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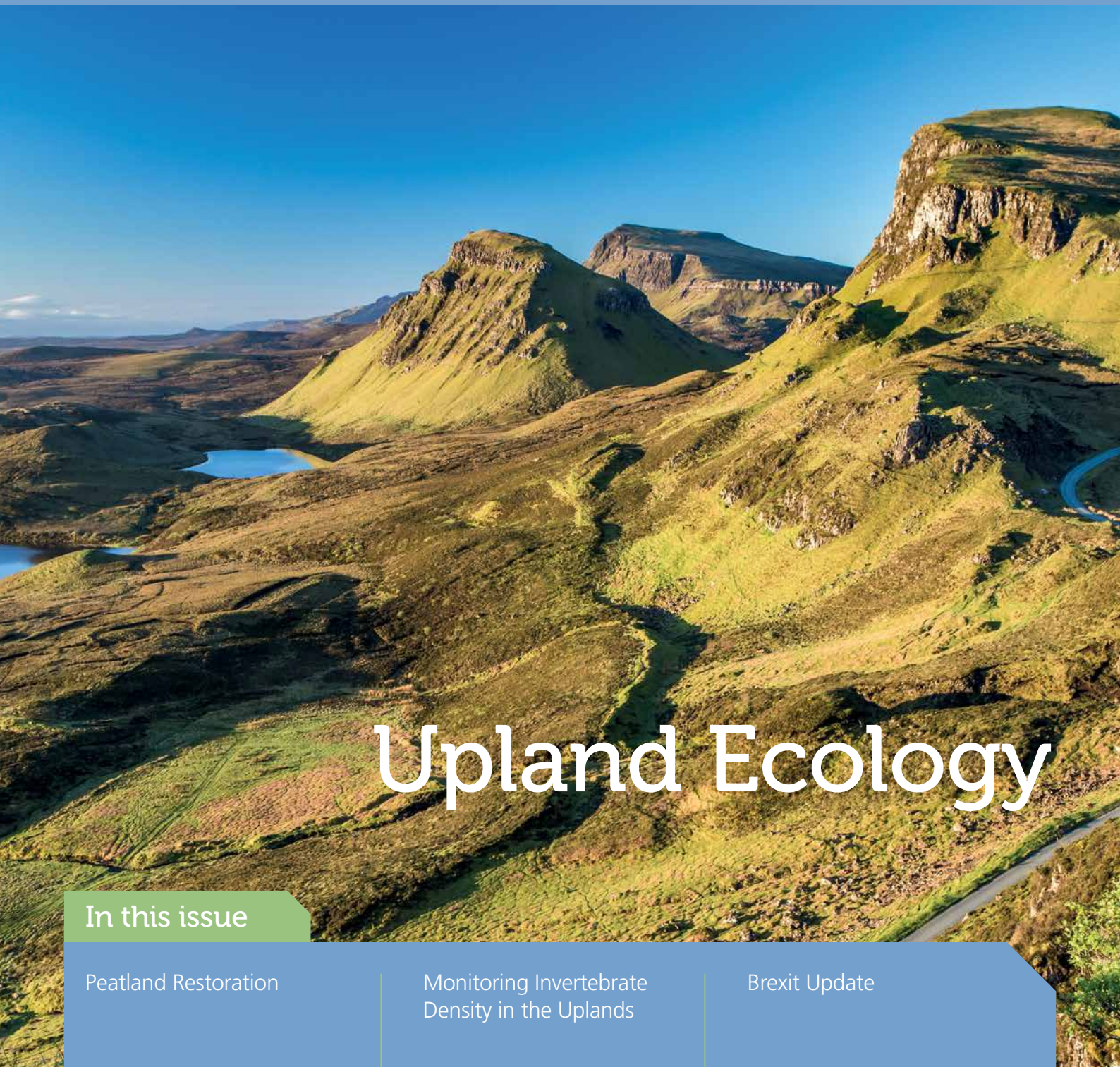

Upland Ecology

In this issue

Welcome

Brexit and the Natural Environment

Welcome to the latest Edition of *In Practice*. When I wrote my first Editorial as the new President of CIEEM six months ago, I mentioned how the upcoming referendum on EU membership was one of the key issues of concern to the Institute. Our survey of your views showed that the vast majority of CIEEM members supported the 'Remain' campaign and believed that the natural environment was better protected inside the EU. If I am honest, I don't think that I ever really believed that Britain would vote to leave the EU, so waking up on 24 June it took me several minutes to take in what the Today programme was telling me.

During the run-up to the referendum it was frustrating to see very little in the mainstream press regarding the impacts of Brexit on the natural environment. For me, that highlights the need for much more work for our members in explaining the importance of the natural environment to the economy, that it isn't an esoteric issue, but a matter critical to the future of the country.

The European Union has been effective in delivering a common framework of legislation dealing with aspects of pollution control, management of waste and resources, and climate change, as well as legislation relating to protected sites, species and habitats. There is a complex inter-relationship between EU and UK law in these areas and consequently there is a huge issue in establishing exactly how that framework of law should operate in a post-Brexit UK.

CIEEM's concerns are threefold: that any period of transition would lead to a disruption in delivering environmental targets and would lead to uncertainty for businesses affected by such legislation; that Britain would cease to have any voice or influence in determining European policy on the environment; and that in developing new environmental legislation, some of the important legislative protection provided by EU law would be diluted or lost altogether.

There has been a widely-reported view that most of the legislative protection for the natural environment would remain unchanged in the event of Brexit. This is based on the assumption that the UK would attempt to negotiate membership of the European Economic Area (EEA). Whilst it is correct that most EU environmental legislation is required to be applied by EEA members, the Bathing Water Directive and the Nature Directives (Habitats Directive and Wild Birds Directive) are not required to be adopted. Given previous UK government concern about the impact of the Nature Directives on development, and the commitment to reducing red tape, I remain to be convinced that the UK would adopt these Directives in full and voluntarily.

Of course we don't yet know what our future relationship with the EU will look like. In scenarios where the UK was outside of the EEA, most of the EU environmental legislation would cease to apply and future governments would be free to progressively weaken the approach to protecting nature conservation interests where this was deemed to support business or improve global competitiveness. At the time of writing the Government has given no indication as to their preferred scenario, and there is speculation about the legal implications of triggering Article 50 of the Lisbon Treaty.

Whatever the outcome in the next two to five years, this clearly represents a time of re-thinking and re-working how we maximise the effectiveness of environmental legislation in the UK. I believe that this represents an opportunity for CIEEM and its members, to contribute positively and proactively in partnership with Government and other stakeholders, and to cement our reputation as the source of informed comment and advice to provide the foundation for sound, evidence-based policy. In this issue, you can read more about what CIEEM will be doing, and I hope you will be interested in becoming involved in some of our policy work.

Stephanie Wray CEcol CEnv FCIEEM
CIEEM President

Information

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Front cover image: Quiraing, Isle of Skye, Scotland

Correction: Of the two images for Ireland on page 47 of Edition 92, June 2016, the left image is not from Ireland but is in fact the Glenfinnan Viaduct in Scotland.

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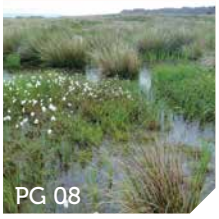

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Membership Renewals Reminder

Membership subscription fees for 2016/17 are due on 1 October 2016 and all members should by now have received their renewal notice. If you know that you will shortly be taking a career break and are unsure about paying your subscription, please get in touch with the membership team as it may be possible to place your membership in abeyance.

As one of over 5,000 ecological and environmental professionals with CIEEM membership, you play a key role in our mission to raise the profile of the profession and to promote the highest standards of practice for the benefit of nature and society. **Your support is now more valuable than ever.** For CIEEM to work both individually and collaboratively with other professional bodies, learned societies, associations and NGOs to ensure that messages are clear and unequivocal in terms of what needs to be done to safeguard and enhance the environment, and to hold governments to account over the continued improvement and implementation of environmental legislation and policy, it is vital that we continue to represent the views and expertise of an informed, engaged and committed body of members.

In addition, over the coming year we will be:

- improving access to higher grades of membership for members joining us through non-academic routes;
- revising the online experience for members, with improvements to training and event booking processes and the professional directory;
- launching some additional member benefits;
- replacing our member database so that we can improve the relevance of our communications to you.

As always, if you have any comments or suggestions about your membership and its benefits please do contact the Membership Manager at stuartparks@cieem.net.

CIEEM and Brexit

By the time you read this we will have published our position statement on Brexit with our recommendations that all UK governments need ambitious visions for nature conservation, that we should continue to implement the current level of protections and management post Brexit in order to provide certainty and reduce the burden on stretched resources, and then take our time to review the legislation to make it fit for purpose in achieving the above mentioned visions.

In addition we have written to all UK, Northern Irish, Scottish, and Welsh parliamentarians, and responded to a number of Select Committee inquiries.

We also continue to update the website resource page on news and other information relevant to Brexit in an ongoing basis.

For up to date information please visit: http://www.cieem.net/eu-referendum

CIEEM Awards 2016

Please see page 57 for the full report on the CIEEM 2016 Awards.

New Accreditation at the University of Derby

CIEEM is pleased to announce that two new degree pathways at the University of Derby have been accredited:

- BSc (Hons) Zoology
- BSc (Hons) Biology

Degree accreditation recognises the relevance of the pathway content and the quality of teaching, which provides students with the skills and knowledge required to help them pursue a career in the ecological and environmental management sector.

Furthermore, CIEEM accreditation enables the students to upgrade to graduate membership, without the need to be competency assessed.

Congratulations to the academic team at the University of Derby.

Professional Standards Committee Activities

PSC met in June and welcomed new Committee member, Allison Potts, who joins us from Natural England. We said goodbye to Katherine Kennedy, who has gone on to join CIEEM's Risk and Audit Committee.

Survey of ALGE Members and Raising Standards of ecological report writing

We discussed a recent survey of ALGE Members, which sought views across a range of issues around report writing. The committee considered next steps for how we may take on board issues raised by the survey along with previous work around raising standards. You can find out more about the findings of the ALGE survey at http://bit.ly/29rWuui. PSC are committed to exploring initiatives to support improved professional practice with regard to report writing, and have commenced work to identify options. This work will be ongoing over the coming months.

Good practice guidance

Continuing our work looking at how CIEEM can help to identify good practice guidance, we agreed to use the existing Source of Survey Methods (SOSMs) (http://www.cieem.net/sources-of-survey-methods-sosm-) as our starting point. We will revise and update this list and expand it to include guidance on mitigation. We will then review how we can most effectively sign-post members towards recognised guidance.

Revised Preliminary Ecological Appraisal (PEA) Guidance

Staff Changes

CIEEM is pleased to welcome Diana Clark to the newly created role of Welsh Section Support Officer. Read more about Diana and the role on page 70.

New Defra Ministers

Prime Minister Theresa May has appointed Andrea Leadsom as the new Secretary of State for Environment, Food and Rural Affairs; replacing Liz Truss. George Eustice remains in Defra; changing from Parliamentary Under Secretary of State for Farming, Food and Marine Environment to Parliamentary Under Secretary of State for Rural Affairs and Biosecurity. Thérèse Coffey has been appointed as Minister of State for Agriculture, Fisheries and Food, effectively replacing Rory Stewart. Lord Gardiner of Kimble remains Defra's representative in the House of Lords as Parliamentary Under Secretary of State for the Environment and Rural Life Opportunities.

https://www.gov.uk/government/news/new-ministerial-appointment-july-2016-secretary-of-state-for-environment-food-and-rural-affairs

New Wales Cabinet Secretary for Environment and Rural Affairs

Lesley Griffiths has been appointed as Wales' new Cabinet Secretary for Environment and Rural Affairs.

http://gov.wales/about/cabinet/cabinetm/lesley-griffiths?lang=en

Review of the Scottish Planning System

In September 2015, an independent panel was appointed by Scottish Ministers to review the Scottish planning system. The report of the panel, 'Empowering Planning to Deliver Great Places' was published on May 31, 2016. Scottish Ministers published their response to the report of the independent planning review panel on July 11, 2016.

http://www.gov.scot/Topics/Built-Environment/planning/Review-of-Planning

Government rejects lead ammunition phase out

The UK Government has rejected the Lead Ammunition Group's recommendation to phase out lead ammunition based on its risk to wildlife and people.

http://www.leadammunitiongroup.org.uk/

People, Politics and the Planet: Any Questions? Britain in a Changing Europe

Watch the debate that took place on 21 July 2016 at the Royal Geographical Society, which brought together a panel of politicians and experts to debate the future of the natural environment in the wake of the UK's narrow EU referendum result.

http://geographical.co.uk/uk/uk/item/1846-people-politics-and-the-planet-any-questions-britain-in-a-changing-europe

Scottish Wildlife Trust sets out a vision for Scotland's uplands

The Scottish Wildlife Trust has set out a new approach to the way that Scotland's uplands are managed, including financial incentives to encourage good environmental stewardship and regulations that achieve more sustainable management of deer and upland grouse moors.

http://scottishwildlifetrust.org.uk/article/scottish-wildlife-trust-sets-out-a-vision-for-scotlandrsquos-uplands/

Breeding Bird Survey 2015

The British Trust for Ornithology (BTO) has published the latest Breeding Bird Survey, the main scheme for monitoring the population changes of the UK's common breeding birds.

https://www.bto.org/sites/default/files/bbs-report-2015.pdf

European Commission adopts first EU list of invasive alien species

The European Commission has adopted a list of invasive alien species that require action across the EU. The list contains 37 species that cause damage on a scale that justifies dedicated measures across the Union. The list came into force on 3 August 2016.

http://ec.europa.eu/environment/pdf/13_07_2016_news_en.pdf

http://ec.europa.eu/environment/nature/invasivealien/index_en.htm

http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1468477158043&uri=CELEX:32016R1141

WWT publishes 'Rich in Nature'

The Wildfowl & Wetlands Trust report urges the Government to deliver its promise of a 25-year plan, and also to make itself accountable to Parliament through an annual budget statement on the value of the environment, alongside the value of the economy.

http://www.wwt.org.uk/conservation/saving-wetlands-and-wildlife/publications/rich-in-nature/

RSPB withdraws support for Hen Harrier Action Plan

The RSPB's Martin Harper has said that the voluntary approach of the Hen Harrier Action Plan has failed, leaving licensing as the only viable option.

http://www.rspb.org.uk/community/ourwork/b/martinharper/archive/2016/07/25/withdrawal-from-the-hhap.aspx

Expansion of Wicklow Mountains National Park

Minister of State for Regional Economic Development, Mr Michael Ring, has announced that the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs has reached an agreement to purchase 4,900 acres (1,983 hectares) of the Dublin Uplands, which will be added to the Wicklow Mountains National Park.

http://www.npws.ie/news/expansion-wicklow-mountains-national-park

Biodiversity greater inside Earth's protected areas

The results of this study reinforce the global importance of protected areas but suggest that protection does not consistently benefit species with small ranges or increase the variety of ecological niches.

http://www.nature.com/ncomms/2016/160728/ncomms12306/full/ncomms12306.html

The Central Role of Peatland Restoration in the Uplands

Penny Anderson CEcol FCIEEM

Peatland is our greatest store of ancient carbon, captured when bogs were wetter, less polluted and probably less heavily grazed. Where it is lost in gullies or drains, peat not only turns streamwater beer-coloured, which is costly to remove, it contributes to climate change as an extra source of CO_2. Dry peat bogs do not capture carbon as they could, or should, through a *Sphagnum*-rich surface vegetation.

Gully blocking on Keighley Moor for Yorkshire Water.

Projects to produce peat-forming conditions are essential after centuries or more of damage, and various techniques are being trialled (Hinde *et al*. 2010; and see Carr and O'Hara, Short and Robson, and Ross *et al*., in this issue). Such re-instatement is needed to increase the resilience of moors to climate change. Active peat reduces the risk of wildfire – itself the main cause of peatland degradation. Increasing the *Sphagnum* cover is critical because it generates its own local hydrology, which keeps the peat wetter and provides a much-better habitat for many upland species (Carr and O'Hara, this issue).

Increasing wetness to restore active peat also supports more craneflies (Carroll *et al*. 2011), on which many moorland birds depend, even though there may be other mechanisms such as mismatch of prey and breeding cycles or conditions that are too warm militating against the long term survival of some upland birds in marginal habitats (Pearce-Higgins 2010).

Restoration and appropriate management for nature conservation are explored in several articles in this issue of *In Practice*. Active peat, appropriately diverse vegetation, habitat structure and wetness can all be enhanced through grazing management, peat re-wetting and re-vegetating. Benefit for nature conservation was the primary aim of the Sustainable Catchment Management Programme (SCaMP) (Ross *et al*., this issue), and the RSPB work at Dove Stone shows just how effective this can be (Carr and O'Hara, this issue). However, the article by Thiel (this issue) demonstrates that it is not always straightforward: despite many of the management changes adopted being used widely on moorlands, the expected improvements were not universal, possibly related to inadequate predator control.

Gully blocking on Keighley Moor for Yorkshire Water, with *Sphagnum* and cottongrasses colonising a pool.

Such studies show the complexity of relationships between species, their environment and site management, and how different measures vary in their effectiveness in different situations. For some species, the changes in the hydrology through re-wetting measures are more pertinent than vegetation changes, but

Hydrology severely altered by peat extraction making it difficult to restore; conifers from surrounding plantations invade readily (Coleraine).

Blanket bog severely damaged by wildfire and heavy grazing.

Wooden dams installed on Marsden Estate (South Pennines) by the National Trust.

All photo credits: Penny Anderson.

hydrological change can be rapid or slower to develop, depending on local conditions (Ross *et al*., this issue; Wallage *et al*. 2006).

Habitat structure and micro-sites are more important to many species than the presence of particular plants (unless dependent on them for food). However, for many invertebrates, these relationships are poorly understood. The case of the rare money spider *Semljicola caliginosus* (Wilson, this issue) illustrates this clearly. There is a dearth of research and monitoring of upland invertebrates and their response to the sometimes quite dramatic habitat changing effects of restoration (Carroll's 2011 research being an exception).

On the other hand, it is important to remember the bigger picture in terms of the ecosystem services the uplands, and the peat environment in particular, can bring when in good condition. It is this large-scale restoration that is described by several articles in this issue. The Forestry Commission, its equivalent in Ireland (Coillte) and some private estates have been releasing conifer plantations on peat for restoration. Anderson (2010) showed that c. 200,000 ha of peat bog (lowland and upland) in Great Britain are afforested and some 3000 ha have been restored since 1986, with most since 2001. Forestry Commission research (Anderson 2010) identifies best practice as whole tree removal and drain blocking (including plough furrows) to restore water tables and reverse the drying and shrinking processes (Lindsay 2010). Short and Robson (this issue) take this a stage further by exploring new ways of blocking forestry drains and furrows in a cost-effective way.

New methods for restoring peatland to better condition move best practice forwards. No site is the same. Contractors, site managers and experienced consultants all have an important role to play in helping develop not only new, effective methods and monitoring protocols, but also to ensure that more contractors become experienced in the techniques across the UK. Building on studies such as those described in the articles in this **Upland Ecology** theme, we can help work towards healthy upland ecosystems that are sustainably managed across the UK.

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Anderson, R. (2010). *Restoring afforested peat bogs: results of current research*. Forestry Commission Research Note FRCN006. Forestry Commission, Edinburgh.

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About the Author

Penny Anderson is sort of retired from the long-established ecological consultancy, Penny Anderson Associates, of which she is still a Director. She has specialised over the last 35 years in peatland restoration amongst other things.

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How Effective is Upland Moorland Management?

Andre Thiel MCIEEM

Keywords: biodiversity duty, mitigation management, moorland planning system, predator control, robust monitoring

This articles presents the results of a ten-year study (2002-2011) of upland moorland management to mitigate impacts on birds of a surface coal mine in south-west Scotland. It raises questions about the effectiveness of widely used moorland prescriptions and highlights the need for the planning system to be responsive to the outcomes of robust monitoring programmes to deliver planning commitments and biodiversity enhancements.

Introduction

Upland moorland represents one of the largest areas of semi-natural habitat in Britain. It has a long history of management intervention, including grazing, shooting, afforestation, mining and, more recently, windfarm and hydro-scheme developments. Conservation management often attempts to reverse the impacts of such activities. However, robust monitoring of the effectiveness of such measures is rare.

Wetland area on restored ground. © Tim Elliott

Powharnal mine. © Tim Elliott

In 2002, Scottish Coal applied for planning permission to extract coal at Powharnal, west of Muirkirk in East Ayrshire, south-west Scotland. The 184 ha site overlapped with 99 ha of the proposed Muirkirk and North Lowther Uplands Special Protection Area, subsequently designated in 2003 for breeding hen harrier *Circus cyaneus*, peregrine *Falco peregrinus*, merlin *Falco columbarius*, short-eared owl *Asio flammeus* and golden plover *Pluvialis apricaria*. The application represented the largest development of its kind in a Natura 2000 site.

The planning application predicted a number of adverse impacts on habitats, resulting in reduced numbers of field voles *Microtus agrestis*, passerines and waders, all of which are important prey species for the SPA qualifying raptors. A package of measures to mitigate these impacts in an adjacent 10 km^2 area of moorland was proposed.

East Ayrshire Council granted planning consent in 2004, subject to several planning conditions, including setting up a management group, formed of representatives of the Council, Scottish Natural Heritage, RSPB and Scottish Coal, to oversee the implementation of mitigation management.

The mitigation area

The mitigation area, located at an altitude of 230-430 m above sea level, consisted of six compartments (NS665235, Figure 1). These could be divided into two gross habitat categories: degraded bog dominated by purple moor-grass *Molinia caerulea* with smaller areas of hare's-tail cottongrass *Eriophorum vaginatum*,

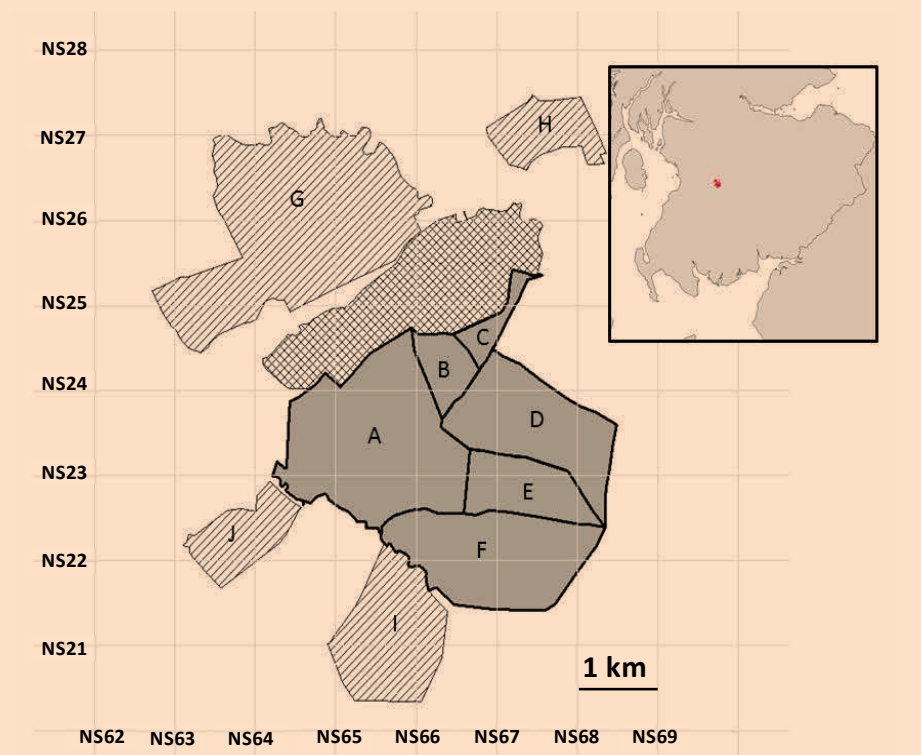

Figure 1. Mitigation area: the dark grey areas represent the compartments making up the mitigation area (A-C: degraded bog, D-F: intact bog and mosaics), the cross-hatched area the Powharnal mine and the hatched areas represent additional compartments that were added subsequently to mitigate impacts of a revised working method (not considered here). The inset shows the location in south-west Scotland.

The management group therefore agreed the following mitigation measures:

- grazing reduction to encourage ericaceous vegetation
- creation of 88 small wetland scrapes (< 20 m^2 in size) to enhance invertebrate availability
- installation of 115 peat dams to block drains and restore the hydrological integrity of adjacent mires
- cutting of grass-dominated areas in winter to diversify sward structure for field voles and ground-nesting birds
- burning/cutting of heather in winter to enhance the feeding resource for red grouse *Lagopus lagopus*
- legal control of crows, foxes and mustelids to reduce predation of ground-nesting birds.

Grazing reduction and wetland creation were implemented in 2002-2003 prior to planning consent being granted. Grass and heather cutting/burning was carried out from 2003, while predator control was continued in the mitigation area from 2004.

equivalent to NVC communities M20b and M25b (compartments A-C, 45% of the area) and intact blanket bog of heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix* and hare's-tail cottongrass, equivalent to the M19a, M19b and H12a NVC communities, along with various mosaics of degraded bog, flush and rush pasture (compartments D to F, 55%).

Mitigation management

The aim of mitigation management was to maintain/enhance the habitats in the mitigation area to increase prey numbers for raptors during the 20 years of mining operations.

A condition assessment of the mitigation area highlighted an unsustainably high grazing pressure, lack of heterogeneity of heather and scarcity of wetlands. The frequency of heather burning declined after 2001. Predator control was carried out as an integral part of moorland management for grouse shooting but due to habitat degradation and a drop in economic viability it was abandoned on the surrounding moor in 2004.

Left: cut heather with re-growth; right: untreated heather. © Tim Elliott

Botanical Monitoring

Botanical monitoring from 2003-2011 was based on a total of 89 fixed quadrats located across the six compartments. At each location, measures of vegetation structure (height, density and tussock frequency), indicator species (heather, cross-leaved heath, purple moor-grass, hare's-tail cottongrass, deer-grass *Trichophorum germanicum*, rushes and *Sphagna*) and the prevalent growth form of heather were made annually in August following established methodologies (Pearce-Higgins and Grant 2006).

Ornithological Monitoring

Three survey methods were used between 2002-2011 to estimate populations of all bird species within the mitigation area with emphasis on prey species of SPA qualifying raptors: (i) four constant-effort searches during April to June targeting waders and less abundant passerines (Brown and Shepherd 1993, Calladine *et al*. 2009), (ii) surveys from transects 500 m apart in May and June targeting the most abundant species, i.e. skylark *Alauda arvensis* and meadow pipit *Anthus pratensis*, (iii) post-breeding population estimates of red grouse sampled from the same transects during late July-early August using pointer dogs.

Data Analysis

Changes in bird numbers relative to the initial 2002 dataset (collected prior to the start of mining) could be due to management interventions, weather (especially important in upland environments) or similar unpredictable processes. To account for this, data from the national Breeding Bird Survey (BBS) monitoring scheme were used as a reference against which changes in indices of abundance from the different datasets collected in the mitigation area during 2002-2011 were compared (for full details, see Calladine *et al*. 2014). Biases associated with a particular survey method can be expected to be constant over time, which validates comparing changes in indices of abundance as opposed to changes in density estimates. Since the uplands of Scotland are poorly represented in the BBS dataset, 30-32 additional pairs of 1-km squares selected randomly from comparable moorland habitat within south-west Scotland were surveyed. These were used to augment the BBS dataset and strengthen its predictive power as a reference for expected change directly relevant to the mitigation area. Altogether, data from 474 reference squares from across Scotland, northern England and Northern Ireland (together called the reference area) were used (Figure 2).

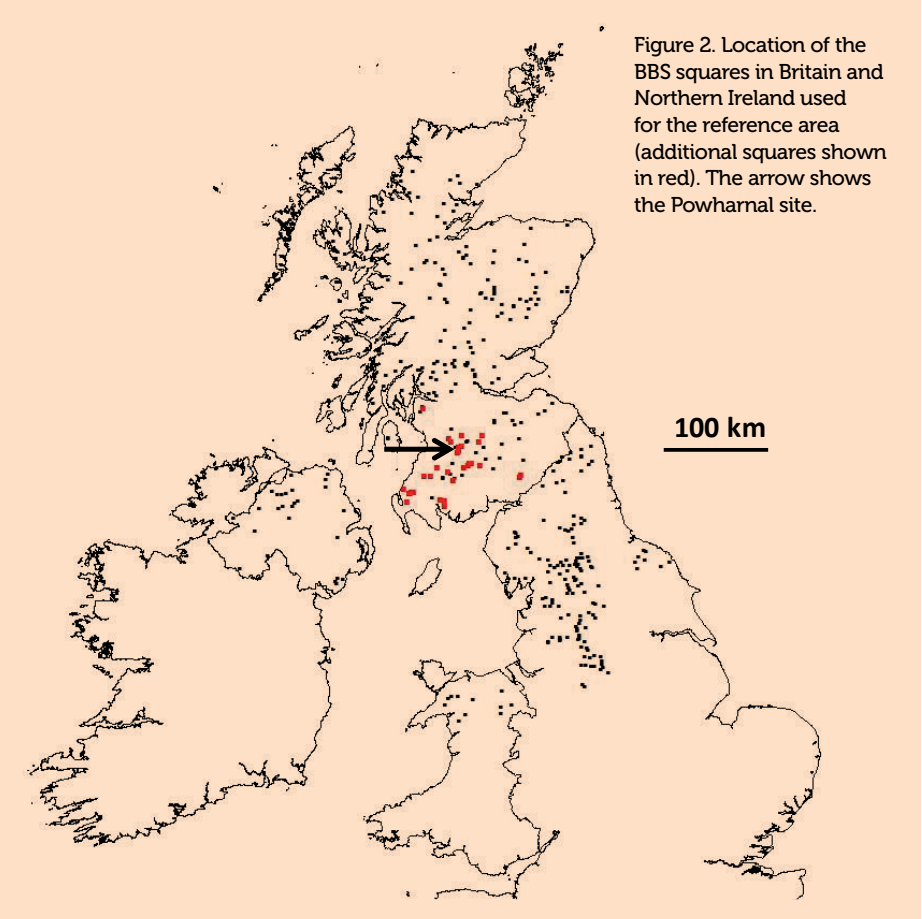

Figure 2. Location of the BBS squares in Britain and Northern Ireland used for the reference area (additional squares shown in red). The arrow shows the Powharnal site.

Results

Nine species (carrion crow *Corvus corone*, curlew *Numenius arquata*, golden plover, meadow pipit, red grouse, skylark, snipe *Gallinago gallinago*, stonechat *Saxicola rubicola*, wren *Troglodytes troglodytes*) were sufficiently abundant in the mitigation area to allow a comparative assessment of population trends during the

Meadow pipit. © Anne Cotton

period 2002-2011 and an assessment of associations with the vegetation metrics.

Numbers of the nine species varied, sometimes markedly, during the study period. Overall, stonechat and (non-breeding) carrion crow increased more significantly in the mitigation area than in the reference area. Red grouse, skylark and meadow pipit showed a more negative trend. Curlew, golden plover, snipe, wren and the scarcer species breeding in the mitigation area showed no significant differences, with indications that golden plover did not decline as markedly as in the reference data, while the opposite was true of snipe.

There were no detectable changes in any of the three vegetation metrics across the compartments. Compartment E, dominated by heather, showed a declining trend in the structure metric, indicating a development towards taller and more tussocky grass cover. No consistent trends were evident in individual compartments for the indicator species and heather growth form metrics.

Discussion

After 10 years the monitoring programmes provided evidence that, while further degradation of habitats had been halted, mitigation management had not resulted in the predicted increases in breeding densities of the main prey species of the SPA qualifying raptors. Factors that might have caused this lack of success are considered below.

Potential of populations to increase

The mitigation area was part of a wider area that had been surveyed in 1989 using the same constant-effort survey method but with only two visits. Taking into account the factors by which species are under-estimated on two as compared to four visits (Calladine *et al*. 2009), the mitigation area was estimated to have supported three times as many breeding curlews in 1989 as during the period 2002-11, while counts of golden plover and snipe were similar to the maxima recorded between 2002-11. No comparable figures existed for other species. The mitigation area thus had at least some potential to support higher numbers of birds.

Carrion crow. © Anne Cotton

Appropriateness of the management prescriptions

It is possible that the management prescriptions were inadequate for the mitigation area, insufficient or had not been implemented for long enough.

Botanical monitoring showed that habitat condition had stabilized overall. Although there was limited potential for some breeding bird populations to increase, the fact that three species actually declined is surprising. This and the fact that there were no consistent trends in the populations of different species makes it unlikely that vegetation management was a primary cause driving changes in bird populations.

Size of the mitigation area

It is possible that the mitigation area at 10 km^2 was too small to support the predicted increases in bird densities. However, Fletcher *et a*l. (2010) showed that experimental predator control on similar-sized moorland blocks (9.3-14.4 km^2) in Northumberland led to increases in the numbers of breeding red grouse, curlew and golden plover. This implies that increases in some bird populations in a moorland area of the scale of Powharnal would be feasible with appropriate management.

Predation by raptors and owls

Predation by raptors and owls can lead to reductions in the numbers of breeding red grouse, skylark and meadow pipit (Baines *et al*. 2008, Park *et al*. 2008). Since the mitigation area was part of an SPA designated for breeding raptors and owls, predation by these species could have counteracted any increases resulting from mitigation management. However, breeding numbers of raptors and owls decreased in the mitigation area during the 10-year study period in line with similar or higher declines across the SPA. Therefore, predation by SPA qualifying species is highly unlikely to have driven population reductions of their main prey species in the mitigation area.

Management of the surrounding area

The land surrounding the mitigation area consisted of the Powharnal mine (from 2003 onwards), enclosed pasture and an active grouse moor (until 2004). Given opposite trends – red grouse numbers declined more in proximity to the surface mine than further away, while skylark and meadow pipit numbers did the opposite – it is unlikely that disturbance from the mine led to overall significant declines in breeding bird populations.

There was no evidence of major changes in management (e.g. grazing regimes) of agricultural land surrounding the site. In contrast, management of the adjacent grouse moor stopped in 2004. Managed grouse moors where muirburn and predator control take place can support higher densities of red grouse, curlew

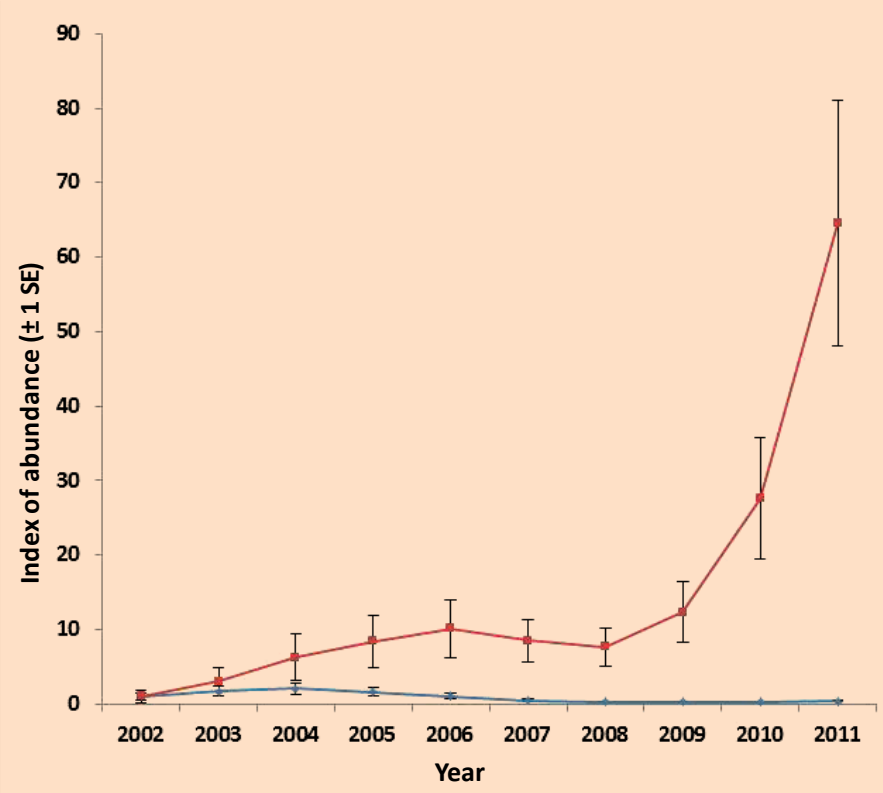

Figure 3. Indices (± 1 SE) of carrion crow abundance 2002-2011 measured in the mitigation area (red line) and as predicted from the reference area (blue line). The indices show change in abundance relative to a baseline in 2002 (index = 1).

and golden plover than unmanaged areas (Tharme *et al*. 2001, Fletcher *et al*. 2010). Although the mitigation area was large enough, in principle, to support higher densities of at least some species, the lack of response from the breeding bird assemblage might in part be attributed to the change in moorland management in the surrounding area.

Predator control

Predation has been shown to be a cause of declines in upland populations of curlew, golden plover and lapwing (Fletcher *et al*. 2010). The index of carrion crow abundance in the mitigation area increased markedly relative to that recorded in the reference area, while there was no corresponding increase in the numbers shot in the mitigation area (Figure 3).

Crows formed about half of the mean annual predator cull during 2004-2011. Given the low numbers of other predators (foxes *Vulpes vulpes*, weasels *Mustela nivalis*, stoats *Mustela erminea*, American mink *Neovison vison*), it was not possible to assess the effectiveness of control on these species but, even assuming sufficient numbers were removed to have an effect on breeding birds, ineffective removal of crows remains the most plausible factor that prevented the desired outcomes.

Conclusion

This 10-year study highlights practical difficulties in implementing effective management for moorland birds. Monitoring provided robust quantitative evidence for the lack of effectiveness of a suite of widely recommended management prescriptions to increase numbers of common upland breeding birds.

The monitoring programme was not designed as a controlled experiment and causal relationships can therefore not be inferred. Nonetheless, elimination of other factors points to the abandonment of predator control in the surrounding area and ineffective implementation in the mitigation area as the most likely causes.

In addition to adding to the body of evidence for measuring ecological impacts called for by Hill and Arnold (2012), the findings have ramifications for wider moorland management. While upland agri-environment schemes, which commonly include some of the management interventions used at Powharnal, are widely implemented, moorland birds continue to decline (Balmer *et al*. 2013).

Agri-environment schemes and mitigation/compensation management associated with windfarms and hydro-scheme developments in upland areas may not be realistic in the absence of effective predator control, including on surrounding land.

Public bodies have a duty to further biodiversity under the Nature Conservation (Scotland) Act 2004 and the Natural Environment and Rural Communities Act 2006 and a recent analysis of opencast coal restoration stresses the need for effective compliance and competent monitoring (Scottish Government 2015). The findings of this study raise further questions about the effectiveness of the planning system in delivering such outcomes.

To be effective, planning conditions should be based on empirical evidence. However, such evidence is not always available. At Powharnal, as is commonly the case elsewhere, the expertise of management group members, expert opinion, existing guidance and best practice were used instead. This study was part of a 10-year review of the effectiveness of the mitigation programme, shortly before Scottish Coal went into liquidation in 2013 and all operations, including mitigation management, came to a halt.

While mitigation management at Powharnal may not have been effective in achieving the desired outcomes, it would not have been possible to reach this conclusion without the robust monitoring programmes in place, arguably one of the successes at Powharnal.

Key to the delivery of planning commitments and biodiversity enhancements, especially where there is no empirical precedent, is robust monitoring, as deployed in this case study, that is capable of objectively informing adaptive management, as opposed to merely documenting its implementation.

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This article is based on the paper by Calladine *et al*. (2014) published in *Bird Study* to which the reader is referred for further details. A copy of the article is available from the lead author (john.calladine@bto.org).

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Left. Heather moorland. © Anne Cotton

Evidence of Benefit to Breeding Birds from Blanket Bog Restoration at Dove Stone in the Peak District National Park

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Keywords: blanket bog restoration, conservation, management, moorland wading bird populations, Upland Breeding Bird Survey

A nine-year programme of peatland restoration in the Peak District National Park has led to increases in moorland bird populations, notably golden plover *Pluvialis apricaria* and dunlin *Calidris alpina*. Evidence suggests that these increases are associated with re-vegetation of bare peat and work to raise the water table.

Golden plover. Photo credit: Geoff Carr

Background

The 4,000 ha site at Dove Stone in the north-west of the Peak District National Park is owned by United Utilities as water catchment and has been managed in partnership with RSPB since 2010. It forms part of the Dark Peak SSSI and the European protected sites Natura network South Pennine Moors Special Area of Conservation/Special Protection Area, designated for its extensive semi-natural moorland habitats and populations of breeding moorland birds. Blanket bog is the dominant habitat covering 2,500 ha within a mosaic of heathland and grassland communities that are associated with the moorland edge and steep valleys. All of the study area is fairly level blanket bog lying above 500 m. Like much of the South Pennine peatland, it has been severely degraded through the 19th and 20th centuries by a combination of atmospheric pollution, over-grazing and damaging fires. This led to the almost complete loss of natural *Sphagnum* moss cover and subsequent peat erosion across extensive areas, at worst leaving completely bare peat. Over 120 km of erosion gullies have developed, with the drier peat between gullies supporting a modified vegetation community with increased bilberry *Vaccinium myrtillus* and crowberry *Empetrum nigrum*. Across non-eroded peatland, the original diverse blanket bog plant assemblage has been reduced to species-poor vegetation dominated by cottongrass; primarily hares-tail cottongrass *Eriophorum vaginatum* but also common cottongrass *Eriophorum angustifolium* associated with wetter conditions – the ubiquitous 'Featherbed Moss' community of the South Pennines. None of the blanket bog is in Favourable SSSI Condition but is categorised as recovering.

The decline in dunlin in the Peak District

Whilst habitat condition has been in decline for over 150 years (Moss 1913), there is more recent evidence of significant

Figure 1. An eroding gully at Dove Stone in the Peak District in 2012. Photo credit: Geoff Carr

peat loss and drying of these former wetlands (http://www.moorsforthefuture.org.uk/conservation-and-land-management) (Figure 1). This is the likely cause of a decline in numbers and range of dunlin, the wader most associated with wetter blanket bog, since the 1970s (Yalden 1974). In 1972, Yalden (1974) recorded 140 pairs of dunlin and presence in 90 kilometre squares; in 1990/91, this had dropped to 92 dunlin pairs in 52 kilometre squares (1990/91 Peak District Moorland Bird Survey); by 2004, just 68 pairs were recorded in 32 kilometre squares (2004 Peak District Moorland Bird Survey). This significant decline led to concerns that the dunlin was heading towards local extinction (Pearce-Higgins *et al.* 2006). The decline across the Peak District was mirrored at Dove Stone.

Peatland restoration at Dove Stone

Since 2007, large-scale conservation initiatives have been implemented, initially through United Utilities' Sustainable Catchment Management Programme (SCaMP) and ESA schemes. Sheep grazing has been excluded from about two thirds of the blanket bog, and densities have been reduced on the remaining area.

Over 100 ha of bare peat was re-vegetated between 2008 and 2010. This included annual application of lime and fertiliser by helicopter to raise the pH of the ultra-acidic bare peat and encourage plant growth. A grass seed mix, predominately commercial amenity species, was also spread by helicopter, which developed quickly, establishing vegetation that could then be colonized by native species. At the same time, heather brash sourced from lower moorland on site was spread over bare areas to introduce heather seed and provide a mulch to promote vegetative growth.

Work has continued since 2010 through the RSPB/United Utilities Dove Stone Partnership using both stone and heather bales to block gullies in order to raise water tables, reduce erosion and promote re-vegetation of eroding bog (Figure 2). Stone dams have been installed in more than 12 km of erosion gully and heather bales (produced on site – similar to traditional small hay bales) have been used to raise the water table in over 50 ha of formerly eroding peat pan (relatively flat areas of erosion). Colonisation by bryophytes, including localised *Sphagnum* recovery, and by both cottongrass species, has been rapid.

Bringing back *Sphagnum*

Sphagnum mosses are beginning to increase in abundance in some areas, primarily in the wetter margins of the bog and some of the gully systems, but large areas have little or no *Sphagnum* presence. A key conservation target is therefore the continued natural spread and re-introduction of *Sphagnum* in order to restore active *Sphagnum*-rich blanket bog across significant areas. Natural recovery is dominated by 'flush' *Sphagnum* species, *Sphagnum fimbriatum* and *S. fallax*, with lesser amounts of *S. palustre, S. papillosum* and *S. subnitens*.

Trials of a range of methods of *Sphagnum* spreading found that hand planting of *Sphagnum* clumps into wetter areas was most effective. While *Sphagnum* can grow from small fragments, intact clumps of *Sphagnum* planted in direct contact with wet peat, but protected by vegetation, have proved resilient in dry periods. *Sphagnum* introduced to bare peat almost always disappears because the peat is still mobile. *Sphagnum* is harvested in a sustainable manner taking 5-10 c. 10cm^2 clumps/m^2, using both on-site donor areas, and non-SSSI sites from Bowland, North Pennines, and from Southern Scotland. On-site sources around bog margins and in gullies provide 'flush' *Sphagnum* species, mostly *S. fimbriatum*, and other sites have provided typical bog *Sphagnum* species such as *S. magellanicum, S. papillosum* and *S. capillifolium*. Currently *Sphagnum* is being introduced at a rate of 1,250 hand clumps/ha, a pragmatic approach to establishing *Sphagnum* presence. Hand-planted clumps are establishing well. A sample of clumps introduced into wetter

Dunlin eggs hatching. Photo credit: Geoff Carr

restoration areas in spring 2012 had grown to c. 50 cm^2 on average by spring 2016. This indicates that over the four-year period there was in the region of 5 cm of radial growth of the clumps each year. Re-introduction in combination with natural processes is beginning to deliver an increased *Sphagnum* presence, though the actual amount of *Sphagnum* cover remains very low – on-going monitoring work should give some indication of cover.

Water quality

There is evidence of a marked reduction in Particulate Organic Carbon (POC) following restoration work. Reductions in the high levels of Dissolved Organic Carbon (DOC) associated with a degraded peatland have yet to be seen, but the upward trajectory in increasing colour has slowed. (For further detail on water quality monitoring carried out for United Utilities by Penny Anderson Associates please see http://corporate.unitedutilities.com/documents/SCaMP_Final_Report_Updated_Dec_2015.pdf.)

Response of breeding moorland birds to restoration

Golden plover, dunlin and curlew *Numenius arquata* have increased on the blanket bog since the initiation of conservation-led management. The numbers of the three species combined have risen from 75 pairs in 1990 to 175 pairs in 2014 with the largest increase occurring between 2010 and 2014 during water table management. This contrasts with the probable decline in golden plover and moderate declines in curlew in England reported by the BTO over the same period (see http://app.bto.org/birdtrends/species.jsp?s=curle&year=2015). For dunlin, a clear decline in range in England is evident from the 2007-2011 Bird Atlas (Balmer *et al*. 2013). As well as increases in wading birds at Dove Stone, red grouse *Lagopus lagopus* increased by 20% and skylark *Alauda arvensis* by 170% between 2010 and 2014. The increases in dunlin are most welcome, and show a real reversal in fortunes (Table 1).

Golden plover nest. Photo credit: Geoff Carr

Table 1. Pairs of dunlin recorded in full site surveys of 2,500 ha blanket bog at Dove Stone.

Year	Pairs dunlin
1972	23
1990	15
2004	8
2010	15
2015	43

The increase in numbers of wading birds recorded at Dove Stone has been most apparent in areas where large-scale water table restoration work is underway. There have also been increases in less-eroded, intact blanket bog along watersheds where water tables have generally been maintained.

Golden plover breeding productivity study

Between 2011 and 2013, a detailed golden plover breeding survey was carried out over a 200-ha area, where territories were mapped and fledged young were counted (Carr and O'Hara 2015). Numbers increased over the three years, from 12 pairs in 2011 to 25 pairs in 2013, averaging 1.22 fledglings per pair over three years. This compares favourably with data from the late 1990s, which reported 0.57 fledglings per pair, consistent with a stable population (Pearce-Higgins and Yalden 2003).

Figure 2. Water table restoration at Dove Stone between 2010 and 2014 using heather bales. Photo credit: Geoff Carr

Dunlin. Photo credit: Geoff Carr

The importance of wet ground and *Sphagnum* for moorland birds

Yalden and Pearce-Higgins (1997) found evidence of a number of potential drivers of population change in golden plover. These included winter mortality following prolonged cold winters, phenological mismatch between golden plover hatching and the emergence of a key chick food (cranefly *Tipulid* spp.), due to warmer springs, and a link between dry August weather and golden plover numbers two years later.

Craneflies are known to be the most important food supply of many moorland birds. Research has shown that high water tables and the presence of *Sphagnum* helps summer survival of cranefly eggs and larvae, particularly in drier summers. There is evidence for golden plover, dunlin and red grouse that the abundance of emerging adult cranefly in spring affects chick survival rates and subsequent breeding population the following spring (Carroll *et al*. 2015). So, initiatives to restore water tables and make peat wetter by blocking drainage grips and erosion gullies should make the habitat less susceptible to drying out and benefit *Tipulid* populations.

Restoration of degraded blanket bog is a long-term process and the work reported in this article is still in the early stages. However, monitoring at Dove Stone has shown that positive changes can take place relatively quickly with moorland birds responding to management aimed at re-vegetating and re-wetting areas of peat.

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Notes

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The Cloud-Living Spider: Monitoring Invertebrate Diversity in the Uplands

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Keywords: invertebrates, mires, *Sphagnum*, spiders, vegetation community

Male *Semljicola caliginosus* (habitus) taken in a pitfall trap, Bull Bogs. © David Bodenham (Ecosapiens)

Line of pitfall traps (red flags) on edge of bog-pool, Great Shunner Fell.

Surveys focussing on a very rare money-spider and its associated arachnid assemblage in the uplands highlight the need to consider invertebrates more widely when considering habitat management or monitoring.

Introduction

The cloud-living spider *Semljicola caliginosus* is one of the UK's more mysterious species. It numbers among the 31 species of arachnid included in England's list of Species of Principal Importance and is a Section 41 species (BRIG (Biodiversity Reporting and Information Group) 2007), having declined by 78% over 25 years (JNCC (Joint Nature Conservation Committee) 2010).

The spider was the focus of a three-year study under Natural England's Species Recovery Programme, whose aim is to reverse the decline of some of England's most threatened fauna and flora. Surveys were conducted in upland areas within Yorkshire and Northumberland from

2013 to 2015 to map the spider's current distribution and understand more about its ecological requirements. The surveys also recorded other rare spider species, including *Minicia marginella*, which previously had only one UK record.

This project has wider relevance: first, by demonstrating that the presence of invertebrates of nature conservation significance can potentially serve as indicators of success for upland habitat restoration and management; and second, by highlighting that some widespread and seemingly uninteresting habitats such as *Sphagnum* seepage lines (see below) are capable of supporting noteworthy invertebrate assemblages.

Distribution of the cloud-living spider

Semljicola caliginosus is a typical money-spider (Araneae, Linyphiidae) being a uniform light to darkish brown and attaining a length, excluding leg-span, of approximately 2 mm. All *Semljicola* species occur at > 40° N (predominantly 50° - 70° N) in Europe, Asia and North America in the hypoarctic belt at the latitudinal range of the tundra and taiga (Saaristo and Eskov 1996, Gao *et al*. 1993), and are associated with cold climates. *Semljicola caliginosus* is the southernmost of the 14 species currently assigned to the genus and it may be that the wet conditions experienced within the low 50° N latitudes buffer the relatively warmer air temperatures.

The UK supports a significant percentage of the global population of *S. caliginosus* but climate change and inappropriate management across the uplands may be having a significant negative effect on the species' distribution within England and possibly the UK.

Semljicola caliginosus was first described in the UK from two specimens collected on the moors above Marsden, near Huddersfield in West Yorkshire (Falconer 1910). Since then, it is thought to have been restricted to a cluster of upland sites in north-west England and a few scattered locations throughout Scotland. At northern latitudes, it has also been recorded close to sea-level. It was reported from northern Russia in the 1980s (Tanasevitch and Koponen 2006) and from Norway in 2012 (Kjetil Åkra, pers comm); prior to these reports it was believed to be endemic to the UK, with England and Scotland holding globally important populations. Other than a cluster of records from the 1970s and 1980s, there are only five records since 2000. Table 1 summarises all the known records in the UK since 1992 (Holmes 1992) and earlier records relating to the Yorkshire study sites from (Horsfield 1982).

The species' detailed ecology is very poorly understood though some general inferences can be made. Falconer (1910) collected it from rushes (*Juncus* spp.), and some inference of habitat can be made from a site's name (e.g. Tarn Moss, Malham). Horsfield (1982) reported *S. caliginosus* from *Sphagnum*-rich communities collected in summer 1980 from various sites in the Yorkshire Dales but no detail was published. Subsequent correspondence yielded limited additional information (see Table 1).

Table 1. Recent records of *S. caliginosus* in the UK (1980 – 2011)

Location	Vice-county & Hectad	Year/ Period	Habitat	Altitude
Insh Marshes National Nature Reserve	96: East Inverness-shire; NH 80	1996; 2000-2002	Wetland vegetation; *Sphagnum* amongst sedge	230 m
River Ythan, c. 3 km east of Ellon	93: North Aberdeenshire; NY 92	2011	Reedbed litter on edge of estuary	5 m
Bull Bogs, Muker Common, nr. Thwaite	65: North-west Yorkshire; SD 89	2003	Amongst *Sphagnum* and rushes	530 m
Baugh Fell, nr. Sedburgh	65: North-west Yorkshire; SD 79	2009	Edge of *Sphagnum* bog-pool	615 m
Angram Common, nr. Sedburgh	65: North-west Yorkshire; SD 89	2009	Edge of *Sphagnum* bog-pool	630 m
Stowerhill Moss, nr. Haltwhistle	67: South Northumberland; NY 67	1992	Community similar to the M17 *Scirpus cespitosus – Eriophorum vaginatum* [deer-grass – hare's-tail cottongrass] blanket mire	300 m
Little Watch Moss, nr. Haltwhistle	67: South Northumberland; NY 67	1992		300 m
Great Whernside, nr. Kettlewell	64: Mid-west Yorkshire; SD 97	1980	M6c *Carex echinata – Sphagnum recurvum/ auriculatum* [star sedge – flat-topped bog-moss/ cow-horn bog-moss] mire, *Juncus effusus* (soft rush) sub-community (Rodwell 1991)	550 m
Great Shunner Fell, nr. Thwaite	65: North-west Yorkshire; SD 89	1980		c. 700 m
Pen-y-Ghent, nr. Horton-in-Ribblesdale	64: Mid-west Yorkshire; SD 87	1980		700 m
Greensett Moss, nr. Ribblesdale	64: Mid-west Yorkshire; SD 87	1980		600 m
Starbotton Fell, nr. Starbotton	64: Mid-west Yorkshire; SD 97	1980		600 m

Additional records appear in an internal English Nature report that informed the designation of the Lampert Mosses Site of Special Scientific Interest (SSSI) in Northumberland (Holmes 1992). Two sub-sites located within the Northumberland and Cumbrian Border Mires listed the species from mire vegetation at an altitude of around 300 m with a brief description of the community; the spider apparently is associated with wet, *Sphagnum*-rich communities with deer-grass *Scirpus cespitosus*, cross-leaved heather *Erica tetralix*, common cottongrass *Eriophorum angustifolium*, bog asphodel *Narthecium ossifragum* and crowberry *Empetrum nigrum* (see Table 1).

The common link in the uplands would appear to be the presence of abundant *Sphagnum*, often along seepage lines (sinuous channels within the mire that are dominated by a *Sphagnum* layer overlying a hydrological flow through the peat substrate), though this is not universally true. The most recent Scottish record was taken close to sea level within reedbed leaf-litter (Spider Recording Scheme database; see srs.britishspiders.org.uk). This suggests that the species' ecology is more complex than simply *Sphagnum* seepage lines at altitude.

Vacuum sampling *Sphagnum* tussocks, Butterburn Flow SSSI.

Methods

Survey sites were selected from Horsfield (1982), Holmes (1992) and the SRS database, focussing on the locations with the most recent records and most accurate data (Table 2). It is thought that *S. caliginosus* may be sexually mature and therefore identifiable to species level throughout the year (Harvey *et al*. 2002). However, to improve the chances of identifying the species correctly, surveys in 2013 and 2014 were completed between August and October, i.e. the period when the species was

Table 2. Sites surveyed for *S. caliginosus* in the UK (2013 - 2015)

Location	Region	Year(s)	Date / Period	Habitat
Buckden Pike	Yorkshire Dales	2013	August to October	Mire vegetation
Starbotton Fell		2013 & 2015	May to October	*Sphagnum* seepage line
Bull Bogs		2013 & 2015	May to October	*Sphagnum* seepage line
Great Shunner Fell		2013 & 2015	May to October	*Sphagnum* seepage line & edge of *Sphagnum* pool
Pen-y-Ghent		2013	August to October	Mire vegetation
Tarn Moss, Malham		2013	August to October	Mire vegetation
Whernside		2013 & 2015	May to October	*Sphagnum* seepage line & edge of *Sphagnum* pool
Kielder Mires	Border Mires	2014	September & October	Mire vegetation
Lampert Mosses		2014 & 2015	May to October	*Sphagnum* seepage line & mire vegetation
Spadeadam Mires		2014	September & October	*Sphagnum* seepage lines
Butterburn Flow		2014 & 2015	May to October	Mire vegetation

previously recorded. In 2015, surveys were undertaken between May and July to cover the period when most spider species are sexually mature and therefore identifiable to species level.

At each location, ten pitfall traps were set at c. 10 m intervals along a 100 m transect within *Sphagnum*-rich vegetation. Monopropylene glycol was added as a suitable preservative. Traps were serviced approximately once a month. Two timed suction surveys (c. 180 seconds) within similar habitat close to the pitfall traps using a modified garden blow-vac (G-Vac) were carried out monthly, when the pitfall traps were checked, to increase the number of samples and therefore the likelihood of recording the species. Both methods collected a significant bycatch of ground-dwelling or low-vegetation inhabiting invertebrates such as wolf-spiders (Lycosidae), jumping spiders (Salticidae), and particularly rove beetles (Coleoptera, Staphylinidae). All spiders and beetles were retained for identification to species level. Lethal methods are the only reliable means of surveying for spiders and beetles, partly due to their size and microscopic morphological features required for identification and also because of their cryptic nature. Lethal sampling has no meaningful or measurable effect on populations when undertaken responsibly (Invertebrate Link 2002). Due to the remoteness of many of the study sites, these data added to the general knowledge of spider and beetle distribution in these very under-recorded areas.

Results

Over the three years, 163 samples (52 pitfalls; 111 G-Vac) were collected from eleven locations (Table 2), yielding 4,619 specimens of 140 species. *S. caliginosus* had been recorded previously at all of the sites except Spadeadam. However, this study confirmed presence at only two sites, both in the Yorkshire Dales National Park and within the North Pennines Moors SAC and SPA (Table 3).

S. caliginosus is a rare species, representing about 3% of the total number of individuals captured at the two locations where it was recorded. The spider assemblage comprised 63 species, of which just five made up half of the numbers recorded; and twelve, including *S. caliginosus*, three-quarters of the species recorded (see Table 4).

Pitfall trap in *Sphagnum*, Greensett Moss, Whernside.

Three of these species, in addition to *S. caliginosus*, are considered to be peat bog indicator species though only *S. caliginosus* itself is considered to be stenotopic; that is, able to tolerate only small environmental changes (Boyce 2004, Scott *et al*. 2006,).

Of the two locations where *S. caliginosus* was recorded, Bull Bogs (526 m asl) consists of a winding *Sphagnum* seepage line surrounded by mire vegetation and immediately adjacent to a minor road.

By contrast, Great Shunner Fell is a massif in the north-west corner of the Yorkshire Dales National Park, and an imposing backdrop to the southern flank of Swaledale. *Semljicola caliginosus* was collected from several naturally formed drainage channels, choked with *Sphagnum* (e.g. Carr Gill; 580 m asl) and in the margins of shallow pools near the summit (Shunner Fell Rake; 660 m asl).

Across all locations, 37 peat bog indicator species were recorded together with a number of other rare species, including Species of Principal Importance. Of these, the most remarkable was *Minicia marginella*, which had previously been recorded at a single location on the south Kent coast near Dover

Sphagnum seepage line, Bull Bogs, Muker Common . Red flags mark pitfall traps.

Table 3. *S. caliginosus* as a component of the spider assemblage as recorded by all methods (2013 & 2015)

Location	No. species	No. spiders (all species)	No. *S. caliginosus*	Percentage *S. caliginosus*
Bull Bogs	40	635	26	4.0 %
Great Shunner Fell	58	655	14	2.1 %
Combined	63	1,290	49	3.1 %

Table 4. Most frequent associates of *S. caliginosus* in spider assemblage. * denotes a peat bog indicator species

Species	No. individuals	% of assemblage
Centromerita concinna	209	16.2 %
Agyneta decora	125	9.7 %
Pardosa pullata	125	9.7 %
Pirata piraticus *	108	8.4 %
Silometopus elegans *	91	7.0 %
Diplocephalus permixtus *	72	5.6 %
Bolyphantes luteolus	59	4.6 %
Metopobactrus prominulus	44	3.4 %
Bathyphantes gracilis	43	3.3 %
Alopecosa pulverulenta	42	3.3 %
Semljicola caliginosus *	40	3.1 %
Tenuiphantes tenuis	26	2.0 %
Other species	306	23.7%

in 1987 and 1991 (Snazell 1991, 1992) but not subsequently (Harvey *et al*. 2002). A single female was taken in September 2014 with 26 ♂, then a further 11 ♀ in 2015, all from Butterburn Flow SSSI in Cumbria.

Discussion

Bull Bogs and Great Shunner Fell are topographically one system, linked to each other by broadly similar habitat despite being separated by c. 2.9 km. Unfortunately, permission was not given by the shooting estates to survey potentially suitable habitat on land between the two sites (identified from aerial photography) so it is not possible to say whether the two *S. caliginosus* populations are isolated or connected. Baugh Fell and Angram Common (see Table 1) are also part of this system, which extends east-west between Garsdale and Swaledale.

The results of the 2013-2015 surveys suggest that *S. caliginosus* requires very wet *Sphagnum*, either on the edge of shallow pools in open mire, or within seepage lines where the vegetation 'floats' on the surface. The relevance of vertical structure (Horsfield 1982) remains unclear as the pool edges on Shunner Fell Rake lack this feature.

For reasons currently not understood, *S. caliginosus* was not recorded from locations that support comparable vegetation communities at similar altitudes to the two sites where the spider was found. Interestingly, a similar pattern is evident for *M. marginella*, recorded in good numbers at Butterburn Flow SSSI but absent from a similar raised mire at Coom Rigg Moss (part of the Kielder Mires SSSI complex), located approximately 4 km north of Butterburn Flow SSSI. These results demonstrate that habitat characteristics alone are not necessarily a good predictor of species presence.

Further work investigating *Sphagnum* species' distributions and structure, micro-topographical variations, acrotelm (the upper peat layer containing living plants) and peat depth, temperatures, hydrology and potentially prey species' distributions, (hypothesised to be springtails (Collembola)), is needed to help us understand the specific factors that affect spider assemblages. A combination of invertebrate and vegetation community analysis is likely to provide a more accurate picture of a site's ecological and nature conservation significance.

Relevance to ecologists and land managers

Whilst *S. caliginosus* was the focus of the study, a number of scarce or stenotopic species were also recorded whose distribution reflects subtle variations in vegetation communities, hydrology and habitat structure. It is important for ecologists and land managers to understand the significance of different invertebrate assemblages because they reflect aspects of broad habitat that vegetation community analysis often struggles to fully convey.

The apparent importance of *Sphagnum* seepage lines or bog-pool margins for *S. caliginosus* populations is a case in point. The vegetation community where *S. caliginosus* has been recorded is comparable to the M6 NVC community (Horsfield 1982). This has been defined as a widespread soligenous mire (Rodwell 1991), forming on hillsides and heads of springs but of little botanical interest (Averis *et al*. 2004). Whilst characteristic, its nature conservation value may not be fully appreciated in the absence of invertebrate surveys.

The success of habitat management, restoration, and mitigation schemes must be measured against appropriate baseline data. In upland habitats, there may be a high percentage of specialist invertebrate species, including rare species of national or even global significance. It is crucial that they are not forgotten or ignored when baseline and monitoring surveys are carried out. Solely relying on vegetation monitoring, such as the percentage cover of desirable species, is unlikely to be sufficient to gauge true success without also surveying the associated invertebrate assemblages.

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Richard Wilson specialises in invertebrate and avian ecology, with a particular interest in spiders. He is the national spider recorder for Yorkshire, County Durham and Northumberland and sits on the conservation committee of the British Arachnological Society. He is currently writing guidance on invertebrate surveys with Dr Sarah Henshall, to hopefully be endorsed by CIEEM. See his blog (http://richardwilsonecology.wordpress.com/) for information of relevance to developers, planners and ecologists.

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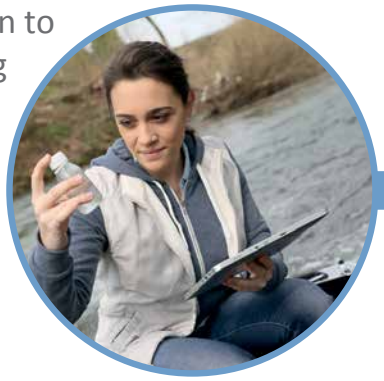

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An Innovative Approach to Landscape-Scale Peatland Restoration

Rachel Short MCIEEM and **Peter Robson CEnv MCIEEM**
ScottishPower Renewables

Keywords: drainage, forestry, peat dams, peatland restoration, wind energy

ScottishPower Renewables has undertaken extensive research into developing peatland restoration methods that are effective at a reasonable cost over a large scale. No specialist equipment is required so restoration can be used on other sites in Scotland and elsewhere using widely available plant machinery.

Introduction

Upland environments in Scotland comprise a rich mosaic of grassland, heathland, woodland and bog habitats. Many areas are subject to high rainfall and cool annual average temperatures which, when combined with suitable topography, lend themselves to the formation of peat (Lindsay 1995). The uplands are also where the wind resource is greatest, which has led to many windfarms being located in these same areas. As a result of the planning process, many upland windfarms have a commitment to restore areas of degraded peatland, often through the implementation of a Habitat Management Plan. Degradation has occurred through drainage to aid agricultural use or afforestation for commercial forestry purposes.

ScottishPower Renewables is a pioneer in the implementation of large-scale upland Habitat Management Plans within the wind industry with responsibility for 7950 hectares spread across 16 sites (as at May 2016) and a further 500 ha in the next 18 months, primarily in the Scottish uplands. Approximately half of this area comprises former commercial forestry on peatland, with the remainder mostly unplanted peatland, which has been used for grazing historically. Whilst techniques for restoring unplanted peatlands are relatively well understood (O'Brien *et al*. 2007), few practical examples of peatland restoration from commercial forestry exist (Anderson 2010). ScottishPower Renewables has carried out research to understand how forested peatlands work at a functional level, and to investigate new restoration techniques. Trials have also been undertaken to refine conventional restoration techniques on drained unplanted peatlands to identify cost savings and improvements at a practical level.

Figure 1. High density regenerating conifers at Black Law Windfarm, Central Belt, Scotland.

Afforested Peatland Restoration Methods

Understanding how heavily degraded, afforested peatland systems have been affected by past management is fundamental to achieving effective restoration. The process of planting forests on blanket bog often involves deep ploughing to create elevated ridges into which trees are planted, and furrows connected to a drain network. Left unaltered, this method has significant implications for the long-term hydrological

Figure 2. An excavator turning over a stump and root plate using the ground smoothing method.

function of peat. The furrows create localised drawdown of the water table and affect surface water movement. Moreover, the elevated ridges cause approximately 40% of the surface area to be raised above the original ground level resulting in the drying and oxidation of exposed peat that is located above the water table. As trees grow, the surface of the peatland is compressed by the weight of the trees and shading increases as branches become denser. After felling, despite light being able to reach the surface once again, the legacy of drains and furrows persist. Furthermore, there is potential for erosion on bare, exposed peat through a combination of frost, wind and water runoff.

ScottishPower Renewables has undertaken eight years of monitoring at Black Law Windfarm (Central Belt, Scotland) to investigate whether blanket bog would restore post-felling without further intervention. The results suggest that although this could occur in certain localised circumstances, the majority of deforested blanket bog will require further management to achieve restoration due to the highly degraded nature of these habitats. In addition, interventions to prevent conifer tree regeneration from seed will be necessary on sites where surface conditions remain dry.

Early trials using traditional restoration methods of ditch blocking were quickly found to be unsuccessful. The ploughed ridge/furrow surface acts as a secondary drainage network and prevents the water table being elevated close enough to the surface. In addition, the density of regenerating conifers on several sites (Figure 1) meant that a treatment was needed which dealt with both the drainage features and the regenerating trees. A number of alternative methods were trialled over winter 2010/2011 using six controlled trial blocks (0.4 ha each) of different treatment types and two untreated control blocks at a test site at Whitelee Windfarm (West Scotland) in an effort to remedy both the dry surface conditions and the increasing problem of regenerating conifer trees. The test site at Whitelee was chosen because it encompassed the range of ground conditions that needed to be addressed during the trial and also it is owned by ScottishPower Renewables, providing scope for unconstrained experimentation.

By summer 2011, a technique termed 'ground smoothing' had emerged as a promising candidate. It involves un-ploughing the ground by overturning tree stumps into existing plough furrows (Figure 2). When combined with tracking by low-ground-pressure machinery, this results in a flattened surface providing protection from erosion, whilst also burying regenerating trees (Figure 3). Monitoring over three years revealed that resulting water levels were dramatically improved (Figure 4) and conditions following treatment were particularly suited to bog vegetation

Figure 3. A trial plot immediately after ground-smoothing treatment. Note the absence of regenerating conifers within the treatment area and pools of water on the surface.

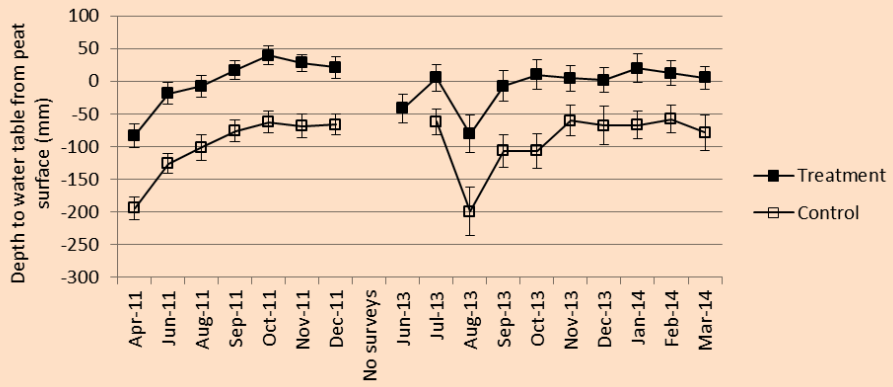

Figure 4. The mean depth (mm) to water table from the top of the peat surface over a three-year period on the "ground smoothed" treatment block compared to the untreated "control" block over the same period. Error bars indicate the 95% confidence interval from n=20 samples.

specialist species (Figure 5), which appeared to colonise treated areas at a surprisingly rapid rate (Figure 6). This method also appears to be effective in the control of regenerating trees, which fail to survive the treatment, and in the absence of further sources of seed, long-term regeneration is expected to be extremely limited.

Building on the success of the trials in 2010/11 (Cris *et al*. 2011), and a larger-scale 10-hectare trial in 2013, ground smoothing was rolled-out at a landscape scale (>100 ha) at Black Law Windfarm over winter 2014/15. A large-scale monitoring scheme is underway to investigate the environmental effects on water quality, runoff rates and erosion. The results indicate that careful planning is required to minimise the risk of adverse effects on local water chemistry, particularly dissolved organic carbon, water colour and suspended solids. Management should include:

- treating multiple smaller areas of ground at one time rather than one large area
- minimising the proportion of land treated at one time within each water catchment to help control the intensity of downstream effects
- leaving strips of land untreated to act as buffers at intervals within the treated area and at the periphery to help reduce sediment export (Figure 7)

Figure 5. The same trial plot as in Figure 3 one year after treatment showing rapid colonisation by *Eriophorum vaginatum* and *Sphagnum cuspidatum*.

Peatland restoration methods need to be commercially viable in order to be used at a large scale. Conventional peatland restoration following forestry removal, i.e. excavator-mounted tree-mulching of conifer regeneration and drain blocking, can cost in excess of £3,500/ha and still be constrained by the legacy ridge and furrow networks. The cost of using the ground smoothing method is estimated to be £500 – £900/ha.

ScottishPower Renewables will continue to undertake hydrological and vegetation monitoring of the restoration work at Black Law and Whitelee until management objectives have been reached, and plan to implement this method at other appropriate sites across their portfolio in the future.

Unplanted Peatland Restoration Methods

Conventional methods of damming existing drainage ditches in unplanted peatlands typically involve the excavation of peat from an adjacent borrow pit which is used to construct a peat dam structure (O'Brien 2007). This is time consuming (and therefore expensive at a large scale) and damaging to peatland between the dams, especially when large borrow pits are required at close spacing.

An alternative method trialled by ScottishPower Renewables uses a low-ground-pressure excavator straddling the drain and working downslope. The excavator uses the bucket to pull peat towards the machine effectively thrusting material upwards to create an elevated ridge (Figures 8 and 9). This allows the vegetated acrotelm (peat layer containing living plants) to remain relatively intact and on top of the dam reducing the amount of exposed peat. This process is repeated along the width of the drain (typically 3-5 repetitions) and is finished by compressing the top of the dam and flattening the cut-off face behind the dam to provide

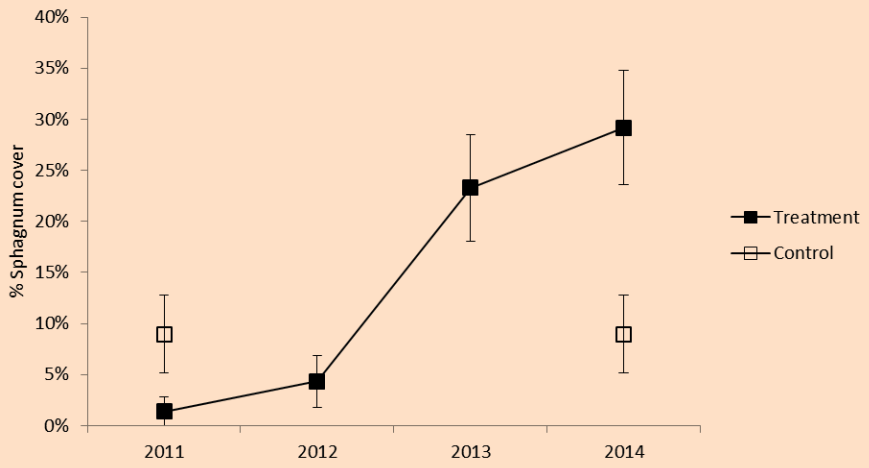

Figure 6. Change in cover of all *Sphagnum* moss after treatment compared to an adjacent control site (0.4 ha). Error bars indicate a normal approximation of 95% confidence interval for binomial data on n=252 independent trials.

an exit point for livestock. The width of the dam is important as it must be wide enough to not only ensure that the ditch itself is blocked, but also the collapsed oxidised slopes either side of the channel. This reduces the likelihood of surface water flow around the side of the dam, and encourages lateral flow to re-wet sections between drains. The height of the dam is also an important factor: ideally dam levels should be set just above the water table to reduce the risk of peat oxidisation (drying out) whilst also acting as an effective barrier. The resulting series of dams formed using this method appears like a continuous wave, leading to this method being referred to as "wave damming" (Figure 10).

Approximately 23 km of drains at Black Law Windfarm were installed in winter 2015/6 at a drain spacing of 3-4 m (depending on gradient). Visual monitoring checks after six months suggests that, so far, this technique appears to be robust with dams appearing to be inherently strong. However, long-term monitoring is ongoing to determine performance of the dams during drought conditions and stability over the long term. Ditch size is the main limitation to the use of this technique as larger ditches (typically over 1 m depth or width) may not be suited to this method due to safe machine working limits.

Conventional peat dams constructed using excavated peat typically take over 10 minutes to build depending on the size and method of construction. Conversely dams formed using the wave-damming method take less than two minutes to build, presenting a significant time and cost saving. In addition, disturbance to the surrounding peat is reduced. ScottishPower Renewables will conduct further trials with a view to implementation at a wider scale across a number of sites in Scotland in the future if the monitoring results are favourable.

Figure 7. Buffer strip of untreated land (left side) to help reduce sediment export after treatment (right side).

Figure 8. An excavator using its bucket to pull a second cube of peat towards itself. Note the first cube of peat that has already been thrust towards the machine to the right of the bucket.

Figure 9. An excavator using its bucket to compress the thrust peat material to form an elevated ridge, with vegetation remaining on the surface.

Conclusions

ScottishPower Renewables is committed to restoring over 8300 ha of peatland, both forested and unplanted. Research over the last seven years has developed restoration techniques that are both ecologically robust and economically viable over large scales. These methods use commonly available plant machinery, giving them a wide appeal. Provided mitigation measures are implemented to minimise sediment runoff in the first few years by incorporating buffer strips, and restoration planning considers any sensitivities within the receiving water catchments, there should be a reduction in cost and an increase in effectiveness of peatland restoration in Scotland and elsewhere. Good quality peatland is an important habitat in its own right and also a major carbon store, therefore techniques that make peatland restoration more effective and affordable are valuable tools in combating climate change.

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Figure 10. A finished row of wave dams holding water along a drain.

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United Utilities' SCaMP Project – A Decade of Water Quality, Hydrological and Vegetation Monitoring

Keywords: carbon, habitat restoration, hydrology, peatland, upland, water colour

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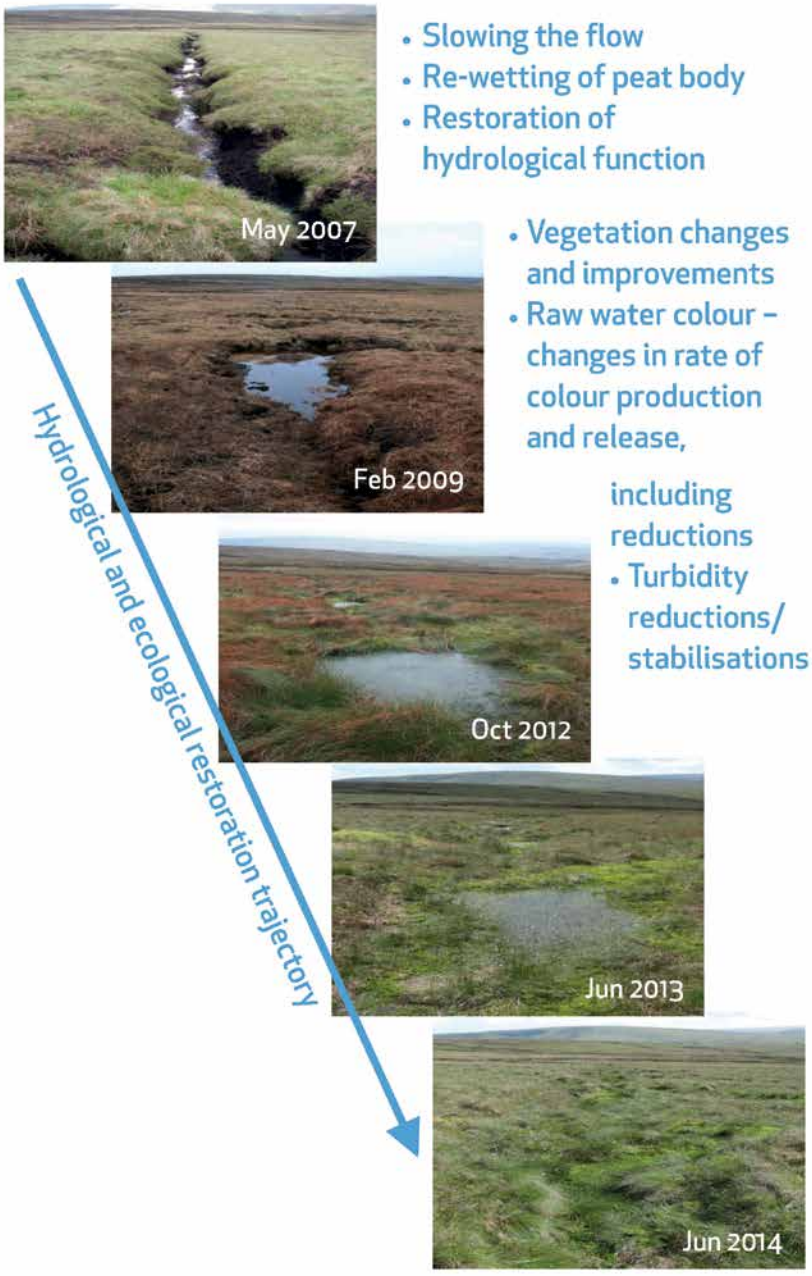
Upland catchment management, and in particular blanket bog restoration, has made significant progress over recent years. United Utilities' Sustainable Catchment Monitoring Programme is one of the first and longest-running schemes addressing the issue of integrated upland catchment management and undertaking monitoring of large-scale, blanket bog restoration techniques. Here we present key results from the water quality, hydrological and vegetation monitoring undertaken by Penny Anderson Associates Ltd on two of the estates within the SCaMP project over ten years since the project's inception.

Introduction

United Utilities' Sustainable Catchment Management Programme (SCaMP) is an innovative and large-scale project aimed at improving catchment quality in terms of nature conservation, raw drinking water quality, runoff rates, sediment load and downstream flooding, and ensuring a sustainable future for the company's agricultural tenants.



Monitoring of water quality, hydrology and vegetation responses to habitat restoration measures implemented under the SCaMP programme has been underway across a number of United Utilities' estates since 2006. The project is now in its third phase, due to complete in 2020.

Over this current phase, the role of catchment restoration measures in contributing to the management of 'raw' water colour has been a particular focus, alongside habitat restoration.

What is Raw Water Colour and why is it important?

Raw water colour is a key priority for United Utilities under their obligation to meet European Commission water quality and colour standards. On upland blanket peat catchments, Dissolved Organic Carbon (DOC) is responsible for almost 100% of the colour observed in streamwater samples and so colour is used, not only to measure water quality, but as a surrogate for DOC release in carbon budgets. Colour is more cost effective to measure than DOC and so is monitored to assess the effectiveness of restoration on water quality.

Removing colour at the processing stage can be costly and generates undesirable by-products that also need to be removed from drinking water. Fluctuations in raw water colour, as well as increasing levels, can cause water treatment plants to become inoperable when the capacity for removal is exceeded. Reducing water colour at source is therefore preferable in terms of both environmental management and drinking water quality.

Two terms are used to describe water colour. 'True colour', also known as raw water colour, is the colour after particulate matter has been removed (usually by filtration). 'Apparent colour' is what one actually sees and is the colour resulting from the combined effect of true colour and any particulate matter, or turbidity. In turbid waters, the true colour is substantially less than the apparent colour.

In natural waters, colour is due mainly to the presence of dissolved organic carbon, which originates from soil and decaying vegetable matter. These organic impurities can be deeply coloured, for example dissolved organic tannin compounds can result in dark brown colours.

Figure 1. Locations of the SCaMP monitoring project estates, North West England.

In the UK water industry, water colour has traditionally been measured using the Hazen unit (scale). Developed in the 1890s by chemist Allen Hazen (1869-1930), this colour scale's original purpose was to assist in the determination of the quality of public water supplies.

As a guide, tea has a colour of about 2500 Hazen units (HU). A true colour of 15 HU can be detected by an observer in a volume equivalent to glass of water, and a true colour of 5 HU can be detected in larger volumes of water, for instance in a white bath. A true colour of up to 25 HU would probably be acceptable to most people provided the turbidity was low. True colour is preferred analytically, as the measurement is more precise than for apparent colour, and not as dependent on site or time.

The monitoring programme

The objective of the monitoring programme is to measure and assess habitat responses to restoration measures in terms of water quality, hydrological function and vegetation community. Restoration targets include reduction or stabilisation of water colour, increasing and more stable peat water table levels, bare peat reduction and vegetation change towards the target of blanket bog community.

A number of estates within United Utilities' tenancy are included in the monitoring programme, comprising Brennand and Whitendale (both in the Forest of Bowland), along with Goyt Valley, Ashway Gap, Quiet Shepherd and Arnfield (all in the Peak District) (Figure 1).

The mechanism for implementing SCaMP restoration measures is via Farm Plans and associated agri-environment schemes. Measures include:

- Re-wetting blanket bog through 'grip blocking' (i.e. the partial infilling or damming of artificial drainage channels previously cut in the blanket peat);
- Re-vegetating bare peat using various seed sources, soil ameliorants and ground stabiliser;
- Gully blocking to enhance blanket bog condition and reduce the degradation and loss of peat;
- Removal of, or changes to, grazing stock regimes to reduce grazing pressure; and
- Changes to, or removal of, managed burning regimes.

Data collection

The following key water quality and hydrological measurements are collected at a minimum of three key locations on each estate:

- Peat water table level (every 15 minutes, using automatic *in-situ* sensors);
- Peat water temperature (every 15 minutes, using automatic, *in-situ* sensors);

- Peat water table sampling for temperature, colour and turbidity (daily), using programmed pump sampler and *in-situ* sensors;
- Catchment outlet stream-flow (water level and discharge every 15 minutes, using automatic, *in-situ* sensors and statistical rating for flow calculation);
- Stream water sampling for temperature, colour and turbidity (daily); and
- Rainfall and air temperature (every 15 minutes), using a tipping bucket rain gauge and temperature sensor, with on-board data logging.

Vegetation data are collected each monitoring year from fixed plots situated on treated areas across each estate, together with untreated reference plots where available. Plots are contained within areas of homogeneous vegetation types and are approximately 50 x 30 m. Thirty 2 x 2 m quadrats are placed randomly within each plot to measure percentage cover of all plant species, along with environmental data such as bare peat cover, vegetation height, presence of grazing, etc. Quadrats are re-randomised within each fixed plot for each monitoring year.

Results

For this article we present the key results for two estates, Goyt Valley and Brennand, where grip blocking was the primary restoration measure. Goyt Valley was a relatively intact area of blanket peat with numerous grips (artificial drains) and vegetation dominated by heather *Calluna vulgaris* and common cottongrass *Eriophorum vaginatum*. Brennand was a similar site but with an area of bare and eroding peat on the upper catchment.

A summary of the measures applied to these two estates and the monitoring regimes are presented in Tables 1 and 2. The locations of the sampling sites are shown in Figure 2 (Goyt Valley) and Figure 3 (Brennand).

Effects of restoration measures on raw water colour

Seasonal Kendall and Mann-Kendall time series statistical tests for trend were applied to raw water colour data from Goyt Valley and Brennand (Table 3). These tests allow seasonal variation to be 'factored out' of the analysis to expose any underlying direction of change.

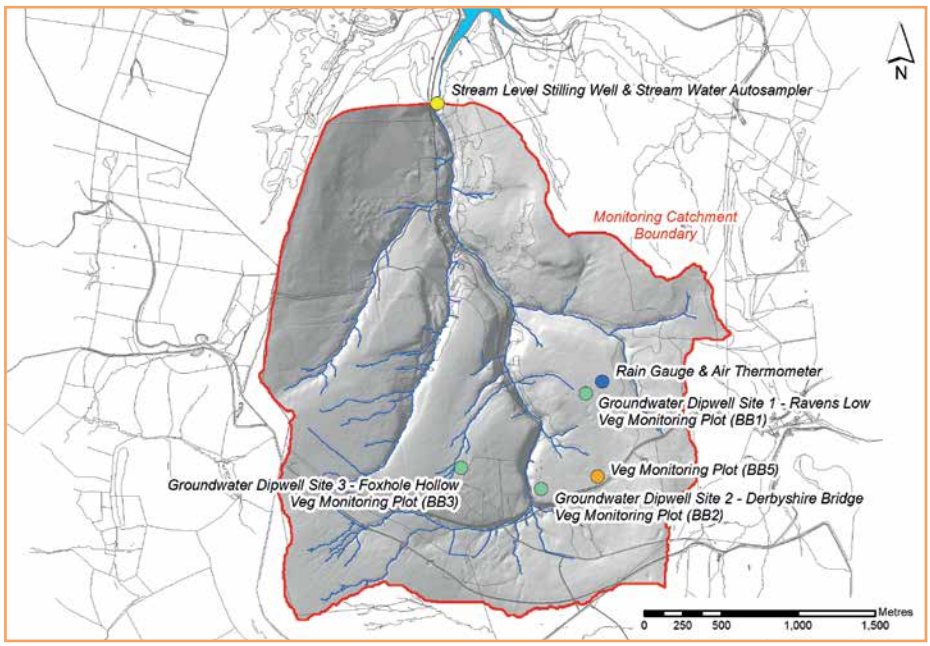


Figure 2. Goyt Valley – monitoring locations.

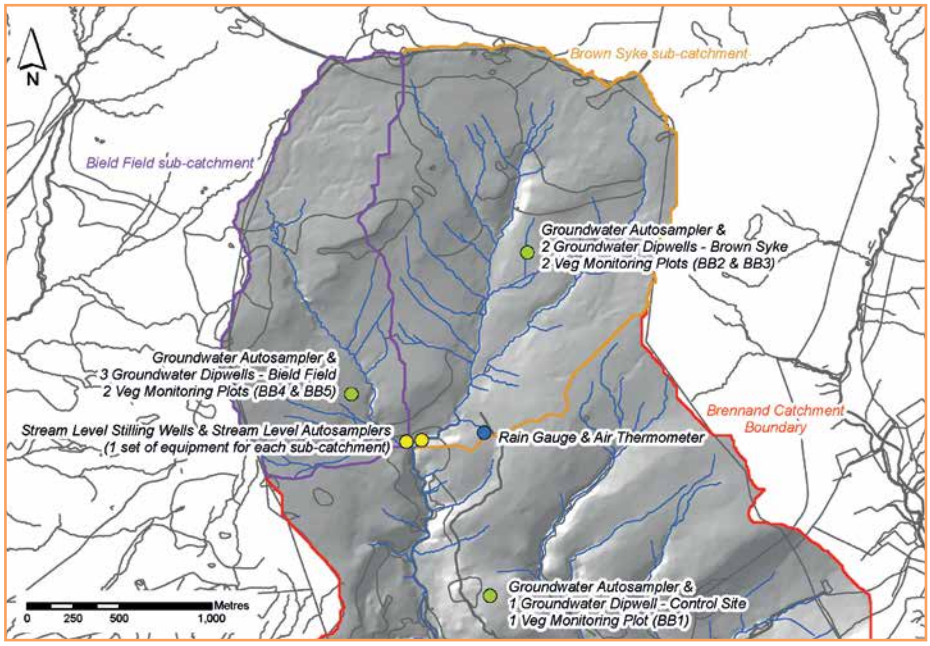


Figure 3. Brennand – monitoring locations.

At Goyt Valley, a statistically significant, long-term, decreasing trend in colour in the outlet stream was identified (Table 3). This has been achieved as a result of grip blocking (using both peat and plastic dams) across only a small area of the Goyt catchment, together with stock exclusion and cessation of burning across the wider catchment.

At Brennand, analysis identified a stationary, long-term trend in colour over the monitoring period (Table 3, Figure 4). Seasonal peak colour appears to be decreasing, as indicated by a slight reduction in the summer colour peaks year-on-year. However, considering the highly degraded nature of the blanket peat across a significant area of the catchment, the stationary trend in colour levels is a positive result. Despite these improvements, colour still remains high and the treatability of raw water from these catchments is a significant issue, as the process to reduce colour within water at the water treatment works is expensive.

Table 1. Restoration Measures and Monitoring Regimes Applied.

Estate	Restoration Measures		Monitoring Regime	
	Grip Blocking	*Additional Measures*	*Hydrology*	*Vegetation*
Goyt Valley	Plastic dams installed spring 2005, peat dams spring 2006 and spring 2007. Reference site blocked 2010.	Reduced summer grazing from 0.72 to 0.2 ewes/ha plus off-wintering. Managed burning removed.	Stream level, flow and temperature at catchment outlet into reservoir. Autosampler for stream colour and turbidity. Peat water table level at three sites. Catchment rainfall and air temperature.	5x fixed plots (labelled BB1 to BB5). 30x quadrats ($4m^2$) per plot. Monitoring completed in 2006, 2008, 2010, 2012, 2014.
Brennand	Peat dams installed November 2008 to January 2009.	Reduced sheep grazing from 1.2 to 0.485 ewes/ha April to September, and to 0.257/ha in winter. Managed burning reduced in area.	Stream level, flow and temperature at two catchment outlets (Bield Field and Brown Syke streams) Autosampler for stream colour and turbidity on both catchment streams. Peat water table level at three sites on each sub-catchment. Rainfall and air temperature.	5x fixed plots (labelled BB1 to BB5). 30x quadrats ($4m^2$) per plot. Monitoring completed in 2007 – 2010, 2012, 2014.

Response of the water table within the peat

At both Goyt (Figure 5) and Brennand, water table levels within the peat rose gradually after grip blocking, and have equilibrated over the past few years, generally remaining near to the ground surface and showing improved stability (i.e. less fluctuation) over time. These sites show a significant move towards a more favourable blanket bog hydrological regime and this is reflected in positive changes in vegetation cover, especially of peat-forming *Sphagnum* moss species.

Vegetation response to grip blocking

Change in the percentage cover of each plant species over time was assessed using the Kruskal-Wallis non-parametric analysis of variance with the Dwass-Steel-Critchlow-Fligner Test applied for *post-hoc* pairwise comparisons between individual monitoring years. Means and standard

Table 2. Restoration Treatments for Each Vegetation Monitoring Fixed Plot at the Goyt Valley and Brennand.

Estate	Fixed Plot Number	Treatment
Goyt Valley	BB1	*Treated plots:* Reduced summer grazing from 0.72 to 0.2 ewes/ha plus off-wintering, heather burning removed, grips blocked with peat dams.
	BB2	
	BB3	*Reference plot until 2010:* As for BB1 but retention of open grips and grazing reduced to 0.5 ewes/ha plus off-wintering. Blocked completely spring 2010.
	BB4	*Reference plot:* Intact blanket bog but dry site atypical of area therefore monitoring not taken forward.
	BB5	*Treated plots:* As for BB1 but additional grip blocking with plastic piling and grazing reduced to 0.5 ewes/ha plus off-wintering.
Brennand	BB1	*Reference plot:* Reduced sheep grazing from 1.2 to 0.485 ewes/ha April to Sept, and to 0.257/ha in winter. Intact blanket bog, no grips to block.
	BB2	*Treated plots on eroding catchment:* Reduced grazing as above. Selected grips blocked.
	BB3	
	BB4	*Treated plots on non-eroding catchment:* Reduced grazing as above. Selected grips blocked.
	BB5	

Table 3. Nonparametric Seasonal Kendall and Mann-Kendall Test Results for Monotonic Trend in Raw Water Colour (Spring 2006 to October 2014).

Site (out-take stream)	*Number of Observations (Measurements)*	*Approx. Mean Observations Per Year*	*Mean Observations Per Month*	*Seasonal Kendall Slope Coefficient*	*Mann-Kendall Slope Coefficient*	*P value*	*Significance*	*Trend Direction*
Goyt Valley – Stream 1	2631	310	25.8	-0.004	-0.004	*P* <0.001	>99.99%	Decreasing
Brennand – Stream 1 (Bield Field)	2133	251	20.9	-0.001	0.007	*P* =0.145	NS	Stationary
Brennand – Stream 2 (Brown Syke)	2040	240	20.0	0.005	0.000	*P* =0.183	NS	Stationary

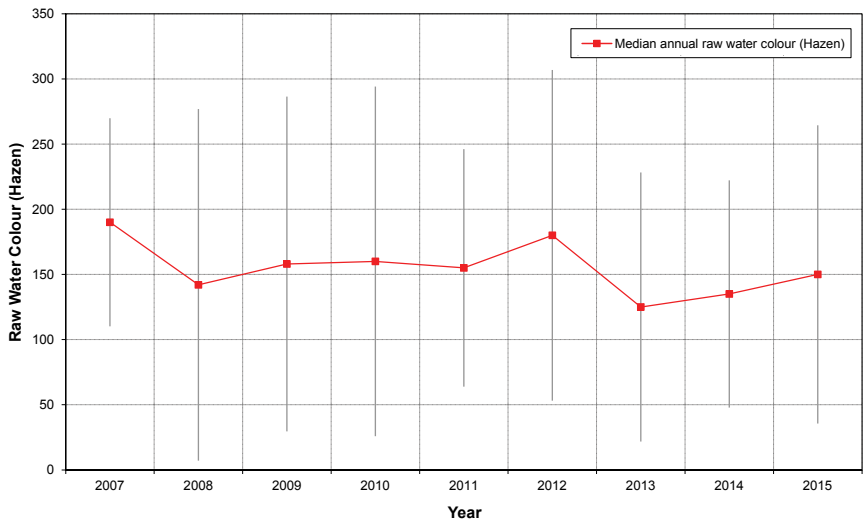


Figure 4. Measured median annual raw water colour (Hazen), observed on Brown Syke Stream, Brennand Catchment (2007 to 2015).

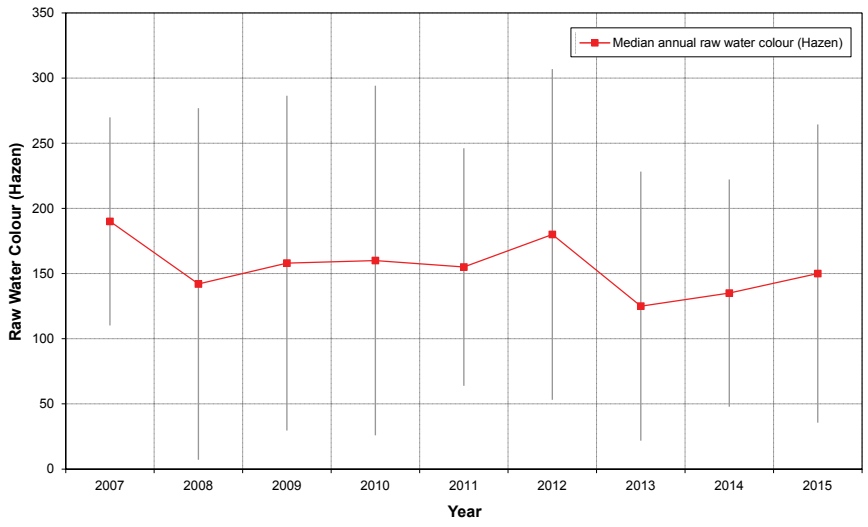


Figure 5. Median annual peat water table level (2007 to 2014) observed at Dipwell 1, Raven's Low, Upper Goyt Valley.

errors for each fixed plot (labelled BB1 to BB5 for each site) for each monitoring year are presented on the associated graphs (Figures 6 & 7).

Vegetation on Goyt and Brennand shows an increasing cover and diversity of *Sphagnum* mosses across the main blanket bog area. In addition, many of the pools formed in the blocked grips have become extensively colonised by *Sphagnum*. This expansion within grips is a common pattern seen in other peatland restoration schemes, for example in drain blocking after removal of conifers on blanket peat (Armstrong *et al.* 2010) in some of the first grips to be blocked in the North Pennines (Barrett 1997), and on Exmoor (Langton 2010) where *Sphagnum cuspidatum* increased substantially after drain blocking. Expansion of *Sphagnum* across the wider bog surface is less widely reported.

On the Goyt Valley, *Sphagnum* also shows increasing cover on the monitoring sites (fixed plots BB1 to BB3 plus BB5), although this was less noticeable at plot BB3 where grip blocking had been in place for the least amount of time (Figure 6). The wettest site (plot BB5) shows a statistically significant increase from 3% to 26% up to 2012, dropping slightly to 19% in 2014. This is largely related to increases in *Sphagnum fallax* but with additional cover and frequency of *S. fimbriatum* and *S. subnitens* in 2014, indicating diversity is also improving. Other sites (plots BB1 and BB2) also increased in *Sphagnum* cover from 1% to 10%, and this increase was significant for plot BB1. These *Sphagnum* species are typical early colonisers of damaged peatland, including areas where nutrient enrichment may be a factor (Lindsay 2010).

At Brennand, *Sphagnum* has increased to 40-50% cover on the re-wetted areas (fixed plots BB2 to BB5) – a statistically significant increase over time (Figure 7). *Sphagnum fallax* appears to be the main contributor to this, a species known to be able to expand relatively rapidly under favourable conditions. *Sphagnum papillosum*, a key peat-forming species (Lindsay 2010), also forms a significant cover, in particular at the reference site (fixed plot BB1 – this site was never drained) where there was a rapid and sustained significant increase in cover since stock reduction and changes to burning regimes. In addition, *Sphagnum capillifolium* shows a general increase in cover over time on the intact areas of blanket peat within the catchment. Overall, the monitoring results indicate that stock reduction, changes to burning regimes and re-wetting are all contributing factors to increasing *Sphagnum* cover across the site.

On both Goyt Valley and Brennand, dwarf shrubs (largely heather) showed a trend towards an initial increase in cover following changes to burning and sheep grazing regimes (2007-08) and an indication of a decline in dwarf shrub cover over the period 2008 to 2014, which may be linked to re-wetting.

Additional changes that are pertinent to blanket bog quality include a reduction in purple moor-grass *Molinia caerulea* on Goyt Valley, where this species was originally at quite a high cover on some sites (around 60% in 2006 falling to around 45% in 2014). The reductions are likely to be a result of the grip blocking, since purple moor-grass does not favour stagnant, wet peat, preferring flushed or slightly drier ground (Taylor *et al*. 2001). The Mires Restoration Project on Exmoor also found changes in purple moor-grass

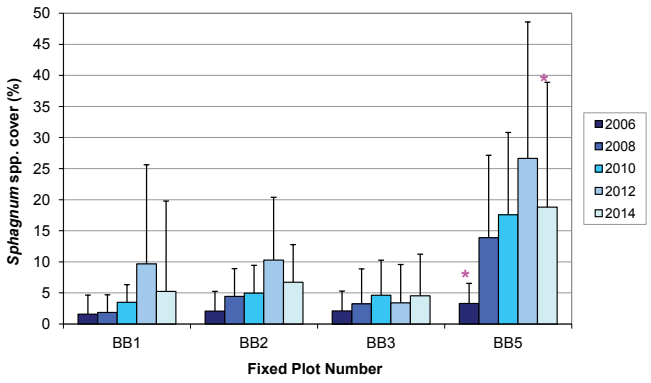


Figure 6. *Sphagnum* cover (mean and SD) on the Goyt Valley plots following restoration.

Note: All plots reduced grazing; BB1 and BB2 – peat-blocked grips from 2006; BB3 – peat-blocked grips from 2010; BB5 – plastic and peat-blocked grips from 2005. Asterisk indicates a statistically significant increase between 2006 and 2014 at the 5% level ($P<0.05$).

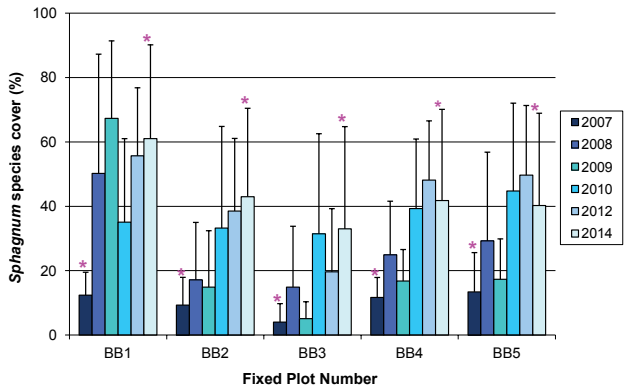


Figure 7. *Sphagnum* cover (mean and SD) at Brennand before (2007) and after (2008 onwards) restoration.

Note: BB1 – reference site; BB2 and BB3 – grips blocked, eroded catchment; BB4 and BB5 – grips blocked uneroded catchment. Asterisk indicates a statistically significant increase between 2007 and 2014 at the 5% level ($P<0.05$) or greater.

dominance and reversion to a more species-rich blanket bog community within three years of drain blocking (Smith 2009). There is an indication that on the wettest site where *Sphagnum* is recovering fastest, the purple moor-grass is declining. As a generally invasive species, this is a welcome sign of improved blanket bog condition.

Conclusions

A decade after the initial project inception, the effects of SCaMP-related restoration measures have had highly beneficial effects on water quality, hydrology and blanket bog vegetation in both Goyt Valley and Brennand and, overall, the effects are sustained. The following conclusions can be drawn:

- Colour production and delivery in streamflow appears to be largely stable or decreasing slightly within the long-term datasets. The long-term trends on SCaMP catchments appear to contradict the nationally observed increasing trend in raw water colour, observed over the past 30 years or so.
- Peat water table levels are now meeting the basic requirements for good quality, blanket bog vegetation with elevated and more consistent levels as a result of grip blocking.
- The vegetation is moving towards a more diverse blanket bog community with more of the key species present, especially *Sphagnum*, along with some other desirable blanket bog species.

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Further Reading

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The Habitats Directive, Its Implementation and Interpretation in the Irish Courts

Elva Carbery
McCann FitzGerald

Keywords: appropriate assessment, best scientific knowledge, European sites, Habitats Directive, NIS, screening

This article discusses the leading cases on the interpretation of the Habitats Directive in Ireland and the implication for ecological practitioners.

The cases set out the legal tests and requirements which practitioners should have regard to in order to comply with Article 6(2) and 6(3) of the Habitats Directive when carrying out a Stage 1 screening for appropriate assessment and a Stage 2 appropriate assessment.

The article also looks at a recent Court of Appeal decision which considered the meaning of "best scientific knowledge", first considered in the well-known Court of Justice of European Union ("CJEU") case of *Waddensee*.

Background

The Habitats Directive[1] and the Birds Directive[2] are implemented into Irish law by the Planning and Development Acts 2000 to 2015 ("Planning Act") in a planning context and more generally by the EC Natural Birds and Habitats Regulations 2011 to 2015 ("the Regulations")[3].

Both pieces of legislation set out the requirements at Stages 1 and 2 of the appropriate assessment process in order to comply with the Habitats Directive[4]. However, the Court of Justice of the European Union ("CJEU")[5] decision in

Sweetman[6] and the Irish High Court decision in *Kelly*[7] both highlight the difficulties that can arise when interpreting these requirements.

While the legislation clearly sets out a step-wise approach to these particular requirements, it does not, nor did it ever intend to, set out the precise requirements at a practical and technical level. This is set out in the EU and Department of Environment guidance documentation[8].

The Decision in Sweetman

The decision in *Sweetman* related to a court challenge to An Bord Pleanála (planning board) decision to grant permission for the development of the Galway Outer Bypass road scheme. Although decided by the CJEU in 2012, it remains a leading case on the interpretation of the requirements for carrying out an appropriate assessment. Part of the proposed road crossed the Lough Corrib Site of Community Importance (SCI) which hosts 14 Annex I habitats, six of which are priority habitat types including karstic limestone pavement. The Bypass would have resulted in permanent loss of approximately 1.47 hectares of limestone pavement from an overall area of 270 hectares of limestone pavement within the entire Lough Corrib SCI, which extends in total to approximately 25,253 hectares.

Sweetman argued that An Bord Pleanála had incorrectly interpreted Article 6 of the Habitats Directive, in concluding that the Bypass would not have an adverse effect on the integrity of the site. Initially unsuccessful in the High Court, he then appealed to the Supreme Court who decided to refer questions to the CJEU for its ruling.

In essence, the CJEU was asked to consider whether a plan or project subject to Article 6(3) of the Habitats Directive, had an "adverse effect on the integrity of the karstic limestone habitat". The application of the precautionary principle was also considered. The decision and outcome are considered further below.

Decision of the European Court of Justice

Following assessment of the impact of the Bypass on the Lough Corrib SCI, An Bord Pleanála established that it would have a locally significant negative impact on the SCI, but decided that such an impact did not adversely affect the overall integrity of the site. All parties involved agreed that the construction of the Bypass would result in the permanent, irreparable loss of part of the Lough Corrib SCI's limestone pavement – an EU Annex I priority habitat.

However, *Sweetman* argued that a negative impact of that kind (i.e. irreparable loss) would entail an adverse effect on the site's integrity. The alternative view (expressed by the other parties, including the State and the Attorney General) was that the finding of damage to that site was not necessarily incompatible with there being no adverse effects on its overall integrity (in the context of the entire Lough Corrib site).

Referring to the established principle in *Waddensee*[9], the CJEU revisited the two-stage process under Article 6(3) of the Habitats Directive. It noted that the Directive requires an assessment procedure intended to ensure, by means of a prior examination, that a plan or project not directly connected with or necessary to the management of the site concerned but likely to have a significant effect on it, is authorised only to the extent that it will not adversely affect the integrity of that site.

There is a requirement to carry out an appropriate assessment of the implications for a protected site when there is a "likelihood" that the plan or project will have a significant effect on that site.

Where a plan or project not directly connected with or necessary to the management of a site is likely to undermine the site's conservation objectives, it must be considered likely to have a significant effect on that site. Such a risk must be assessed in the light of the characteristics and specific environmental conditions of the site concerned.

A plan or project can only be authorised on condition that (following a Stage 2 Assessment[10]) it will not adversely affect the integrity of the site concerned. In considering the scope of the expression "adversely affect the integrity of the site" in its overall context the CJEU held that it must be seen as a coherent whole in the light of the conservation objectives of the European Site. In the past this presented a difficulty where the conservation objectives (COs) were not prescribed. Generic COs (based on the qualifying interests of the site) are now provided for most, if not all sites, that do not have prescribed COs and the practitioner must assess COs on this basis. Where no COs have been set for a site, either specific or generic, the practitioner must assess on the basis of qualifying features: habitats (in the light of their structure and function, conservation status, etc.); and species (populations dynamics, range and available habitat, etc.).

The trigger for appropriate assessment was also considered by the CJEU which noted that the Stage One requirement was to assess whether a plan or project is likely to have a significant effect. The CJEU determined that there was no need to establish such an effect; it was merely necessary to determine that there may be such an effect.

This case is a reminder to practitioners that the threshold at the first stage, when screening for appropriate assessment of Article 6(3), is very low. Screening operates merely as a trigger to determine whether an appropriate assessment must be undertaken.

The CJEU upheld the principal established in previous decisions that an assessment carried out under Article 6(3) of the Habitats Directive cannot have gaps and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of works or any development on concerned Nature 2000 sites. The CJEU accepted that the Bypass would result in the permanent non-renewable loss of a priority habitat and thus determined that such a loss would be an adverse one. The decision was therefore quashed and the Bypass scheme could not go ahead.

While *Sweetman* looked at the trigger for appropriate assessment, the actual findings and conclusions to be addressed in an appropriate assessment was considered in further detail in the decision in *Kelly*, discussed below.

The Decision in *Kelly*

Kelly (2014) was the first case to look at the actual detail as to what an assessment was required to conclude. It remains the leading case and in 2016 was upheld by the Court in the decision in *Balz*[11]. The decision in *Kelly* related to a court challenge to two decisions of An Bord Pleanála that granted planning permission for two windfarm developments in County Roscommon, both in the vicinity of a number of European Sites – Special Areas of Conservation and Special Protection Areas.

Two inspectors were appointed by the Board, one in respect of each development. Both recommended refusal of permission but these recommendations were not followed by the Board which granted permission in both cases.

Mr Kelly's challenge was based on a number of grounds, those relating to appropriate assessment[12] being that:

(i) the decisions to grant each planning permission were made in breach of the requirements of Article 6(3) of the Habitats Directive, and

(ii) the planning board, failed to carry out an appropriate assessment in either case in accordance with Article 6(3) and the decisions of the CJEU, or to give reasons for the determination made.

Decision of An Bord Pleanála

The decision of the Board in relation to the first development, insofar as it related to appropriate assessment, was as follows:

"The Board completed an Appropriate Assessment in relation to potential impacts on Natura 2000 sites …..the Board concluded that on the basis of the information available that the proposed development either individually or in combination with other plans or projects would not adversely affect the integrity of any European site in view of the conservation objectives of this sites.

The Board did not agree with the Inspector's conclusions……the Board considered that it could not reasonably be concluded on the basis of the information on ground conditions and other material submitted; the nature of the proposed development and the use of normal good construction practice, that the integrity of these sites would be adversely affected by the proposed development."

The decision of the Board in relation to the second development was practically identical.

Legal Basis of Appropriate Assessment

The High Court considered the requirement to carry out an appropriate assessment under Article 6 as seen in the light of previous decisions of the CJEU[13] and (in this instance) the Planning Act.

The Court summarised that to be lawfully conducted, an appropriate assessment:

(i) "Must identify, in the light of the best scientific knowledge in the field, all aspects of the development project which can, by itself or in combination with other plans or projects, affect the European site in the light of its conservation objectives. This clearly requires both examination and analysis.

(ii) Must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps. The requirement for precise and definitive findings and conclusions appears to require analysis, evaluation and decisions. Further, the reference to findings and conclusions in a scientific context requires both findings following analysis and conclusions following an evaluation each in the light of the best scientific knowledge in the field.

(iii) May only include a determination that the proposed development will not adversely affect the integrity of any relevant European site where upon the basis of complete, precise and definitive findings and conclusions made the Board decides that no reasonable scientific doubt remains as to the absence of the identified potential effects."

The Court held that the appropriate assessment carried out by the Board did not meet these criteria.

The inspector concluded that she did not consider that the applicant had provided adequate information to prove beyond reasonable scientific doubt that the project would not have adverse effects on the integrity of certain sites. An Bord Pleanála disagreed with their inspector in its decision. However, significantly, it had not provided any evidence of an assessment which included complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the proposed development on the European Sites concerned, having regard to their conservation objectives. Both decisions of An Bord Pleanála were quashed by the High Court.

The recent decision in *Balz*, which relates to the successful challenge by the applicant in judicial review proceedings to a windfarm development in County Cork, adopted the decision in *Kelly* and reaffirmed the legal test and requirements for a robust appropriate assessment.

What is now required?

On the basis of *Kelly*, in order for an appropriate assessment to be lawfully conducted, it must include an examination, analysis, evaluation, findings, conclusions, and a final determination.

Therefore to assist a competent authority, in carrying out a lawful appropriate assessment, any Natura Impact Statement (NIS) should include the wording set out in *Kelly*.

The NIS should determine that the project (alone, or in combination with other plans or projects) will not adversely affect the integrity of the European site(s) in question. This is the appropriate assessment test. The NIS can go on to say that in fact the plan or project is not likely to have significant effects on the European Site(s). However, it is important that the appropriate assessment Stage 2 test[14] conclusions are referred to in the NIS and that this is the test that is used.

The findings and conclusions reached in any NIS should be complete, precise, definitive as well as being capable of removing all reasonable scientific doubt as to the effects of the proposed development on the European Sites concerned, having regard to their conservation objectives. There should be no omissions or gaps in the findings or conclusions.

An NIS, which reflects as far as possible the test set out in *Kelly* above, will best

assist a competent authority in carrying out an appropriate assessment in compliance with the requirements of that case. The meaning of "best scientific evidence" has also recently been considered by the High Court and this is considered in further detail below.

The Decision in People over Wind[15]

In this case from 2016, *People over Wind and Environmental Action Alliance Ireland* challenged a grant of planning permission by An Bord Pleanála for an 18-turbine windfarm in County Laois. They were unsuccessful in the High Court and appealed to the Court of Appeal. The issues that arose on the meaning of best scientific evidence in this case related to the evidence before the Board on the impact of the proposed development on the Nore freshwater pearl mussel *Margaritifera durrovensis*. The Court of Appeal decision as upheld in the Supreme Court, considered the following questions:

(i) What obligation, if any, is on An Bord Pleanála, to seek or procure the best scientific evidence in carrying out an appropriate assessment?

(ii) In light of the scientific evidence that was before An Bord Pleanála with regard to the Nore freshwater pearl mussel, in carrying out its appropriate assessment was An Bord Pleanála entitled to regard this as the best scientific evidence for the purposes of deciding the appeal?

(iii) In reviewing the decision of An Bord Pleanála in respect of appropriate assessment was the Court restricted to considering matters that were before An Bord Pleanála at that time or was it entitled or obliged to have regard to new or additional evidence concerning the Nore freshwater pearl mussel?

(iv) If so, did this evidence show a gap in the best scientific evidence put before An Bord Pleanála such that its decision should be quashed or sent back to the board for further consideration?

The Court noted that the term "best scientific evidence" was not used in the Habitats Directive, nor in the case law of the CJEU relating to the Habitats Directive. Instead the phrase "best scientific knowledge" was used by that court. The Court of Appeal noted that there was a difference between the concepts of "scientific knowledge" and "scientific evidence", and that the objective was to ensure that the integrity of a Special Area of Conservation is not compromised by permission which is based on scientific analysis which is outdated, flawed or which does not measure up to state of the art scientific understanding.

The Court held that this did not arise as a hugely detailed environmental impact assessment concerning relevant scientific and environmental aspects of the wind farm was prepared, including an NIS. In the Court's view the material submitted with the application complied with the requirements set out in the *Sweetman Case*, as the precise issue critical to the protection of the protected species was identified and fully addressed. The obligation on the competent authority was to have access to the best scientific knowledge reasonably available and to ensure the appropriateness of any assessment meets proper scientific standards. The Court held that the availability of additional information after the date of the decision made by An Bord Pleanála did not change the validity of that decision at the time. The planning decision in this case was therefore upheld.

Conclusion

These cases give an insight into the requirements of Article 6(3) and 6(4) of the Habitats Directive as interpreted by the Irish Courts. They provide guidance for practitioners on the legal interpretation of the requirements, legal tests and most importantly the language and conclusions which should be detailed within screening reports and Natura Impact Statements.

Notes

1. Council Directive 92/42/EEC on the conservation of natural habitats and of wild fauna and flora
2. Council Directive 2009/147/EC on the conservation of wild birds
3. European Communities *(Birds and Natural Habitats) Regulations 2011* (S.I. No. 477 of 2011)
4. European Commission Guidance (2001) *Assessment of plans and projects significantly affecting Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) on the Habitats Directive 92/43/EC ("EU Guidance") and Department of Environment (2010) Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities ("AA Guidance")*
5. European Court of Justice (ECJ) now known as the Court of Justice of the European Union
6. Case C-258/11 Peter Sweetman and others v An Bord Pleanála
7. Kelly v An Bord Pleanála [2014] IEHC 400
8. EU Guidance and AA Guidance
9. C-127/02 Waddensee and others v Staatssercretaris van Landbouw and others
10. In accordance with EU Guidance and AA Guidance
11. Balz v An Bord Pleanála [2016] IDEC 134
12. The only grounds to be considered for the purposes of this article
13. Waddensee (Case C-127/02), Commission v. Spain (Case C-404/09), and Sweetman (Case C-258/11)
14. EU Guidance and AA Guidance
15. People Over Wind and others v An Bord Pleanála (2015) IELA 272

About the Author

Elva Carbery is a consultant at McCann FitzGerald in the Environment & Planning group. Elva advises on planning and environmental aspects of projects at all stages of development and planning and environmental disputes at all Court levels.

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Featured CIEEM Training Events

Protected Mammals: Survey, Impact Assessment and Mitigation

Dundrum, Co. Dublin, 20 September
Trainer: Paul Scott CEnv MCIEEM

Aimed at those who are responsible for co-ordinating surveys of various nationally protected terrestrial mammal species, as well as those actually undertaking field surveys, this course considers how to design survey protocols in different impact assessment scenarios and at different times of year. The training also explores how to advise clients on avoiding impacts and best practice for mitigating significant impacts on individuals as well as on supporting habitats.

QGIS for Ecologists and Conservation Practitioners

5-6 October – Dunblane
Trainer: Stephanie Miles
20-21 October – Co. Westmeath
Trainer: George Smith CEcol MCIEEM
26-27 October – London
Trainer: Paul Losse MCIEEM

This popular course offers training for those with no/little experience of using Quantum Geographical information Systems (QGIS). Run over two days, the course outlines how open source QGIS software can be used to access a range of environmental data sources, how to create and query data layers, how to present species and habitat records, carry out spatial analysis and prepare maps for inclusion in reports.

Introduction to Bats and Bat Survey NEW LOCATION

Wareham, Dorset
12 October
Trainers: Katie Pollard MCIEEM and Danny Alder MCIEEM

This one-day training event provides a comprehensive introduction to bat ecology, identification, law and survey techniques. The course is ideally suited to those early in their career or with little or no previous knowledge or experience of bat work, and includes sessions exploring how to analyse survey results and communicate survey information to clients. The training includes a field visit and an opportunity to practice surveying skills.

Ecological Modelling NEW

Newport, South Wales
24 October (Introduction)
25-26 October (Intermediate)
Trainers: James Vafidis MCIEEM and Robert Thomas

Responding to the need to provide training in the principals and potential applications of modelling for habitat and species management, industrial development and research projects, we have set up training at Beginner and Intermediate levels. Both courses are suitable for professionals wishing to develop a better quantitative basis to make management decisions. Our introductory level training outlines how to construct, validate and assess simple models using R. Intermediate level training explores a range of ecological models, focusing on their suitability for different data types and questions.

Article and Feature Writing for Conservation Practitioners

Sheffield, 8 November
Trainer: Chloe Palmer MCIEEM

Would you like to submit a feature to *In Practice* but are unsure how to go about it? Do you want to write articles to appeal to a wider audience? Are you looking to get your message across clearly and make an impact? Now in its second year, this well-received training will demonstrate how to sell your ideas to an editor, how to present your content to match an in-house style, and how to format your article to make it readable and eye-catching.

Surveying and Monitoring of Bats in Woodlands NEW

Leeds, 10 November
Trainers: John Altringham and Anna Berthinussen

Aimed at Intermediate – Advanced practitioners this classroom based course examines the pros and cons of different survey and monitoring approaches such as acoustic vs. catching, walked transects vs. static detectors. There will be opportunities to discuss the issues surrounding bat identification from acoustic recordings and the detailed survey protocols and analysis approaches suited to different objectives.

Understanding Wildlife Law

Manchester, 18 November
NEW LOCATION
Trainer: Penny Simpson

This one-day course explains how wildlife law relating to protected sites and protected species is enforced and regulated. The training includes consideration of the key criminal offences which developers, operators and land managers must consider in their work, the duties of public bodies in relation to wildlife law, and how those duties are discharged in relation to planning applications and other consenting procedures. The training will also consider the implications of Brexit.

Designing Biodiversity No Net Loss and Net Positive Projects

London, 21 November NEW
Trainer: Julia Baker CEnv MCIEEM

Aimed at individuals wishing to develop or enhance skills in 'no net loss' and 'net positive' (NNL/NP) and offsetting in line with international and UK guidelines and standards. The training includes use of biodiversity units and ecological impact assessments to design NNL/NP projects, good practice principles to generate positive outcomes for biodiversity and international guidance for stakeholder engagement. The training complements our course on Biodiversity Units, which focuses on undertaking Biodiversity Unit calculations for both development sites and offsets.

Report Writing for Ecological Impact Assessment NEW

Birmingham, 23 November
Trainer: Mike Dean CEcol CEnv MCIEEM

This one-day course aimed at Intermediate – Advanced practitioners, will focus on producing good quality Ecological Impact Assessment (EcIA) reports following CIEEM's 'Guidelines for Ecological Report Writing'. The training will explore the challenges faced in producing ecological reports, offer generic guidance on EcIA report structure and content (including ES chapters), proportionality, 'fit for purpose' and how to avoid common pitfalls.

www.cieem.net/training-events

Meet the Author – Richard Wilson

What do you do?

I am a freelance ecologist, specialising in invertebrates and birds, though also interested in legislation and policy, which I convey via my blog. The invertebrate survey guidance I am writing with other technical specialists and Buglife is another role. Outside work, I am the spider recorder for Yorkshire to Northumberland for the national recording scheme; and I sit on the Conservation Committee of the British Arachnological Society.

What or who first inspired you to make a career in ecology or environmental management?

A combination of Mr Overall (Year 3 teacher) who took us on nature walks and suggested I studied the birds in my parents' back garden to write up in 'project time'; my parents who encouraged this; Sir David Attenborough documentaries (I got special dispensation to stay up beyond bedtime to watch); and the Willard Price 'Adventure' series all gave me the inspiration (and dreams) to explore our natural world.

How did you get to where you are today?

Ever since childhood, I have wanted to put a name to something, be it a plant, bird or invertebrate. From an early age, I saved pocket money for field guides, binoculars or a moth trap and taught myself with encouragement from adults. As soon as I could, I volunteered, much of it at RSPB Minsmere, getting stuck in, be it radio-tracking bitterns, surveying spiders, or learning to use a chainsaw. After my Masters degree in Leeds, fortune delivered my first permanent position in Newbury. But, desperate to return to Leeds, I applied for an ecologist position there, despite having no idea what a consultant did! I went for the interview, must have impressed and have worked in this sector ever since.

What have been the most important steps along the way?

A desire to be involved and remaining positive, despite inevitable disappointments. Developing a specialism has helped me to stand out. Becoming a good communicator (I hope?!) has helped too; perhaps all those Attenborough documentaries taught me more than I realised?

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

As to freelance: self-reliance and the ability to take on a wider skill set than just ecology. To become a specialist, the ability to focus on a taxonomic group (or policy area), and then develop a positive reputation by engaging with the subject through training, self-teaching, and subsequently communicating these acquired skills and knowledge to a wide but relevant audience.

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

Find a local site and get to know it well all year round: you will learn much and get a 'feel' for the site's ecology. Adopt a 'do it yourself' approach utilising social media to ask questions; join a local natural history society and http://www.afocusonnature.org/; and then writing up your experiences for your local Wildlife Trust will get you known and also hone relevant skills.

What's the best thing about your job?

It's not a job but a paid hobby. As a kid, I dreamed of being paid to survey invertebrates, visit the central African jungles and experience what Sir David Attenborough wrote in his introduction to *Life on Earth, "…the splendour and fecundity of the natural world from which I have never recovered"*. I have and do. Maybe I am living the dream?

What's the downside?

On a day-to-day basis, very little. The seasonality can be tough at times and a significant proportion of my time is spent interacting with the M1, M25 or A1.

What's next for you?

Advancing the invertebrate survey guidance, which will involve knuckling down over the winter months? Pondering the implications of Brexit, which is likely to be the most serious of tests affecting the sector and profession.

What is your top tip for success?

A common theme has been 'people', 'communication', and 'acquiring knowledge/experience'; then wrapping this all up and persevering. Fortune plays a role too. So, my top tip is to get involved; build a network of individuals who can support your objective(s); develop and hone a skill set through formal training but also of your own volition. And persevere.

For further information

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The Reality of Brexit

Wyn Jones
Convenor, UK Environmental Law Association's nature conservation working party

With the shock of the referendum result comes the reality of leaving the European Union and the complexities of doing so. At the time of writing this article, details of the process and the timing are still unclear. Government has established a Department for exiting the European Union led by David Davis MP, which is responsible for overseeing negotiations to leave and establishing the future relationship between the UK and EU. The Department will work closely with the Department for International Trade and the Foreign and Commonwealth Office in the negotiations. The Prime Minister has stated that the Article 50 notification to the European Council of the United Kingdom's decision to withdraw from the European Union will not be made in 2016 and is expected in early 2017. This will trigger the commencement of negotiations. Ironically the UK was to hold the Presidency of the EU in the second half of 2017.

In terms of the process, a legal challenge has been made to ensure that the result of the referendum is underpinned by an Act of Parliament before the Article 50 notification is served. The law firm Mischon de Reya argues that as the result of the referendum is not legally binding, the approval of Parliament is needed before Article 50 notification is made. Government believes that it has a mandate to do so without recourse to Parliament. Discussions between the parties on this issue are ongoing.

The European Communities Act 1972 will need to be repealed at some point. Whether this will occur before, during or at the end of the Article 50 process is unclear. Government will be undertaking a review of all the relevant legislation and as a consequence will determine which elements it wishes to retain, amend or revoke. It has not been stated who will undertake the review and when but presumably it will be the responsibility of the relevant Government departments. However, it is expected that the outcomes of the review will be the subject of public consultation. Some of the legislation may need to be retained dependent upon the outcome of the trading relationship negotiated between the UK and EU. One thing is certain; the process will take many years.

To add to the complexities, the devolved Governments have delegated responsibilities for many elements, including the environment. They will be party to the reviews and will probably undertake their own. It seems likely that they will reach different conclusions further extenuating the differences in the legal and policy frameworks between the countries. The situation in Northern Ireland is made more complex because of the land border with the Republic of Ireland and no doubt issues will arise with Gibraltar's border with Spain. In Scotland there will be added pressure for a further referendum on independence.

In the grand scheme of things the environment does not feature highly in Government priorities, with nature conservation even less so. It may therefore be many years before the review conclusions are reached and changes proposed.

Trade and fiscal issues will be a priority. One of the priorities will be to establish arrangements for the payment of subsidies for farmers in the UK on leaving the EU Common Agriculture Policy. The basis for making payments and linkage to biodiversity and wider environmental benefits will need to be reviewed. Again the devolved Governments may well take the opportunity to adopt different approaches. Leaving the Common Fisheries Policy will present different but challenging issues to resolve.

Although the UK will remain a member of the European Union until the end of the Article 50 process, it is already clear that the ability of the UK to participate in EU research projects and joint ventures is being affected. Equally the ability to access funding under schemes such as LIFE (funding instrument for the environment) is also likely to be affected.

All in all there is still considerable uncertainty as to the process, timing and implications of leaving the European Union. In the meantime it is **'business as usual'** as all EU derived laws remain in force until such time as the relevant legislation is repealed. Therefore the measures to secure the management and protection of European habitats and species provided by the EC Habitats and Birds Directives **must** be applied[1].

I leave you with a quote from the late politician Ernest Bevin: *"If you open Pandora's Box, you never know what Trojan horses will jump out."* Hold on for the roller coaster ride!

Note

1. Note that Kate Jennings at RSPB is collating details of cases where the Directives have not been correctly applied.

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Brexit: What now for the ecological consultancy market?

Andrew Baker FCIEEM
Managing Director, Baker Consultants Ltd and Baker Consultants Marine Ltd

Introduction

When I was first asked to pen this article, like many in the profession I was still reeling from the shock of the outcome of 23 June. Harrold Wilson once said *"A week is a long time in politics"*. In the days following the referendum that quote could have been accurately rewritten as 'two hours', so rapid were the ricochets that rattled across the political battle-field. In the days immediately following the vote, whenever I met a fellow ecologist we would spend time contemplating the implication of a post-Brexit Britain. These conversations were of course full of wild speculation and while much remains opaque some aspects of the post referendum ecological landscape are starting to become clearer. What is certain is that we are now entering a period of change when almost everything that is familiar to a professional ecologist may be amended or even disappear. We are at a cross-roads and the profession needs to be clear on the direction it wishes to travel lest it be forced down a less favourable path.

Legislation and Policy

Ecologists have been blessed; for a very long time our profession has the backing of comprehensive legislation protecting designated sites and species on land, in water and in the seas. There are very few professions that have quite the same strong legal backbone supporting their activities. While landscape architecture (for example) is a long established profession (its institute was founded in 1929) the discipline has considerably less law at its disposal compared to our profession. Since the early 1980s the majority of nature conservation law has arisen from European Directives. Of course, for the moment, is it business as usual. As far as the law is concerned, nothing has changed, bats and great crested newts still enjoy the same protection and the same mechanisms that protect Natura 2000 sites remain in place. Indeed, this may be the case for many years, with the legal challenges to the referendum and constitutional aspects of Article 50 stacking up in the courts it may be a very long time before the UK triggers the exit process (I have wondered how many of these legal challenges may end up being heard by the highest legal authority, the European Court of Justice!).

To most of us who work in nature conservation it would seem unthinkable that all EU derived legislation would be swept away. However, I remember the days when the UK was dubbed the 'dirty man of Europe' for its woeful environmental protection. While it may be unthinkable that we could return to such a situation we must remember that the forces that are now amassed against us are considerable. Those that see wildlife protection as 'red tape' regard the result

of the referendum as mandate to sweep away what they regard as unnecessary bureaucracy that stifles economic activity. A member of the government who remains a senior Defra minister described environmental directives in the run up to the referendum as *"spirit crushing"*.

A number of models have been mooted around which the UK would develop its future relationship with the EU post Brexit. One option is stay as a member of the European Economic Area (EEA), another is to join the European Free Trade Association (EFTA). While both of these options require much EU legislation to remain in place this does not include much of the environmental protection; the Nature Directives would not apply.

I don't think that I need to explain how the loss of EU-derived law would affect the profession and the devastation it would bring in terms of jobs, standing and the sector's development not to mention protection of the natural environment. In post-Brexit Britain anything seems possible (I wish I'd had a fiver on Boris Johnson being made Foreign Secretary). If we are to keep the protection of the natural environment which the previous generation had secured, it is going to take the efforts of all parts of the profession: public, private and voluntary.

Brain Drain

The UK's membership of the EU heralded an unprecedented international collaboration in science and technology. The Erasmus Programme allowed students to study anywhere in the EU providing the UK with an influx of some of the brightest young talent. Moreover, on graduation these students offered the UK an educated work force that were multi-lingual and familiar with their home culture. For those in the scientific service sector who were interested in exporting to other EU countries these students were invaluable. My marine company, which provides specialists in underwater noise and bio-acoustic services, employs nine people, six of whom are non-UK nationals. Having attracted the best in their field from across the EU we were then able to sell our services across the EU and 90% of our turnover is generated from exports.

Great crested newt

There are few questions in science that are not being tackled by international teams of academics bringing together the best talent from across the EU. Science that knows no national boarders, based on the free movement of skills across the EU, has created huge benefits particularly for environmental disciplines. International teams have been very effective at examining EU-wide issues and then persuading politicians and regulators to act internationally. It has been reported that Brexit is already jeopardising British involvement in EU research projects. Any science-based profession relies on a healthy academic environment that carries out critical research. Many ecological consultancies collaborate with universities to answer questions that are critical to the profession. The impact of Brexit upon the higher education sector seems likely to be considerable; loss of EU research funding, reduced fee income from EU students, and the likelihood of a new brain drain as academics move abroad in order to maintain international collaboration, will have knock-on effects upon the environmental consultancy sector.

What concerns me, possibly even more than that impact of Brexit upon the academic sector is the continued spread of cynicism toward educated opinion. Michael Gove said, in the run up to the referendum, *"I think people in this country have had enough of experts"*. He said this to counter the overwhelming evidence that was being presented by academics, economists and lawyers that Brexit would be bad for the country. For me it was one of the most chilling aspects of the pro-leave campaign. The public cynicism towards professional expertise is being successfully harnessed by many politicians. It seems that we have entered an era when the facts simply don't matter. Professor Brian Cox responded to Michael Gove's rhetoric saying that this cynicism is the *"road back to the cave"*. The adverse effects upon higher education is one thing, but when politicians are of the view that educated opinions are not of value that is quite another order of magnitude of greater concern.

It's the Economy Stupid

At the time of writing it has only been just over a month since the referendum. In that

Brown long-eared bat

time the reporting on the health of the UK economy has been mixed. The majority of economists have predicted that the UK will suffer as a result of Brexit and that the effects will be long-term. The health of the ecological consultancy market is closely linked to the overall health of the economy. The global downturn of 2007-2008 had a major impact on many consultancies especially those who were heavily reliant on the housing market. In my view the economic effects of Brexit are likely to be more subtle than the previous recession. If there is a downturn it will be entirely home grown and not as a result of a drying up of international credit. The housing market, for example, seems to remain on course and we have not experienced the widespread cancellation of projects that was the case in the previous recession. My view is that it is the uncertainty that has been created by Brexit that will have the main impact upon the economy. Given that the Brexit process is itself unclear and we don't know what the UK's relationship with her biggest customer will look like, it seems that any decline will be long-term.

One aspect of the impact on the UK economy that is already apparent is the devaluation of the pound against the US dollar and the euro. For most UK ecological consultancies this is likely to be of little concern, other than an increase in costs such as fuel prices or imported scientific equipment for example. For those consultancies that do export to the EU the drop in the pound is of course a short-term benefit, however the great advantage of the EU to UK companies is the access to EU customers. The political mood in Germany and France is unlikely to lead to easy negotiations on Brexit. While the drop in the pound may make UK consultancies more competitive they may not be allowed to even bid for EU-based projects in the future. Along with the exit of academics I feel that there will be an exit of UK companies to base their operations in remaining EU countries. I for one cannot take the risk of not having access to our EU clients and will be moving my marine company to an EU country as soon as practically possible.

Conclusions

In the run up to Brexit I campaigned to remain in the EU. I struggled to find anyone working in ecology or in the wider scientific community who thought that Brexit would be good for the UK. The research carried out by CIEEM showed overwhelming support for maintaining our relationship with the EU. The profession is now faced with an unprecedented period of change and uncertainty that may have far-reaching consequences. Critically we are now faced with the possibility of the diminution of the law that has protected the natural environment for over a generation. There is an apocryphal curse that was attributed to the Chinese: *"May you live in interesting times"*. While this curse is now known to be of English origin it became widely used in the late 1930s, let's hope that our current times don't become any more interesting.

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Innovation in Regulation: How Natural England is Thinking Differently to Deliver for Protected Species

Joanna Carter
Senior Adviser Partnerships and Engagement, Innovation and Reform Team, Natural England

Jane Morton
Senior Adviser Customers and Communications, Sustainable Development Team, Natural England

Introduction

Natural England is seeking to deliver better long-term outcomes for the environment, by engaging early and listening to those we work with, building common understanding, being open-minded and flexible and looking for solutions that are mutually acceptable and beneficial. This outcomes approach focuses on the result, not the process used to get there.

That's not to say we aren't already doing this: at an individual level many of our staff have worked with you to find creative solutions.

What does this mean for regulatory reform?

Delivering an outcomes approach in our regulatory reform work offers real opportunities to think about the benefits that can be realised at a population or landscape-scale. This includes looking at favourable conservation status for protected species, and what role regulation might play in helping to achieve this.

Natural England considers incoming mitigation licence applications, including European Protected Species (EPS) licences, applying tests based on risk and impact. Until recently, there was no alternative process, even if the risks and impacts to the species concerned were relatively low. The process (on both sides) was resource intensive, and the system struggled to cope with demand for licences, to the frustration of all concerned.

Greater horseshoe bats

Case Study 1: The A338 Major Maintenance Scheme

The A338, Bournemouth Spur Road, vital to Dorset's economic viability, passes through, and provides linking habitat between several otherwise isolated blocks of lowland heathland, including areas variously recognised as Sites of Special Scientific Interest, Special Areas of Conservation, Special Protection Areas and Ramsar sites.

A £28m Major Maintenance Scheme for the A338 was planned, including reconstruction of 18km of failed carriageway, road widening and renewal of drains and culverts, leading to a permanent loss of around 1ha of non-SSSI grass verge, some of which is used by EPS species – sand lizard and smooth snake.

A previous scheme had been abandoned in 2010 through lack of funding. The EPS mitigation licence for that scheme had taken a capture and exclusion approach, with half moved to immediately adjacent land and half to *ex situ* receptor areas, and required 7km of temporary reptile fencing.

Work to capture the reptiles had been started but abandoned before completion, with fencing left *in situ*. Surveys in 2013 indicated reptile species had re-colonised the exclusion area. Cost estimates for a new licensed relocation stood at c. £1million, and experience suggested that conservation benefits would be limited.

Natural England worked with Dorset County Council's (DCC) Natural Environment Team and CGO Ecology to design an alternative methodology which minimised risk to EPS reptiles, enhanced their preferred habitats and avoided the need for an EPS licence.

Habitat degradation was employed to encourage reptile dispersal, including carefully timed removal of vegetation and potential breeding sites and winter refuges. To avoid deliberate disturbance, new heathland, sand patches and other habitat was created adjacent to the works, and species-specific measures incorporated.

Sand patch near carriageway © Dr Annabel King, Dorset County Council

Mike Harries, DCC's Head of Environment and Economy Directorate commented:

"Very impressed with the approach to managing the verges in advance (during the hibernation season) so that there was no need for physical intervention later […] On the face of it this seemed a very extreme approach, but in reality is a very natural way to reduce the adverse impact on protected species, whilst also providing improved habitat […] – a great result for human and reptile!"

Whilst DCC's initial approach for advice through NE's chargeable services sought to reduce the scheme costs (achieving a significant cost reduction for reptile mitigation works) the result was a model that could be implemented for similar works elsewhere, and most importantly, improved the outcomes for the species present.

The habitat enhancements, including restoration of 30ha of heathland, are expected to deliver a long-term increase in local EPS reptile populations.

For Natural England, and many in the sector, spending time on low impact, low environmental gain casework doesn't make sense. Our range of general and class licences already cover a number of low risk, low impact scenarios, such as surveying, wildlife control and routine management and it makes sense to explore opportunities to move more low risk, low impact species licensing work over to these licensing methods. By doing this we can spend proportionally more time on higher risk, higher impact situations, where there is a real opportunity to secure environmental benefits, and conserve important habitats, roosts or populations.

Natural England has been working hard to improve our licensing processes through:

- designing less work intensive solutions for low impact situations;
- developing single organisational and project-specific licences which replace multiple licences, protecting species found during works, but minimising delays;
- recognising the expertise and experience of those who use our licences, and rewarding this through earned recognition;
- offering chargeable services that give the option of getting early advice on licence applications; and
- licensing reforms which take a strategic, landscape-scale approach, and offer greater positive impacts on protected species populations.

Make licensing work better for protected species

Earned recognition

The first workshops to become a Registered Consultant (RC) for the new Great Crested Newt (GCN) Low Impact Class Licence (LICL) completed in July. The licence, launched in June, enables:

- the capture, transport and temporary disturbance of GCN;
- temporary damage or destruction, or permanent damage or destruction of small areas of their resting places on terrestrial habitat; and
- temporary damage or destruction of resting places or breeding sites in aquatic habitat found in ditches.

Case Study 2: The Midland Mainline Electrification Scheme

Electrifying a 40km stretch of the Midland Mainline rail route is a real challenge: testing ground conditions, then installing metal piling foundations and gantries to take the overhead line electrification and finally renewing the cabling systems. Given the habitat and large number of ponds *en route*, there was a high likelihood that GCN would be found. With a proposed seven-year construction schedule, the potential lengthy delays caused if GCN were found, while surveys were completed and EPS licences applied for, could add significantly to the timescale and costs.

Atkins, working for their client Network Rail, and with delivery partner Carillion, approached Natural England to identify a licensing solution which would avoid potential delays, whilst protecting any GCN found during work.

The result, in August 2015, was the first ever project-wide EPS mitigation licence issued for this type of scheme. The licence permits the checking of cable troughs, installation of gantries from the rail track (to minimise impacts) and to move any GCN located within these small areas aside. With prior consent in place, when GCN are located, it avoids unnecessary and costly delay.

Whilst this 'upfront licensing' approach is innovative, many of the licensing conditions will be familiar to those operating individual GCN EPS licences, including:

- specifying the activities and working methods covered by the licence;
- allowing deliberate disturbance, capture and transport of GCN and damage or destruction of small areas of terrestrial resting places in the active season, but also allowing movement of individuals when found unexpectedly;
- monitor compliance and ensure those operating under the licence are competent to do so; and
- requiring actions taken under the licence to be reported on an annual basis.

To minimise the disturbance to GCN, any found during works must be captured by hand and moved to safe, suitable terrestrial habitat within 20m of their original location, on land owned by Network Rail.

©Natural England/Peter Wakely

Matt Oakley MCIEEM, Principal Ecologist for Atkins, said:

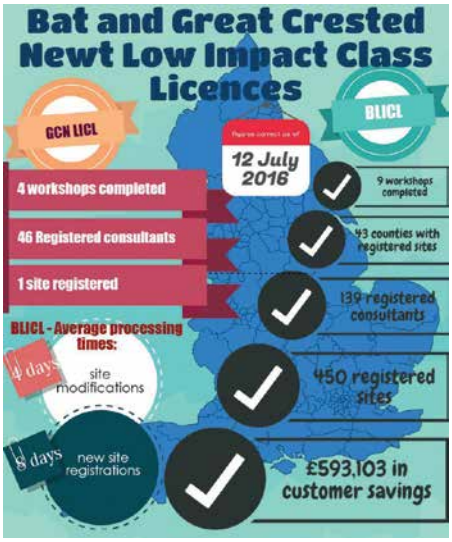
"This paves the way for future project-wide mitigation licences being granted for other large multi-phased developments including other electrification schemes and smart motorway schemes."

Activities affecting newts present in other aquatic habitats are excluded, as are activities that may damage or destroy other waterbodies used by newts as resting places or breeding sites. The licence is to be used only where permitted activities are judged to have a low impact on the population of GCN.

As with the Bat Low Impact Class Licence (BLICL), a proportionate amount of mitigation is expected if proposals result in permanent impacts. Habitats must be fully reinstated where temporary impacts occur.

Initial feedback has been positive, with some suggested changes to the licence scope and conditions. Both the GCN LICL and BLICL will be reviewed on an ongoing basis, based on applications and feedback, and changes and improvements will be made where appropriate.

We're also employing earned recognition in the forthcoming Bats in Churches Class Licence, in partnership with the Church of England, Historic England, Bat Conservation Trust and Churches Conservation Trust. This licence will enable



eligible RCs to deal with the higher risk and specialised circumstances that can arise when bats inhabit places of worship, and aims to help church communities by reducing the physical and social impacts caused by bats while promoting, where possible, outcomes that are good for bats and people.

Proposed licensing policies

Natural England has proposed four new licensing policies to ensure protected species have a more secure future. These should also make the licensing process smoother for applicants. They focus on addressing ecological risk, and delivering better outcomes for the overall population of a species on a landscape-scale, in line with the Lawton report's entreaty of 'more, bigger, better, joined'. The proposals are:

1. Reduce need for translocating or excluding EPS, when suitable compensatory habitat has been provided
2. Enable investment in off-site compensatory habitat where this would provide more benefit to EPS
3. Allow temporary colonisation of mineral extraction and brownfield sites by EPS
4. Reduce need for surveying where the impacts on EPS can be confidently predicted

Currently, development sites are first surveyed to establish the presence or absence of EPS, and, if a species is detected, more surveys are undertaken to establish the scale of potential harm. This can be expensive and time-consuming: money which could have greater value for

species conservation if it was instead spent on creating habitat.

The fourth proposal offers greater flexibility in the level of survey needed, when the impacts on EPS can be predicted with sufficient certainty. This will only apply in circumstances where it is genuinely difficult to carry out surveying.

Dr Paul Horswill, of Natural England, provides an example:

"Imagine that your home is being extended and re-roofed. Towards the end of autumn, bat droppings are unexpectedly discovered, but there is not enough time to carry out a programme of full surveys. Under the old approach, you would have to wait until more surveys confirm the status of the roosts. Under the proposed new approach, DNA analysis confirms the presence of brown long-eared and common pipistrelle bats. The ecologist concludes your roof is unlikely to be a suitable hibernation space for brown long-eared, but might be for pipistrelle. A licence could be issued on the basis of ecological risk: that there might be maternity roosts of both species and hibernation roosts for common pipistrelle. Works could go ahead timed to avoid the hibernation and breeding periods and with suitable compensation and monitoring in place."

In the current system, the next step after surveying, where development proceeds, is a programme of mitigation and compensation, with all reasonable measures taken to trap, relocate and exclude protected species from site. In some cases, more money is spent on fencing, trapping and relocation than improving or creating new habitat. Under the first proposed new policy, there could be a reduced requirement for translocating or excluding EPS when there is a programme of enhancing or creating new habitat that will more than compensate for the risks of not moving individual animals.

This works hand-in-hand with the second proposed policy, which enables the creation of habitat not on the development site, where this would provide greater benefit to the protected species. These proposed approaches are being piloted now in Woking.

The third proposal is to allow temporary colonisation of mineral workings and brownfield sites by protected species. Quarries often create ideal conditions for GCN in particular, with significant resource spent excluding them during the quarry's working life. With policy three, as an alternative to fencing off the quarry (and capturing and removing newts), a conservation plan for GCN would be developed, increasing the area of terrestrial and breeding habitat available on-site during, and following, mineral extraction. A management plan would set out how to minimise mortality risk during works, and monitoring of the habitats in the working area and outside that newts could be using. A legal contract would secure plans, with a licence then issued for the site. Ultimately, the long-term conservation status of the protected species should be improved as they can exploit the temporary conditions and, once mineral extraction work is complete, the restored site will also provide more suitable habitat than was originally present.

Following the recent public consultation on the proposed policies, which received generally positive comments, we've made some changes. We're now considering how best to take the proposals forward.

Case Study 3 – The Bat Low Impact Class Licence

The Bat Low Impact Class Licence (BLICL), operating since May 2015, uses the earned recognition approach, which benchmarks the skill and experience levels considered necessary to hold certain types of species licence. It was developed in partnership with CIEEM, recognising the organisation's emphasis on continuing professional development.

The BLICL offers an alternative to an individual EPS mitigation licence for low impact licensed activities affecting low conservation significance bat roosts, in up to three structures, and supporting individual or small numbers of individuals of up to three of seven species of bat.

To be eligible to use this licence, consultants must meet a set of criteria, attend a workshop and pass an assessment. They then become a Registered Consultant (RC) and can apply to Natural England to register sites under the licence. The approach recognises their expertise and experience in deciding when it is appropriate to register a site under the BLICL, and how and when to undertake the licensed activities without submitting the detail for review by Natural England.

Surveys are still required, but the application process requires only a single site registration form, rather than the application, reasoned statement, method statement, maps and figures needed for an individual EPS licence.

A return is submitted for each site registered within four weeks of licensed activities being completed.

Andy Warren MCIEEM, of Cotswold Wildlife Surveys, is one of the first consultants to become a RC for both the BLICL and the new Great Crested Newt Low Impact Class Licence (GCN LICL):

"As a self-employed ecological consultant, who has been applying for individual development licences for over 10 years, the time-consuming application procedure has become a familiar part of my working year.

I was encouraged when the concept of earned recognition was proposed and delighted this led to the establishment of Low Impact Class Licences for bats and GCN. The application process is greatly simplified, making the completion of the paperwork much easier. It only takes a few days to register a site; especially useful if you are close to the end of the active season and need to get started on the ground. There is still a requirement to prevent harm to bats/GCN, and mitigation measures do have to be implemented, so it represents a win-win solution for everyone, including the wildlife!"

Case Study 4: Landscape-scale approach in Woking

A new organisational licence was granted to Woking Borough Council (BC) in April 2016 following the development of a conservation plan for GCN. Rob Cameron, Principal Adviser for Natural England's Protected Species Reform programme explains:

"After extensive surveying of Woking Borough, from eDNA to more traditional habitat surveys and environmental modelling, we established a landscape-wide picture of the GCN local population. We then created a conservation strategy with Woking BC, including mapping where it is most important to retain, enhance and link existing newt populations. The map identified where some impacts are acceptable, and where new habitat should be targeted to ensure that it is properly joined up. The avoid-mitigate-compensate hierarchy will be followed; the map identifies areas to avoid. Mitigation will include measures such as finding places where green corridors should be created alongside new developments, and before any development takes place, Woking BC has already started to identify and manage new compensatory habitat."

A Woking BC spokesperson said:

"Our aim is to strike the balance between protecting and enhancing the natural environment for future generations, while meeting the demand for new homes and other infrastructure that is vital to support Woking's continued growth.

The new licencing approach means the Council can invest in strategic habitat provision, thereby ensuring the long-term survival of this protected species. The habitat improvements will go beyond simply ensuring there is no reduction in the number of great crested newts in the Borough, we expect the population to grow and flourish as a result.

Developers benefit too, as the simplified licensing and survey approach will save them time and reduce costs.

We plan to take a similar approach to support all endangered and at risk species across the Borough, creating positive natural environments in our town, villages and countryside that will allow them to thrive."

Mel Hughes, Natural England's Innovation and Reform Director, comments:

"We are confident that the strategic approach to licensing in Woking will be better than the old approach for newts and are looking to roll it out further. Monitoring is built into the new strategic approach, and will actually give us a much better handle on how newt populations are responding, and will give us an excellent evidence base for future decisions.

Planning authorities in Kent and Cheshire are interested; two counties where we already have excellent newt data. We are exploring a variety of funding possibilities, including investment from developer groups and other local partnerships. We are moving on to look at how we could take a landscape-scale approach for bats, but recognise the added complexities of the ecology and the number of bat species in England."

Conclusion

Natural England is building on our own and others' experiences of what works (and what doesn't) in our regulatory reform work. We want to ensure that, where risks are low, our approach is light-touch and lets those with the knowledge, expertise and experience get on with the job. Where risks and/or potential environmental gains are high, we want to use the latest science and thinking, and, through partnership working, develop innovative approaches that can deliver at a landscape-scale.

Natural England Response to Viewpoint

Response to Waller, A.S. (2016). Viewpoint: A Step Too Far – The Proposed Weakening of the EPS Mitigation Licensing Process. *In Practice* 92: 57-59.

Dear Sirs,

Thank you for the opportunity to respond to the questions posed by Mr Andrew Waller in edition 92 of *In Practice*.

1. **In GCN [great crested newt] borough-wide strategic habitat mitigation plans, what happens if GCN are killed on the development site? Since injuring and killing GCN is a 'Strict Liability offence', does this mean that the developer will be open to prosecution?**

Developers who choose to use the new approach will be legally authorised to act under a licence that allows for killing and injuring GCN.

2. **How can it be proved that strategic habitat compensation for GCN will actually benefit the species in the long-term? What happens if monitoring shows that GCN meta-populations have not benefitted?**

Under the new approach, a baseline of habitat distribution and GCN hotspots is established at the outset, and a monitoring plan agreed. That will ensure we are able to judge the success of each scheme in increasing the extent, quality and occupation of habitat. Monitoring needn't be expensive, as GCN habitat can be effectively assessed through habitat suitability and eDNA surveys. If success is not as high as anticipated, conservation plans can be adjusted.

3. **Natural England proposes to accept GCN mortality at certain sites. How will the "acceptable" level of mortality be established?**

The purpose of the licensing system is to safeguard the conservation status of protected species. Reducing requirements for exclusion, trapping and relocation and focusing on securing greater extent, quality and connectivity of habitat – more, bigger, better, joined – will enable licensing to contribute more to the conservation status of GCN than it does at present.

Great crested newt. Photo credit: David Kilbey

If the conservation status of the species is safeguarded through habitat provision, there is little benefit in setting thresholds as suggested by Mr Waller, especially since the number of GCN lost on development sites is always an unknown.

4. **If it is proposed that GCN could be moved further away from the development site, there would have to be proven connectivity on the more distant sites with regards to other GCN meta-populations. If a GCN population is moved a great distance away, what will the implications be with regards to animal disease and genetics?**

The proposed policies do not suggest changing requirements for disease screening, nor the distances GCN can be moved. It is likely that GCN will be moved less than before, as licensing becomes more focused on securing habitat provision.

Where more distant habitat compensation is licensed, the intention is that this will allow bigger, better sites to be selected at locations where colonisation will occur by natural dispersal from nearby habitat. To ensure this, applicants will need to demonstrate that the proposed location is well-connected, and will increase the amount of occupied habitat.

5. **Has an adequately large and varied sample of developers been asked if they are comfortable with the concept of individual GCN being killed on their sites? And will Local Authority Ecologists and Planners be satisfied with the proposed policies?**

There has been a public consultation on the Woking GCN Pilot and on the proposed licensing policies. Roughly a hundred consultants (who act for

Noctule bat

developers) responded on the latter and about thirty developers. Prior to launching the two public consultations we held extensive discussions with our Developer Industry Group and Developer Customer Panel. The response from developers and consultant ecologists has been positive; the majority responded that they think the policy could benefit GCN.

There were smaller numbers of consultation responses from local authorities but the majority felt that it would reduce costs, delays and uncertainty for developers.

Notwithstanding this support for the proposed approach, we have made minor adjustments to the proposals in response to concerns raised. Should a developer or another applicant wish to proceed with the traditional approach of trapping and translocation, that option remains open. The proposed policies add flexibilities, but do not remove them.

6. **Bats are frequently concealed in crevices, where they cannot be seen during a daytime inspection. Currently, we require a certain level of surveying to assess the likely impacts on bats from a development proposal. What would be the criteria for reduced survey effort?**

When responding to the public consultation, many ecologists expressed frustration with the rigidity of current survey standards, and requested greater ability to use their expert judgement. This proposed licensing policy will only allow reduced survey effort in circumstances where the impacts of a licence can be predicted confidently. It is important that survey standards are not diluted. Thus if there are significant doubts as to whether the proposed measures fully safeguard the bat species that might be present, a licence will not be granted.

7. **The proposals put forward by Natural England in its two consultations imply that this may be rolled out to other EPS. Should it be inferred that hazel dormice or sand lizards may be next?**

Dormouse. Photo credit: Debbie Bartlett

We are investigating whether licensing of other EPS could be done more strategically but have no implementation plans as yet. We anticipate that the vast majority of applications to use the proposed policies will be for GCN (and bats in the case of the proportional survey policy). If we receive an application for a different EPS we will carefully consider it. It would be a shame to refuse a proposal that offered significant benefits.

In response to Mr Waller's other points, making licensing better for business helps achieve our primary aim of making it better for wildlife. The rigidity of the system has given licensing a bad name and made it more difficult to achieve positive outcomes for protected species. The focus on exclusion, rescue and relocation of GCN has distorted investment. Six or seven times more is spent by developers on these measures than is spent on habitat provision, even though it is the latter that would make most difference to the conservation of this species.

Sand lizard

In the policy recommendations we make to Defra, we will give great weight to the feedback we have had from consultants, NGOs, developers and others. We will ensure that Defra is informed so that it can put in place policy which best protects nature and facilitates much needed development and we will do our then best to ensure it works in practice.

Yours faithfully,

Rob Cameron

Principle Adviser, European Protected Species Licensing Reform, Natural England

Reporting of Wildlife Crime Article 1 – Professional Issues to Consider

Ellie Strike CEnv MCIEEM, Mike Oxford CEcol FCIEEM and Sally Hayns CEcol MCIEEM
(on behalf of the Professional Standards Committee)

Key Terms: Wildlife crime, environmental damage, public interest, whistle blowing, legal obligations, professional obligations, contractual terms & conditions.

One question that we are often asked, which on the face of it can seem quite simple, is: *"As members of CIEEM, what are our responsibilities for reporting wildlife crime?"* The answer, however, is often not so simple and it has become clear that this is an issue on which CIEEM members would welcome further information.

In writing this article we want to make it clear that we understand that the issues can be less than straightforward, that there are slight but important variations in the national legislation and common law applicable across the different parts of the UK and that there is considerably more variation in the legal frameworks outside of the UK. Accordingly, we have tried to keep this advice generic and straightforward. Clearly this article cannot deal with all the legal differences between the different countries making up the UK and beyond and so we do therefore recommend that members make themselves familiar with the specific legal requirements/frameworks in the countries where they work, and take specific legal advice to inform their decisions when necessary.

There are further complexities and nuances in *how* to actually report wildlife crime, which we will explore further in another article planned for a later edition of *In Practice*. In this article we concentrate on some key issues likely to impact on a member's decision to report a wildlife crime.

This article is presented by way of information only for members. CIEEM's revised Code of Professional Conduct and its Supplementary Notes, dated June 2016, remain the key documents against which any complaint against a CIEEM member will be judged in any disciplinary scenario.

Context is key

Firstly, it is important to consider the context in which you may encounter a wildlife crime. It may be as a concerned member of the public where you are a 'third party' and have no contractual involvement in the actions leading to the suspected offence. Alternatively, you may be involved in a professional context (i.e. as a consultant, or working for a local authority, NGO or SNCO). A suspected

crime may be entirely down to someone else's actions, or there may be a situation where you may feel you have become somehow complicit in the committing of an offence. And clearly the context will have significant bearing over the way in which you will feel obliged to act, want to act, or feel conflicted/compromised.

As a 'member of the public', the course of action may actually prove more straightforward (although not always), as there are not likely to be professional relationships involved, and as such you may feel there is less of a personal/professional risk from the reporting of a crime. However, when in a professional capacity, knowledge or suspicion of a wildlife crime could present you with a more challenging dilemma. For instance, if you are a consultant and suspect your client to be responsible for committing an offence you may want to report it but be concerned, from a different legal perspective, that you are bound by contractual obligations and matters of confidentiality – whether perceived or otherwise.

Furthermore, context will almost certainly also influence how you decide to report a suspected wildlife crime and to whom.

Are we legally obliged to report wildlife crime?

This brings us to the first key question – are citizens *legally obliged* to report a wildlife crime? In strict legal terms, there is generally no obligation on anyone to report a wildlife crime (but two key exceptions are described in boxes 1 and 2).

Box 1. Obligations to Report Environmental Damage

There is a legal obligation under Regulations 13 and 14 of the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 to, in certain circumstances, notify the details of 'environmental damage', where failure to do so is a criminal offence.

The 2015 Regulations transpose into English law the requirements of the Environmental Liability Directive (2004/35/EC). Similar provisions exist in Scotland, Wales, Northern Ireland and the Republic of Ireland.

Box 2. Reporting 'breaches' under Natural England's Low Impact Class Licences

In England, under Natural England's 'Low Impact Bat Class Licences' (and we assume this to be the same for the low impact class licences for other species), there is an express requirement through a licence condition for Natural England to be informed of any breach of the licence. So there is a duty to report any breach of the licence and failure to do so could lead to prosecution under regulation 58(1) of the Conservation of Habitats and Species Regulations 2010 (i.e. the offence of breaching a licence condition).

So for any member of the public, the reporting of a wildlife crime comes down to a person's own discretion, their ethical standpoint, and also knowledge of wildlife law (i.e. their knowledge of whether a crime has been or is likely to be/to have been committed).

This then brings us to the real crux of the discussion, namely, if there is no (or very limited) *legal obligation* to report wildlife crime, what is CIEEM's *expectation* of its members?

Relevant aspects of CIEEM's Code of Professional Conduct in reporting wildlife crime

Clause 5 of the revised Code of Professional Conduct (CoPC) dated June 2016 states that members of CIEEM shall:

"Act at all times with professional integrity, avoiding or managing any conflicts of interest and avoiding actions that are inconsistent with my professional obligations and the Objects of CIEEM."

The Supplementary Notes prepared to support the revised CoPC (also dated June 2016), in respect of Clause 5, read:

"Acting with professional integrity includes acting honestly, honourably and in accordance with ethical principles such as fairness, impartiality, confidentiality, respecting others, and avoiding or managing conflicts of interest.

Professional obligations include, but are not restricted to: […]

* the requirement to undertake work with due skill, care and diligence, the requirement to act in the public interest (e.g. by taking all reasonable measures, subject to any legal constraints, to (i) prevent the commission of wildlife crime by others (whether members on non-members); and (ii) support the enforcement agencies in their roles to investigate, prosecute and/or secure remediation of the effects of wildlife crime, in either case whether through reporting wildlife crime/suspected wildlife crime or otherwise);"

A reasonable interpretation of this is that, where a member knows or suspects a wildlife crime to have been committed or believes a wildlife crime will be committed, a member should report that suspected offence (unless, by doing so, he or she would be in breach of the law) or, if not, be able to explain how otherwise he or she has satisfied the requirement to *"take all reasonable measures …"* as set out.

The paragraph above states *"unless, by doing so, they would be in breach of the law"*. An example of where an ecologist might be in breach of the law by reporting a known or suspected wildlife crime would be where the ecologist has been retained to advise in a situation covered by 'legal privilege' (e.g. he or she is appointed to advise a solicitor who is advising a company which may have committed an offence).

By including the above wording in the Supplementary Notes, a failure to report a known or suspected wildlife crime could, depending on the circumstances, constitute a breach of the CoPC. However, CIEEM is in no way underestimating the significance for our members of this, and every situation would be looked at on its merits, including factors such as the commercial relationship between the member and the person suspected and/or extent to which remediation had been secured and the role of the member in doing so.

We recognise that, as discussed above, the context in which you may encounter a wildlife crime will have significant bearing over how you may feel about making such

a report. Not least, you will want to ensure that your reputation, business and/or job will be unaffected by the reporting of a crime, and here we go on to discuss some important considerations in respect of that.

Considerations for a consultant reporting a client's known/ suspected wildlife crime

Going back to the matter of context, one of the more testing of scenarios is where a consultant suspects that their client has committed (or is aware of their intention to commit) a wildlife crime.

From a legal point of view, the key consideration for the consultant to be aware of is that their client could potentially take legal action against them for *'breach of confidence'* (this sort of action is governed by *'common law'* (i.e. judge-made law), rather than set out in legislation). However, for this to be successful the court would need to be satisfied that:

a. the information (relating to the reported crime) was not already in the public domain/was not common knowledge;
b. the information disclosed was a direct result of the client-consultant relationship so that it would be regarded in law as confidential; and
c. the information was used in an unauthorised way (i.e. reporting it to the relevant authority was unauthorised).

There are two key ways in which a consultant may protect themselves against such action:

1. 'Cure' through legal defence (i.e. a defence that can be argued in legal terms when a case is brought against the consultant)

   or

2. 'Prevention' by ensuring that appropriate clauses are built into the contractual terms and conditions of consultant appointment from the outset.

Cure – Legal Defence

There are two potential legal defences relevant to a claim for breach of confidence. The first is where it can be shown that the disclosure is of such significance as to be **'in the public interest'**. The second defence is known as an **'unclean hands defence'**, which is discretionary, and could be invoked in cases where the court feels that the actions of the client are such that they ultimately lose their right to make a claim for breach of confidence. Successful reliance on these defences can never be certain and, whilst they can be used in conjunction, they can only be used once legal action has already been brought – so they could be considered a 'cure' approach (if found to be applicable), rather than 'prevention'. They are also only likely to be successful if there is a high degree of confidence that an offence has actually been committed, and is provable.

Prevention – Contractual Safeguards

This brings us to the need for members to consider the 'preventative' measures that can reduce retrospective over-reliance on 'cure' methods. This is where contractual safeguards find their place. If worded carefully, appropriate clauses in contractual appointment documents can ward off future legal action – specifically on grounds such as breach of confidence. CIEEM strongly advises that you seek your own legal advice on the precise wording but the suggested wording in Box 3 is a good starting point to discuss with your solicitor.

Reputational Issues

Accepting all of the above, there are other considerations, not least of which is that of reputation – both for an individual member, their employer and a client if relevant. This can be very subjective and, given the nature of media nowadays (in particular social media), decisions, perspectives and opinions can have far reaching impacts outside of any courtroom environment. The reputational impacts can occur very quickly, and be far less easy to remediate. Clearly this has the potential to damage professional relationships, and is highly likely to impact on an individual and/ or employer's decision to report a client or other third party. We will cover how to take any reputational issues into account in our next article which will explore options around how to report wildlife crime.

Box 3. Example clause for inclusion in *Terms and Conditions of Appointment* to achieve safeguard against breach of confidence action

Subject to the clause below, the Consultant agrees to keep all information obtained from the Client confidential where the Client so specifies in writing, save where such information is known to the Consultant already or exists already in the public domain, until: (i) the information enters the public domain; (ii) the Consultant is given the same information by a third party; (iii) the Consultant is released from its confidentiality requirement by the Client; or (iv) 3 years have elapsed since the formation of the contract.

The Consultant may disclose in whole or in part any information or knowledge obtained from the Client to a third party where required by law, court order or any governmental or regulatory authority. If the Consultant becomes aware or has a reasonable belief that the Client or any director, officer, agent, employee or subcontractor of the Client has breached or is likely to breach any legislation, regulation, court order or term or condition of any licence permit or consent ("Licences") the Consultant shall be entitled to bring all relevant details as the Consultant sees fit to the attention of the relevant authority including the police or the statutory nature conservation body and shall also be entitled to request the relevant authority to remove from any Licence the name of any officer, director or employee of Consultant which appears on such Licence.

(NB: This text is for example purposes only and CIEEM strongly advises that you seek your own legal advice to identify wording that is fit for your needs.)

Public disclosure and considerations for individuals and their employers

Also of relevance to such scenarios is legislation in place to protect 'whistle-blowers'. In England, Wales and Scotland the Public Interest Disclosure Act 1998 (the '1998 Act') (and its equivalents in Northern Ireland and elsewhere) afford a member a degree of protection from their employer if they look to dismiss, or otherwise discriminate against the member as a result of a disclosure (if made in accordance with the legislation).

In order to protect yourself from any negative recourse from your employer, it is strongly advised that you first make your employer aware of your suspicions (an 'internal disclosure') or, if appropriate, the person or organisation responsible for the conduct which is the subject of the disclosure (the 'responsible person', for instance the client) or the relevant organisation which is the 'prescribed person' for acts relating to environmental damage as set out in the legislation. If no action is taken by your employer or you reasonably believe, at the time of the disclosure, that you will be subjected to a detriment if you make the disclosure to your employer, the 'responsible person' or the 'prescribed person', you may then choose to report your client directly to the police or statutory agency. The bottom line is that you should satisfy yourself that you have 'whistle-blown' within the terms of the 1998 Act (or its equivalents) and made what would be considered a 'protected disclosure'. This way you will ensure you benefit from its protection should your employer seek to dismiss or discriminate against you following (and as a direct result of) your disclosure.

Other considerations for members who are not consultants

If you are a member working in the public, NGO or academic sector and consider reporting wildlife crime, you are less likely to face the same contractual dilemmas as those in a consultancy. There will be no issue of breaching confidentiality between consultant and client to consider, and nor will there necessarily be any problem of reputational damage to either yourself or your organisation. You will, however, have to consider whether the information you have access to is as a result of your employment and, if so, whether there are any data protection or confidentiality issues involved. In other words, reporting a suspected wildlife crime (committed for instance by a developer) may be more straightforward for a CIEEM member not working in the private sector – but it might not!

One key issue will be deciding the most effective means of reporting the suspected offence and we will cover your options in detail in the next issue of *In Practice*.

However, if you wish to report a crime that you suspect has been committed by your employer, the 1998 Act (and its equivalents) would also be the main source of legal protection afforded to you. In this context the 'client' is principally the organisation for which you work – including colleagues, superiors and subordinates – as opposed to clients from an external organisation. From a legal perspective, as in the case of the consultant, it would be safer for you to first notify your employer, or if appropriate the 'responsible person' or 'prescribed person'. This is for the same reasons as outlined above.

It is also worth noting that, even if you were to have a confidentiality clause in your employment contract, it could not prevent you from being able to make a disclosure as it is not legally possible for an employer to include contractual clauses that would prevent disclosure when acting in the public interest.

In the next article on this topic we will look in more detail at how to report and who to report wildlife crime to, what your status would be under different scenarios and the issues around attempting to prevent a potential wildlife crime.

Acknowledgements

We are grateful to Penny Simpson and Elizabeth Ferguson at Freeths LLP for commenting on drafts of this article.

CIEEM Awards 2016

On Thursday 30 June 2016 the Birmingham Botanical Gardens again hosted the CIEEM Awards. The Awards event was a day to celebrate excellence in the fields of ecology and environmental management, honouring individuals, organisations and projects that have demonstrated exemplary and inspirational best practice in the industry.

The day began with a drinks reception and the chance for finalists and guests to wander around the beautiful gardens. The Birmingham Botanical Gardens was the perfect setting for these Awards for the third year running.

CIEEM President, Stephanie Wray CEcol CEnv FCIEEM, opened proceedings and was followed by our guest speaker, CEO at The Wildlife Trusts, Stephanie Hilborne OBE. Stephanie Hilborne highlighted the importance of embracing the positives of Brexit and emphasised an inclusive discussion going forward involving all stakeholders.

2016 Award Winners

To view the video of Stephanie Hilborne's speech please visit: www.cieem.net/award-winners-2016

Following this, guests enjoyed a three-course luncheon before the Awards host, Paul Rooney, began the announcement and presentation of winners. He was superbly aided on stage by Stephanie Hilborne.

Roger Crofts

The highlight of the event was the presentation of the prestigious CIEEM Medal to Roger Crofts in recognition of his outstanding, lifelong contribution to environmental conservation, governance and management. Des Thompson read the citation for Roger.

To view the video of Roger's acceptance speech please visit: www.cieem.net/cieem-medal-winner-2016

Left to right - Sally Hayns, Stephanie Hilborne, Paul Rooney, Stephanie Wray

Among the winners were some fantastic finalists, with some achieving Highly Commended in their category. A full list of winners and finalists, along with photos from the day, can be found at www.cieem.net/awards.

Last but certainly not least we need to give a special thanks to this year's sponsors, Greenhouse Graphics and McParland Finn, without whom the event would not have been possible. If you or your organisation are interested in sponsoring the 2017 Awards event please contact EmmaDowney@cieem.net.

Awards 2016 Winners

Best Practice Award – Innovation: Wildfowl and Wetlands Trust for SuDS for Schools

Best Practice Award – Knowledge Sharing: Ecosystem Knowledge Network

Best Practice Award – Stakeholder Engagement: Epsiolon-Adi Consortium for Management Planning and Implementation of Communication Measure for Terrestrial Natura 2000 Sites in the Maltese Islands

Best Practice Award – Large Scale Nature Conservation: Scottish Natural Heritage for Peatland ACTION

Best Practice Award – Small Scale Nature Conservation: Friends of Ali's Pond for Ali's Pond Local Nature Reserve, Sonning

Tony Bradshaw Award: Ecosystem Knowledge Network

Promising Professional Award (Sponsored by McParland Finn Ltd): Lorna Roberts

Members' Award (new for 2016): Ian Bond CEnv MCIEEM

Corporate Achievement Award: Forest Enterprise Scotland for Forest Management for capercaillie on the national forest estate in Strathspey: reconciling capercaillie conservation with timber production and recreated in Glenmore and Inshriach forests.

NGO Impact Award: Scottish Environment Link for Species Champion Initative

Postgradute Student Project Award: Jacqueline Jobes (Oxford Brookes University)

Undergraduate Student Project Award: John-Paul Hogan (Nottingham Trent University)

***In Practice* Award (Sponsored by Greenhouse Graphics):** Do recent developments in mapping technology and assessment demand a comprehensive new habitat classification? by Bob Edmonds CEnv MCIEEM, Bill Butcher MCIEEM, Peter Carey, Lisa Norton and Jo Treweek CEcol MCIEEM

Left to right – Paul Rooney, Bruce Howard (Ecosystem Knowledge Network), Stephanie Wray

For the full list of finalists visit: www.cieem.net/awards-2016

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Professional Development for Office-Based Ecologists and Environmental Managers

Over the course of your career there will be many twists and turns. Whilst some of us will remain at the field-based coalface of ecology or environmental management, others will find themselves increasingly office-based, leading teams and managing staff, budgets and projects.

There are often obvious developmental needs for field staff – e.g. becoming trained in the most recent survey, assessment and reporting techniques. But if you are in related, but less field-based activities, the world of training and development can be less clear and perhaps feels less of a priority.

Some recent cases seen by the Professional Standards Committee bear this out. There have been instances where more experienced Members have been referred to a disciplinary hearing and been found not to be up-to-date in the knowledge of current guidance, tools or techniques. There is also the sense that training and development is perhaps more important for those who are in the relative formative years of their career. However, we all have a responsibility to invest in our own professional development. Indeed, maintaining a CPD record is a requirement placed on all our Members.

Here we explore professional development for those who no longer have technical fieldwork at the core of what they do. We seek to provide some assurance over what CIEEM's expectations are regarding training and development for those now more involved in leadership or project management.

Planning your career

You may be where you are because you have diligently planned and engineered your career. However, many of us find that opportunity and circumstance lead us down a different path to that we may have envisaged at the start. This may be perfectly acceptable, or you may feel disappointed that your career has taken a different turn. If this is the case, you may need to invest in a training and development plan that helps to address where you want to be, rather than where you are, or where you find yourself heading. Take the time to identify the skills and knowledge that would be advantageous for where you want to be. A basic gap analysis of what you already have, versus what you still need, can be a really simple way of starting to plan for the future. Use the CIEEM Competency Framework (www.cieem.net/competency-framework) to assess your current competences and where you need to go next. The new online CPD tool, available in the Members' area of the website (www.cieem.net/members-area), has the facility to help you plan as well as record your CPD, so use this to help develop a realistic, but ambitious plan for your own development.

Be realistic about how long it may take you to get there. Set yourself milestones and plan ahead. You may not always hit your target, so be prepared to re-visit your plan and revise it as your thinking becomes clearer, or in response to changes in your personal or professional life.

Training

Even if you are no longer field-based, you may still find that you benefit from staying up to date on field techniques and assessment methods. Even though you are no longer in the field, you may still need to provide support to your staff, to understand what new equipment they need and how to use it. Indeed, in some situations, you may find yourself liable if you are responsible for staff who fall foul of the law, or who find themselves the subject of disciplinary proceedings. You need to make sure you are confident that, should such a situation arise, your technical knowledge is at a level commensurate with the support you offer others, and for the level of responsibility your position holds.

Recognising the need for wider personal and professional development

If pure 'technical' training is no longer something that is required for your role (and perhaps challenge yourself over whether that is truly the case), this doesn't mean that development is over for you. In fact, this is exactly the time where you should be reflecting on what other skills you can attain to support the wealth of your technical knowledge, and to grow both personally and professionally.

When we progress in our careers and move more into the realms of management (be that management of people or projects), the need for what have traditionally been known as 'softer' skills come more to the fore. Communication and people skills become a necessity rather than a 'nice to have', and for those of us who may not be natural people managers, it is really important that we acknowledge where our strengths lie and spend some time focussing on where we can build our skills.

Many of the skills that we call on at this stage of our careers are less well catered for through traditional training courses (although there are some very good courses in leadership, negotiating, people and project management), and this is where you can be more creative with your planning. CIEEM also provides a range of courses and masterclasses aimed at more

experienced practitioners (e.g. on European Protected Species and the Law, Advanced Ecological Impact Assessment) and would be very keen to receive suggestions on new topics, including those from the transferable competences area of the Competency Framework.

Mentoring and coaching are really valuable means of exploring and expanding your professional skill set. The other great thing about less formal arrangements like these is that you may find them easier to fit them around a busy work diary in a way that suits you. Don't feel restricted to only looking within your own profession for mentors or coaches either, you may find that working with someone from another sector can bring you insights that you hadn't even considered.

Approach people who you respect, and who you feel have the experience or skills that you would want to learn from. Even the busiest people will recognise the mutual benefits of entering into a mentoring relationship. In fact, you may want to consider mentoring or coaching other people yourself. It can often be as affirming and beneficial for the mentor as for the mentee.

Think about the extracurricular activities you could get involved in. Joining working groups or committees, attending networking events, writing articles, volunteering or becoming a trustee are just a few examples of things you can do that have the added benefit of supporting your professional development. Just be sure to know what you want from such activities before you embark on something that will take up your time.

Finding the time

If you are in a more senior position it can become increasingly difficult to 'justify' the time needed to invest in your development. Remember, you have got to where you are because you have a skill set that has enabled you to get there. If you and your employer value this skill set, then think how much more valuable you will be when you have added yet more strings to your bow. If you are your own employer then there is no excuse!

Go back to basics with your time management. Plan time into your work schedule, even if it's just half an hour, to focus on your development. If you make it a regular appointment with yourself, you can get into a healthy habit of reflecting on your own needs, and how they help you to be the best you can be in your role.

Still struggling to identify your training and development needs?

Don't ever be afraid to ask for feedback – the ability to seek, and embrace feedback is at the heart of all truly beneficial development. Your line manager, peers, clients and staff will all have invaluable feedback they can impart. Some of it may be things you are already aware of, but there may just be some pointers towards development needs that you were not aware of. Try to be open-minded about the feedback you receive, and view it as constructive rather than critical. To avoid any issues with your working relationships, you may want to consider ways of receiving feedback that anonymise the responses.

Meeting CIEEM CPD requirements

If your development is tailored to you and your specific needs, and undertaken in a planned and structured way, you can't go far wrong. Remember, your CPD can be both structured and un-structured, so factor this into your planning. Structured CPD need not be a training course – there are lots of options.

CIEEM place the requirement for CPD on our members with the intention of supporting you in your career, and continuing to build the profession and its reputation. It is not an optional obligation and you may well be held to account if you cannot supply evidence of CPD. Take a positive approach and challenge yourself to see how you can continue to grow and develop, and how in turn, this helps us to develop and grow the wider profession.

For more information, visit the CPD pages in the Members' Area of the CIEEM website (www.cieem.net/members-area).

CIEEM Training Event

Effective Workplace Mentoring NEW LOCATION

Birmingham, 1 November
Trainer: Liza Oxford-Booth

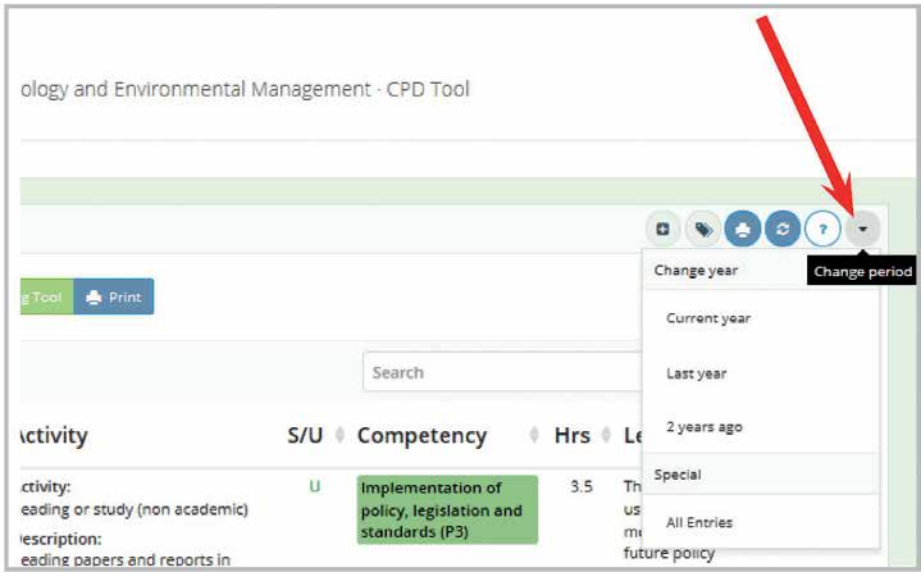
Mentoring offers the opportunity for both the mentor and the mentee to grow and develop within an organisation. Being a mentor hones many skills such as coaching and listening: it can develop greater self-awareness and increase job satisfaction. This one-day course will take you through the end to end process of effective mentoring. From learning what mentoring is, and isn't, through to examining tools and techniques to get the best from your mentee.

'My CPD' Tool Reminder

We've had a great response to the new 'My CPD' tool launched earlier this year, with approximately 1,300 of our members logging on and using the tool to record their CPD. A few early teething problems have been addressed we have received some very positive feedback.

With membership renewals just around the corner this is a great time to make sure that your CPD record is up-to-date and start using the tool if you have not already done so. To access the tool, follow this link: https://cpd.cieem.net and use the same login details for the members' area of the website.

For further information on CPD please visit the members' area of the CIEEM website
www.cieem.net/members-area
or contact CPD@cieem.net.



Here's a top tip to help with using the 'My CPD' tool.

Viewing all of my entries:

Hover over 'My CPD' along the top of the page and click on 'CPD Record'. In the right-hand corner of the page, under the 'Current Year' tab, there is an arrow pointing downwards next to the question mark button. If you click on this arrow you can select which year you would like to view, which will show all of your CPD entries for that year. Alternatively, you can click on the bottom option in this section which says 'All Entries' and this will bring up all of your CPD entries from every year that you have inputted information.

25 Years On: A View from Graduate Members

Following on from the views of the Vice Presidents in this our 25th anniversary year, we have asked for the views of Graduate members of the Institute to let us know what they think about where the profession is going in the next 25 years, what big challenges are coming up, and what CIEEM should be doing for members and the sector.

Nathan Jenkinson GradCIEEM

Southern Ecological Solutions Ltd

What will make me a desirable candidate? What will make me an asset to this company? What is it that others are doing that I'm not? These are just some of the questions I found myself asking when first applying for entry-level roles in ecological consultancy. In an industry where finding a job is ever more competitive, it has never been more important to make yourself a stand out candidate.

Breaking into a career in the ecology sector has evolved, where in the past specialists in other environmental professions moved towards consultancy as legislation and planning policy changed to create the niche that ecological consultants now operate in. Today, we see an ecology industry that has expanded, attracted more young minds and become a challenging industry in which to start a career. This trend is one that is likely to continue given the impacts that recent political events may have on the industry, both in the short- and long-term, alongside the rise in the prevalence of vocational degrees (such as the MSc in Species Identification and Survey Skills at the University of Reading) giving graduates skills that are more and more tailored to the sector.

Therefore, moving into the next 25 years of the ecology profession, at an individual level it is key to go above and beyond academic learning. Alongside an undergraduate or postgraduate degree, giving your time to voluntary causes in which you have an interest, but will also complement the development of field skills underpinning any successful ecological career, is invaluable (this topic was covered brilliantly in the article entitled 'I've Got My Degree, Now What…? Becoming a Junior Ecologist' in the September 2015 edition of *In Practice*). Volunteer work with various protected species groups and wildlife charities contributed hugely to enhancing my field skills, and ultimately allowing me to break through into the profession whilst giving something back to conservation. If this is a career you want to work in, every moment of your time is worth it.

So what, in this increasingly competitive profession, can CIEEM do for its individual members and the sector in the next 25 years?

To ensure individuals looking to work in ecology are fully prepared to apply for and undertake entry-level roles, contact with CIEEM at an early stage (at school, college or the beginning of a degree course) is essential. Raising awareness of CIEEM, its pivotal role in the ecology sector, and how to go about developing the range of skills that employers view as desirable in candidates will not only benefit aspiring ecologists, but also aid in maintaining and broadening the field skills of the ecology sector across the UK.

Get out there, get involved, and stand out from the crowd!

Sara Parratt-Halbert GradCIEEM

Freelance Project Manager and Environmental Educator

Outside the EU I wonder what the future will be as successive governments nibble away at the environmental legislations we currently have. It's always been difficult to ensure legislation is enforced, but there does seem to me to have been plenty of work for ecologists in recent years as a result. My ecologist colleagues are always 'pulled out' with work and there seems to be plenty of opportunity on the job market.

For environmentalists, however, it has been very difficult for many years, and I feel they are very much regarded as poor cousins – after all, they're not 'proper' environmental professionals are they? Their struggle has been largely unrecognised. I really do feel there is not the same level of support, interest or opportunity either out in the world or within CIEEM, for those who are not ecologists. I keep hearing the phrase 'Not Just Ecologists'. That's great, but I haven't seen much to support that notion in practice. There needs to be a recognition that the environmental sector is far broader than CIEEM perhaps acknowledges, and it would do well to cater for other than ecologists if it wants to ensure a growing membership for itself, and to work towards a sector whose strength will lie in better supported professionals from all spheres rather than a few. As a mature graduate with a great depth of practical environmentalist experience, it has become so difficult I have now been forced to leave the sector altogether. While environmentalists remain unsupported, and the difficulties they face from lack of legislation and a weak job market remain unrecognised, I won't be the last.

Had I pondered the future of environmental professionals prior to the referendum my conclusions might have been different from those I have drawn since then. I feel big challenges are likely to be ahead of us as a result of the referendum, and I confess to a growing unease at what Brexit will now mean for our environment and the sector charged with its protection. The EU has been a reasonably reliable protector and I doubt that same protection will be offered in anywhere near the same level by any successive government regardless of political persuasion. CIEEM and other organisations need to bring their collective might to bear, not only during the instigation of Article 50, but especially once the dastardly deed has been done. When one considers the damage this government has inflicted – or intends to inflict (HS2 anyone?) – even with EU legislation in place, what is going to happen when Brussels is no longer part of the picture? CIEEM must step up to the plate and step away from any fence-sitting. The natural environment is going to be rather short of friends, methinks.

Shona Smyth GradCIEEM

Assistant Forest Manager, Tilhill Forestry Ltd

With woodland creation now looking at contributing to ecological gain as part of the ongoing multi-benefit approach to modern forestry, particularly with recent reports stating planting is at an all-time low; the environmental profession may come under scrutiny as to how we manage existing woodlands. From client level, there needs to be a widened understanding of the benefits that forestry can deliver other than commercial gain and it is up to professionals to promote environmental paybacks; particularly in relation to ecosystem services.

When creating woodland, we spend large amounts of time surveying and understanding ecological sensitivities to incorporate them into the design process, using appropriate silviculture. The ecological benefits of forest management for commercial value are witnessed through second and third rotations, where the improved structure and age class distribution increases the number of sensitivities and protected species we have to take into account as part of management. The long-term commitment of land to forest crop means that there is a need for incorporating ecological understanding into the forest industry. Though many forest managers understand the environmental gains of forestry, it is often overshadowed by negativity and preconceptions highlighted by the media, mainly relating to clear fell sites and deforestation outside of Europe. By working in closer connection, foresters and ecologists can ensure that the best possible value is achieved from land use.

The future is an opportunity to alter the negative perception of forestry; from experience, this is hindering the decisions of young people perusing their career within the sector. Many young professionals may feel that their environmental or ecological skills do not have a place in modern forestry. However, the sector encompasses a wide skill set, and career prospects are dynamic. There is an opportunity to build relationships between professionals, and encourage young professionals to have an open mind when choosing an environmental sector.

CIEEM should be looking at communicating with the forest industry, particularly the Institute of Chartered Foresters (ICF), to encourage future and current CIEEM members to pursue further qualifications in forest management. Collaborating with commercial companies, such as Tilhill Forestry, could help find a needed balance between business and conservation, widening the skill sets available to both industries. Perceptions need to change if we are going to adapt land management to climate change and the biotic and abiotic factors that will be effecting both forestry and ecological businesses as a result. It is a dynamic and exciting industry to be a part of, one which needs greater appreciation and understanding for its contribution

to environmental services. CIEEM should be aiming to provide better support and guidance to those members who work in forestry to improve the delivery and appreciation of these services.

Zoe Webb GradCIEEM

Ove Arup & Partners Ltd

Reading the reflections of the four Vice Presidents on the past 25 years of this Institute, I look forward to the next 25 believing that the lessons learnt so far will be more relevant than ever given the recent period of political and economic uncertainty we have entered.

The recent referendum has shaped the direction of our sector for years to come and presents perhaps one of the biggest challenges in the Institute's history. Depending on the outcome of negotiations, our withdrawal from the EU changes our position from being a player to becoming a bystander in the EU environmental agenda. However, the environment is not a feature which can be divided along political or geographic lines, but one that requires a cross-boundary approach. Our fragmentation from the EU and the repercussions of this decision will require us to work cohesively to ensure that the environment is considered a priority at every level. We must continue to enshrine nature conservation values into the heart of Government, particularly during the foreseeable period as negotiations get underway, meaning CIEEM's position as a lobbying body and influential voice will become more relevant than ever, and I believe take on a greater focus as part of its role in supporting and representing the ecological sector.

Communications with others, both within and external to our sector, is becoming a key skill, necessary at the heart of every role whether in the private or public sphere. Of particular importance and of greatest challenge is engagement with young people; we must appeal to students and graduates at every level and market our industry as a realistic career prospect for the young people of today if we are to secure environmental protection and resilience for tomorrow.

We have also seen great shifts in technology over the past 25 years, and I believe that we will again over the next 25. These advances have been recognised, embraced and encouraged in many respects, but where I believe the challenge lies is in the knowledge sharing which is fundamental to ensuring our sector adopts a cohesive approach to a changing world. With new technology, CIEEM must ensure that best practice and the highest professional standards are maintained.

I believe that CIEEM's position within our industry will only strengthen over the next 25 years. Its role in raising the standards of our profession and being a recognised driving force has been fundamental to the improved recognition of our sector. If we are to achieve CIEEM's vision of *'a society which values the natural environment'*, we must meet the challenges being posed as society changes and ensure a continued effective dialogue during those transitions.

Chartered Membership

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

- Chartered Ecologist (CEcol): The Register of Chartered Ecologists recognises the effective application of knowledge and understanding of the science of ecology by professionals committed to the highest standards of practice.
- Chartered Environmentalist (CEnv): CIEEM is one of 23 professional bodies licensed by the Society for the Environment (SocEnv) to award Chartered Environmentalist status. CEnv is an increasingly recognised standard of good environmental practice.

The following profile highlights the work of Chartered professionals and provides an insight into the kind of roles that these senior ecologists and environmental managers are required for.

New Chartered Members

CIEEM is pleased to announce the following new Chartered members:

Chartered Ecologist	Chartered Environmentalist
Ms Sinead Gavin CEcol MCIEEM	None to report
Mr Stephen Carter CEcol CEnv MCIEEM	
Mr Andrew Law CEcol CEnv MCIEEM	
Ms Tamsin Morris CEcol CEnv MCIEEM	
Mr Darryn Nash CEcol MCIEEM	
Mrs Suzanne Glencross CEcol MCIEEM	
Mr Julian Arthur CEcol CEnv MCIEEM	
Mrs Colleen Hope CEcol MCIEEM	
Mr Steven Betts CEcol CEnv MCIEEM	
Prof. Richard Delahay CEcol MCIEEM	
Mr Alistair Baxter CEcol CEnv MCIEEM	

Chartered Ecologist application deadlines

CEcol Application due date	CEcol Interviews	Ratification
16 September 2016	w/c 12 December 2016	TBC
2 January 2017	w/c 27 March 2017	TBC
3 April 2017	w/c 26 June 2017	TBC

Chartered Environmentalist application deadlines

CEnv application due date	CEnv report submission deadline	CEnv Interviews
1 September 2016	24 November 2016	w/c 13-24 February 2017
3 March 2017	26 May 2017	TBC

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

Richard Graves

CEcol CEnv FCIEEM

Director, Richard Graves Associates Ltd

Why did you join CIEEM?

To meet other ecologists and help to develop the profession further.

Why did you apply for Chartered status?

This was something I had been looking forward to and helping to work for, for a number of years, so I applied as soon as I could.

How did you find the process?

Once fully familiar with CIEEM's competency framework straightforward enough if concentrated on for a day or two. I was a bit more nervous about the interview than I anticipated but all went well.

How has achieving Chartered Status impacted on the types of work you undertake?

I find it of benefit when undertaking review and audit and public inquiry work as it provides evidence of a higher level of competence.

Would you recommend applying for CEcol to your peers and colleagues?

I've been actively promoting both CEnv and CEcol to anybody I feel should apply. The more members who are chartered the more these qualifications will matter.

What is your education background?

- BSc (Hons) Human Biological Sciences, Loughborough University of Technology 1991
- Postgraduate Diploma Environmental Impact Assessment, University of Wales, Aberystwyth 1993
- MSc Crop Production in the Changing Environment, University of Essex 1996

What volunteer work have you done?

A significant amount of voluntary conservation work over the years and for IEEM/CIEEM, 11 years on Council, including eight years as the Chair of the Membership Admissions Committee and four years as Treasurer. Currently a CEcol and CEnv examiner and member of the standing disciplinary panel. Author and contributor to bat survey guidance and a number of CIEEM and other organisation working groups.

What training have you undertaken?

Recently attended a University of Kent workshop on great crested newt population monitoring. Other than CIEEM annual conferences most of my training over recent years has related to health and safety, employment law and management, so it was nice to do something more technical. Over the years I have had the benefit of working with and having working for me many expert ecologists. I've always taken the opportunity to work with these colleagues and learn as much as I can when doing so. There is always more to learn in ecology.

What is the best thing about your job?

I've always regarded being an ecologist as my vocation. Having worked within other organisations, large and small, for most of my career I never realised, until I started working for myself, how much more 'ecology' I could actually do when it is entirely up to me to set up the priorities for the day, week, month or year.

If you are interested in submitting your own profile please contact the Registration Officer, Michael Hornby, at RegistrationOfficer@cieem.net.

CIEEM has a new Registration Officer – Michael Hornby

Prior to joining CIEEM, Michael worked in various technical administrative roles with financial institutions and in local government. He has an interest in wildlife conservation, particularly sustainable agriculture and agroecology, and holds a degree in Rural Resource Management from the University of Plymouth. Outside of work Michael enjoys camping, hiking and undertaking volunteer conservation work.

Michael says: *"I am looking forward to getting my teeth into the role and looking at ways to improve the efficiency of the process, to pave the way for increased numbers of applications. I am also hoping to develop applicant mentoring and increasing the number of CEcol and CEnv workshops. If you are interested in running a workshop or know of any areas that may require one, please let me know."*

Contact Michael at: RegistrationOfficer@cieem.net

British Ecological Society

2016 Annual Meeting
11 – 14 December, Liverpool, UK
www.britishecologicalsociety.org/2016
@BritishEcoSoc #BES2016

We pride ourselves on creating an inclusive and diverse Annual Meeting, offering something for everyone within our community.

Our meeting is the largest event of its type in Europe, attracting in the region of 2,000 international delegates for career development, cutting edge science and networking – and a great deal of fun!

We offer day rates for those unable to join us for the whole event – keep an eye on our website for programme updates.

We have another packed programme of career events this year – bringing together practitioners and leading ecologists who will cover all things from career-planning, to publishing and grant writing.

Our career programme starts on Sunday 11 December with tips on how to raise your profile and make the most of the meeting. This will be followed by the 'Unlocking your potential' Q&A panel discussion, with the opportunity to put your career questions to our panellists who are from a broad range of backgrounds. The afternoon will include a session on how to stay employable in and out of academia, how to move from PhD to postdoc, or postdoc to permanent contract, and how to get your work published. We have also planned a session on communicating effectively from CV to interview.

Throughout the meeting we will run additional sessions on exploring career options outside academia, opportunities to meet our plenary speakers, how to manage an interdisciplinary career and hear highlights from our grant writing workshop.

On Sunday 11 December, members of the publications team will be holding a session on 'How to get published' – which links to our booklet *A guide to getting published in Ecology and Evolution*, and the webinar that took place earlier this year (the recording and guide is available on the career development resources section on our website).

With around 60 journal editors and editorial board members in attendance, our Annual Meeting is one of the largest gatherings of ecology editors in the world; there will be plenty of opportunities for you to meet them informally at our stand.

The publications team is also organising a workshop on the future of peer review in ecology, followed by a panel discussion with experts answering questions and offering their perspectives on the role of peer review in scientific research, different peer review models and how the peer review landscape could develop in the future.

In *Journal of Applied Ecology*, the latest 'Policy Direction' article[1] describes a decision support tool offering a practical approach to improving the management of conservation conflicts. All 'Policy Direction' and 'Practitioner's Perspective' articles are FREE to access.

Defra has committed to introducing a 25-year plan for the natural environment in England, now made both more pressing and more complex by the vote to Leave the European Union. Our policy workshop will offer an opportunity for dialogue with the Government and an insight into Defra's latest plans. What new form will this plan take for a future outside of the EU? How can ecologists engage with and inform the Government's new approach to the natural environment? If you are interested in policy, we have created a policy-specific theme on Monday 12 December; contact Ben, our Policy Manager if you would like to know more: Ben@BritishEcologicalSociety.org

CIEEM members were instrumental at our Summer School this year as well as in creating our popular *Rooting for a Career booklet*. Email Samina if you're keen to play a part in our Early Career working group or to help progress our career resources and events: Samina@BritishEcologicalSociety.org

We'd love to hear how we can collaborate, so please get in touch with Richard Richard@BritishEcologicalSociety.org or chat with us on Twitter @BritishEcolSoc.

Note

1. Young, J. C., Thompson, D. B. A., Moore, P., MacGugan, A., Watt, A. and Redpath, S. M. (2016). A conflict management tool for conservation agencies. Journal of Applied Ecology, 53: 705–711. doi:10.1111/1365-2664.12612

Member Network News

CIEEM has two types of Member Networks: **Geographic Sections** and **Special Interest Groups**. Each is run by a committee of members for the benefit of other members, providing opportunities to network, share knowledge and learn more about the science and practice of our profession.

There is also a role to play in promoting professional standards, feeding into consultations and representing the views of members at a local, national and international level.

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

SOUTH EAST ENGLAND

Water Vole Mitigation and Monitoring at London Gateway Port

30 March 2016, London

This event was led by Charlie Dwight (The Ecology Consultancy – Senior ecologist and water vole researcher) and hosted by Marcus Pearson (DP World – Environment Manager). The event comprised of a presentation by Charlie on water vole mitigation work undertaken to date at the London Gateway development site, and was followed by a site visit to see the impressive new London Gateway Port Site, and then a site visit to see the water vole research pit tag and radio collar recovery and observe the mitigation site and trapping efforts undertaken as part of the project/NE research.

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

NORTH WEST ENGLAND

Environmental mitigation for local road schemes: A5758 Broom's Cross Road

8 April 2016, Bootle

On the afternoon of Friday 8 April, a group of CIEEM members from North West England took advantage of a pleasant spring day to visit the recently opened A5758 Broom's Cross Road, just to the north of Liverpool. The visit was hosted by Stephen Birch, Sefton Council's Transport Planning Manager, on behalf of CIEEM's North West England Section. The event provided the opportunity to see how the environmental mitigation measures had been implemented on the ground.

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

NORTH WEST ENGLAND

Sustainable Upland Management at Haweswater

13 May 2016, Penrith

Lee Schofield (RSPB) and John Gorst (United Utilities) gave up a day of their time to welcome members of CIEEM's North West England Section to RSPB Haweswater. Haweswater is known for having had the last breeding pair of golden eagles in England, with the lonely male recently disappearing (presumed dead). The area is now being managed to demonstrate a more sustainable way of managing the uplands.

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

YORKSHIRE AND THE HUMBER

From the Yorkshire Dales to the Midnight Bell: a year of Yorkshire and Humber Section Events

As ever, the Yorkshire and Humber Section has been busy throughout 2015 and early 2016. Events have included: a look at landscape-scale conservation in the Yorkshire Dales; winter hedgerows with Barry Wright; ancient woodlands with Prof. Melvyn Jones and Christine Handley; PAWS restoration in partnership with Robin Ridley of the Woodland Trust; GCN translocation and eDNA analysis; and identification of aquatic plants. The Committee has supported student events and also held its lively annual End of Season Social at the Midnight Bell in Leeds.

You can read more about what Section members been up to and get a taste of what the committee is planning for the coming months at www.cieem.net/yorkshire-and-the-humber.

Participants learned how to identify aquatic plants on the Stainforth and Keadby Canal. Photo credit Pillippa Baron

SOUTH WEST ENGLAND

Meeting with Cornwall County Ecologist

14 April 2016, Truro

Over 30 ecologists from Cornwall and some from Devon attended this event with Natasha Collings-Costello MCIEEM, County Ecologist for Cornwall. Natasha highlighted some of the recent initiatives in the county including the recently published draft Environmental Growth Strategy and how she was working closely with the planners to improve their understanding of ecological issues and opportunities.

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

WALES

A Visit to Stanner Rocks

4 June 2016

Andy Shaw led the Welsh Section meeting to Stanner Rocks just on the Welsh side of the border with the West Midlands region. Here he is showing the group some of the site's botanical rarities, in this case sticky catchfly and spiked speedwell.

You can read more about this and other Welsh Section activities at www.cieem.net/wales

OVERSEAS TERRITORIES AND MARINE SPECIAL INTEREST GROUPS

Conference 2016: Protecting marine and coastal areas in the UK and Overseas Territories

21 September 2016, London

Managing our natural resources through the use of marine spatial planning and marine protected areas is fundamental in ensuring biodiversity and sustainability for generations to come. This is an evolving topic, with initiatives globally as well as at an EU and UK level.

Find out more about this conference and how to book your place at http://www.cieem.net/events/1195/uk-overseas-territories-and-marine-coastal-group-conference-2016

MIDLANDS

West and East Midlands Section Conference 2016:

Ecology and the Historic Environment: Conflicts and Consensus

12 October 2016, Calke Abbey, Derbyshire

Ecologists often work alongside archaeologists, conservation architects, landscape historians and other professionals from the Historic Environment sector. These relationships can be characterised by conflicts over issues such as protected species in historic buildings and lakes, management of dead wood in historic parkland or archaeological features constraining habitat creation schemes. Yet there should be much common cause between the different interests, as in many instances what is good for the historic environment is good for the natural environment.

Find out more about this conference and how to book you place at: http://www.cieem.net/events/1239/west-and-east-midlands-section-conference-2016

2016 ELECTIONS

Our new format online elections will be held for all CIEEM Member Networks this autumn. Nomination forms and details of current committee vacancies will be circulated to all members by direct email at the beginning of September and elections will take place by online voting in October. Don't miss out on this opportunity to have a say in your Member Networks.

Keep up to date with the elections at www.cieem.net/elections-2016.

WALES

Appointment of new Welsh Section Support Officer

We are very pleased to announce the appointment of Diana Clark as the new Welsh Section Support Officer. Diana has experience in key positions on both the Welsh and East Midlands Section committees, as well as working as a consultant ecologist. She joined the CIEEM Team in early August on a part-time basis and will be supporting the Welsh Section Committee, Vice President (Wales) and the Secretariat to increase CIEEM's activities in Wales, including training, events, conferences, policy work and student engagement. So keep an eye out in all the usual places for news of how this unfolds – we're especially excited about the 2017 Welsh Conference next February, held jointly with Natur and PONT.

You can find out more about the Welsh Section and how to contact Diana at www.cieem.net/geographic-sections/8/02.-wales

Look out for upcoming events in your area and keep up to date with news of what's been going on at www.cieem.net/member-networks. Find out how you can get involved at www.cieem.net/get-involved.

New Members

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

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

ADMISSIONS

Full Members

Dr Frazer Burlinson, Mags Cousins, Paul Culyer, Dr Thomas Flynn, Elena Guerra, Frances Lancaster, Sophie Leadsom, Dr Amanda Lloyd, Gemma Mahoney, Glen Parker, Catherine Ray, Matthew Rogers, Madeleine Ryan, William Self

Upgrades to Full Membership

Michelle Bullock, Rachael Iveson, Stacey Whiteley, Dr Francis Williams

Associate Members

Charlotte Baltruschat, Kari Bettoney, Sarah Birtley, Janine Burnham, Gordon Campbell, Matthew Clifford, Sarah Denne, Richard Fenna, Rebecca Hazlewood, Felicity Husband, Damien Kirby, Emily McVean, Trevor Taylor, David Wills

Upgrades to Associate Membership

Catherine Baldock, Alice Clarke, Gareth Clay, Gemma Cone, Carola Dallmeier, Emma Davis, Elizabeth Langston, Joanne Lucas, Alex Mueller, Sheila Murphy, Lucy Rouse, Robert West

Graduate Members

Georgia Kelly, Andrew Kenny, Sarah King, Hannah Meinertzhagen, Kyle Mellish, Lucy Merry, Hamish Muirden, Kathleen Murphy, Owen O'Keefe, Joanne O'Keeffe, Amy Parsons, Jennifer Pearson, Joanne Richmond, Sarah Rochelle, Helen Ruffhead, Matthew Ruiz, Lewis Saunders, Henry Smith, Robin Somers-Yeates, Peter Trickett, Nicole Turley, Jeffrey Turton, Sarah Unsworth, Emma Wainwright, Thomas Whitlock, Ashleigh Wylie, Dr Tarryn Wyman, Mark Yeldham

Upgrades to Graduate Membership

Helen Larzleer, Rosie Morris, Charis Russell-Smith, Sarah Smith, Lindsay Stronge, Katherine Wright

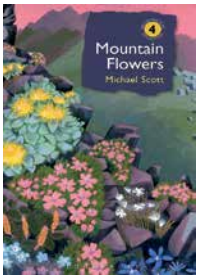
Qualifying Members

Miss Stephanie Bentham-Green, Miss Grace Dooley, Miss Lauren Garside, Mr David Haigh, Miss Katherine Halsall, Mr Stephen Norford, Mr Alexander Richardson, Mrs Leigh Russell, Mr Christopher Troth, Mr Jeremy Ward, Mr Daniel Williamson

Student Members

Opeyemi Adeyemi, Kouadio Angoua, Emma Bacchus, Samantha Beard, Nicola Bleach, Rachel Blissett-Lyne, Victoria Brown, Dean Carroll, Rob Dixon, Raelene Edwards, Catherine Gisborne, Katherine Gowers, Lucy Grable, Iwona Grala, Victoria Granger, Benjamin Griffin, Benjamin Killick, Elen Lesourd, Euan Mackenzie, Russell Mansfield, Dominika Murienova, Elizabeth Neale, Charlotte Pettis, Amelia Reddish, Natalie Robinson, Rebecca Rose, Denise Sasaki, Sarah Shorter, Onika Stellingburg, Owain Turner, James Verity, Ellis Watts, Rebecca Woods

Recent Publications



Mountain Flowers

Author: Michael Scott

ISBN: 9781472929822

Price: £31.50

Available from: http://bloomsbury.com/uk/mountain-flowers-9781472929822/

Britain's mountains and exposed sub-arctic regions of the far north are home to a remarkable range of specialist flowers, shrubs and ferns. In this journey from the Lizard to Shetland, Michael Scott examines Britain's richest upland sites, bringing an important 21st-century perspective to our understanding of the flora along the way. *Mountain Flowers* has much to offer wild flower enthusiasts and botanists, including detailed profiles of over 150 of the plants most characteristic of our montane regions.

Britain's Birds: An identification guide to the birds of Britain and Ireland

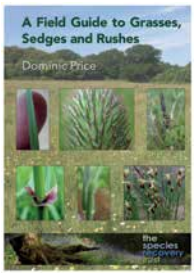
Authors: R. Hume, R. Still, A. Swash, H. Harrop and D. Tipling

ISBN: 9780691158891

Price: £14.99

Available from: www.nhbs.com/title/208442/britains-birds

Britain's Birds will be enjoyed, valued and constantly referred to by all birdwatchers – whether beginner, experienced or professional. This is a thoroughly comprehensive, up-to-date and practical bird book. Focusing on identification, and containing maps, facts and figures on numbers and distributions, this publication was devised by a team of lifelong birdwatchers, all with many years' experience of showing people birds and producing user-friendly field guides.



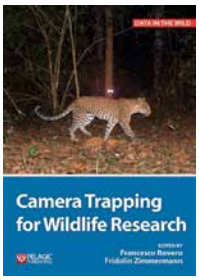
A Field Guide to Grasses, Sedges and Rushes

Author: Dominic Price

Price: £10 (plus £2.50 p&p)

Available from: www.speciesrecoverytrust.org.uk

The book contains 72 pages of species descriptions, habitat lists and flowcharts in full colour to help beginner and intermediate botanists learn how to identify this fascinating and challenging group of plants. All proceeds from sales go to SRT's species conservation projects.



Camera Trapping for Wildlife Research

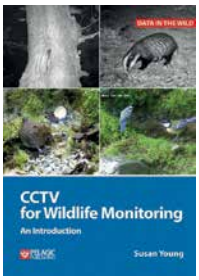
Editors: F. Rovero and F. Zimmerman

ISBN: 9781784270483

Price: £34.99

Available from: www.pelagicpublishing.com

This book provides a much-needed guide to the sound use of camera trapping for the most common ecological applications to wildlife research. Each phase involved in the use of camera trapping is covered.



CCTV for Wildlife Monitoring

Author: Susan Young

ISBN: 9781784270971

Price: £29.99

Available from: www.pelagicpublishing.com

This is a handbook on the use of CCTV in nature watching, conservation and ecological research. With expert experience in engineering, photography and wildlife, Susan Young describes CCTV equipment and techniques, giving readers the confidence to tackle what initially may seem technically challenging. No prior knowledge of CCTV is required – step-by-step information is provided to get anyone started recording wildlife.

Resilience of peatland ecosystem services over millennial timescales: evidence from a degraded British bog

Swindles, G. T. *et al*.

Journal of Ecology 2016, 104: 621–636. doi:10.1111/1365-2745.12565

This study demonstrates the importance of palaeoecology for understanding the trajectories of peatland development and ecosystem dynamics, including their resilience and resistance to pulse and press disturbances. The authors show that peatlands have the capability to recover spontaneously from severe disturbances such as peat cutting, albeit on timescales much longer than those applied to contemporary monitoring of restoration efforts. The implications are relevant for determining whether it is preferable to manage and restore peatlands, or to allow them to recover naturally without human intervention.

A conflict management tool for conservation agencies

Young, J.C. *et al*.

Journal of Applied Ecology 2016, 53: 705–711. doi:10.1111/1365-2664.12612

The tool uses a systematic stepwise approach with six distinct decision stages: (i) establishing whether there is a conflict or an impact; (ii) understanding the context of the conflict, including the stakeholders affected; (iii) developing shared understanding of the conflict and goals; (iv) building a consensus on how to reach the goals; (v) implementing measures; and (vi) monitoring the outcomes. The authors argue that this new tool has wide applicability and democratic legitimacy and offers an exciting and practical approach to improve the management of conservation conflicts.

Free online: http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12612/full

Using *in situ* management to conserve biodiversity under climate change

Greenwood, O. *et al*.

Journal of Applied Ecology 2016, 53: 885–894. doi:10.1111/1365-2664.12602

The authors provide a synthesis of published evidence examining whether habitat management can be used to offset the adverse impacts on biodiversity of changes in temperature, water availability and sea-level rise. Their focus is on practical methods whereby the local environmental conditions experienced by organisms can be made more suitable. The recent literature suggests that some of the adverse effects of climate change can be offset by appropriate management. However, it is clear from the existing evidence that some techniques have a higher risk of failure or unexpected outcomes than others and managers will need to make careful choices about which to implement.

Free online: http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12602/full

Modest enhancements to conventional grassland diversity improve the provision of pollination services

Orford, K.A. *et al*.

Journal of Applied Ecology 2016, 53: 906–915. doi:10.1111/1365-2664.12608

A modest increase in conventional grassland plant diversity with legumes and forbs, achievable with the expertise and resources available to most grassland farmers, could enhance pollinator functional diversity, richness and abundance. Moreover, the results here suggest that this could improve pollination services and consequently surrounding crop yields and wildflower reproduction in agro-ecosystems.

Free online: http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12608/full

Tailored flower strips promote natural enemy biodiversity and pest control in potato crops

Tschumi, M. *et al*.

Journal of Applied Ecology 2016, 53: 1169–1176. doi:10.1111/1365-2664.12653

The authors conclude that tailored flower strips can be an effective agri-environmental measure to enhance natural enemies and aphid control in nearby crops. Furthermore, tailored flower strips may help to reduce insecticide input in potato production as they significantly decrease the probability that action thresholds are reached. Promoting natural enemy abundance and diversity, as observed for hoverflies, may increase the stability of pest control and provide additional benefits to agro-ecosystems in terms of natural enemy conservation.

Practical implementation of ecosystem monitoring for the ecosystem approach to management

Kupschus, S., Schratzberger, M. and Righton, D.

Journal of Applied Ecology 2016, 53: 1236–1247. doi:10.1111/1365-2664.12648

The authors propose a more integrated approach aimed at not only assessing change, but simultaneously delivering evidence of the underlying reasons for observed changes. Using principles developed from observational and modelling efforts in the Barents Sea and the wider literature, they distil the essential characteristics that an integrated monitoring programme must exhibit. They demonstrate how such an integrated programme can offer substantial operational efficiencies compared to a coordinated approach.

Free online: http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12648/full

Forthcoming Events 2016

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

Conferences		
Date	Title	Location
21 September 2016	Overseas Territories and Marine & Coastal SIG Conference 2016 – Protecting marine and coastal areas in the UK and Overseas Territories	London
12 October 2016	West and East Midlands Section Conference 2016 – Ecology and the Historic Environment: Conflicts and Consensus	Calke Abbey
1-2 November 2016	Autumn Conference 2016 – Developing your skills for the future: Understanding the impacts of new tools, techniques and policies	Nottingham

Training Courses		
13 September 2016	Water Vole Ecology and Surveys	Cirencester
14 September 2016	Water Vole Mitigation	Cirencester
15 September 2016	Introduction to Phase 1 Habitat Survey	Sudbury
16 September 2016	Green Infrastructure	London
20 September 2016	Protected Mammals (Terrestrial) Republic of Ireland: Survey, Impact Assessment and Mitigation	Dundrum, Co Dublin
21 September 2016	Introduction to Bats and Bat Surveys	Dunblane
22 September 2016	Bat Impacts and Mitigation	Dunblane
29 September 2016	Introduction to Bats and Bat Surveys	London
29 September 2016	Survey and Monitoring of Road and Rail and Associated Mitigation Schemes for Bats: Pre, During and Post-construction	Leeds
4 October 2016	Priority and Protected Species Law and Policy	London
4-5 October 2016	Developing Skills in Ecological Impact Assessment (EcIA)	London
4 October 2016	Hazel Dormouse – Ecology and Surveys	Forest of Dean
5-6 October 2016	Hazel Dormouse – Handling, Mitigation and Detailed Habitat Requirements	Forest of Dean
5-6 October 2016	QGIS for Ecologists and Conservation Practitioners	Dunblane
11 October 2016	Effective Communication for Women	London
12 October 2016	BS42020 Biodiversity: Code of Practice for Planning and Development	London
12 October 2016	Introduction to Bats and Bat Survey	Wareham
17 October 2016	Calculating and Using Biodiversity Units	London
17 October 2016	Badger Ecology and Survey Techniques	Dorchester
18 October 2016	Badger Mitigation	Dorchester
18 October 2016	Introduction to Ecological Impact Assessment (EcIA)	Birmingham
19 October 2016	Ecological Report Writing	Birmingham
20 October 2016	Badger Survey, Impacts and Mitigation	Falkirk
20-21 October 2016	QGIS for Ecologists and Conservation Practitioners	Moate, Co Westmeath
21 October 2016	Camera Trapping for Ecologists	Mold
24 October 2016	Introduction to Ecological Data Modelling	Newport
25-26 October 2016	Developing Skills in Ecological Modelling	Newport
26-27 October 2016	QGIS for Ecologists and Conservation Practitioners	Stanmore
27 October 2016	Otter Ecology and Surveys	Kelso
1 November 2016	Effective Workplace Mentoring	Birmingham
1-2 November 2016	Water Vole Live Trapping, Care and Restoration	Launceston
4 November 2016	European Protected Species for Consultants	London
8 November 2016	Trees and Bat Roosts	Dorking
8 November 2016	Article and Feature Writing for Conservation Practitioners	Sheffield
10 November 2016	Protected Mammals (excluding Bats) Impacts and Mitigation	Dunblane
10 November 2016	Surveying and Monitoring of Bats in Woodlands	Leeds
14 November 2016	Advanced course in Ecological Impact Assessment (EcIA)	Edinburgh
15 November 2016	BS42020 Biodiversity: Code of Practice for Planning and Development	Newcastle
15 November 2016	Ecological Report Writing	Edinburgh
18 November 2016	Understanding Wildlife Law	Manchester
21 November 2016	Designing Biodiversity No Net Loss and Net Positive projects	London
22 November 2016	Habitats Regulations Assessment (HRA) of Projects	London
22 November 2016	Advanced course in Ecological Impact Assessment (EcIA)	Birmingham
23 November 2016	Report Writing for Ecological Impact Assessment	Birmingham
29-30 November 2016	Developing Skills in Ecological Impact Assessment (EcIA)	Manchester
6 December 2016	Survey and Assessment of Hedgerows in Winter Months	Damerham