland Creation Webinar Series

The ERHC SIG held a fantastic two-part webinar series, aiming to stimulate reflection and discussion on potential approaches to woodland creation. Part one of this highly topical webinar series focused on the strategic context and planning for woodland creation.

Woodland creation has risen up the political and economic agenda with governments setting out ambitious targets to increase woodland cover. It is seen as having an important role in climate change amelioration as well as providing recreational, biodiversity and other natural capital benefits. However, reconciling different objectives and deciding on priorities can be difficult. The webinar had a range of prominent and experienced speakers who stimulated discussion and learning about different approaches to woodland creation.

Speakers included Simon Mageean (Programme Director of the Northern Forest at the Woodland Trust) on planning the Northern Forest and some of the strategic thinking underlining the project, Christine Reid (Principal Conservation Advisor at the Woodland Trust) on introducing the Woodland Trust's guidance for woodland creation, Professor John Rodwell (formerly Lancaster University) on how understanding the cultural heritage and ecology of trees can inform woodland creation, Dr Keith Kirby (University of Oxford and previously English Nature) on what constitutes the right tree, right place and right reason for expanding woodland cover and reconciling different objectives and Dr Kieron Doick (Head of Urban Forestry Research Group at Forestry Commission) on woodland creation on urban/brownfield land the importance of soils.

Part two focused on woodland creation case studies and the implementation of creation and restoration methods. Presentations included Dr David Hetherington (Ecological Advisor, Cairngorms National Park) on landscape-scale approaches to woodland expansion in an upland environment, Pete Leeson (Woodland Advisor, Woodland Trust) on working with landowners on woodland creation, including wood pasture systems and incorporating flower-rich habitats, Hugh Chalmers (Land Management Advisor, Tweed Forum) on creating native community woodlands in the Scottish Borders and Hugh Dorrington (Owner, Aveland Trees) regarding how to grow a resilient woodland.

UK Overseas Territories Special Interest Group

Herpetology in the UK Overseas Territories: Spotlight on Iguana Conservation

In this webinar, delegates heard about some of the fantastic conservation projects currently underway in the UK Overseas Territories. These will include talks regarding the current threats, opportunities and conservation stories focusing on iguanas; namely the Lesser Antillean iguana (Anguila) and the blue iguana (Cayman Islands).

The Lesser Antillean iguana (*Iguana delicatissima*) once had a home range that spanned much of the Antilles, but now is heavily restricted due to habitat loss, over exploitation and pressure from invasive species. Efforts have been made to translocate individuals to safe locations, to ensure the continuation of the species.

The blue iguana (*Cyclura lewisi*) has undergone significant population declines in recent decades due to habitat loss and human pressure, with only an estimated 30 individuals left in the 1990s. Since then, captive breeding and release of iguanas has started to result in the recovery of the species, with the 1000th individual being released in 2018.

Ireland Geographic Section

An Introduction to the Use of Detection Dogs in Ecology

This online talk introduced delegates to the capabilities and uses of detection dogs for ecological research and conservation purposes. It took a detailed look at the effectiveness of dogs, but also the limitations, and how you might proceed to engage a dog team, based on the questions the speaker, Ciarán Cronin regularly gets asked.

Ciarán is a highly active and experienced ecologist, birdwatcher and general naturalist, with over 35 years of bird identification experience, and over 20 years as a professional ornithologist and ecologist. Ciarán has been training and developing skills as a wildlife detection dog handler for a number of years. Along with his wife Abi, he currently operates a number of wildlife detection dogs, mostly focused on the location of bat and bird carcasses at windfarms in Ireland. They are currently the only certified Conservation Detection Dog Handlers in the Republic of Ireland (Lantra Accreditation).

Career Profile

By Simon Peach, Member of the Student & Early Careers Focus Group

Name: Stephanie Holt

Organisation: Natural History Museum

Job title: UK Biodiversity Training Manager

Years in the sector: 21

What has your career journey looked like so far?

Growing up I was always interested in nature and wildlife; living off the Jurassic Coast of Dorset at the time gave me lots of opportunities to explore the surrounding nature and wildlife. I completed a degree in Environmental Management at Bournemouth, and then like many found finding a first job difficult. I began working at a bank, settling failed trades on the stock market which gave me a really strong work ethic and data manipulation skills. However, after doing a lot of volunteering and short courses I managed to secure my first ecology role as Assistant Ecologist with the Hampshire Biodiversity Information Centre at Hampshire County Council. I then moved into the Hampshire County Council's ecology team as Senior Ecologist working on biodiversity in planning before moving to Sparsholt College to lecture on the national diploma and Portsmouth University degree level courses in conservation and wildlife management. I then moved over to consultancy with Ecological Planning and Research, specialising in my main interest, bats, before moving to my current position now at the Natural History Museum – the absolute pinnacle of a fascinating career so far.

My initial role at the Museum was to design and deliver a 3-year Heritage Lottery Funded project called 'Identification Trainers for the Future' which aimed to train and develop species identification skills in a team of young or career changing trainees. The project focused on the more difficult-to-ID species groups where we are seeing a loss of skilled experts, primarily invertebrate taxa, as well as looking at how we can communicate science to different audiences. It was such a fantastic combination of my ecological and teaching skills, and a real challenge to deliver an impactful programme.

We brought in 15 trainees to deliver 12-month training on critical ID skills to build the new 'Specialist Naturalist'. It was looking at how we can decant knowledge from the museum's scientists to create experts of the future who could also communicate with different audiences – the project has been hugely successful, with our ex-trainees now all off doing exciting and valuable roles in conservation, ecology and museums and I'm very proud of all of them!

What does a typical day look like?

My current role as UK Biodiversity Training Manager is a development of the original ID Trainers project, and I am currently launching new training programmes from the Angela Marmont Centre for UK Biodiversity using the wealth of knowledge from across the Museum to facilitate the teaching of natural history skills through lots of exciting new mediums. It's difficult to describe a typical day, but it might involve spending time developing a new course, either discussing content with colleagues, or writing course material or delivering content currently primarily through our online training platform. Additionally, I might spend time working with my team on developing our new soon-to-be launched ID guides (do keep an eye out on the Museum's website for these!), or working on one of our conservation projects. At the moment I'm spending a lot of time looking at the genomics data from our recent Brilliant Butterflies project, a project funded by the People's Postcode Lottery on which we worked in partnership with London Wildlife Trust and Butterfly Conservation on restoring and recreating chalk grasslands in and around Croydon and Bromley. I might write a UK wildlife article for our website, or help out with some of the science content for other programmes such as our Urban Nature Project or Our Broken Planet programme of events.

How has COVID-19 affected your work?

The response of both the museum in terms of its management and the staff has been amazing throughout the pandemic. For the vast majority of us we've been able to continue with much of our work, mostly thanks to our wonderful IT team. Our digital teams have been incredibly creative in being able to still reach out to our audiences and produce digitally engaging content which has allowed us to reach people in a totally different way. The digital outlet has allowed us to keep sharing all of that enthusiasm and information with people to engage with, and for me it's been a catalyst to really develop our online training capacity. Fortunately we already had an online training platform, but I'm not sure I'd have ended up creating such a focused online-only course, and one which we will now be keeping as the mainstay of our UK Natural History Training Programme. Fundamentally though most of us just can't wait to get people back through the doors into our fantastic Museum and collections!

What is one skill you have learnt that has been crucial throughout your career?

Learning how to work with people. How to get the best out of what you're working on together and communicate and inspire people together. Communication skills are essential and something I've really had to learn since university. Working effectively with other people is really something so crucial to learn and develop!

Which one piece of advice would you give to an early career practitioner entering the industry?

The post-COVID world is difficult in many ways but actually there are a lot to opportunities. A lot of graduate CVs I see are identical and too clinical to see the person behind the paper – I look for the things that make you stand out for an ecologist. Tell me what it is you are passionate about and what ID skills you have, what have you done to evidence that you are genuinely interested? Earlier in my career I was able to spend a lot of my free time doing courses, volunteering, getting myself involved – particularly working on my identification skills. And that's something that a lot of recent graduates don't have, they don't have those ID skills that really make you an ecologist.

What is one book that everyone should read?

The Natural History and Antiquities of Selbourne by Gilbert White. Published in the late 1700s, by a quirk of publishing fate it is the fourth longest constantly in-print book in the English language. A series of letters detail White's natural history journey and his passion for finding wildlife. He paints a beautiful picture of the wildlife he finds and it's an incredible record of his observations of nature which we can still look back on today, but at its heart it is full of biological records, the mainstay of all of our work. The beauty is that it's about science communication as much as its about science. I am entirely biased as it's one of my favourite topics, but the book is the foundation of amateur natural history in the UK, and it should be read by everyone!

Stephanie holding the shell of Gilbert White's tortoise

Q&A

Hannah Williams MCIEEM, Principal Ecologist, WSP and Governing Board Member, CIEEM

How did you get into the sector?

I got into the sector following 18 months of volunteering, including helping: a University of Birmingham PhD student looking at the effect of lighting on bats; The Conservation Volunteers; and Birmingham City Council. This then led to a training programme called Learning Environments in Marine, Urban and Rural (LEMUR) and a placement at Warwickshire County Council.

What does your current role involve?

My key role is to help lead my ecology team's approach to Biodiversity Net Gain (BNG). This has included working on more complex projects for BNG; developing internal templates and training; determining what areas to develop expertise in; what work to bid for and relationships to develop with clients; commenting on policy and occasionally getting out to do UKHab and habitat condition assessments, amongst other things!

Why did you get involved with CIEEM?

I originally became a member as it was promoted at university. I wanted to make sure that as I developed I was considered credible and this was an element of that. It also enabled me to feel connected to a like-minded community. It helped me to find out about what the expectations were on an ecologist as I have been developing. Most recently it is helping me learn how I can contribute to important areas such as influencing policy.

What do you think is the biggest issue facing the sector?

Right now it could be a skills shortage – there doesn't seem to be enough of us. As the climate and biodiversity crises are better understood, organisations seem to be realising they need to be doing more and are coming to us for help. Now is the time to promote the profession so that we get more people choosing to come into ecology.

What is the next big thing for the sector?

I think the next big thing will be the fallout of the UN Biodiversity Conference COP15 and new requirements on those countries signed up to the treaty to update their post-2020 biodiversity frameworks to be even more ambitious for nature. This currently proposes numerical targets and also a requirement on businesses to look at their impacts on biodiversity.

Who do you see as a great leader in the sector?

Bhutan – a more holistic approach to the well-being of the country has meant that the environment features more in their approach to development.

If you could change one thing to make the world better for nature and biodiversity, what would it be?

Give everyone a solar panel to put on their roof. I think if energy was less centralised it would mean all sorts of good for the world as well as for biodiversity.

If you could magically change one thing we do as a sector, what would it be?

Collectively be more confident of our value to society.

What advice would you give to those just starting out in the sector?

Money was often a stumbling block and so I wish I had been pluckier in things like finding out and applying for grants if I had only recognised that they are out there to assist young folks getting into the sector. Being able to physically access opportunities was quite important for me to get started and so being able to drive was a massive plus when I was younger. I put all my money into my banger of a car so I could get to various training/volunteering events that helped me build up some experience.

What is your favourite animal, plant, fungus, bacterium or archaeon?

I think those who know me would probably expect me to pick a plant, but I just love sloths – they always seem to look happy. I am also told I act a bit like one which makes me laugh given my job in a fast-paced consultancy.

What is your favourite thing to do outside of work?

Read, fact or fiction – one of those you can't put down.

Can you tell readers something random about yourself?

I seem to be quite bendy given I'm not a kid anymore – I tend to sit cross-legged or in the lotus position out of choice (it is actually comfortable for me)!

BOOKS, JOURNALS AND RESOURCES

Compiled by the Academia Special Interest Group

Paper Review OPEN ACCESS

Towards a best-practices guide for camera trapping: assessing differences among camera trap models and settings under field conditions

P. Palencia, J. Vicente, R.C. Soriguer & P. Acevedo

Journal of Zoology, 2021

https://doi.org/10.1111/jzo.12945

The authors start with the premise that it's essential we test the field performance of camera traps before deploying them, so we can understand what impacts the camera settings have on detection, compare data from different models/studies, and account for the less than perfect detection that camera traps have. In a field trial in southern Spain, they used CCTV to monitor animals entering a study zone, and compared the performance (whether or not they captured an image of the animal) of five widely used camera trap models covering this zone, set at different heights and sensitivity settings. Detection varied between camera models, and was higher during the day than at night. As has been found in other studies, detection varied widely between species, mostly relating to size (the bigger the animal, the more likely it will be detected). One of the most interesting results was related to camera-trap height, something often not discussed. They interpreted their results as it being optimal to set the camera at shoulder height of your target species. There is a useful table of practical limitations and recommendations at the end of the paper that includes aspects such as deciding on a sensitivity setting, ensuring consistency of camera trap model for a single study, and how to decide on camera trap height.

Paper Review

The elusive winter engineers: structure and materials of hazel dormouse hibernation nests

L. Gubert, R.A. McDonald, R.J. Wilson, P. Chanin, J.J. Bennie & F. Mathews

Journal of Zoology, 2021, 00, 1– 11

https://doi.org/10.1111/jzo.12940

This paper reviews the different types of hibernation nests created and used by the hazel dormouse *Muscardinus avellanarius.* The study aimed to identify the main materials used in dormouse nests and understand if regional and/or local microclimate impacted on the type of nests built. The survey was conducted in areas of broad-leaved and coniferous woodland, roadside habitats and hedgerows in Devon and Cornwall. Thirty-three hibernation nests were located through radio-tracking, systematic searches and incidental finds. The study found that most hibernation nests were built similarly in terms of structure and were most commonly constructed with an outer layer of leaves and a core section of woven material. Nests had a mean of two materials per nest and the materials most frequently used were bracken, hazel and beech leaves, and grasses. All materials were harvested locally and in every case were available within 3 m of the nest.

Paper Review

Ecological and methodological drivers of persistence and detection of bird fatalities at power lines: insights from multi-project monitoring data

J. Bernardino, R.C. Martins, R. Bispo, A.T. Marques, M. Mascarenhas, R. Silva & F. Moreira

Environmental Impact Assessment Review, 2022, 93: 106707

https://doi.org/10.1016/j.eiar.2021.106707.

This paper compiles data from both published and grey literature on the post installation monitoring of energy projects, such as wind farms, solar facilities and power lines. These bird fatality surveys are based on regular carcass searches with both carcass persistence (CP) and searcher efficiency (SE) biases typically performed for each individual single project. The authors argue that this is not efficient and, using data from 36 separate monitoring programmes, concluded that carcass size was key to successful detection by humans, with season and habitat interactions affecting visibility of carcasses. It is no surprise that the humans in this research were consistently out-performed by scent detection dogs. The importance of this study lies in the conclusion that, while all sites are different, routinely collected data from multiple projects can be combined to identify broad ecological patterns, highlight limitations and improve Environmental Impact Assessment monitoring practice.

Book OPEN ACCESS

DNA-based Biodiversity Assessment Methods

In Practice readers will be interested to note that Kat Bruce (NatureMetrics) and others have published an open-access online book entitled *A Practical Guide to DNA-based Methods for Biodiversity Assessments*, which was the product of several years of work collaborating with hundreds of eDNA experts from across Europe. The authors hope this will be an important work for setting solid foundations within this young but fast-moving field.

https://ab.pensoft.net/article/68634/

Paper Review OPEN ACCESS

Time to integrate global climate change and biodiversity science-policy agendas

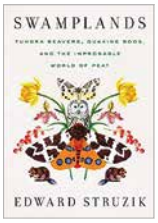
N. Pettorelli, N.A.J. Graham, N. Seddon, M.M. da Cunha Bustamante, M.J. Lowton, W.J. Sutherland, H.J. Koldewey, H.C. Prentice & J. Barlow

Journal of Applied Ecology, 2021

DOI: 10.1111/1365-2664.13985

This article clearly sets out the importance of integrating the two policy agendas (global climate change and biodiversity) and of progressing this in the context of the opportunity presented by the two COPs, 26 on Climate Change and 15 the Convention on Biological Diversity. The logic is, I'm sure, clear to all of us, but these authors identify five distinct areas where there is simply not enough information to enable effective integration. The research priorities identified include understanding of how climate change mitigation/adaptation benefits biodiversity conservation, capacity to track and predict ecosystems movement in response to climate change, as well as on the effectiveness of nature-based solutions (NbS). A note of caution is raised regarding the significance of using NbS as the mechanism for integrating the climate and biodiversity agendas with these authors pointing out the uncertainties and difficulties in implementation and that there is little real evidence of the biodiversity benefits. A list of requirements for integration is provided, including the need for greater funding for global conservation, removal of perverse incentives that negatively affect climate and/or biodiversity, an agreed framework for monitoring biodiversity gains resulting from NbS across ecosystems and over time, and rethinking environmental legislation so that it supports biodiversity conservation in times of rapid change. Essential reading for anyone interested in policy matters.

Book



Swamplands: Tundra Beavers, Quaking Bogs, and the Improbable World of Peat

Author: Edward Struzik

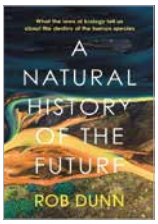
ISBN: 9781642830804

Available from: nhbs.com

Price: £23.99

In *Swamplands*, journalist Edward Struzik celebrates these wild places, venturing into windswept bogs in Kauai and the last remnants of an ancient peatland in the Mojave Desert. *Swamplands* highlights the unappreciated struggle being waged to save peatlands by scientists, conservationists and landowners around the world. An ode to peaty landscapes in all their offbeat glory, the book is also a demand for awareness of the myriad threats they face. It urges us to see the beauty and importance in these least likely of places. Our planet's survival might depend on it.

Book



A Natural History of the Future: What the Laws of Biology Tell Us About the Destiny of the Human Species

Author: Rob Dunn

ISBN: 9781399800129

Available from: nhbs.com

Price: £24.99

Humans have made unprecedented technological innovations with which we have sought to control nature. We continue to try to reshape nature for our purposes – so much so it seems we may be in danger of destroying it. Biologist Rob Dunn argues that nothing could be further from the truth: rather than asking whether nature will survive us, better to ask whether we will survive nature. Elucidating several fundamental laws of ecology, evolution, and biogeography, Dunn shows why life cannot be stopped. Instead, he shows us a vision of the biological future and the challenges the next generations could face.

Paper Review OPEN ACCESS

Reptile conservation. global evidence for the effects of interventions for reptiles

K.A. Sainsbury, W.H. Morgan, M. Watson, G. Rotem, A. Bouskila, R.K. Smith & W.J. Sutherland

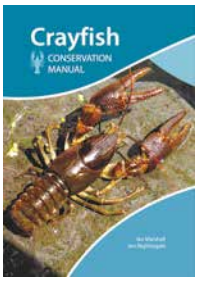
Conservation Evidence Series Synopsis, 2021, University of Cambridge, Cambridge, UK

www.conservationevidence.com/synopsis/pdf/9

Reptile Conservation is the latest synopsis, in the long list of evidence reviews of conservation actions for a range of species groups and habitats, synthesised by the Conservation Evidence team. In the background section of this document we learn that as grazers, seed dispersers, predators, prey and commensal species, reptiles perform crucial functions in ecosystems. And although they are a hugely diverse group of animals, adapted to live in a wide range of habitats, their relatively narrow geographic distributions coupled with particular life history traits makes some reptile species particularly vulnerable to anthropogenic threats.

Multiple threats to reptile populations have been identified and are implicated in species declines. This synopsis provides valuable information in relation to management measures or interventions for threats to reptiles such as residential and commercial development and refers to habitat protection, habitat restoration and creation, species management, mitigation translocations and many more. However, it's just as interesting to see where the evidence is absent for many management measures, particularly those regularly proposed in mitigation strategies in the UK. Hence it also provides a timely reminder of the importance of effective monitoring of management actions and interventions in conservation, so that we know what really works.

Book



A New Best Practice Manual for White-Clawed Crayfish

The new *Crayfish Conservation Manual* provides practical guidance for all works associated with crayfish. Authors Ian Marshall MCIEEM and Dr Jen Nightingale MCIEEM introduce the new publication.

Introduction

The white-clawed crayfish (WCC) *Austropotamobius pallipes* is the UK's largest freshwater crustacean. Once widespread, their numbers have been decimated by habitat fragmentation, environmental degradation and pollution. However, the most severe impact has been from the spread of non-indigenous crayfish species (NICS) and the associated water mold *Aphanomyces astaci*, commonly known as crayfish plague.

This has resulted in a loss of approximately 50–80% of populations globally and led WCC to be classified as Endangered on the IUCN Red List of threatened species.

Development

Ian and Jen met in summer 2019 at the Bristol Zoological Society, to discuss the future of crayfish conservation in England and the barriers to conserving WCC. It was evident that there was a lack of clear guidance on how to develop strategies, select conservation actions and deliver them effectively. Although there were multiple, highly informative publications already available on crayfish, many were over a decade old. To form a complete picture, ecologists would need to read multiple documents, ensuring legislation and references were updated accordingly. They realised a new publication was required.

One key element they agreed upon was that any publication should be visual and accessible, with an aim of bridging the gap between academic research and practical conservation. This would ensure a rapid uptake of the best practice methodology presented and increase both the quality and speed of delivery of conservation actions for the species.

Contents

The manual is 280 pages long and contains eight chapters. Each is broken down into sections with extensive detailed descriptive information on all elements of crayfish work associated with that topic. They approached each chapter with the eyes of an ecologist, ensuring all information is summarised in tables and supported by key references. The aim was that anyone with ecological knowledge and a passion for conservation can utilise the manual.

Although primarily focused on conservation, the manual's mitigation chapter does provide extensive guidance for situations where WCC or NICS (or a mixture of both) are likely to be impacted as part of a development.

The multiple case studies cover topics from each of the chapters within the book. Colleagues and crayfish-related associates were contacted, resulting in 20 case studies being submitted and included. These case studies enable easier conceptualisation of the information and ideas, within the manual, with the ultimate aim of inspiring readers by the work of others. Standard forms for recording surveys and a new population assessment form are also included.

The intention is that the manual will now be the key reference document for those working with crayfish and will be heavily referenced by Natural England, local planning authorities and the Environment Agency. This will guide and steer practitioners, ensuring that their work utilises best practice principles, thereby reducing the risk to the species in the future.

Future

The manual will be reviewed and updated in the future with the possibility of a supporting website, to allow for practitioners to share further case studies and other relevant information. Crayfish conservation is a fast-changing discipline, with new techniques such as eDNA, and the application of ancient ones, such as tau kõura, being used in new and exciting ways.

The decline of WCC within the UK continues, with the loss of populations recorded annually. With limited sustainable management or eradication techniques available, NICS continue to spread. However, new WCC breeding facilities are being developed, such as the recently established facilities at Northumberland Zoo and Wingham Wildlife Park. In addition, multiple ark sites, across the country are being established; these conservation initiatives help to combat local WCC extinctions. We hope that the publication of the manual will motivate others to help conserve one of our most threatened species.

Thanks

This book would not have been possible without the sponsorship of the Bristol Zoological Society, Environment Agency, Bristol Water, South West Water, Wessex Water and the many contributors who offered their expertise and knowledge. Your support has greatly helped in shaping this book, thank you! An extra special thank you to Clare Challice of Inkwood Design and Abi Stubbs her illustrator, for their absolutely incredible work on the graphic design and artwork for this book.

Availability

The *Crayfish Conservation Manual* is available from NHBS.com for £55, which includes downloadable copies of survey and population assessment forms.

About the Authors

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For information on these events and more please see http://cieem.net/training-events.

Conferences
Training Courses

15 March **Habitats Regulations Appraisal (HRA) of Plans and Projects (Scotland)** Edinburgh, Scotland	15 & 22 March **Introduction to Nature Conservation Legislation in the UK (England)** Online	22 March **2022 Spring Conference – Taking Biodiversity Net Gain from Theory to Practice** Birmingham	22 March **Reptiles: Ecology, Surveys & Mitigation** London
30 & 31 March **Phase 1 Habitat Survey** Dunkeld, Scotland	4 & 5 April **Introduction to Bat Ecology and Bat Surveys** Online	6 & 7 April **Train the Trainer for Ecologists** London	11 & 12 April **Bats: Assessing the Impact of Development on Bats, Mitigation & Enhancement** Online
21 & 22 April **An Introduction to the NVC** Dunkeld, Scotland	26 & 28 April **2022 Irish Conference – Sector Symbiosis: The Art of Interdisciplinary Working for Ecological Benefit** Online	26 & 27 April **Dynamic Dunescapes: Introduction to Sand Dunes and their Management** Online & Cumbria	28 April **Ancient Woodland Indicators** Nr. Bristol, South West England
10 & 11 May **Water Voles - Ecology and Surveys** Online & Cirencester, South West England	11 & 12 May **Habitat Survey & Mapping** London	19 & 20 May **Habitat Condition Assessment** London	19 May **Botany for Beginners** Nr. Bristol, South West England
19 & 20 May **Water Vole Mitigation** Online	16 June **Bat Ecology and Survey** County Fermanagh, Ireland	17 June **Bat Impacts and Mitigation** County Fermanagh, Ireland	27 & 28 June **Water Voles - Ecology and Surveys** Online & Derbyshire
13 July **2022 Summer Conference – Facilitating Nature's Recovery Through Environmentally-friendly Farming** Online	5 September **Introduction to Fern Identification** Nr Bristol	November **2022 Autumn Conference: Nature, Carbon and People** Edinburgh	

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>
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