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inpractice

Issue 91 | March 2016

Managing the Impact of Animal and Plant Diseases on Biodiversity

In this issue

Welcome

From Our New President

Welcome to the latest edition of *In Practice*, where you will find a wide range of interesting articles on wildlife disease issues. Rather than give you my take on those, I will let you read them for yourself and use this space to introduce myself as CIEEM President, and talk about some of the exciting work that the Institute is involved in.

We have been through a period of significant change at CIEEM over the past few years: receipt of the Royal Charter; a new governance structure; and a reorganisation of the Secretariat. In 2016 we have a strong and growing membership, and a Register of over 100 Chartered Ecologists. So what's next?

One of my priorities is to continue to raise the profile of the Institute and its members. There still seems to be a lot of misunderstanding and misinformation about what professional ecologists and environmental managers do. I want CIEEM to become known as the place to go for skills, knowledge, and evidence-based advice on matters to do with the natural environment. We want to engage the press, providing comment on matters of interest to the wider public, and get involved with schools as STEMNet Ambassadors to ensure that the next generation understand the great careers available in our sector.

Importantly we want to engage on policy matters. A key issue for us at the moment is the impacts on both our sector, and the natural environment, if the UK were to leave the EU. Thank you to those of you who completed our recent members' survey on this issue which showed overwhelming support for the "In" campaign. You can read a brief summary of these data in Institute News on page 4, with a full report in the next edition.

In addition to working on the EU referendum, we are keen to engage politically and to proactively advise on matters relating to environment policy in all the countries where our members work. To this end I have recently established a policy working group of senior Fellows and you will be hearing more about their work.

For a long time, CIEEM has been interested in the training and competence of Ecological Clerks of Works (ECoWs). This year we intend to develop and implement a scheme for the formal training and accreditation of ECoWs, sponsored by stakeholders who recognise the importance of this strategic skills gap. We would be very interested to hear your views on this, particularly from organisations who may wish to become sponsors and contribute to the development of the system.

Another of my priorities is to increase membership. With more members, we have a louder voice and continue to raise the profile of our industry. And of course the increased revenue from more members means we can provide more services to members. So please, do engage with your Institute and let us know what you want to see.

Despite being a consultant myself, I am keen that CIEEM is not seen as a 'Consultant's Club' and want to reach out to potential members in NGOs, statutory bodies, central and local government, and academia. What can the Institute do for you? And, also, what can you do for the Institute, the profession and future generations of ecologists?

For those of you who are already members, we would like you to see membership of CIEEM as a journey, closely linked to your career development. You can apply to upgrade your membership at any time; you do not need to wait until membership renewals season! Why not review the (new improved) Competency Framework and see if it's time to apply for Full membership, Chartered status, or even to start drafting that Fellowship application?

Whatever the stage of your career, I hope that you all find something of value and interest in your membership of CIEEM. Please let us know. And also what else you would like us to do.

Have a great survey season!

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Information

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Front cover image: Acute Oak Decline

Contents

Volunteers Wanted

CIEEM's Governing Board is looking for 2 volunteers to serve on a new Audit and Risk Sub-Committee. Volunteers, who should be Full members or Fellows of the Institute, should have some experience of managing business risk including finance, health and safety and employment. The Sub-Committee will meet twice a year in Winchester, although attendance via Skype or teleconference will be possible.

Interested members should visit the members' area of the CIEEM website and download the Audit and Risk Committee Terms of Reference and the Standing Committees Application Form. The deadline for the return of forms is 31 March 2016.

Staff Changes

In January we said goodbye to our Professional Development Officer **Helen Boulden**, who decided after nearly four years with CIEEM to take some time out to spend with her young daughter. We wish Helen all the best.

In the same month we were pleased to welcome **Krystie Hamilton** as our new Professional Development Co-ordinator. Krystie will take on some of Helen's responsibilities and work closely with our existing Professional Development Co-ordinator Lexie Munro.

CIEEM publishes new guidance on work experience

Guidelines on Providing Quality Work Experience in Ecology and Environmental Management has been produced to help organisations provide legally compliant, ethically sound, properly planned and rewarding work experience opportunities to those seeking to enter the profession. It emphasises the value and benefits of such opportunities to host organisations and the wider profession as well as to the individual. The guidance can be downloaded from the Professional Guidance Series of documents in the members' area of the website.

CIEEM and the EU Referendum

CIEEM continues to be engaged with the forthcoming EU referendum.

We have undertaken a survey of the CIEEM membership to ask their views on the impacts of a possible Brexit. We are continuing to analyse the results, however the overwhelming response from members is that EU membership is better for the sector and for nature conservation. A report of the findings will be published shortly.

We are collaborating with the Society for the Environment on this matter in the context of the wider environmental sector.

We also continue to add links to information relevant to the natural environment and the referendum on the below webpage.

http://www.cieem.net/eu-referendum

Activities of the Professional Standards Committee (PSC)

The production of guidance documents and the review and, in some cases, endorsement of guidance produced by other organisations has become an increasing part of the role of the PSC and was the main focus of the December meeting. In response, the PSC has drafted a series of principles which it believes underpin good guidance, which were discussed and agreed during the meeting.

Following on from the recent guidance note produced for homeowners in relation to bat surveys, PSC has produced a guidance note for homeowners on engaging an ecologist (http://www.cieem.net/news/304/cieem-publish-new-guidance-for-homeowners-on-engaging-an-ecologist). This was reviewed and discussed at the December meeting and published early in the New Year.

The draft 3rd Edition of the Bat Conservation Trust's *Bat Survey Guidelines* and the Mammal Society's draft *Water Vole Mitigation Handbook* were reviewed and discussed; both documents were recommended to the Governing Board for endorsement, which was subsequently approved.

The PSC also agreed to approve a proposal for the production of new guidance to assist ecologists with the interpretation of air quality impact assessments, so that impacts on ecological resources can be better predicted.

The need for CIEEM to produce a list of approved professional practice guidance documents was debated, given the number of different documents available and the increasing reliance placed on these by planning authorities, as well as their relevance to complaints made against members. The PSC noted a number of challenges to this task and would be keen to hear the views of members.

The December meeting also included agreement of a joint statement with the Association of Local Government Ecologists. This is intended to promote greater clarity on the ecological reports to be submitted in support of planning applications, and the need for these to follow CIEEM's *Guidelines for Ecological Report Writing* and, in the case of EcIAs, the *Guidelines on Ecological Impact Assessment*. The statement is aimed at planning applicants as well as local planning authorities.

Future themes for *In Practice*

Edition	Theme	Submission deadline
September 2016	Upland Ecology	30 May 2016
December 2016	Working in Partnership	29 August 2016

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

Bill to boost Wales' natural resources to become law

The latest piece of pioneering Welsh Government legislation – the Environment (Wales) Bill – aimed at planning and managing Wales' natural resources in a more sustainable and joined-up way has been passed by the National Assembly for Wales. When law, it will put in place a stronger approach to tackle climate change with at least an 80% emission reduction target by 2050.

http://gov.wales/newsroom/environmentandcountryside/2016/bill-to-boost-wales-natural-resources-to-become-law/?lang=en

Environmental Better Regulation Bill good news for Northern Ireland environment and business

Environment Minister Mark Durkan has driven forward important new legislation that will help protect the environment and give a boost to environmentally responsible businesses. The Environmental Better Regulation Bill has secured the final approval of the Assembly. This legislation will strengthen environmental protection, simplify environmental legislation and reduce red tape for business.

https://www.doeni.gov.uk/news/environmental-better-regulation-bill-good-news-environment-and-business-durkan

New GCN Mitigation Licence Method Statement Template

Natural England has been working to improve the great crested newt (GCN) Method Statement template. From 30 January 2016 Natural England expects all new GCN applications to be submitted with a Method Statement using this new template. Any new applications submitted on the 'April 2013 template' after this time will be sent back to the applicant with a request to re-submit on the new template.

https://www.gov.uk/government/publications/great-crested-newts-apply-for-a-mitigation-licence

Natural England consultation on proposed licensing policies

At the time of writing, Natural England (NE) is planning to launch a public consultation on four new proposed licensing policies for European Protected Species (EPS) at the end of February. These policies aim to secure better outcomes for EPS and be more enabling of development. They relate in particular to NE's approach to securing mitigation and compensation and broadly cover:

- Opportunities to reduce the amount of trapping and translocation required by licensing, with a shift towards habitat provision instead
- Greater flexibility in the location of habitat compensation (allowing strategic locations to be used and development contributions to be pooled)
- Greater flexibility in requirements for temporary habitat (such as mineral workings)
- Opportunities to reduce seasonality delays in development by ensuring that field survey requirements are closely tied to risk levels

CIEEM will email members directly when we have confirmation of the consultation details.

Third edition of Bat Surveys for Professional Ecologists published

Following extensive feedback from different user groups the Bat Conservation Trust (BCT) has produced *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition). The guidelines were revised, updated and reviewed by experts and feature new chapters and content.

www.cieem.net/news/300/third-edition-of-bat-surveys-for-professional-ecologists-published

Review group's report recommends increases to wildlife crime penalties

Scotland's Environment Minister Aileen McLeod has welcomed the publication of a report examining the penalties available for wildlife crime offences. The report, drawn up by a review group chaired by Professor Mark Poustie, an Environmental Law expert at Strathclyde University, sets out ten recommendations. As well as increases to the maximum available penalties, the report also recommends greater use of alternative penalties such as forfeiture, systematic use of impact statements in court, new sentencing guidelines, and consolidation of wildlife legislation.

http://www.gov.scot/Publications/2015/11/2196

Natural England to end core support for LERCs

Natural England's (NE) evidence team has recently contacted managers of Local Environmental Records Centres (LERCs) in England to announce that it will no longer be pursuing Memoranda of Agreement with LERCs. This means that they are not going to provide support for the daily running of LERCs or requesting specific services from them. This was not a decision NE have taken lightly, but felt it was a necessary step in the pursuit of a strategy more in line with their Open Data agenda. As a consequence of the decision, from 1 April 2016 onwards, NE will not be using species, habitat and sites data provided by LERCs in their decision-making.

The decision does not necessarily mean a complete end to NE–LERC relations, as NE intends to offer LERCs the opportunity to bid for Open Data grants in the future. However it will have a significant impact on data access to NE at a national level and will require local Area Teams to make their own funding agreements with LERCs where they need to continue accessing their services.

www.cieem.net/news/301/natural-england-to-end-core-support-for-lercs

New plans to save England's hen harriers

Plans to help revive the hen harrier, one of England's most persecuted birds, have been published as part of the government's ongoing commitment to preserve and enhance our nation's natural environment.

https://www.gov.uk/government/news/stewart-new-plans-to-save-englands-hen-harriers

Ireland EPA launches Strategic Plan 2016-2020 – 'Our Environment, Our Wellbeing'

The EPA will further strengthen its core functions of regulation, enforcement and assessment over the life of its new Statement of Strategy, prioritising air and water quality, climate change, and enhancing the radiation protection framework. The Agency will also seek to engage more closely with citizens, communities, and businesses, to mobilise sustainable behaviours.

http://www.epa.ie/newsandevents/news/name,58927,en.html#.VrsmB1Kuwr8

Independent Welsh badger vaccination analysis

Following the decision to suspend sourcing the BCG vaccine due to a global shortage, the Animal and Plant Health Agency (APHA) was commissioned to identify the likely impact the non-availability of Badger-BCG in 2016 would have on the vaccination project within the Intensive Action Area (IAA) in West Wales. The report concluded that despite not being able to complete the fifth and final year, four years of badger vaccination would achieve a reduction in prevalence of TB in badgers in the IAA. APHA modelling showed that vaccinating for four years, missing year five, and returning to vaccinate in year six is not different from vaccinating for five consecutive years.

http://gov.wales/newsroom/environmentandcountryside/2016/independent-vaccination-analysis-welcomed/?lang=en

Defra publish details of the second tranche of MCZs

Defra has now published details of the second tranche of Marine Conservation Zones, in which 23 sites will be given protection. This will extend England's 'Blue Belt' to cover over 20% of English waters and provide protection for the diverse array of wildlife in our seas.

www.cieem.net/news/295/defra-publish-details-of-the-second-tranche-of-mczs

European Parliament votes for nature

In a vote at the European Parliament on 2 February 2016, Europe's political representatives have stood up to defend key under-threat EU nature laws. By an overwhelming majority of 592 to 52, MEPs voted to approve a report on the Mid-term review of the EU's Biodiversity Strategy, which calls for the protection of the Birds and Habitats Directives.

www.cieem.net/news/298/european-parliament-votes-for-nature

New report sets out the case for greening London

A new report, *Natural Capital: Investing in a Green Infrastructure for a Future City*, was published on 9 December 2015. Launched as part of London's Infrastructure Plan 2050, it highlights how the network of green walls, living roofs, rain gardens, parks and street trees, and the services they provide, are as essential to the city as other infrastructure such as rail, roads, pipes and cables.

http://www.london.gov.uk/what-we-do/environment/environment-publications/green-infrastructure-task-force-report

A Horizon Scan of Global Conservation Issues for 2016

This paper presents the results of the seventh annual horizon scan, in which the authors aimed to identify issues that could have substantial effects on global biological diversity in the future, but are not currently widely well-known or understood within the conservation community. Fifteen issues were identified by a team that included researchers, practitioners, professional horizon scanners, and journalists. The topics include use of managed bees as transporters of biological control agents, artificial superintelligence, electric pulse trawling, testosterone in the aquatic environment, building artificial oceanic islands, and the incorporation of ecological civilization principles into government policies in China.

http://www.cell.com/trends/ecology-evolution/pdf/S0169-5347%2815%2900291-8.pdf

Launch of Scottish Protected Nature Sites web tool

The flagship dataset from Scottish Natural Heritage (SNH), Site Condition Monitoring (SCM), records the condition of around 2,000 species and 3,000 habitat features across nearly 2,000 sites of national and international importance for wildlife and geodiversity throughout Scotland. Information on features of notified interest – such as animals, plants, woodland, or the fossil record – can be examined for Scotland's land, fresh waters, coasts and surrounding seas. A powerful new way of accessing and viewing this wealth of information is now available on Scotland's Environment Web (SEWeb).

http://www.environment.scotland.gov.uk/get-interactive/data/protected-nature-sites/

Guidance to Natural England: preventing spread of bovine TB

This guidance outlines what is required in order for any cull of badgers to be effective, safe and humane. This is guidance issued to Natural England by the Secretary of State under section 15(2) of the Natural Environment and Rural Communities Act 2006 (NERC). This replaces previous guidance issued in December 2011.

https://www.gov.uk/government/publications/guidance-to-natural-england-preventing-spread-of-bovine-tb

Ireland's National Biodiversity Indicators released

The National Biodiversity Data Centre has released the first set of National Biodiversity Indicators, designed to summarise trends in the health of our species, landscapes and seascapes. They also track broad changes in Irish society's relationships with wildlife. The overall assessment is that there is inadequate progress in 60% of indicators, good progress has been made in 32%, whereas progress with the remaining 8% is uncertain. Overall they demonstrate that more concerted action is needed if Ireland is to meet targets set out in the National Biodiversity Plan and those set by the European Union and the Convention on Biological Diversity.

http://www.biodiversityireland.ie/irelands-national-biodiversity-indicators-released/

Wildlife Disease Surveillance by the Animal and Plant Health Agency

Keywords: disease reservoirs, emerging disease, scanning surveillance, wildlife

J. Paul Duff, Alex M. Barlow, Andrew C. Breed, Daisy Duncan, J. Paul Holmes and Richard M. Irvine
Animal and Plant Health Agency

Wildlife species host a variety of pathogens and diseases that pose risks to the health of humans and domesticated animals, as well as potentially having negative impacts on biodiversity. Through systematic collection, collation and analysis of data on disease in wild animal populations, and the investigation of wildlife mortality events through veterinary surveillance activities in England and Wales, the Animal and Plant Health Agency (APHA) aims to provide an early warning of new and emerging threats to wildlife health.

Figure 1. Wildlife disease investigation requires collaboration with ecologists. Two female kingfishers *Alcedo atthis* in good condition with no evidence of disease were found dead together at a river's edge in northern England. Territorial disputes occasionally lead to drowning and death in this species and was suspected in this incident. Photo credit: J.P Duff.

Introduction

The problems caused by infectious diseases emerging from wildlife hosts will undoubtedly increase in the coming decades. There is increasing global movement and 'mixing' of organisms: from pathogens such as viruses, bacteria and parasites, to disease vectors like mosquitos and other arthropods, to their vertebrate hosts like humans, livestock, wild mammals and birds. As the physical and spatial barriers between potential pathogens and hosts are removed, the opportunities for transmission, infection and disease increase. We still know relatively little about the pathogen fauna of British wildlife but it is evident that the more we look the more pathogens we find. Recent discoveries of pathogens in wildlife that can also infect people, such as hantavirus in British rodents (Pounder *et al*. 2013), highlight the need for care when in close contact with wild animals. This is particularly relevant to ecologists and others working professionally in natural environments and with wildlife.

Practical implications

Ecologists and other environmental practitioners play a key role in wildlife disease surveillance as observers of wild animals and their habitats. Awareness is important because:

- New and emerging disease in wildlife can be significant: incidents of mortality should be reported to appropriate investigation agencies (Table 1) for diagnosis and assessment.
- Disease may pose a threat to wild animal health, either from infectious agents (viruses, bacteria) or from toxins.
- Disease in one species may reflect a larger threat to other wild species, and to biodiversity in general.
- Wildlife disease may reflect environmental damage not otherwise recognised.
- Wildlife disease may reflect environmental toxicities and anthropogenic (man-made) pollution incidents.

Collaboration between those working in the field and wildlife disease investigators

includes reporting unusual wildlife mortalities and collection of data from wild animal species. Wildlife disease incidents should be investigated as a matter of priority when:

- Mass mortality events occur, i.e. where five or more individuals of the same or different species are found dead. Specifically, incidents should be reported to the Defra Helpline where five or more wild birds of any species are found dead at any location on mainland Great Britain (see Box 1).
- Several individuals in a group appear to be ill.
- Nervous system disease is seen, characterised by behaviour change, apparent blindness, persistent head tilt or twisting of the neck, disorientation, collapse and paddling movements. Diseases affecting the brain and nervous system can be important, e.g. rabies, bat lyssavirus infection, avian influenza and West Nile fever.
- Threatened species are found dead or moribund.

There are relatively few diseases in British wildlife that are the subject of statutory investigation, e.g. surveillance for avian influenza virus infection in wild birds that are found dead. Notifiable diseases of livestock that are also notifiable in wildlife in Britain are rare, e.g. anthrax.

The control of wildlife disease can be problematic, and interventions, mitigation and management of disease in free-living populations is in its relative infancy in this country and globally. However, some good examples do exist, e.g. a range of management techniques to prevent squirrel pox have been implemented in Northern England with some success. Internationally, rabies vaccination of wild carnivores is employed extensively and to good effect.

Why are diseases of wildlife important?

Wildlife can be a reservoir of disease for other animals and people, and this is of concern to governments and society (Jones *et al*. 2008). The appearance and distribution of new diseases, together with human and livestock susceptibility, are largely unpredictable and control can be extremely costly, e.g. ebola in West Africa in 2015. To mitigate such risks, government-funded scanning surveillance is carried out in Great Britain for animal-related threats, present in or emergent from wildlife. In summary:

- Wildlife is recognised as a source of new and emerging disease.
- Wildlife can be reservoirs of zoonotic disease, e.g. bat lyssavirus, Lyme disease, trichinellosis, echinococcosis.
- Wildlife can be reservoirs of disease that affect domesticated stock, e.g. bovine tuberculosis (*Mycobacterium bovis* infection) in badgers *Meles meles*, feral wild boar *Sus scrofa*, deer and other wild species in Great Britain; louping ill, avian influenza, West Nile virus, leptospirosis, salmonellosis, Q Fever.
- Exotic pathogens may be introduced to a country or region by migrating wildlife, e.g. West Nile virus and avian influenza virus by migrating wild birds.
- Wildlife disease may be a sensitive indicator of underlying environmental pollution.
- Wildlife disease incidents, with mass mortality, may be of concern to the public.
- Wildlife disease may be of conservation importance, threatening endangered populations and biodiversity, e.g. squirrel pox disease in English red squirrels *Sciurus vulgaris*.

Wildlife disease surveillance in England and Wales

Wildlife disease surveillance is the continuous collection, collation and analysis of data on disease in wild animal populations. The Animal Plant and Health Agency (APHA) Diseases of Wildlife Surveillance Scheme (APHA DoWS) has a leading role in wildlife surveillance in Great Britain, led and managed by the APHA Wildlife Expert Group. APHA also coordinates surveillance projects for diseases that are considered to pose significant threats, such as avian influenza and West Nile virus infections in wild birds, and zoonotic disease in wild rodents. Information is made available through published reports on new diseases in wildlife (e.g. squirrel pox, rabbit haemorrhagic disease, European brown hare syndrome, iridovirus or ranavirus in frogs, and bovine tuberculosis in badgers).

The APHA DoWS was set up by Defra in 1998 in England and Wales and extended in 2003 to include partnership working with the SAC Consulting: Veterinary Services (see Box 2). Surveillance for wildlife disease was included in the Defra Animal Health and Welfare Strategy (2003) but it was not until 2009 that the England Wildlife Health Strategy (EWHS) was published in response to the increasing threats from West Nile fever and avian influenza, both diseases with wild bird reservoirs. England is one of the few countries in Europe with a published strategy, although the EWHS only discusses broad considerations and does not provide detailed responses to outbreaks of specific disease in wildlife. From 2009, in accordance with the EWHS, wildlife disease surveillance in Great Britain has been undertaken by the Great Britain Wildlife Disease Surveillance Partnership (GBWDSP), see Table 1.

Table 1. The Great Britain Wildlife Disease Surveillance Partnership (GBWDSP): partner organisations and expertise.

GBWDSP partner organisation	Species expertise and disease coverage
APHA DoWS & Wildlife Expert Group	All wild mammal and bird species unless listed below
SAC Consulting: Veterinary Services	Wildlife in Scotland
Institute of Zoology, London	Garden wildlife, cetaceans and threatened species
Wildfowl and Wetlands Trust	Waterbirds
Centre for Environment, Fisheries and Aquaculture Science	Fish and aquatic invertebrates
Forestry Commission England	Wild deer and feral wild boar
Natural England	General responsibility for the natural environment in England

Contact details for these organisations are available from internet searches. For a general point of contact the work numbers for the three APHA DoWS leads are: Paul Duff, 01768-885295 (paul.duff@apha.gsi.gov.uk); Paul Holmes, 01743-467621; and Alex Barlow, 01626-891121.

Box 1: Steps to identifying possible disease outbreaks in wildlife in the field

Ecologists and environmental practitioners finding dead or obviously sick wild animals should first assess the incident (Figure 1). If trauma is the likely cause of injury or death, or when carcasses are decomposed or cannot be collected safely, then no further action is advised.

If five or more dead wild birds (of the same or different species) are found together, avian influenza virus infection is a possibility and the Defra Helpline (03459-335577) should be alerted. Equally, if wildlife poisoning is suspected, the Defra Wildlife Incident Investigation Scheme should be contacted (0800-321600).

In other cases, please contact the most appropriate organisation from Table 1. They may request that bodies are placed in plastic bags if it is safe to do so and if appropriate protective clothing is available (e.g. disposable gloves). As wild animal carcasses may carry pathogens that could infect people, simple personal hygiene precautions should be taken to minimise the risk of infection:

1. Avoid touching the body with bare hands and use disposable gloves. If gloves are not available, a plastic bag can be used as a makeshift glove, and then turned in on itself.
2. Place the body in a suitable, leak-proof, plastic bag, avoiding contaminating the outside of the bag.
3. Tie the bag, place it in a second bag and tie the second bag.
4. Evert gloves to remove, place them in a separate bag and dispose of these responsibly.
5. Wash hands thoroughly in soap and water.
6. If the carcass is not required, bury it as found.

When GBWDSP partner organisations wish to carry out post-mortem examinations and/or laboratory investigations, they will usually make arrangements for collection of carcasses or courier transport to a diagnostic laboratory. The APHA DoWS and several other organisations will examine accepted cases free of charge and send diagnostic reports to whoever submits the carcasses. Further information on handling and disposal of dead wild birds is available at http://webarchive.nationalarchives.gov.uk/20130402151656/http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/ai/wildbirds/#reporting.

Investigation of wildlife incidents by APHA and the GBWDSP

Where wildlife mortality incidents are investigated by APHA and the GBWDSP, the findings should be **discussed** with species and habitat specialists; an **assessment** should be made; **mitigation actions** considered; and the **results disseminated** as appropriate. APHA and GBWDSP organisations may also perform field investigations.

The results and findings of APHA's surveillance work are assessed by the APHA Wildlife Expert Group. New and/or re-emerging wildlife-related disease threats are submitted to the Veterinary Risk Group who review the evidence and formulate proportionate risk mitigation measures. These are further reviewed, challenged and/or endorsed by the Chief Veterinary Officers of the four UK administrations (Anon. 2016).

Wildlife disease surveillance at the national level depends upon a network of diagnostic laboratories (Figure 2), to enable access to investigative services, and because dead and dying wildlife does not travel well. This must be backed up by diagnostic depth and expertise in the veterinary disciplines, for example pathology, histopathology, parasitology, bacteriology, virology, molecular biology and epidemiology (Figure 3). Finally, there must be access to expertise in the ecology of the species/populations being investigated (Figure 1) – wildlife disease investigation requires input from ecologists.

The APHA DoWS work is carried out at six APHA Veterinary Investigation Centres in England and Wales, supported by two larger laboratories at APHA Weybridge, Surrey and APHA Lasswade, Scotland (Figure 1). Non-infectious conditions, such as toxicities, and suspected wildlife poisoning incidents are also investigated, usually linked to the Wildlife Incident Investigation Scheme. Collaborative investigations, involving SAC Consulting: Veterinary Services and non-government partner organisations (e.g. Institute of Zoology, London), have included squirrel poxvirus, ranavirus disease in frogs, garden bird salmonellosis and trichomonosis, and drowning incidents in starlings.

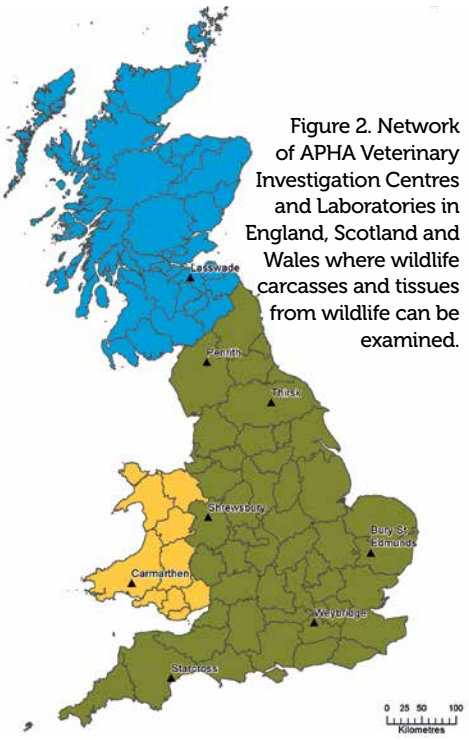

Figure 2. Network of APHA Veterinary Investigation Centres and Laboratories in England, Scotland and Wales where wildlife carcasses and tissues from wildlife can be examined.

An update on wildlife disease investigation and surveillance projects in Great Britain

2001 – surveillance began for West Nile virus in wild bird casualties; to date, neither the disease nor virus has been found in Britain (Brugman *et al*. 2012).

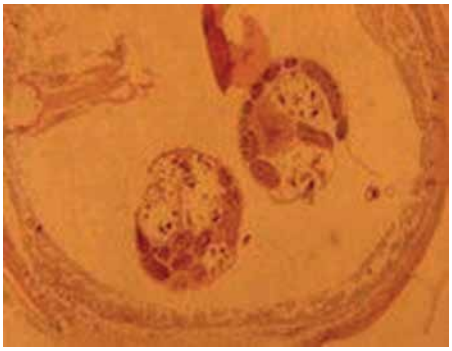

Figure 3. National wildlife disease surveillance requires a full range of diagnostic capabilities. Here, histopathology reveals in cross-section two tracheal worms within the trachea (the wind pipe, with the outer ring structure visible) of a common starling *Sturnus vulgaris*. Photo credit: J.P Duff.

2003 – necrotic enteritis in swan species (*Cygnus olor, C. cygnus*) detected (Pritchard *et al*. 2004).

2005 – scanning surveillance for avian influenza virus in wild birds commenced resulting in the detection of H5N1 highly pathogenic avian influenza virus (Eurasian lineage) on two separate occasions (2006 and 2008) in wild birds found dead (Irvine 2013). Different low pathogenicity avian influenza (LPAI) viruses have also been detected, as would be expected because wild waterbirds represent the natural reservoir hosts for such LPAI viruses. These and other findings will inform future wildlife surveillance (Breed *et al*. 2012).

2011 – *Echinococcus multilocularis*, an exotic zoonotic parasite not previously found in Great Britain, found in a beaver *Castor fiber* (Barlow *et al*. 2011).

2015 – the fungus responsible for white nose syndrome in bats, a disease causing mass mortalities of bats in North America, detected in English bats (Barlow *et al*. 2015) but so far not shown to cause mass mortality, possibly because bats in Britain have protective immunity to the pathogen.

Future directions

The ultimate importance of wildlife disease surveillance is to identify changes at the global scale, not only in vertebrate health but also changes in air, water and climate quality that are not detected by other means – wildlife health may be the 'canary in the coalmine' indicator of environmental change. Examples include the unregulated use of diclofenac (an anti-inflammatory drug used in livestock) causing unsustainable population declines in several species of vulture across Southern Asia; the extinctions of amphibian species across three continents due to chytrid fungal disease; and unsustainable mortality caused to albatross and other marine animals due to floating plastic marine debris across the oceans. The last two examples are relevant in Britain and are monitored by GBWDS Partners and their networks. Ecologists and environmental practitioners working in collaboration with veterinarians and scientists play important roles in wildlife disease investigation and surveillance, and in education of the public.

Responsibilities for wildlife and the health issues that affect free-living species can be unclear. Government-funded wildlife disease surveillance in Britain mainly relates to animal health and welfare, public health and biodiversity protection. A similar approach is being employed increasingly by governments worldwide. Whilst the level of surveillance activity should be proportionate to the magnitude of the threat, it has the potential to play a crucial role in helping to maintain global biodiversity through early warning of catastrophic disease threats.

Further information

Data from investigations by the GB Wildlife Disease Surveillance Partnership and other information on wildlife disease appears in *Quarterly Wildlife Emerging Threat Reports,* available online from the APHA website (https://www.gov.uk/government/publications/wildlife-disease-surveillance-reports-2015).

An essential provision of the England Wildlife Health Strategy is that DoWS works in partnership with other government and non-government organisations both inside and outwith the GBWDSP, many of whom make their own valuable contribution to the investigation of wildlife disease (Toms and Lawson 2016)

Acknowledgements

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Box 2: Provision of wildlife disease surveillance in Scotland

The Scottish Government provides a Public Good Veterinary and Advisory Services budget for surveillance of important, novel or emerging wildlife diseases, and investigation of wildlife crimes. Post-mortem examinations are carried out under this budget by SAC Consulting: Veterinary Services, a GBWDSP partnership organisation.

Investigations which may be eligible in wild birds in Scotland include examinations for reasons of public concern; risk of disease to humans and domesticated stock; incidents deemed unusual by competent persons such as ecologists or similar practitioners; suspected poisoning incidents; and mass mortality incidents (five or more dead birds in one location at one time). If an ecologist or other practitioner suspects that they have found carcasses or sick wild birds which may be eligible, they are strongly encouraged to contact their nearest disease surveillance centre.

Centres are located in Aberdeen, Ayr, Dumfries, Edinburgh, Inverness, Perth, St Boswells and Thurso. Contact details and directions can be found on the SRUC (Scotland's Rural College) website, www.sruc.ac.uk, by clicking the "Veterinary Services" tab and scrolling down to "Contact Details"; alternatively, contact Caroline Robinson on 01738 629167 or caroline.robinson@sac.co.uk.

Where mass mortality incidents are discovered, a representative sample of carcasses is required: either 10% or five birds, whichever is greater (subject to practicality). Submission of single carcasses of any wild birds of the targeted "High Risk Species" which do not otherwise fit the eligibility criteria will also be considered for disease surveillance. This list, for simplicity, can be thought of as certain species of swans, ducks, geese, shorebirds, waders, seabirds (mainly gulls) and raptors. Follow the APHA's advice on carcass collection to safeguard human health.

In wildlife species other than birds, investigations which may be eligible include novel and emerging diseases (squirrel leprosy in red squirrels, for example), and wildlife crimes.

Where possible, note the Ordnance Survey reference of the incident location. The finder or an agent of the finder (or the police, in the case of suspected crime) may need to submit carcasses to a centre as there is no arrangement with other agencies to collect carcasses, except in some exceptional incidents.

Note: Where crimes such as cruelty, compromised welfare or other legislation breaches are suspected, it is important to contact **Police Scotland** in the first instance, without disturbing the scene.

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Control Measures for Exotic Plant Pests and Diseases in the UK

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Keywords: exotic plant disease, exotic plant pests, inspections, notification, Risk Register

We are facing an unprecedented threat from exotic plant pests and diseases. If they were to become established, they would have huge potential to change how our landscape looks as well as severely impact our biodiversity, economy and food security.

Government and stakeholders share the responsibility for preventing the establishment of exotic notifiable pest and disease, reporting suspicious symptoms and managing outbreaks. Management can take the form of eradication via plant destruction or treatment, containment by restricting movement of plants and/or the use of physical or biological "barriers". Consignments of plants or plant products found with pest and disease at our national borders can be returned to their point of origin or destroyed.

Government responsibilities are executed by the UK Plant Health Services comprising Defra, the Forestry Commission, and the devolved administrations in Wales, Scotland and Northern Ireland. The Plant Health and Seeds Inspectorate implements plant health measures in England and Wales on behalf of Defra and the Welsh Government, while the Scottish Government implements these matters in Scotland. Similar legal measures are in place in Ireland through the Forest Pest and Disease Regulations implemented by the Forest Service, Department of Agriculture, Food and the Marine.

Stakeholders include all those involved in the planning, management and maintenance of green spaces, e.g. landowners, industry (particularly horticulture, agriculture and forestry), plant retailers and nurseries (especially those importing or exporting plant material), environmental consultants, land agents, landscape architects, developers and civil engineers, NGOs and the public.

Asian longhorn beetle *Anoplophora glabripennis*.

The Risk Register

Familiarity with priority plant pest and disease threats can be gained by making use of the UK Plant Health Risk Register: https://secure.fera.defra.gov.uk/phiw/riskRegister/ (Figure 1).

Over 800 organisms have so far been rated for the likelihood and impact of their becoming established or spreading within the UK. The Risk Register is not intended to provide a simple list of the "top ten pests", but to establish different priorities for regulation, research, contingency planning, publicity, surveys and detailed risk assessment, depending on the characteristics of the organism. A Defra co-ordinated working group meets on a monthly basis to ensure the register is kept up to date.

Statutory notification requirements

Following the finding in the UK of *Chalara* ash dieback *Hymenoscyphus fraxineus*, and due to the threats from a range of new pests and diseases affecting trees, statutory notification requirements were introduced for a number of tree genera when imported into England and Wales from EU Member States and Switzerland, although not from other parts of the UK. At present, these include plane *Platanus* spp., ash *Fraxinus* spp., sweet chestnut

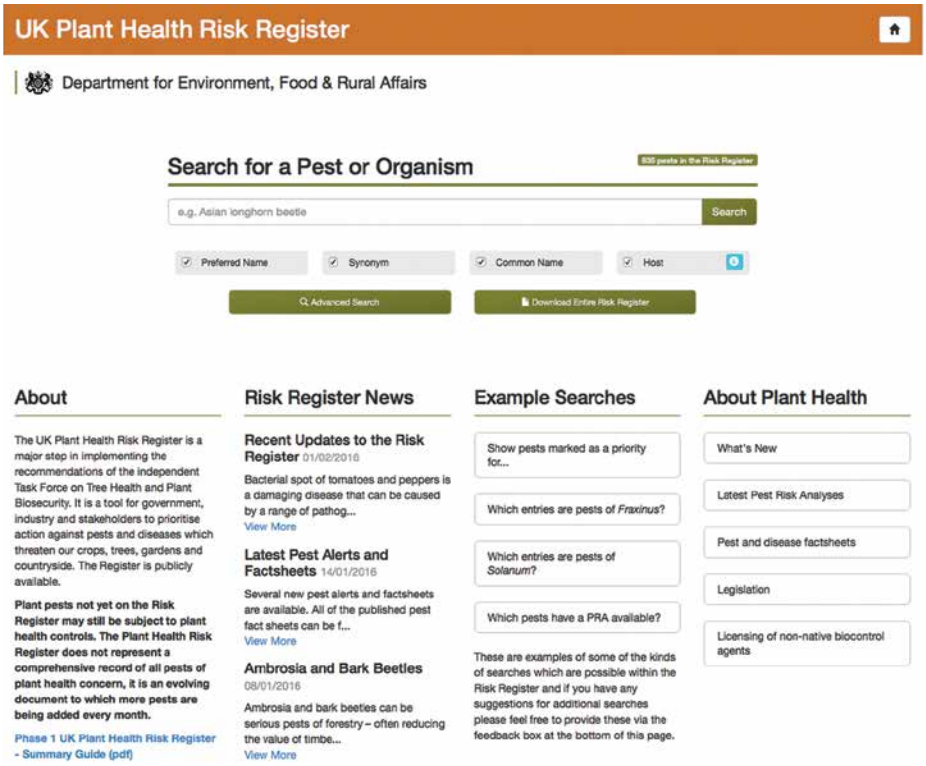

Figure 1. Screenshot of Plant Risk Register.

Castanea sativa, oak *Quercus* spp., elm *Ulmus* spp. and pine *Pinus* spp. The scheme has just been extended to include *Prunus* spp. (cherry, plum, laurel, etc.) due to the large number of high-risk pests and diseases for which it is a host. These include *Xylella fastidiosa*, which is causing devastating outbreaks in Italy and France including Corsica, citrus longhorn beetle *Anoplophora chinensis*, bacterial shot-hole of laurel *Xanthonomas arboricola* pv *pruni*, and *Xylosandrus crassiusculus*, as well as unlisted pests such as *Platynota stultana* and the red necked longhorn beetle *Aromia bungii*.

The notification requirements apply to anyone who imports these genera directly from the EU as trees, plants or seeds, including nurseries, landscapers, developers or civil engineers, small garden centres and members of the public. Notifications should be made to the Animal and Plant Health Agency (APHA) by the first importer of the material prior to, or up to four days after the date of arrival.

The aims of statutory notification are to raise awareness about the threats to these species; provide intelligence about the level of trade (much of which occurs during the dormant period over autumn and winter); facilitate tracing in the event of problems; allow targeted surveillance inspections to be carried out by APHA and the Forestry Commission; and generate evidence in support of further measures, if needed. The notification requirements are changed and updated as new plant health risks are assessed by Defra. Without notification of intra-EU trade there is no means of reliably monitoring the import of such plants irrespective of whether they are accompanied by plant passports.

Inspections

Inspections are made of several tree genera to check for specific pests and diseases that are present in other EU Member States. Planes are inspected for plane wilt *Ceratocystis platani* and oaks for oak processionary moth *Thaumatopea processionea* and as a host of chestnut blight *Cryphonectria parasitica*, which mainly affects sweet chestnut. Inspectors also survey sweet chestnut for the oriental chestnut gall wasp *Drycosmus kuriphilus*, which has been found recently in Kent and is under eradication. The UK has established Protected Zones for the organisms affecting oak, plane and chestnut. These imports must be accompanied by a Plant Passport, which indicates compliance with the additional Protected Zone requirements by the supplying nursery.

Pines are inspected for red band needle blight (*Schirria pini* or *Dothistroma septisorum*) and pine processionary moth *Thaumatopea pityocampa,* brown spot needle blight (*Mycosphaerella dearnessii* and *M. gibsonii*) and pitch canker *Gibberella circinata*. Elms can be a host of elm yellows phytoplasma and are inspected for this specialised form of phloem-inhabiting bacterium, which is spread by insects and causes a range of symptoms including yellowing, dwarfing and premature leaf loss, as well as abnormal growth in the stems and leaves. Currently imports of ash and sweet chestnut are prohibited until Pest Free Areas are designated in other EU Member States.

The working group identifies new plant pest and diseases on particular host plants and updates the Risk Register to ensure that it is up-to-date and accurate. However, we all need to remain vigilant for the "unknown" threats, i.e. those pest and diseases that have not been described/observed before, those which have extended their host range or those which have hybridised with other pathogens producing a change in their pathogenicity.

Practical action

There are practical steps that ecologists and environmental practitioners can take to reduce the risk of accidental introduction of exotic pests and diseases. Consult the Risk Register to familiarise yourself with pest and disease threats. Consider where you source your plants and trees; check that appropriate Plant Passports are present; and quarantine imported material before planting out.

Finally, please be especially alert to the threat from Asian longhorn beetle *Anoplophora glabripennis* (See photo). It is a serious, relatively new threat to trees in the UK and can arrive in contaminated wooden packaging. It hatches out of an exit hole approximately 10mm in diameter. If you see this beetle, please capture it in a container and contact the Plant Health and Seeds Inspectorate immediately.

If you suspect you have found any of the pest or disease species listed above or on the Risk Register, please contact the APHA Plant Health and Seeds Inspectorate by email at planthealth.info@apha.gsi.gov.uk or phone at 01904 405 138; if you are concerned about a pest or disease in a woodland or forest please use the Forestry Commission's Tree Alert at http://www.forestry.gov.uk/treealert.

Further information

Pest fact sheets and information can be found at: https://secure.fera.defra.gov.uk/phiw/riskRegister/ and http://www.forestry.gov.uk/pestsanddiseases

Information on topical Issues affecting plant health including a *Guide for Industry* with more information on *Xylella fastidiosa* can be found at: https://www.gov.uk/guidance/protecting-plant-health-topical-issues

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Disease Risk Analysis and Post-Release Health Surveillance in Wildlife Translocations

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Keywords: conservation, disease risk, DRAHS, reintroduction, translocations

Figure 1: Pool frog *Pelophylax lessonae* undergoing health examination.

The benefits of conservation translocations, along with some examples and potential drawbacks were well-described in a recent issue of *In Practice* (Issue 89 – September 2015). Here, the Disease Risk Analysis and Health Surveillance (DRAHS) partnership examine some of the health issues that can arise when undertaking these translocations – both for the translocated animals, and for other species at the sites of reintroduction.

Introduction

Conservation translocations, or moving individuals to provide a conservation benefit to the species, occur with increasing frequency around the world, with high profile examples including the California condor *Gymnogyps californianus* and the Mallorcan midwife toad *Alytes muletensis*. They do, however, present potential disease risks which in some cases have had devastating outcomes. A well-known example of catastrophic disease as a result of a translocation stems from the introduction of North American grey squirrels *Sciurus carolinensis* to Britain in the 19th century. Although not carried out for conservation purposes, this translocation serves an example of the potential dangers as the grey squirrels brought with them the now infamous 'squirrelpox virus', a virus with which the grey squirrels had co-evolved and could carry without significant ill effect. In stark contrast, this pathogen was novel to the UK's native red squirrels *Sciurus vulgaris*, and as they do not have the immune mechanisms to effectively fight the infection, squirrelpox disease has had a substantial impact on the red squirrel population. Other examples of diseases which have caused catastrophic mortality as a result of translocations include crayfish plague in the UK and rinderpest in East Africa.

Minimising the risks from disease in translocations – 'the DRAHS approach'

The Disease Risk Analysis and Health Surveillance (DRAHS) team at the Institute of Zoology has been investigating methods to assess and minimise the risk of disease in conservation translocations, primarily in England. Working with Natural England on its Species Recovery Programme since 1989, we conduct disease risk analysis and post-release health surveillance on a number of conservation priority native species across a broad taxonomic range, from the red kite *Milvus milvus* and hen harrier *Circus cyaneus* to the pool frog *Pelophylax lessonae* (Figure 1) and short-haired bumblebee *Bombus subterraneus*.

A disease risk analysis, or DRA, involves conducting comprehensive literature reviews and liaising with experts to build an understanding of the parasites that the yet-to-be translocated species may harbour. Similarly a good DRA should also build an understanding of which parasites or non-infectious hazards, such as toxins, may pose a threat to the translocated animals at the release site. In some cases, if little is known about a species' parasites, then a field survey may be undertaken to examine the animals in question. One of the key objectives is to minimise the risk of the translocated animals releasing pathogens into the ecosystem at the release site, such as with the grey squirrel example above. Once a hazard list has been created, a disease risk assessment is conducted by examining the probability of the hazard being released, the likelihood that the population of concern may become exposed to it, and the potential magnitude of these consequences on biodiversity (Sainsbury & Vaughan-Higgins 2012).

Conducting a comprehensive DRA prior to wild animal translocation is now advised by the IUCN (International Union for the Conservation of Nature), who published detailed guidelines on wildlife translocations, to which DRAHS contributed. These guidelines state that in order to maximise the chance of a successful translocation "…disease risk assessment should start at the planning stage, with its depth in proportion to the estimated likelihood of occurrence and severity of impact of any prospective pathogen…" (IUCN/SSC 2013).

Importantly, the DRAHS team conduct post-release health surveillance to determine what effects, if any, the translocation had on both translocated animals and naturally occurring populations at the release site. Surveillance includes health examinations at the destination site as well as post-

mortem examination of any animals found dead. Surveillance is undertaken over the long term to assess the effectiveness of the translocation and to improve future translocations techniques.

Key Successes

Some of the major projects that we have worked on in recent years include the reintroduction of red kites throughout England and the use of this species as a 'sentinel' for monitoring environmental pollutants impacting on birds of prey. We have conducted post-mortem examinations of over 285 red kites over more than 20 years and have built up an archive of frozen and fixed samples available for retrospective analysis if new threats come to light. This archive contributed to work showing that kites have been poisoned by scavenging on animal carcases containing lead ammunition, the first time this threat has been identified for a bird of prey in Britain (Pain *et al*. 2007). Our work on red kites has also helped to improve our understanding of the ongoing threat to wildlife from secondary poisoning by anticoagulant rodenticides (more commonly known as rat poisons), with red kites scavenging on poisoned rats and subsequently accumulating high levels of rodenticide, which can cause disease and mortality (Burn *et al*. 2002)

Additionally, we have worked on the reintroduction of pool frogs into Norfolk, a species thought to have gone extinct in the UK in the mid-1990s. Given the impact of amphibian diseases on global biodiversity, the DRA and pre-release health examinations in this ongoing project are particularly rigorous (Figure 1) (Bobadilla Suarez *et al*. 2015). The pool frog population continues to be closely monitored as it becomes established, although there are currently no observed negative health impacts on other populations, and releases have now started at a second site.

Other projects with key DRAHS involvement include translocations of dormice *Muscardinus avellanarius* across England, where pre-release health examinations identified a suspected alien cestode parasite, potentially acquired in captivity, which was eliminated prior to release following careful therapeutic treatments and screening (Sainsbury *et al*. 2003).

Collaborations

This work is carried out as part of a partnership between the Institute of Zoology and Natural England, with collaboration from a large number of other organisations, including RSPB, Peoples' Trust for Endangered Species, The Wildlife Trusts, Amphibian and Reptile Conservation, Paignton Zoo, Centre for Ecology and Hydrology, Wildfowl and Wetlands Trust, Fera, APHA and the Forestry Commission, among others.

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Disease and contaminants pose major risks to wildlife and human populations. Some diseases warrant particular attention because they cause major mortalities that lead to population crashes of affected species and their predators, threaten wildlife species of high conservation concern, and/or pose a potential threat to humans. The risk that environmental contaminants can pose to wildlife populations has been repeatedly demonstrated, a classic example being the impact of organochlorine pesticides on predatory birds and mammals. Zoonotic diseases and widescale contamination are therefore of major interest and concern to regulators, researchers, statutory and NGO conservation agencies and, more widely, agricultural and business communities and the general public.

Assessment of the risks posed by disease and contaminants to wild vertebrates (and to humans) typically involves monitoring occurrence and severity in sentinel species. Various monitoring schemes have been developed in the UK. Each has distinct and different aims but they function in similar ways, and so face mutual challenges. The Wildlife Disease & Contaminant Monitoring & Surveillance (WILDCOMS) network, initiated through a Knowledge Exchange grant from the Natural Environment Research Council (NERC), was established to forge closer collaboration and harmonisation between these different schemes. This collaborative network aims to:

- provide a focal point for disease and contaminant monitoring in wild vertebrates
- provide an integrated overview of the health status of UK wild vertebrates
- facilitate collaboration between WILDCOMS network partners
- facilitate identification of disease and contaminants of emerging concern.

Overall, WILDCOMS provides a holistic overview of disease and contaminant status in UK wildlife. It distributes quarterly newsletters to more than 450 stakeholders, and its website receives up to 2000 visits per month. More information on the partner schemes in the WILDCOMS network and on the activities undertaken through WILDCOMS can be found at www.wildcoms.org.uk

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Monitoring Disease in Birds and Other Wildlife: Partnering Citizen Scientists with Paid Professionals

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Keywords: chytrid, citizen science, monitoring, surveillance, trichomonosis, wildlife disease

Wildlife disease is increasingly recognised as a threat to biodiversity conservation on a global scale. While disease research has historically tended to focus on impacts on rare or endangered species, there is a need for systematic surveillance of disease incidence in more common wildlife species, whose populations may also suffer from disease impacts. This article explores how partnering citizen scientists with paid professionals can deliver this, recognising that CIEEM members can make a contribution to both components.

Emerging diseases can threaten biodiversity conservation as well as livestock, companion animal and public health, prompting a call for the establishment of systematic surveillance and monitoring programmes. While such schemes have been delivered in the arenas of livestock production and public health, they have been less evident within biodiversity conservation, something that poses a challenge for efforts to conserve biodiversity at a global scale.

Efforts to monitor, understand and control the impacts of emerging diseases on global biodiversity have tended to focus on species that are rare or endangered, and often living within rather limited geographical ranges, such as island endemic species. However, recent work has revealed both infectious and non-infectious disease (e.g. toxins) to be behind marked population declines of formerly common species of birds (Shultz *et al*. 2004, LaDeau *et al*. 2007, Robinson *et al*. 2010), mammals (Tompkins *et al*. 2002, Leopardi *et al*. 2015) and amphibians (Daszak *et al*. 1999, Martel *et al*. 2014). These events underline the growing need for effective long-term population monitoring partnered with disease surveillance.

Greenfinch numbers fell by 35% following the first occurrence of epidemic finch trichomonosis. Photo by Edmund Fellowes, BTO.

Wildlife disease surveillance

The traditional approach to wildlife disease surveillance has focussed on the collection of opportunistic records of disease occurrence (Duff *et al*. 2016). In the case of wild birds here in the UK, which provides the basis for the examples used throughout much of this article, such records have tended to come from homeowners who have encountered dead or diseased birds

in their gardens, often at or near hanging bird feeders or bird tables.

Since 2000, many of these opportunistic reports have been passed to researchers at the Institute of Zoology (IoZ, London), the Wildlife Veterinary Investigation Laboratory (Cornwall) and the Scottish Agricultural College (Ayrshire), where post-mortem examinations have revealed the likely cause of death and the presence of particular disease-causing organisms. The results of these efforts provide an overview of the types of infectious diseases occurring in our wild bird populations and highlight the range of species affected. However, investigations which rely on the reporting of sick and dead birds by members of the public on an ad hoc basis have an inherent risk of bias because of variation in observer effort.

The Garden Bird Health initiative (GBHi) was launched in 2005 in an attempt to address this bias, bringing together the aforementioned organisations and the British Trust for Ornithology (BTO), the RSPB, the Department of Veterinary Pathology at the University of Liverpool and the Universities Federation for Animal Welfare (UFAW). GBHi surveillance of garden bird mortality and morbidity combined the collection of opportunistic reports from the general public with weekly reports from 'citizen scientist' volunteers contributing to a systematic reporting network, drawn from participants in the BTO's weekly Garden BirdWatch survey. A random sample of participants was selected using a stratification based on location and garden characteristics, with these volunteers collecting information on the incidence of diseased and dying birds alongside regular weekly counts of the birds visiting their gardens.

Carcasses were then selected for post-mortem investigation from the wider pool of those reported, with selection determined by the condition of the carcass, the location and by the species concerned. Birds thought to have died as a result of trauma, predation or infectious disease were treated in a similar manner. By combining these two different sources of information – opportunistic data reported by the general public from a large number of sites and systematic data collected from a smaller number of intensively monitored gardens – it is possible to maximise their relative benefits. The large-scale sampling from the opportunistic survey provides the greatest coverage, increasing the likelihood of receiving reports of novel or infrequent incidents, and enables investigation of disease emergence at the earliest possible stage. The systematic sampling provides a quantitative measure of incidence which will be relatively robust to increases in reporting frequency in response to media coverage.

Garden Wildlife Health pairs volunteers with paid professionals to monitor disease in garden wildlife. Photo by Jill Pakenham, BTO.

Trichomonosis and finches

It was through GBHi that the emergence of finch trichomonosis in British passerines was revealed and its adverse impacts on finch populations documented. The disease is caused by the protozoal parasite *Trichomonas gallinae*, which infects the upper alimentary tract and causes lesions that can interfere with the bird's ability to swallow. The parasite is transmitted either directly between individuals, such as when courtship feeding or feeding young, or indirectly through shared food and water sources. The parasite does not remain viable for long in the environment external to the host but garden feeding stations – where large numbers of birds may gather together to feed – may provide an opportunity for increased rates of parasite transmission.

Finch trichomonosis was first recognised in 2005 and a single, clonal strain of *Trichonomas gallinae* was found to be responsible for the epidemic mortality that occurred subsequently (Lawson *et al*. 2011). The first occurrence of epidemic mortality attributed to the disease through GBHi was documented the following summer (2006), leading to a significant decline in the UK breeding populations of greenfinch *Chloris chloris* (-35%) and chaffinch *Fringilla coelebs* (-20%) by the start of the 2007 breeding season (Robinson *et al*. 2010).

Such levels of mortality and population decline due to an emerging infectious disease were unprecedented in British wild birds with the loss of over 35% of the UK breeding greenfinch population within five years of the disease emergence (Lawson *et al*. 2012b)

This work underlines the value of combining networks of volunteers participating in systematic monitoring programmes (GBHi, BTO Garden BirdWatch and the BTO/JNCC/RSPB Breeding Bird Survey – the latter providing information on the scale of resulting population declines) with paid professionals (the veterinary scientists working on disease and research ecologists at the BTO and elsewhere) and, more widely, engagement with the general public to secure opportunistic reports.

Beyond birds: Garden Wildlife Health

Following the successful completion of GBHi – the project was funded for a defined period – it was clear that ongoing systematic monitoring could deliver important early warning of other emerging infectious diseases and reveal their impact on wildlife populations here in the UK. While greenfinch and chaffinch were the two species for which the impact of finch trichomonosis was most strongly felt, the disease also affected many other passerine species, including species listed as conservation priorities. While we now had a suitable and highly cost-effective model for monitoring disease, we were lacking the ongoing funding needed to secure its long-term future.

Another project with a similar history of success, and also based around a network of volunteers reporting disease incidents, was the Frog Mortality Project (FMP). Launched in 1992, the FMP project started as a partnership between IoZ and Herpetofauna Consultants International Ltd., and later Froglife. The project led to the discovery of a new viral disease in British frogs and toads, caused by a ranavirus, and tracked its spread across England before revealing its long-term impact on common frog *Rana temporaria* populations (Teacher *et al*. 2010).

Thanks to funding from the Esmée Fairbairn Foundation, UFAW, Defra's Strategic Evidence Fund and the Animal and Plant Health Agency's (APHA) Diseases of Wildlife Scheme, which receives funding from Defra through the Scanning Surveillance Programme, a new initiative has been launched. Called Garden Wildlife Health, the project builds on the models of GBHi and the Frog Mortality Project to deliver a cross-taxon monitoring scheme centred on wildlife disease in those bird, amphibian, reptile and mammal populations using gardens – the mammal component is currently restricted to the hedgehog *Erinaceus europeaeus*.

The project is a partnership between IoZ, BTO, RSPB and Froglife, and is again based around the combination of opportunistic reporting and systematic monitoring. Participants can submit their observations through a dedicated web application, which is also used by the wildlife veterinarians who liaise with a subset of those submitting reports to make arrangements for further investigation. Importantly, those submitting carcasses for

Emerging infectious diseases in native amphibians may be spread accidentally by professional ecologists, so understanding the risks is essential. Smooth newt *Triturus vulgaris*. Photo by Mike Toms, BTO.

post-mortem examination receive feedback on the likely cause of death through the website (www.gardenwildlifehealth.org). The Garden Wildlife Health vets highlight ways to help prevent and control disease outbreaks, when they occur, and the website provides disease factsheets that offer guidance on how to optimise garden habitat to safeguard the health and welfare of local wildlife. Additionally, an interactive digital national map is available on the website, with search functions by species, time and various disease conditions that enable the public to learn more of the health conditions affecting wildlife in their region. These resources have wider reach than just this project and CIEEM members may find them of particular interest.

Quarterly reports are submitted to the APHA's Great Britain Wildlife Disease Surveillance Partnership and biannual reports are delivered to the World Organization for Animal Health (OIE). Data collected through both GBHi and Garden Wildlife Health – including a tissue archive – have fed into multiple peer-reviewed papers on wildlife disease (e.g. Lawson *et al*. 2012a, Beckman *et al*. 2014, Lawson *et al*. 2014). In addition to the partner and funding organisations, a range of non-governmental organisations, with an interest in habitat management, species conservation and animal welfare, are invited to attend a twice-yearly Garden Wildlife Health Forum meeting, to receive updates on recent findings and to identify new ways to collaborate and promote best practice for management of wildlife-friendly gardens.

Taking monitoring beyond the garden gate

Private gardens make a significant contribution to the amount of urban green space and are arguably the main contributors to urban biodiversity within developed countries (Goddard *et al*. 2010). They support important populations of birds, amphibians and, to a lesser extent, mammals, and provide access to wildlife that would not otherwise be available to many people. Interest in garden wildlife provides an opportunity to engage homeowners with nature and in the collection of biological data through well-structured citizen science approaches (Roy *et al*. 2012). This is one of the reasons why the garden-based work on disease surveillance has proved so successful.

Operating such 'citizen science' schemes requires the development and maintenance of well-motivated volunteer networks, who understand what they are being asked to do and why. It is essential that the volunteers see the value in their contributions, which is why the reporting back on individual submissions and on the wider project outputs is so critical. The approach delivers a reach well beyond that which could be achieved with a purely professional network. A recent evaluation for a monitoring and investigation project similar to Garden Wildlife Health, estimated that using a paid network would cost at least £2.7 million annually to achieve a similar intensity and coverage of surveillance. Garden Wildlife Health costs a fraction of this to operate.

The online framework developed for Garden Wildlife Health provides an additional opportunity to collect information on wildlife disease from other species and habitats. We have already extended the species range of the Garden Wildlife Health project to include birds of prey, through collaboration with the RSPB's Wildlife Investigations Unit. The flexibility built into the web application allows addition of new

Amphibians and chytrid fungi

Chytridiomycosis, a disease caused by *Batrachochytrium* spp. fungi, predominantly *B. dendrobatidis*, has driven amphibian population declines and species extinctions across the globe. In Great Britain, *B. dendrobatidis* was first detected in 2005 (at a site in the south-east of England). Since this initial report, two national surveys of sites have detected the fungus at multiple ponds across the country. More recently, we have seen *B. salamandrivorans* emerge as a threat to salamander and newt populations (Martel *et al*. 2014), that has caused disease outbreaks and severe declines of fire salamander *Salamandra salamandra* populations in continental Europe. This "salamander chytrid" has now been found in captive amphibian populations here in the UK but is not yet known to occur in the wild. Great crested newts *Triturus cristatus* have been shown to be highly susceptible to *B. salamandrivorans* and there is concern that it could decimate this protected species should it become established in this country in the wild.

Projects like Garden Wildlife Health provide the surveillance and early warning network that can alert us to chytrid within amphibian populations but we also need conservation practitioners and environmental consultants to be aware of the threat from disease and of the opportunities for reporting on amphibian mortality. A group of partners, including IoZ, have produced helpful guidance for reducing the risk of inadvertently spreading chytrid, and other, amphibian diseases (see www.gardenwildlife.health.org). This includes:

- Never release any exotic amphibians from captivity into the wild.
- Never release any native amphibians from captivity into the wild without a disease risk assessment and carrying out its recommendations. Permission from the relevant authorities (e.g. Natural England) should be obtained before proceeding.
- Never transfer wild amphibians between sites without a disease risk assessment and carrying out its recommendations. Do not stock ponds with spawn/tadpoles/adult amphibians – they will colonise new ponds naturally (and often surprisingly quickly).
- Take care when disposing of dead animals. They should be incinerated or buried in such a way that scavenging animals cannot access them.
- Substrates (soil, sand, gravel, etc.) on work clothing and equipment can harbour infections. Ecologists should clean and disinfect equipment and clothing between sites to avoid disease introduction, particularly when involved in monitoring water bodies and their surrounding habitats.

diseases, scientific tests, target species and much more besides. Citizen science offers a myriad of opportunities to optimise wildlife health surveillance that can be developed in the future (Lawson *et al*. 2015).

By partnering citizen scientists with paid professionals we have established a sustainable, robust and highly effective mechanism for monitoring wildlife disease. The outputs from this work can then be used to support new approaches to prevent and control disease threats, delivering management options that are based on more robust and appropriate information. The projects mentioned in this article underline what can be achieved with a well-structured approach and the willingness of volunteers to support and participate in monitoring and surveillance work. Importantly, such projects enable paid professionals to tackle research and applied questions that could not be answered readily without the help of volunteers, and there is certainly scope for more of us to adopt this approach.

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Daubenton's bat; © Hugh Clark/BCT.

Bats and Infectious Diseases: A Two-Sided Story

Keywords: guidance, rabies, risk management, surveillance, white-nose syndrome

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In this article we consider rabies and white-nose syndrome, providing an introduction to the two diseases and their disparate impacts on bat and human health. We highlight the important role that professional ecologists can play in managing the risks associated with these diseases and assisting with ongoing surveillance schemes.

Introduction

When we think about bats and infectious diseases we often think about those diseases that can impact on human health whilst seemingly having little or no effect on the bats that carry them. This isn't, however, the full picture and it is necessary to also understand the other part of the story – diseases that can impact on bat populations themselves. In the UK we are primarily concerned with two diseases that illustrate these different perspectives. Rabies is present within our Daubenton's bat *Myotis daubentonii* population but with little apparent impact on the species; it does, however, present an issue for public health. In contrast, white-nose syndrome (WNS) is a disease that is devastating some species of bat in North America but without any direct impact on human health. Whilst white-nose syndrome hasn't been found in the UK, the fungus that causes the disease is present here. Bat workers have an important contribution to make both to surveillance for these diseases and effective disease risk management.

Rabies

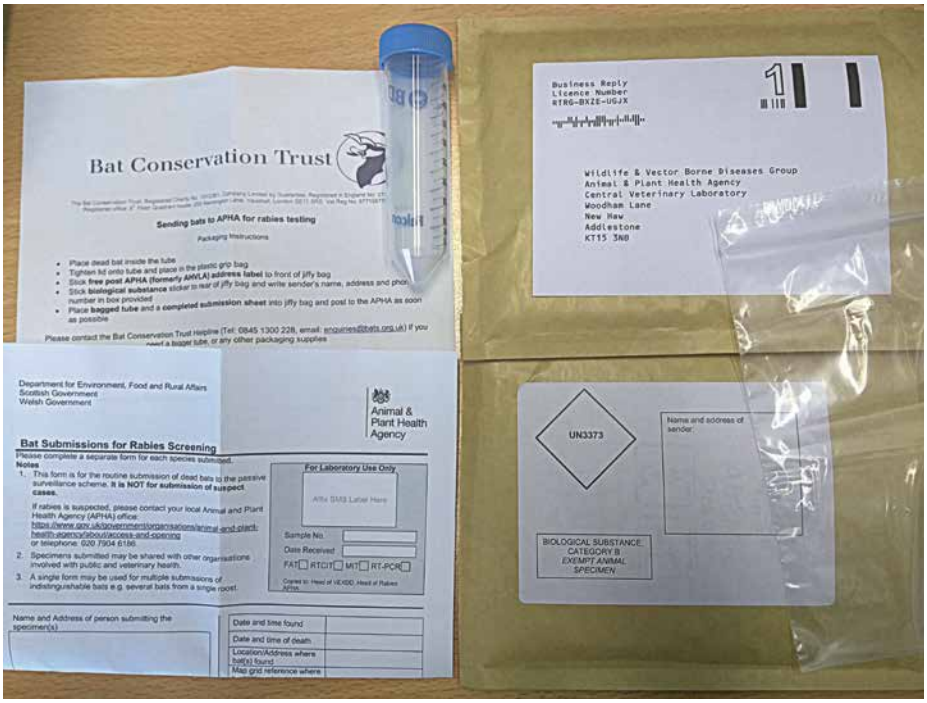
Rabies is an example of a zoonosis, a disease that affects people but which is of animal origin. It is an acute, progressive, viral encephalitis (i.e. it affects the nervous system and brain). It is caused by members of the Lyssavirus genus, of which 13 genotypes have been identified to date, with all but one having a range of host species that include bats (Barrett 2011). The disease is usually spread via a bite or scratch from an infected animal (though the animal may not be displaying any signs of rabies). A range of animals carry lyssaviruses but world-wide the most frequent source of infection (more

than 99% of human cases) is feral dogs infected with Classical Rabies Virus (RABV) (WHO 2015).

Whilst some bat species in the Americas carry RABV, it is not found in European bats. Rather the two main genotypes present are: European Bat Lyssavirus Type 1 (EBLV1) and Type 2 (EBLV2). However, researchers are still finding new genotypes; in 2010, the Bokeloh Bat Lyssavirus (BBLV) was isolated from a Natterer's bat *Myotis nattererii* in Germany (Freuling *et al*. 2011) and was subsequently isolated from the same species in France (Picard-Meyer *et al*. 2013). In 2012, viral genetic material was isolated from a single Schreiber's bent winged bat *Miniopterus schreibersii* in Spain; it has been tentatively classified as the Lleida Bat Lyssavirus or LLEBV (Aréchiga Ceballos *et al*. 2013). The Lyssavirus found in the UK is EBLV2, and it has only been confirmed in the Daubenton's bat population. Whilst it hasn't been recorded in any other species in the UK, there are a small number of mainland European cases from pond bat *Myotis dasycneme* and a single noctule *Nyctalus noctule* as well as Daubenton's bat.

In the UK there has only been one case of human rabies acquired from a native bat, when an unvaccinated bat worker sadly contracted the disease in 2002 (Racey *et al*. 2012). There have been a further three confirmed cases of human rabies (including another bat worker) acquired from bats in Europe in the past 30 years. With a population of approximately 590 million people in Europe, bat-related rabies presents a very small risk (Racey *et al*. 2012). However, out of the hundreds of thousands of human cases of rabies worldwide all but ten recent cases have been fatal (Barrett 2011) and it is this outcome that is a key determiner of UK policy for rabies risk management.

A passive surveillance scheme for rabies in Great Britain has been running since 1987. The surveillance is reliant on the submission of dead bats by bat workers and members of the public to the Animal and Plant Health Agency (APHA) with over 12,500 bats tested to date. This surveillance programme is important for informing our understanding of the disease and as an invaluable educational tool. It is however necessary to acknowledge that both the



Packs for submitting dead bats to APHA for rabies testing are available from the National Bat Helpline.

species data and geographic coverage are skewed. For example, a high percentage of bats submitted have been pipistrelles *Pipistrellus* spp., the species that the public and bat workers are most likely to come into contact with. This skewed distribution led to a change in surveillance policy in 2012. Pipistrelles no longer have to be submitted for testing by bat workers unless they are involved in a contact incident with a human or other animal, e.g. a dog or cat, or where the identification is unknown or uncertain (one of the positive Daubenton's bat cases was actually misidentified as a pipistrelle by a bat worker). The geographical coverage of bats submitted to the scheme perhaps reflects more where bat workers are to be found than bats.

A total of 11 Daubenton's bats have been found with live EBLV2 through this passive surveillance programme (including one in 2015). Therefore, we would encourage bat workers who encounter dead bats to submit all non-pipistrelle species for testing. The packs for sending off dead bats to APHA can be obtained from the National Bat Helpline (0345 1300 228 / enquiries@bats.org.uk) and more details about the scheme can be found on the Bat Conservation Trust (BCT) website (www.bats.org.uk).

The passive surveillance programme has been supplemented by three active surveillance projects, with blood (to test for the presence of antibodies) and saliva (to test for the presence of live virus) samples being taken primarily from serotine and Daubenton's bat at sites in Scotland and England (the bats were released after the samples were taken). One Daubenton's bat was found with live EBLV2 virus as a result of this active surveillance work (Horton *et al*. 2009). Antibodies for EBLV1 were also found in one serotine and two Natterer's bats but no live EBLV1 (Racey *et al*. 2012). The active surveillance projects have confirmed that EBLV2 is present at a low level in the UK Daubenton's bat population.

Bat workers are the main 'at risk' group for rabies in the UK but this risk can be greatly reduced. Anyone handling bats should wear gloves and follow good practice. BCT produces *Bats & Rabies Good Practice Guidelines* for bat workers (http://www.bats.org.uk/pages/-bats_and_rabies-1099.html). Everyone who handles bats as part of their work or volunteering activities is advised to have appropriate vaccinations (Racey *et al*. 2012) and pre-exposure vaccinations are required for bat workers employed or volunteering

for the UK Statutory Nature Conservation Organisations (SNCOs). Details about vaccinations are available on the BCT website along with the *Good Practice Guidelines*. In addition, the National Bat Helpline provides advice to members of the public about rabies, specifically to those who are bitten by bats. Rabies is an important issue with which all those working with bats both in a voluntary or professional capacity should be aware. BCT advocates a proportionate yet transparent approach to rabies communication whilst ensuring that positive support for bats and bat conservation is maintained.

White-Nose Syndrome

Whilst we have known about rabies in bats for decades and its presence in the UK for almost 20 years (Racey *et al*. 2012), white-nose syndrome is a relatively new disease, having only been discovered in North America in 2006 (Puechmaille *et al*. 2010). White-nose syndrome represents the other side of the bats and diseases story. Millions of bats (from seven different species) have died as a result of the disease, which is now present in 26 States in the USA and five Canadian provinces (US Fish & Wildlife Service 2015).

White-nose syndrome is categorised by a collection of symptoms and is associated with hibernating, cave roosting bats (Puechmaille *et al*. 2010). It is named for the presence of a white fungus that may be found on the muzzle and also wing and/or tail membranes of infected individuals (Blehert *et al*. 2009) but other symptoms include increased activity during the hibernation period, bats clustered in areas not normally identified as winter roost sites and, significantly, mass mortality at hibernation sites.

The disease is caused by a fungus *Pseudogymnoascus destructans* (formerly named *Geomyces destructans*), most likely introduced to North America as a novel pathogen from Europe (Warnecke *et al*. 2012). In Europe, the fungus was first confirmed from a bat in France in 2008 (Puechmaille *et al*. 2010) and has subsequently been found in a further 15 European countries, including the UK (Barlow *et al*. 2015). It has been recorded from 11 species (Zukal *et al*. 2014) as well as through environmental sampling (Barlow *et al*. 2015). *P. destructans* has also been found in north eastern China (Hoyt *et al*. 2016) but there is no evidence of the syndrome itself outside of North America and no mass mortalities have been reported at European or Chinese hibernacula. It is believed that European bats have evolved immunity to white-nose syndrome, which is reflected in the genetic diversity of the fungus in Europe compared with North American strains (Puechmaille *et al*. 2011).

Passive surveillance for *P. destructans* has been undertaken by APHA in Great Britain since 2008 (Duff *et al*. 2016). *White-nose syndrome Guidance for Bat Workers in the UK and Isle of Man* (produced by BCT in conjunction with APHA and various Statutory Nature Conservation Organisations) provides instructions on good practice in terms of decontamination protocols, signs to look out for and instructions on how to take samples for analysis. The guidance is updated annually and can be found at http://www.bats.org.uk/pages/about_bats-white-nose_syndrome-586.html. Over 50 bats have been tested to date and the first positive case was recorded in 2013, from a swab sample taken from a live Daubenton's bat hibernating in a disused railway tunnel in Kent (Barlow *et al*. 2015). A second positive case, also from a Daubenton's bat, this time from a hibernation site in Norfolk, was found in 2014.

Rather than relying on being able to culture the fungus from samples taken from bats, researchers in the USA have developed a method for detecting the presence of *P. destructans* from environmental samples (Barlow *et al*. 2015). This led to a pilot study run over the 2012-13 hibernation season by APHA, BCT and Northern Arizona University. Sites were selected in Kent and Sussex, counties chosen due to their proximity to mainland Europe. During their annual National Bat Monitoring Programme hibernation visits, volunteers collected a total of 30 sediment and surface samples from six sites, five of which were positive for the presence of *P. destructans* (Barlow *et al*. 2015). The results from the passive surveillance and the pilot project give reasons for cautious optimism. In the absence of mass mortalities and other symptoms of white-nose syndrome, we believe these results indicate that the situation in Great Britain (the passive surveillance programme does not cover Northern Ireland) is similar to that in most of the rest of Europe where

First Daubenton's bat found in the UK with *P. destructans* (fungus is just visible on the tip of the bat's ear); © Shirley Thompson.

the fungus is present. It is likely that our native bats share the same immunity from *P. destructans* as bats elsewhere in Europe. Further work is underway to analyse environmental samples collected from an additional 26 sites across the UK. In the meantime the passive surveillance programme continues and all bat workers undertaking hibernation surveys are asked to familiarise themselves with the white-nose syndrome guidance (available from the BCT website) and to notify BCT or APHA if they find any evidence of the fungus or white-nose syndrome during their surveys.

The Future

The surveillance schemes for rabies and white-nose syndrome / *P. destructans* will continue, to further our knowledge of these diseases and to inform risk management decisions, both from the perspectives of human health and of bat conservation. Disease guidance for bat workers is reviewed annually and attention is also given to any new and emerging infectious diseases. This is to keep up to date with research and the latest information in deciding on future surveillance programmes, as well as to ensure all necessary information and guidance for bat workers is in place. The participation of bat workers is vital for the success of surveillance schemes and effective disease risk management. It is essential we all follow good practice and maintain a credible and proportionate approach.

Acknowledgements

Managing the issues associated with bats and diseases requires a combined effort with bat workers, volunteers, BCT, APHA and SNCOs working together to manage disease risk. The authors would like to take this opportunity to thank everyone who has contributed to disease surveillance schemes and implementing good practice in the UK.

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The Ecological and Conservation Implications of Ash Dieback (*Chalara*) and Methods to Mitigate Impacts

Keywords: ash dieback, biodiversity loss, *Chalara*, *Hymenoscyphus fraxineus*, mitigation, tree diseases

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Following the arrival of ash dieback in the UK, woodland ecologists and managers are asking: 1) what will be the ecological impact of the loss of ash, and 2) which species of tree should we plant to mitigate impacts on biodiversity, ecosystem function and plant community composition?

Here we report on work that aims to provide some initial answers to these questions using information provided in two recent reports by Mitchell *et al*. (2014a,b), which are freely available on the JNCC and Natural England websites. These reports identify the ecological implications of the loss of ash, suggest mitigation measures and provide a procedure to assess the impact of the loss of ash on biodiversity at any given site and identify suitable alternative tree species.

Background

Common ash *Fraxinus excelsior* (L.) is a widespread woodland and non-woodland tree throughout the UK. It is threatened by an invasive fungal pathogen *Hymenoscyphus fraxineus*, commonly called ash dieback or *Chalara*. *Chalara* causes leaf loss, crown dieback and bark lesions in affected trees. Once a tree is infected the disease is usually fatal, either directly, or indirectly by weakening the tree to the point where it succumbs more readily to attacks by other pests or

Ash tree infected with ash dieback – what will be the impact on the associated biodiversity? Photo credit: Ruth Mitchell.

The BAP lichen *Leptogium saturninum* that is highly associated with ash. Photo credit: David Genney, SNH.

pathogens, especially *Armillaria* fungi, or honey fungus. The likely extent and rate of ash mortality in the UK is still unknown, although mortality has been high in Eastern Europe (c. 90%). Widespread loss of ash trees in the UK will impact on populations of ash-associated species, i.e. those species that in some way depend on ash for breeding or feeding (e.g. birds, bats and invertebrates) or as a habitat (e.g. epiphytic bryophytes and lichens).

For woodlands where management objectives include the conservation of biodiversity, the arrival of ash dieback raises the question of whether it is possible to continue to conserve ash-associated biodiversity in the face of the loss of ash.

1. Ecological impacts of the loss of ash

There are three different types of impacts: i) on species that use ash trees (so called ash-associated species), ii) on ecosystem function and iii) on plant community composition in ash woodland.

i) Ash-associated species

Using existing databases and literature, 955 species were identified that are associated with ash trees in the UK (Table 1). The level of association was defined as:

- obligate - unknown from other tree species
- highly associated – rarely uses other tree species
- partially associated – uses ash more frequently than its availability
- cosmopolitan – uses ash as frequently as or less than its availability
- uses – uses ash but the importance of ash for this species is unknown.

Forty-five species were identified as being obligate on ash and a further 62 species as being highly associated (http://www.cieem.net/data/files/Resource_Library/In_Practice/CIEEM_IP91_Mitchell_Box1.pdf). The obligate and highly associated species are most at risk from ash dieback as they may decline or go locally extinct depending on the rate of loss of the ash trees. The conservation status of ash-associated species was assessed (Table 2) and then combined with their level of association with ash to provide an overall index of how at risk they are from ash dieback (Table 1).

ii) Ecosystem function

Ash leaves have high nutrient concentrations and decompose rapidly. Litter accumulation is lower and topsoil pH is higher under ash compared to other native deciduous tree species. This means that ash provides very different ecosystem functions compared to other native deciduous tree species in the UK. Thus, if ash is lost from our woodlands there are likely to be changes in processes such as nutrient cycling and tree regeneration.

iii) Plant community composition of ash woodland

Ash casts a light shade that, together with the rapid nutrient cycling, allows the distinctive ground flora of ash woods to develop. It is unlikely that ash dieback will cause the extinction of any ash woodland vascular plant species but changes in the amount of light reaching the forest floor will affect the ground flora composition over time. Initially, there will be an increase in light levels as the ash tree canopy dies back followed by a longer-term decrease in light levels as the canopy infills with trees that cast more shade than ash. The initial increase in light as the ash canopy dies back may result in positive outcomes for many ground flora species in ash communities because they are well adapted to periods of canopy reduction/disturbance and, at present, they often only survive in glades and rides, or along woodland edges. Later, as the canopy fills with tree species that cast a denser shade than ash, the abundance of many ground flora species typical of ash woodland is likely to decline with only the most shade-tolerant species surviving. Longer term, it is suggested that sycamore is the tree species most likely to replace ash in many woodlands. However the eventual woodland structure post ash-dieback will be heavily dependent on many other factors such as grazing intensity.

2. Can we mitigate the impact of a loss of ash and which alternative trees should we plant instead?

It may be possible to mitigate the ecological impact of ash dieback by planting alternative tree species. Methods are available to assess site suitability for different tree species in terms of climate, soil type and production potential of the tree, e.g. the Ecological Site Classification (Pyatt *et al*. 2001). This approach is supported by an assessment of which tree species are most ecologically similar to ash in terms of the associated species and ecosystem functioning (Mitchell *et al*. 2014b).

Of 48 tree species known to be suitable

Table 1. Number of species for six types of organism, their conservation status and level of association with ash.

RED - species in danger of severe population decline or extinction
AMBER - species may decline in abundance
YELLOW - species may decline in abundance but unlikely to be greatly impacted
GREEN - species unlikely to be impacted

1. See Table 2 for definitions of conservation status.
2. 546 lichen species shown rather than 548 as two species have only recently been taxonomically separated from other lichen species. Thus, although known to occur on ash their level of association and conservation status is unknown.

		Conservation status[1]		
		No	Unknown	Yes
Birds	Obligate			
	High			
	Partial	4		3
	Uses			
	Cosmopolitan	2		3
Bryophytes	Obligate			
	High			6
	Partial	27		3
	Uses	12		
	Cosmopolitan	10		
Fungi	Obligate	11		
	High	17		2
	Partial	37		1
	Uses			
	Cosmopolitan			
Invertebrates	Obligate	23	3	4
	High	16	6	2
	Partial	27	1	9
	Uses	68	13	50
	Cosmopolitan	14	4	1
Lichens[2]	Obligate	2		2
	High	4	1	8
	Partial	188	7	36
	Uses	2	1	1
	Cosmopolitan	257	4	33
Mammals	Obligate			
	High			
	Partial	1		
	Uses	17		8
	Cosmopolitan	1		1

for establishment on ash sites, oak and beech supported the highest number of ash-associated species (>500 of the 955 species) and elm, hazel and birch each supported more than 400 ash-associated species (Table 3). Among non-native species, sycamore supported the highest number of ash-associated species (473 of the 955 species). However, in terms of ecological function, oak and beech are very different to ash whereas alder is more similar (Table 4). Sycamore is moderately similar to ash in terms of leaf litter decomposition rates and nutrient cycling but casts a much darker shade than ash. A paucity of data on both species use (Table 3) and function means there is a risk that alternative tree species may be wrongly classed as ecologically inappropriate; however, if a species is planted without an assessment of its ecological suitability then unpredictable changes in species composition and in ecosystem functioning could follow.

Guidance and advice

Some practical resources from the research on ash-related species, and the use of alternative tree species, have been released by Natural England (http://publications.naturalengland.org.uk/publication/5273931279761408). These comprise an Excel spreadsheet, some guidance documentation and case studies (Mitchell *et al*. 2014b).

Tools to help conserve ash-associated species

The main "tool" available to woodland managers is an Excel file called AshEcol (listed as NECR151 edition 1 – A spreadsheet of ash-associated biodiversity). It includes a list of the 955 species identified as being associated with ash trees (Mitchell *et al*. 2014b).

Table 2: Conservation designations used to class the species as being of conservation concern in Table 1.

Species group	Conservation designation	Reference
Birds	Classified as Red or Amber in *Birds of Conservation Concern*	Eaton *et al*. 2009
Bryophytes	Classified as Critically Endangered, Endangered, Near Threatened or Vulnerable using IUCN criteria	Hodgetts 2011
Fungi	Red data book	Evans *et al*. 2006
Invertebrates	Red data book / BAP species	Kirby 1992; Conrad *et al*. 2006; Davis 2012
Lichens	Classified as Critically Endangered, Endangered, Near Threatened or Vulnerable using IUCN criteria	Woods and Coppins 2012
Mammals	UK BAP species	http://jncc.defra.gov.uk/page-5717
Vascular plants	Red data book	Cheffings and Farrel 2006

Table 3: Number of ash-associated species potentially supported by alternative trees and shrubs.

Potential alternative tree species	Number of ash-associated species supported[1]			% of ash-associated species for which information was available[2]
	Total (across all levels of association with ash)	Highly associated with ash	Partially associated with ash	
Oak sp. *Quercus robur / petraea*	640	23	271	94
Beech *Fagus sylvatica*	505	13	222	92
Elm sp. *Ulmus procera / glabra*	477	21	248	86
Hazel *Corylus avellana*	430	21	193	88
Birch sp. *Betula pubescens / pendula*	423	11	167	90
Alder *Alnus glutinosa*	389	11	164	89
Rowan *Sorbus aucuparia*	387	9	166	84
Aspen *Populus tremula*	370	18	176	89
Hawthorn *Crataegus monogyna*	302	9	155	88
Crab apple *Malus sylvestris*	272	5	140	83
Field maple *Acer campestre*	256	9	157	88
Holly *Ilex aquifolium*	251	3	107	77
Large leaved lime *Tilia platyphyllos*	242	4	136	81
Scots pine *Pinus sylvestris*	216	0	60	81
Hornbeam *Carpinus betulus*	169	7	90	88
Blackthorn *Prunus spinosa*	167	4	76	81
Wild cherry *Prunus avium*	116	1	48	88
Goat willow *Salix caprea*	105	7	44	32
Whitebeam *Sorbus aria*	100	1	51	82
Elder *Sambucus nigra*	96	6	53	29
Bird cherry *Prunus padus*	95	2	49	87
Privet *Ligustrum vulgare*	92	8	61	75
Grey willow *Salix cinerea*	91	4	39	31
Yew *Taxus baccata*	89	0	53	86
Small leaved lime *Tilia cordata*	84	7	37	31
Black poplar *Populus nigra*	76	4	45	30
Wild service tree *Sorbus torminalis*	7	2	1	22
Non-native				
Sycamore *Acer pseudoplatanus*	473	17	228	88
Horse chestnut *Aesculus hippocastanum*	208	9	116	81
European larch *Larix decidua*	166	0	50	79
Common walnut *Juglans regia*	149	7	85	81
Sweet chestnut *Castanea sativa*	148	5	61	88
Black walnut *Juglans nigra*	126	3	78	80
Plane sp. *Platanus x hybrid*	96	2	60	76
Silver fir *Abies alba*	74	1	26	30
Turkey oak *Quercus cerris*	70	3	29	32
Norway maple *Acer platanoides*	60	4	26	31
Manna ash *Fraxinus ornus*	29	6	5	30
Red oak *Quercus rubra*	28	1	13	29
Western red cedar *Thuja plicata*	17			22
American ash *Fraxinus americana*	12	1	5	29
Green ash *Fraxinus pennsylvanica*	12	2	5	29
Hop-hornbeam *Ostrya carpinifolia*	10	0	5	20
Douglas fir *Pseudotsuga menziesii*	8	0	3	29
Italian alder *Alnus cordata*	6	0	0	23
Manchurian ash *Fraxinus mandschurica*	6	1	3	29
Shagbark hickory *Carya ovata*	1	0	0	19
Caucasian wingnut *Pterocarya fraxinifolia*	1	0	0	19

1. Number of ash-associated species, out of 955, which are known to use the alternative tree species.
2. Percentage of ash-associated species for which it is known whether or not they use the alternative tree species. Low percentages should be treated with caution as an assessment of the suitability of these tree species was not possible for most ash-associated species.

Table 4. The suitability of eleven alternative tree species when ranked by number of ash-associated species they support, by their traits and by ecological functions. Those shaded green are classed as 'good' alternatives to ash, those shaded red as ecologically 'bad' alternatives to ash.

No. of species[1]	Decomposition[2]	Litter quality[2]	Nutrient cycling[2]
Oak	Alder	Walnut	Alder
Beech	Lime	Alder	Lime
Sycamore	Rowan	Lime	Field maple
Birch	Sycamore	Aspen	Sycamore
Alder	Field maple	Field maple	
Rowan	Aspen	Sycamore	
Aspen		Oak	
Field maple		Rowen	
Walnut		Birch	Oak
Wild cherry	Oak	Beech	Birch
Lime	Beech	Wild cherry	Beech

1. Green = supports >450 ash-associated species; orange = supports 300-450 ash-associated species; red = supports < 300 ash-associated species.
2. Ranking taken from Mitchell *et al*. (2014b).

A separate list includes those invertebrate, fungi, bryophyte, lichen, mammal and bird species that use ash trees, and provides a measure of their level of association with ash (obligate, highly associated, partly associated, cosmopolitan and uses). It does not include those species that are associated with ash woodland habitat but do not use the tree, e.g. vascular plants. There is also an assessment of the degree to which 48 alternative tree species can support each of the 955 ash-associated species.

Management recommendations for ash-associated species.

A five-step procedure has been developed to identify which species are associated with ash and to recommend management interventions.

Step 1: Produce a species list (excluding vascular plants) for the woodland across as many taxa as possible using existing data from site surveys or from the National Biodiversity Network's (NBN) gateway (https://data.nbn.org.uk/). While existing species data may be incomplete, it allows the management to be adapted for those species known to be present at the site. New data can be collected when resources allow. Vascular plants are excluded from Step 1 as there are no epiphytic vascular plants on ash trees.

Step 2: Using the AshEcol tool, identify which species from Step 1 are ash-associated. Draw up a shortlist of those species with a high level of association with ash or with a high level of conservation protection (see Table 2).

Step 3: Using the AshEcol tool, identify tree and shrub species that could act as alternatives to ash to provide habitat for the ash-associated species present at the site.

Step 4: Survey the woodland to determine if any of the potential ash-alternative tree or shrub species identified in Step 3 are already present on site. Assess the suitability of the site (climate, soils, etc.) for other ash-alternative species currently not present but which were identified in Step 3.

Step 5: Select those alternative tree and shrub species identified in Step 4 that could be encouraged within the woodland while maintaining the site's objectives (e.g. conservation and/or timber production). Select the most appropriate management method (e.g. natural regeneration, planting, coppicing, controlling deer numbers) to increase the abundance of these alternative tree species.

Further explanation and details are provided in the instructions accompanying the AshEcol tool and in Broome *et al*. (2014).

Case studies

This 5-step procedure has been used to develop case studies for 15 ash woodland sites across the UK (see summary in Broome *et al*. 2014) that provide examples of how ash woodlands could be managed to mitigate some of the potential impacts of ash dieback on ash-associated species. The case studies are available from Natural England for download (http://publications.naturalengland.org.uk/publication/5273931279761408).

Species versus ecosystem function

The 5-step procedure prioritises the conservation of ash-associated species

Woodland ecologists and managers discussing how to manage ash woodlands and conserve ash-associated biodiversity. Photo credit: Ruth Mitchell.

Lichen-rich ash habitat. Photo credit: David Genney, SNH.

but this may not always restore similar ecosystem functions (see above and Table 4). Therefore, depending on the species present at a given site, it may be important to assess the functional role of alternative tree species.

Interacting factors

Ash dieback is not the only driver of change within UK woodlands. High grazing pressure (largely due to deer) is a major concern and could have a significant impact on how UK woodlands respond to ash dieback. If woodland managers wish to restore a tree canopy by natural regeneration following ash loss, some form of herbivore control may be necessary in many areas. Otherwise, there is a risk that regenerating ash saplings that are tolerant to ash dieback could be grazed out before they reach maturity. Climate change and other tree diseases are also impacting UK woods. These factors will have a strong influence on which species increase and decrease in abundance in response to ash loss.

The UK will not see the full impact of ash dieback for a couple of decades. However, given the time taken for trees to grow to maturity, we cannot afford to wait until these effects are seen if mitigation is to be implemented. While we cannot mitigate against all the potential changes in UK woodlands and their interactions, some of which are unknown, the approach outlined in this article does allow us to mitigate against some of the known potential impacts of ash dieback.

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Mating two-spotted oak buprestid in the laboratory. Crown Copyright © 2016.

The Role of the Two Spotted Oak Buprestid in Acute Oak Decline

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Keywords: *Agrilus biguttatus*, acute oak decline, *Quercus* spp.,

Acute Oak Decline threatens both species of native English oak, keystone trees that support a wealth of biodiversity in the UK. The oak jewel beetle or two spotted oak buprestid is closely linked with Acute Oak Decline but its role in the syndrome is unclear.

As part of a wider research consortium, entomologists at Forest Research are studying the beetle in order to understand its restricted distribution in England, and to clarify its role in the syndrome. Although the causes and transmission of Acute Oak Decline are not well understood, good biosecurity practices may limit the spread of the syndrome.

Introduction

Oaks are essential to biodiversity in the UK: more insect species are associated with oaks than with any other UK tree (Kennedy & Southwood 1984), and oaks also provide food and habitats for birds, bats and other mammals. Pedunculate and sessile oaks (*Quercus robur* and *Q. petraea*) are the most abundant trees in many UK woodlands and their loss due to Acute Oak Decline would be a tragedy.

Acute Oak Decline (AOD) is a newly described syndrome that weakens and may lead to the rapid death of both oak species. Characteristic symptoms are most frequently observed on trees over 50 years old. Numerous small, vertical cracks appear between the bark plates, from which dark fluid seeps. Beneath the outer bark, lesions, or areas of decayed and dead tissue, are found, mainly in the phloem but sometimes extending into the sapwood. Although the mortality rate is high, some trees can recover; in affected woodlands, formerly diseased trees are observed with callused-over lesions (Denman *et al*. 2014; Brown *et al*. 2016).

The causes of AOD are currently being investigated. AOD is a syndrome, comprising several biotic and / or abiotic factors that work in combination. Fluctuating soil moisture levels, whether due to drought or flooding, are probably a major abiotic predisposing factor. Biotic agents include two species of bacteria new to science that are consistently found in

AOD lesions: *Gibbsiella quercinecans* and *Brenneria goodwinii* (Brady *et al*. 2010; Denman *et al*. 2012). In addition, the D-shaped exit holes of adult two spotted oak buprestid beetles *Agrilus biguttatus* and their larval galleries are frequently present. The distribution of the disease and the beetle are remarkably similar: both are largely limited to south-central England, with a northerly limit around Nottingham, and East Anglia although the first cases in Wales have recently been reported.

The role of the two spotted oak buprestid

The two spotted oak buprestid is part of the very large genus *Agrilus*, of which the vast majority of species develop on dead or dying hosts, and are therefore not considered to be economically important. The genus does, however, include several well-known pests, including the emerald ash borer *Agrilus planipennis*, an invasive species from Asia that is currently devastating US ash *Fracinus* spp. populations. As native US ash trees have little resistance to the beetle, it can attack and rapidly kill healthy trees. The two spotted oak buprestid's ecology is different from that of the emerald ash borer since it is considered to be native to the UK, and only able to develop on weakened hosts.

Trees with Acute Oak Decline bark lesions. Crown Copyright © 2016.

The two spotted oak buprestid's story is particularly interesting because it was listed as vulnerable in the Red Data Book in the UK as recently as the 1980s. It was thought to be confined to isolated patches of wood-pasture and ancient woodland where there were enough old, weakened trees to maintain small populations. AOD may have helped the beetle by increasing the number of vulnerable hosts suitable for its development. The beetle's population and range now seem to be increasing, although earlier records were not systematic. Although the association with AOD appears strong, the beetle's role is unclear; it could simply be making use of the increased availability of suitable hosts. Alternatively, the beetle could be an essential part of the syndrome, possibly by creating the necessary conditions for lesion formation or even assisting in the spread of the 'AOD bacteria', or by accelerating the mortality of the host trees (Brown *et al*. 2015).

Due to its cryptic nature, the two spotted oak buprestid beetle is difficult to study in the field, and its ecology is not well understood. The adults feed and mate in the oak canopy in early summer, and females lay eggs into bark crevices on suitable hosts. Once hatched, the larvae tunnel into the phloem tissue where they feed, and their galleries damage the host's vascular system. After completing their development, the larvae tunnel to the outer bark to prepare pupal chambers, emerging as new adults through characteristic D-shaped exit holes the next year. Temperature is the key factor influencing insect development time and success, and the two spotted oak buprestid's lifecycle is thought to vary from one to three years depending mainly on temperature.

We developed methods to study the beetle's lifecycle in the laboratory by mimicking the conditions in the field. We collected adults by felling colonised trees and keeping slabs of outer bark and sapwood in large emergence cages. We

found that the adult beetles could live for a couple of months, and that sexually mature females are capable of laying many batches of eggs over their lifespan. We measured egg development time and formulated a procedure to insert eggs into cut oak logs so that we could study the development time of the larvae and pupae at various temperatures. These new data on the two spotted oak buprestid's lifecycle have allowed us to construct a model that predicts the beetle's development under the fluctuating temperatures experienced in the field. It also will allow us to predict the likely geographical range.

While our work on the two spotted oak buprestid's lifecycle is ongoing, our data support the initial hypothesis that the beetle is temperature-limited in the UK, and can only survive in south-central England where warm summers make its development viable. If the beetle is shown to be an essential component of AOD, the distribution of the syndrome may then be limited by the distribution of the beetle. However, it is important to consider the potential for climate change to increase the beetle's UK distribution. Indeed, the recent warmer average temperatures in England may be in part responsible for the beetle's reported population increase.

In order to better understand the beetle's role in AOD, two field studies are underway using trees at sites that have been monitored for symptoms and beetle exit holes. In the first, a dendrochronological study, we removed cores from a range of trees with and without AOD symptoms. By examining the annual growth of these trees, we should be able to determine whether symptomatic trees were already under stress (and perhaps predisposed to disease), as evidenced by reduced growth, before developing characteristic AOD bark lesions and being colonised by the beetle. The results from this work are very preliminary, but there seem to be clear differences between the growth patterns of asymptomatic and symptomatic trees. Using the same set of trees, we are also examining their susceptibility to colonisation by two spotted oak buprestid. We have wounded the trees, and are measuring their callusing response as a proxy for tree defensive ability. As two spotted oak buprestid larvae are thought to be unable to develop on healthy trees, by looking at the defensive ability of a range of asymptomatic (uncolonised) and symptomatic (colonised) trees, we should be able to quantify the stage of decline necessary for the beetles to establish on the trees and complete their development.

An Acute Oak Decline lesion (outer bark removed), with two-spotted oak buprestid larval galleries and dead larvae. Crown Copyright © 2016.

Management recommendations

The causes and transmission of Acute Oak Decline are not yet fully understood but the Forestry Commission leaflet *Managing Acute Oak Decline* (Denman *et al*. 2010) describes current management recommendations and protocols to limit its spread. Information is also available on the Acute Oak Decline page of the Forestry Commission website (http://www.forestry.gov.uk/acuteoakdecline).

If AOD is suspected, woodland managers should contact Forest Research via its advisory service, Tree Alert (http://www.forestry.gov.uk/treealert), so that the

Two-spotted oak buprestid. Crown Copyright © 2016.

syndrome can be accurately diagnosed. Note that other agents, such as *Phytophthora* spp., can produce similar symptoms. Woodland managers are advised to survey and monitor affected woodlands after a diagnosis is confirmed. As trees often recover, felling is usually not recommended, but may be prudent if only a small number of trees are affected, or if affected trees represent a safety hazard.

On sites where AOD is present, biosecurity measures should be taken to limit the spread of the bacteria and beetle. Wherever possible, cordon off affected trees to prevent access, do not touch affected trees and do not take any affected material such as leaves and sticks out of affected woodlands. The beetle can persist in its larval form in the outer bark before emerging the following summer, therefore it is recommended that the timber from an AOD-affected tree be debarked before transporting it off site. The bark should ideally then be burnt on site. Boots should be sterilised when leaving affected woodlands, as should any tools and equipment used on affected trees.

Conclusion

Many thousands of pedunculate and sessile oaks, two of England's most iconic and biodiversity-rich trees, have been damaged or killed by Acute Oak Decline since the 1980s. Initial studies suggest that the UK range of the two spotted oak buprestid beetle associated with the syndrome is restricted by temperature. Warmer summers resulting from climate change may allow the beetle to expand its range, and, if the beetle proves to be an essential component of AOD, may also influence the distribution of the syndrome. Further research aims to clarify the beetle's role in AOD. Meanwhile, implementing biosecurity measures recommended by the Forestry Commission may help to reduce the likelihood of between-tree and between-site spread of Acute Oak Decline.

Acknowledgements

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Featured CIEEM Training Events

Article and Feature Writing for Conservation Practitioners

Sheffield
5 April 2016

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? Aimed at conservation professionals and ecologists, this training day will demonstrate how to sell your ideas to an editor, how to present your content (including matching an in-house style) and how to format your article to make it readable and eye-catching.

Badger Mitigation

Telford / Lincoln
7 April / 26 May 2016
New locations

This one-day event is aimed at experienced practitioners. The training covers the impacts of different types of development on badgers, the licensing requirements and legislation relating to badgers and a range of options for mitigation. The training will focus on practical measures and techniques, including designing and building artificial badger setts and will review the various techniques for excluding badgers from setts.

QGIS for Ecologists and Conservation Practitioners

Stanmore / Gloucester
7-8 April / 17-18 May 2016
New locations

Over two days, delegates will learn how to use free, open source, Quantum GIS software to access a variety of environmental data sources. Sessions will cover how to upload and present new species records and habitat maps. Delegates will learn how to 'use' QGIS to analyse ecological data and prepare maps for inclusion in reports.

Great Crested Newt (GCN) Assessment and Mitigation

Culross
14 April 2016
NEW

This one-day event considers the legal protection of Great Crested Newts (including the relevance of this to Ecological Impact Assessment) together with the potential impacts of development on GCN populations. With sessions focused on developing more detailed mitigation plans, mitigation methods and habitat creation, this classroom based course provides an excellent opportunity to update on the forthcoming SNH revised guidelines for GCN and offers an ideal follow on from our introductory Great Crested Newt Ecology and Survey training.

Habitats Regulations Assessment (HRA) of Plans

Manchester
20 April 2016

Gain an improved understanding of how HRA should influence the plan making process in England and Wales and how plan assessments should be made and recorded. The course will cover the overall purpose, process and methodology of the HRA of plans with professional tips and hints on compliance and best practice.

Train the Trainer

Birmingham
26-27 April
New dates

Want to deliver training? This specially designed course provides ecologists and environmental practitioners with the skills needed to work as a professional trainer, covering techniques for delivering engaging and interactive sessions both in the field and the classroom. Discover how to focus tuition around the learner's needs, tailor activities for groups with mixed abilities and replace lectures with effective learning sessions.

Using the Vegetative Key

Dublin
14 May 2016
New location

Aimed at intermediate – advanced level practitioners this training considers the use and limitations of the 'Vegetative Key to the British Flora'. Delegates will gain familiarity with the main taxonomic features used in the key, and recognise the groups of vascular plants that can be confidently identified using vegetative features. Appropriate methods for collecting material in the field are highlighted enabling confident collection of useful vegetative specimens.

Peregrine Falcon Ecology, Survey and Mitigation

Birmingham
17 May 2016
NEW

This new training course provides an up-to-date understanding of peregrine ecology, current conservation status and examples of effective survey. Delegates will visit a range of mitigation projects to help understand the importance of timing and precautions to be taken during development projects and implementation of mitigation.

Introduction to the National Vegetation Classification (NVC)

Chester / Carlisle
8 June / 29 June 2016
New locations

Need to get to grips with the NVC? This training provides an introduction to the theory and practice of NVC methodology for identifying and describing UK plant communities. The training explores the background and use of NVC methods and includes field sessions to demonstrate the principals involved and practice recording and sampling plant communities.

www.cieem.net/training-events

Important Updates in Natural Environment Law and Policy

Chloe Sutcliffe
Freeths LLP

Keywords: EU Fitness Check, Habitats and Birds Directives, Law Commission, Species Control Agreements, Species Control Orders

This article covers three recent updates in natural environment law and policy:

- The European Commission's "Fitness Check" of the EU Habitats and Birds Directives
- New draft Code of Practice on the use of invasive, non-native species control provisions
- The Law Commission's final report on its review of Wildlife Law

Fitness Check of EU Habitats and Birds Directives

We are nearing the end of the EU Commission's "Fitness Check" on the EU Habitats and Birds Directives[1], with the Commission due to publish its final conclusions in Spring 2016. Although there has been widespread concern over a potential weakening of EU nature legislation, the emerging findings from the Fitness Check are that the nature Directives are here to stay in their current form.

Background

Fitness Checks, part of the European Commission's smart regulation "REFIT" programme, are evidence-based policy evaluations which assess whether a particular regulatory framework is fit for purpose. The Fitness Check "evidence gathering" process includes stakeholder and public consultation and scientific literature review. The findings of Fitness Checks are said to form the basis for the EU's future policy considerations.

Nature conservation NGOs and environmental practitioners have been concerned that any weakening of the nature Directives as a result of the Fitness Check (and its perceived deregulatory agenda) would have a damaging effect on nature protection and biodiversity. These concerns led to a major awareness campaign, "Nature Alert", forming on 12 May 2015, led by BirdLife Europe, WWF, Friends of the Earth and the European Environmental Bureau. Largely owing to the success of the Nature Alert campaign, the public consultation for the Fitness Check generated an unprecedented level of interest, with over 500,000 responses, the vast majority in support of retaining the Habitats and Birds Directives.

Key political influencers have also shown public support for the Habitats and Birds Directives, with two open letters being sent to the EU Environment Commissioner in October 2015, one from the Environment Ministers of Germany and eight other EU countries and the other from MEPs, both warning of the legal uncertainty which would occur if the Directives were to be amended.

The emerging findings

Following the completion of the Commission's "evidence gathering stage", the findings were published in the draft "Emerging Findings" report. Some of the key findings are summarised below against each of the Fitness Check evaluation criteria:

- **Effectiveness**: Where fully and properly implemented, the Directives have efficiently reduced pressures on biodiversity, slowed declines and led to some recoveries of habitats and species. Influences on the implementation of the Directives include the availability of funding, the degree of political support, levels of enforcement and the capacity of competent authorities.
- **Efficiency**: The direct costs of designating, protecting and managing Natura 2000 sites have been estimated at EUR 5.8 billion annually across the EU. The administrative burden of compliance with the Directives is significant. The benefits of the site

and species protection ensured by the Directives greatly exceed the costs of implementation at EU, national and local levels.

- **Relevance**: The Directives' principles and overall approach remain valid and appropriate. The Directives make positive contributions to sustainable development and a significant majority (80%) of Europeans consider the decline and possible extinction of animals, plants and natural habitats and ecosystems to be a serious problem in Europe.
- **Coherence**: The Directives are largely coherent internally and with each other despite some differences in scope and operational measures. The Directives work in coordination with other EU environmental legislation and policies, e.g. Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA).
- **EU Added Value**: The Directives have introduced innovative elements that provide added value to what could have resulted without EU legislation. The transnational character of nature justifies EU level action.

The 20 November 2015 Conference

The high-level stakeholder Fitness Check Conference took place on 20 November 2015 in Brussels. At this Conference, the draft Emerging Findings report was presented and discussed. The "substantive" conclusions from the Conference can be summarised as follows:

1. The Fitness Check has to be viewed in the broader context of the EU's approach to nature and biodiversity and needs to look in particular at what can be done outside the Natura 2000 network to safeguard biodiversity.
2. There is a need to ensure that the (financial) resources that are potentially available for Natura 2000 are more efficiently and effectively mobilised.
3. Better implementation is needed rather than a change in the legislation. This should take the form of smart implementation that can reduce the undue burdens resulting from bad implementation (could include training, best practice and guidance).
4. Enforcement needs to be enhanced.
5. Raising awareness of the benefits (e.g. socio-economic benefits) of the nature Directives needs to be improved.
6. Progress is much more likely to happen when different stakeholders and organisations work together as opposed to being in conflict.

Next steps

We now await the Commission's final conclusions on the Fitness Check, to be published in Spring 2016. Although the emerging findings are clearly positive for protecting nature conservation in the EU, we must note that a potential UK exit from the EU would completely transform the debate in relation to the UK.

New draft Code of Practice on the use of invasive, non-native species control provisions

Background

On 7 December 2015, Defra published a draft code of practice on the environmental authorities' new powers to enter into Species Control Agreements (**SCAs**) and to impose Species Control Orders (**SCOs**) on landowners to ensure that appropriate and effective action can be taken against invasive non-native species (**INNS**) in England. The draft code was open for public consultation until 28 February 2016.

INNS, such as Japanese knotweed *Fallopia japonica*, Himalayan balsam *Impatiens glandulifera* and the grey squirrel *Sciurus carolinensis*, are damaging to biodiversity as they can "outcompete" native plant and animal species, as well as causing other problems such damage to property.

The new provisions

The new species control powers were made under Part 4 of the Infrastructure Act 2015, which came into force on 12 February 2015, effectively inserting a new subsection 14(4A) and Schedule 9A into the Wildlife and Countryside Act 1981 (**WCA 1981**), containing all of the new provisions on SCAs and SCOs.

SCAs are voluntary agreements between environmental authorities (such as NE or the EA) and owners of premises to carry out species control operations. SCOs

on the other hand are imposed on an owner, and attract criminal offences if an owner fails to comply without reasonable excuse. "Owner" means the freeholder, leaseholder or any person who has legal rights to manage premises. These provisions apply to INNS or to formerly resident native animals that have been reintroduced by humans. The provisions define "invasive" as a species that, if uncontrolled, would be likely to have a significant adverse impact on biodiversity, other environmental interests or social or economic interests.

Defra's draft code of practice is important as it sets out the decision-making process to be followed by environmental authorities when applying the new provisions.

The draft code of practice

Some of the key guidance on SCAs and SCOs is as follows:

- Environmental authorities should follow a "three stage process" when seeking to control or eradicate INNS in the following order: attempt to informally agree a plan to control the species with the owner, draw up a SCA on how to control the species and ask the owner to agree to its terms and, only if necessary, impose a SCO on the owner.

SCAs

- An environmental authority should only offer a SCA if it is satisfied that:
  - The premises contain INNS covered by the guidance;
  - The INNS would be likely to significantly impact biodiversity, e.g. by threatening native species or environmental, economic or social interests (e.g. damage to property);
  - The INNS needs to be controlled as a priority (includes considering whether the INNS is part of a national eradication programme and whether the INNS is widespread in England);
  - It has a plan to control the INNS that it believes will work (includes considering the likelihood of the INNS re-invading and the cost of the plan); and
  - The plan is proportionate to the problem (looks at other species and local businesses that could be harmed by the plan).
- The SCA must include the actions that need to be carried out, who is responsible for each one and a deadline by which each action must be done. The environmental authority can opt to include further details, e.g. details of any payments to be made between the environmental authority and the owner.
- The environmental authority needs to pay to control the species unless the owner of the premises was responsible for introducing it (we think that this is unclear and that the code of practice could have gone further to clarify the financial position in relation to both SCAs and SCOs).
- A SCA ends when the tasks are completed and a letter should be sent to confirm this.

SCOs

- A SCO can be served on a landowner if the environmental authority thinks it is a proportionate response to the problem and any of a list of conditions apply. The conditions include the owner of the premises not agreeing to sign a SCA, failing to comply with a SCA or if the owner cannot be found (following a Land Registry search and putting a notice on the premises).
- An environmental authority may issue an emergency SCO if a delay could have significant impact on biodiversity, environmental, social or economic interests (e.g. if the INNS is spreading rapidly) and if the public interest in controlling the INNS overrides the owner's private interests.
- The SCO must specify the person responsible for carrying out the tasks set out in the SCO, the species which the SCO relates to and a deadline by which the tasks must be completed.
- A SCO comes into force as soon as it is made.
- If an environmental authority suspects that an owner has breached a SCO, the authority can do the work and recover costs from them, provided the authority writes to the owner and allows them at least a week to carry out the tasks they haven't done.

Other requirements and formalities

- The environmental authority must notify Defra when a SCA is agreed and before serving a SCO.
- An owner has 28 days to appeal against a SCO to the First-tier Tribunal. The SCO is suspended pending the appeal.
- Environmental authorities may use their powers of entry under the new provisions for various purposes including deciding whether to offer a SCA or make a SCO, to carry out tasks that are part of a SCO or to investigate non-compliance. A warrant is needed in certain circumstances, e.g. where the premises are someone's home.
- After the work set out in a SCA or SCO is completed, the owner can apply for compensation for any financial loss caused by the works or the use of powers of entry onto their land.

Defra is due to report on the findings from this consultation in the coming weeks.

Review of Wildlife Law: Law Commission

On 10 November 2015, the Law Commission published its final report on its review of Wildlife Law, part of its Wildlife Project launched in 2011/2012.

The Law Commission has concluded in its report that the existing legal regimes for various protected species, found spread across many different pieces of legislation, are inconsistent and unnecessarily complex.

The Law Commission's recommendations include the following:

The draft Wildlife Bill

- A new single statute to replace the piecemeal statutes. This is presented by the Law Commission in its proposed "Wildlife Bill", incorporating all legislation on the protection, control and exploitation of wild fauna and flora in England and Wales, with a large number of schedules containing lists of species to be protected or controlled. The schedules include wild birds, wild animals, wild plants and invasive non-native species.

"Deliberate" offences

- All species protected under the "deliberate" prohibitions of the EU Birds and Habitats Directives and the

Bern Convention to benefit from domestic offences making use of the same concept "deliberate" (i.e. rather than "intentional" or "reckless"). "Deliberate" will for the first time have a statutory definition. So, for example, the existing offence of "intentionally killing a wild bird" under s1 WCA 1981 should be changed to an offence of killing a wild bird where the statutory definition of "deliberate" is met.

"Disturbance" offences

- Two different protected species "deliberate disturbance" offences to be retained: one for certain species protected by EU law and the Bern Convention, directed at disturbance to the conservation status of the species and one directed at disturbance of individual specimens in accordance with domestic-only protection.
- For European Protected Species (EPS), the removal of the "individual specimen" disturbance offence, with reliance instead on the "conservation status of the species" disturbance offence (at present found in regulation 41 Conservation of Species and Habitats Regulations 2010).
- Two new EPS strict liability (i.e. no fault) offences of "obstructing access to a protected breeding site or resting place" and "causing deterioration of a breeding site or resting place of an EPS".

Wild birds

- The definition of "wild bird" to be amended to align it better with Article 1 of the Wild Birds Directive along with new powers to protect any other bird species falling outside this definition.
- A new offence of deliberately damaging or destroying the breeding sites and resting places, other than nests, of certain wild birds listed on the Bern Convention (new Schedule 6). Existing offences relating to damaging / destroying wild bird nests to be retained.
- The existing "incidental result of lawful operation that could not reasonably have been avoided" legal defence to be removed entirely for wild birds, but retained for other domestically protected species.
- New powers of the Secretary of State / Welsh Ministers to control, and to monitor, the hunting of wild birds. Also a new general power to introduce / remove / alter the "close seasons" of any animal.

Protected species licences

- A "breach of licence condition offence" available for *all* protected species licences (although this is to apply only to the licence holder, which appears to be an oversight).
- Licences for wild birds, badgers, water voles and other protected species to be subject to both a "no satisfactory alternative" and a "favourable conservation status test" licensing test (as is currently the case only for EPS).
- A wide catch-all licence granting power in respect of "capture" or "possession" or "other judicious use" of certain species, subject to certain (potentially onerous) conditions. The WCA 1981 does not currently permit licences to be granted for economic / development purposes. This change may potentially make it possible in the future to obtain, say, a water vole licence in respect of harm arising from development activities (but in practice this is still likely to be rare).
- A legal duty on licence granting authorities to give written reasons for decisions to grant / refuse licences and new power to charge a reasonable fee for issuing licences. There should not be the creation of any "appeal" mechanism for wildlife licences.

Invasive non-native species

- A new power on the Secretary of State / Welsh Ministers to require certain persons to notify a relevant authority about the presence of an invasive non-native species.
- The current offence under s14(1) of "releasing into the wild" or "allowing to escape into the wild" of a non-native species to be amended to "releasing from captivity" and "allowing to escape from captivity", to avoid the difficulties of interpretation of "into the wild".

Criminal offences, civil sanctions and penalties

- A new offence for a person to "knowingly to cause or permit the commission of a wildlife crime by a person under his or her control" (different to the "vicarious liability" offence under s18A WCA 1981 which applies in Scotland only).
- For a specific list of offences only, a new free-standing offence on legal persons (e.g. companies) where an individual has committed an offence while acting as employee or agent of the legal person and the offence would not have been committed but for the failure of an officer (e.g. director) of the legal person to exercise appropriate supervision or control over the employee or agent in question. The specific offences are those listed under Articles 3(f) and (g) of the Environmental Crime Directive, applying to EPS and Wild Birds Directive Annex 1 and Article 4(2) species.
- Proposed increase in the penalties for criminal offences and a new system making available a whole range of civil sanctions (such as fixed monetary penalties or stop notices) for all substantive wildlife offences (Schedule 34). These are to apply widely, i.e. to the Environment Agency, Natural England and the Marine Management Organisation (but not to the police or Crown Prosecution Service).

Notes

1. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

About the Author

Chloe Sutcliffe is a Trainee Solicitor at Freeths LLP. Having graduated in Law from Durham University, Chloe has worked with Penny Simpson within Freeths LLP's Planning & Environment Group since September 2014 and is involved in advising clients on various areas of environmental law, including protected species matters.

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Meet the Author – Lisa Worledge

What do you do?

I'm Partnerships Officer at the Bat Conservation Trust. My main role is liaison with bat groups but I'm also involved in a variety of project work and am one of the leads on bats and diseases at BCT.

What or who first inspired you to get into ecology or environmental management?

No single thing really, I have always loved being outdoors and have a great curiosity about the connection between living things and their physical environment.

How did you get to where you are today?

The long way around! This is my second career (I'd been in IT outsourcing previously). Bats came after taking a degree in ecology (my first degree was in law and economics!). I went on a bat walk in 2008 and was completely hooked, ultimately leading to my job at BCT.

What have been the most important steps along the way?

Finding my passion for bats; a good grounding in practical skills; some great work experience; taking an excellent masters course in Biological Recording that helped my field and research skills; and always enjoying learning something new.

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

Practical field skills are essential but so are good communication skills. These can be overlooked sometimes but bat work is often as much about people as it is about the bats.

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

Get as much practical experience as you can. There are some great local groups with people willing to share their knowledge and help develop your skills. Be prepared to put time in as a volunteer though, show you are committed and not just expecting things to be 'given' to you!

What's the best thing about your job?

Diversity and the fact that some days I just can't believe someone is paying me to do something I enjoy so much; visiting a group full of people who share my passion for bats; a field trip 'batting'; or attending a great conference.

What's the downside?

Sometimes it can be hard to separate work from my home life, struggling to 'switch-off'!

What's next for you?

I did a course on virology a couple of years ago and would like to do more to support the diseases work we do at BCT. I'm also hoping to attend the 2017 International Infectious Diseases in Bats Conference (any offers of sponsorship?!).

What is your top tip for success?

Follow your passion – if you love what you do for a living then you have succeeded, it isn't just about financial reward.

For further information

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Joint SNH-CIEEM Sharing Good Practice Event on Non-Native and Emergent Diseases of Wild Plants and Animals

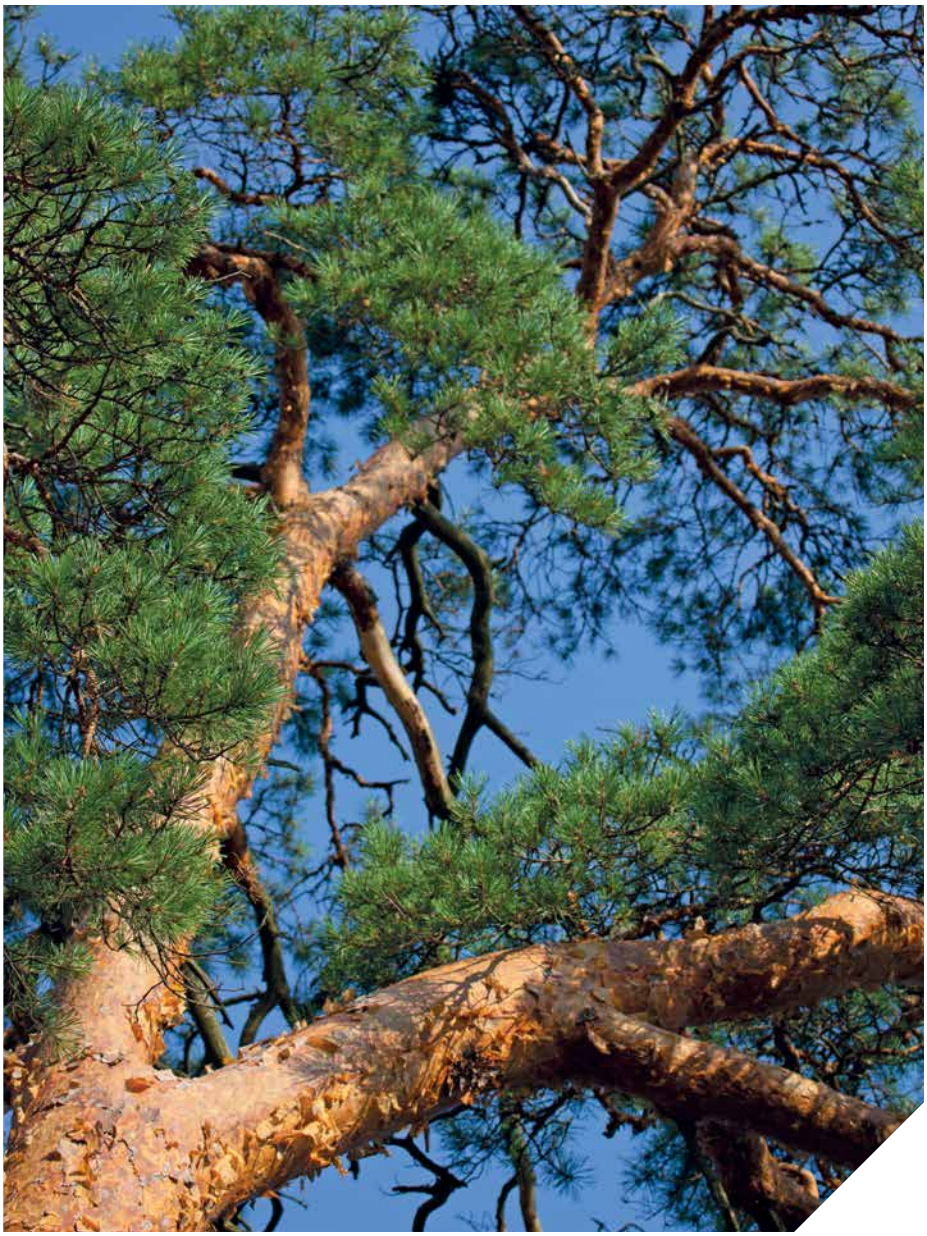
11 November 2015, Battleby

Jenny Park MCIEEM
Policy and Advice Officer, Scottish Natural Heritage

Introduction

On 11 November 2015 CIEEM and Scottish Natural Heritage (SNH) joined forces to host a Sharing Good Practice Event entitled 'Non-Native and Emergent Diseases of Wild Plants and Animals'. This was an event targeted at practising ecologists and others working in the field and who, through the nature of their work, may be in a position to contribute to national surveillance of novel diseases of wild plants and animals.

The aim of the event was four-fold: to raise awareness of novel diseases and how to spot symptoms; to encourage submission of sightings and samples to aid national disease surveillance; to promote good biosecurity practice; and to consider implications for land-management advice. The event was attended by around 70 delegates and was chaired by Kathy Dale, CIEEM Vice-President (Scotland).



Presentations

The event began with an opening welcome from Kathy Dale (CIEEM Scotland Vice President) and Des Thompson (Principal Adviser on Biodiversity at SNH). Paddy Robertson (Tree Health Operations Manager, FCS) then introduced delegates to the novel diseases currently causing most concern to native plants, and the efforts being made to control these diseases. Caroline Robinson (Veterinary Investigations Officer, SAC Consulting) then spoke about the novel diseases affecting our wild animals, and of the research being done to better

understand the impact of these diseases. Ro Scott (Independent Environmental Consultant) then spoke of the role of the environmental professional in tackling diseases of wildlife: of our professional responsibility to be aware of the diseases and their symptoms; to submit sightings and samples to the relevant interested bodies; to practice good biosecurity so as not to contribute to spread during the course of our work; and to spread these key messages to colleagues and clients.

There was then a series of five-minute 'taster' presentations; one for each of the following eight workshop sessions. These short presentations allowed delegates a taster of each workshop to help them choose which four of the eight workshops to attend. Each workshop focussed on an individual disease, or group of diseases, and provided delegates with the opportunity to steer the workshop in the direction of their own areas of interest, and to share their own views, ideas and experiences with the workshop leads.

Workshop/Discussion Sessions

The ecological implications of *Chalara* dieback of ash (*Fraxinus excelsior*) was considered in a workshop led by Ruth Mitchell (James Hutton Institute). Delegates were invited to work through a real example of how the management of a woodland might change following arrival of ash dieback. There were also opportunities for delegates to see *Chalara* symptoms in the field by observing infected ash saplings in the grounds of the venue.

Paddy Robertson's workshop introduced delegates to the Forestry Commission's Tree Alert – an online form for reporting signs of tree pests diseases. Paddy took participants through the process of submitting a report of a suspected tree disease and explained how the information gathered will support important tree health monitoring and surveillance work, contribute to ongoing scientific research, and ultimately, to support efforts to protect the nation's trees.

Caroline Robinson's workshop looked at the novel diseases currently threatening our wild mammals and birds. Caroline introduced participants to the recording schemes and organisations doing research on diseases of wild animals including squirrel, bat, garden birds, deer and hedgehog, and to where sightings and samples should be submitted.

April Armstrong (Forest Research) provided a detailed summary of *Phytophthora austrocedri* disease of juniper *Juniperus communis*; covering its symptoms, current known extent and how to take and submit samples of suspected infections. She was joined by Kate Holl (SNH) who spoke of the ecological and land-management implications of the disease.

Steve Hendry (Forest Research) led a workshop looking at both *Dothistroma* needle blight of Scots pine *Pinus sylvestris*, and novel diseases of alder *Alnus glutinosa*. He was joined by Duncan Stone (Policy and Advice Manager at SNH) who challenged delegates to consider how we might build resilience of our ecosystems so that they may be better able to withstand the cumulative impact of increasing numbers of novel pests and diseases introduced through trade and exacerbated through climate change and other pressures.

Matt Elliot (Forest Research) presented information about *Phytophthora* diseases of *Vaccinium* spp. and considered implications that mass infection might have on our native woodland and heathland habitats. Among the diseases of plants considered during the day, this one is unique in that the host plant is not a tree and as such is not included in Forestry Commission disease surveillance efforts. As such the contribution of environmental professionals to surveillance of this disease is likely to be even more critical in detecting any outbreak.

Pete Minting (Scottish Officer, Amphibian and Reptile Conservation Trust) enlightened delegates about the novel diseases threatening our native amphibians, the biosecurity requirements associated with amphibian survey and sought views from participants about what a soon-to-be revised Advice Note on amphibian disease might contain.

Ewan Purser (FCS) provided a biosecurity demonstration using a simple biosecurity kit kept in the boot of the car, and discussed the risks (epidemiological and reputational) of failing to undertake appropriate biosecurity measures.

Kathy Dale closed the event by setting a challenge to delegates – that they each use the new knowledge gained at the event to be on the look-out for symptoms in the field, and to submit at least one sighting or sample during 2016. This would significantly bolster our national disease surveillance capacity and is perhaps a challenge that we should all set ourselves: a professional responsibility to contribute our skills to national efforts to control the spread of wildlife diseases.

Further Reading

Presentations from the event are available at www.snh.gov.uk/policy-and-guidance/sharing-good-practice/presentations/document/?category_code=SGP&topic_id=1677

Information Relating to Diseases of Wild Plants:

Detailed information about individual tree pests and diseases – www.forestry.gov.uk/pestsanddiseases

Guidance on general biosecurity – www.forestry.gov.uk/biosecurity

Forest Research page on tree pests and diseases – www.forestry.gov.uk/fr/INFD-5STC8A

Online recording form for tree diseases – www.forestry.gov.uk/treealert

Citizen science tree pest and disease project – www.observatree.org.uk

Symptom id sheet for *Phytophthora* diseases of *Vaccinium* – www.fera.co.uk/plantClinic/documents/factsheets/phytophthoraBilberrySymptoms.pdf

Information Relating to Diseases of Wild Animals:

Reporting of sick or dead hedgehogs, garden birds, amphibians and reptiles www.gardenwildlifehealth.org

Wildcoms – www.wiki.ceh.ac.uk/display/wildcomsweb/Home

Diseases of squirrel – www.scottishsquirrels.org.uk/squirrel-facts/frequently-asked-questions/

Diseases of bats – www.bats.org.uk/pages/bats_and_disease.html#Bats_and_disease_in_the_UK

About the Author

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Sharing Evidence of Effective Management and Mitigation

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In December 2014 the Professional Standards Committee established a small working group to explore ways to encourage and facilitate better sharing of knowledge of outcomes from management and mitigation interventions. Anecdotal evidence had suggested that a lack of effective sharing of what works (and what doesn't work) is resulting in a significant duplication of effort and waste of financial resources. Additionally opportunities to deliver the most appropriate and effective biodiversity benefits through development projects are not being realised.

Feedback from a membership survey on this issue suggested that the main reasons why members were not sharing the findings of surveys/studies/mitigation interventions more widely were:

- Having time to feedback/share information.
- Having the time required for processing information/taking through a peer review process.
- Studies/surveys are not always set up scientifically from the outset (needed to fulfil requirements at minimal cost to clients).
- Permission is not always easy to get to release information about the findings.
- The focus of interventions is often protected species and habitat creation/mitigation that is influenced by the need to achieve consent – sharing platforms appeared to require a wider reach.
- Members are not aware of the opportunities to share information.
- Sharing requires additional work that would not necessarily be supported by a client.

Available Tools

The working group has identified some of the existing tools and resources that could be better used or adapted to meet this need, namely the journal database ResearchGate, the Collaboration on Environmental Evidence tool, and the Conservation Evidence tool. All of these have a place in enabling and allowing sharing of information; they have different requirements, and may therefore suit different circumstances.

ResearchGate (www.researchgate.net) is a free online global database of journal publications from across a very wide range of topics. Users can use key search terms to get a list of relevant published papers. It is also a means for researchers to see what others are working on and to make links and set up collaborations. It does not publish papers in its own right.

The **Collaboration on Environmental Evidence** (CEE) tool (www.environmentalevidence.org) is administered by an international team coordinated by Professor Andrew Pullin. CEE is a registered charity in the UK and its purpose is to promote global evidence synthesis in environmental management as well as promoting standards of evidence collation and publish open access reviews of evidence that meet the standards. The main foci of the reviews are the effectiveness of interventions and the impact of human activities. There is also an *Environmental Evidence* online journal.

Most of the completed reviews answer broad questions that may not be directly relevant to the day to day work of CIEEM members, although do provide useful context. The reviews gather the published evidence (including some grey literature) to answer a specific question posed by the commissioning agent (examples include Defra, large corporates etc.), and are undertaken to CEE protocols by an independent team usually assembled by CEE. CEE also supports systematic evidence mapping which identifies what evidence is out there in relation to a topic or issue and where the gaps are.

The tool provides a searchable web-based repository of the completed and in progress reviews, but does not store reference material or papers consulted during the reviews; it does not provide a facility for members to upload and share information. In addition to the many interesting broad-scale reviews, the tool may be of interest to members who wish to commission or get involved in the review of evidence-based interventions.

The **Conservation Evidence** (CE) tool (www.conservationevidence.com) is run by a team at Cambridge University led by Professor Bill Sutherland. CE is a database of case studies (including grey literature) and journal papers, together with published summaries of intervention evidence, for example, of particular taxonomic groups or habitats. The database has been collecting data for 10 years, although the working group's initial review of the tool noted that the information on it is currently quite limited, presumably reflecting the limited use of the site to date.

CE comprises an online database, a journal, and a number of summary

publications designed to explore the evidence of intervention outcomes for particular themes/sectors. It is funded by donations and grants (which has some influence on the summary publications being prepared and published) and is actively looking for collaborators to help increase its global coverage.

CE publishes the online papers continuously – about 20-30 papers a year – and are keen to receive more. Papers can be in the form of 'Short Communications' or simple papers that set out a clearly tested intervention in one or two A4 pages. There is an editorial review process, but this is not considered as strict as the peer review required for many other scientific journals. Seventy percent of first-time contributors are practitioners rather than academics: to the CE team, it appears that the academic community is not currently participating in this type of knowledge sharing and research, and that the real opportunity is for practitioners to create a solid base of pragmatic information on what interventions work and what don't.

With respect to the summary publications, a team of experts is invited to identify threats (e.g. to a habitat type or a taxonomic group such as bats) and the possible interventions to manage those threats (e.g. bat bricks or bat boxes at a particular height or of a particular colour to provide replacements for the loss of roost sites), and then search for and find the evidence to support the effectiveness of the interventions (or otherwise). The reviews include published papers, grey literature, information from relevant organisations/publications etc. but are looking for research outcomes, even small-scale comparative research, rather than case studies. Past reviews have used *In Practice* as a source of papers, but only where these have reported on comparative studies. The aim is to publish a summary of what appears to work and what doesn't, backed up by the evidence to support this. Interestingly, their summaries to date identify that, contrary to widely held belief, many interventions that are considered as best practice have never actually been tested: there is no evidence concerning, for example, the optimum height, orientation or colour of bat boxes to encourage use, or the adoption of replacement ponds by great crested newts.

The CE team welcomes papers that have negative results – 30% of published papers are about what has not worked. They noted that people may find it easier to report a small part of a bigger project (especially if it hasn't worked) rather than the whole project itself.

Summary

In order to encourage sharing, the working group concluded that three main points were prevalent:

- There is a need for a searchable web-based directory.
- Practitioners want to be able to contact quickly and easily the authors to discuss findings/applicability.
- A more flexible approach to consenting would allow for the proper design, implementation, and investigation of project specific interventions.

The working group reported back to PSC that the CE tool would appear to be the existing tool that is most aligned to meet the majority of our members' needs. As an established tool, it is also readily available for immediate use and therefore has advantages over the creation of a new and specific tool.

There are a number of ways in which CIEEM could encourage more sharing of evidence on the effectiveness of mitigation and management through CE. For example CIEEM could:

- Encourage submission of findings by identifying the interventions that are in most need of testing.
- Commission relevant research projects or encourage members to do so.
- Help members to 'refresh' the skills that are needed to support 'Research' projects.
- Incentivise sharing of evidence, data etc. (e.g. though the Best Practice 'Knowledge Sharing' Award) as part of CPD or through criteria for individual awards such as Chartered Ecologist.
- Identify and promote themes/focus years for testing key interventions by setting innovation challenges (e.g. how to improve uptake in bat boxes/ mitigation ponds).
- Engage with the licensing authorities to encourage greater flexibility in consenting to allow for innovation and testing of innovation.

Following consideration of the working group's report, PSC invited the CE team to submit the article published in this issue of *In Practice* describing the tool in more detail and how members can both contribute to it and use it (see page 61).

Similarly CIEEM's Training, Education and Careers Development Committee (TECDC) invited the ACCE (Adapting to the Challenges of a Changing Environment) doctoral training partnership team to submit an article on how CIEEM members can get involved in planning and supporting PhD research into relevant topics. This article appears on page 50.

Next Steps

PSC is continuing to explore this issue and would be interested in hearing your views on what you think would help you to share more evidence of your mitigation and management work. Send an email to enquiries@cieem.net or join the discussion on LinkedIn (www.linkedin.com/groups/4306428).

Conservation Evidence: Providing Evidence to Improve Practice

Nancy Ockendon and Bill Sutherland
Conservation Science Group, Department of Zoology, University of Cambridge

Brown long-eared bat

Summary

Conservation Evidence is a free resource designed to support decisions about how to maintain and restore biodiversity in the UK and globally, by making the relevant evidence easily accessible. In this article we outline the information available from Conservation Evidence, explain how to use it, and describe how you can add to the evidence base, in order to improve decision-making in the future.

Aims of Conservation Evidence

What do you do when you need to make a decision about biodiversity conservation? How do you decide where to site bat boxes, or how to design a tunnel or culvert to aid road crossing for amphibians? Do you have the resources to allow you to base these decisions on evidence? Conservation Evidence aims to provide a place to look for this evidence, and also a place to share your findings about the effectiveness of different conservation options.

Conservation Evidence was set up in 2004, with the aim of increasing the effectiveness of conservation decision-making, by giving those involved in practical conservation easy access to the latest and most relevant evidence. To achieve this we summarise evidence from the scientific literature about the effectiveness of conservation interventions, such as methods of habitat or species management. We also use expert assessment to help decide which interventions are the most effective and which have little evidence to support them. We also provide somewhere to publish the results of your conservation actions to allow others to benefit from your findings, via the *Conservation Evidence* journal. All the evidence summaries and assessments on our website, as well as all our publications, are free to access and download.

Why do we need this?

We believe that basing conservation management and policy decisions on the available evidence will make them more effective. Conservationists can assess the evidence, and its relevance to the species, habitat or site that they are considering, and where possible choose options that have been shown to work, leading to more positive outcomes for biodiversity. Assessing the available evidence before making a decision will also reduce wasted effort and resources. If a large number of people have already tried using an intervention and all found that it was ineffective, this suggests that alternative interventions should be considered.

What Conservation Evidence provides and how to use it

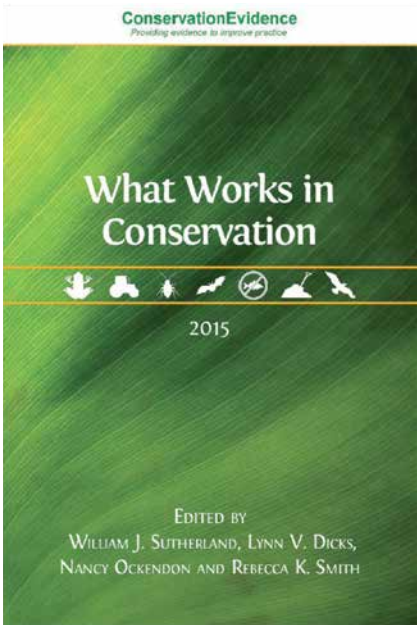
1. **Summaries** of the evidence for the effectiveness of interventions. The Conservation Evidence website contains thousands of summarised studies, which are also collected into **synopses**, by taxa, habitat or conservation issue. You can browse the evidence, or search for a specific topic on the website. For example typing 'hibernacula' into the search box on the Conservation Evidence homepage provides you with nine individual studies and nine possible actions, for which summaries are available. Alternatively, if you are interested in all aspects of conservation of amphibians, for example, you can download or buy the synopsis of amphibian conservation. This lists the possible interventions which could be carried out to enhance populations of frogs, newts and toads, and summarises the evidence available for each of these management options (or, if no evidence currently exists, states this). For example, in the chapter on methods to control

Table 1. Assessment of the effectiveness of interventions for wind turbines from the Bat Conservation chapter of *What Works in Conservation*.

Based on the collated evidence, what is the current assessment of the effectiveness of interventions for wind turbines?	
Beneficial	• Switch off turbines at low wind speeds to reduce bat fatalities
Likely to be beneficial	• Deter bats from turbines using ultrasound
Unknown effectiveness (limited evidence)	• Deter bats from turbines using radar
No evidence (or assessment)	• Automatically switch off wind turbines when bat activity is high • Close off nacelles on wind turbines to prevent roosting bats • Leave a minimum distance between turbines and habitat features used by bats • Modify turbine design to reduce bat fatalities • Modify turbine placement to reduce bat fatalities • Remove turbine lighting to avoid attracting bats

invasive alien and other problematic species, eleven possible approaches for reducing chytridiomycosis disease are listed, and the evidence for each is summarised. Other synopses cover conservation of bats, birds, bees and farmland biodiversity, as well as the control of freshwater invasive species, sustainable aquaculture, soil fertility and natural pest control, and new areas are continually being added.

2. **What Works in Conservation** is a newly published, free-to-download book which provides an assessment of the effectiveness of over 600 conservation management options based on the summarised evidence (Sutherland *et al*. 2015). Assessments were carried out by panels of global experts, and chapters currently cover conservation of amphibians, bats, birds, farmland biodiversity, soil fertility, natural pest control and the control of freshwater invasive species. Based on these assessments, interventions have been classified into effectiveness categories, giving a quick guide to the options for which there is most evidence that they work (see Box 1). For instance, Table 1 shows the results of the assessment for the effectiveness of management options to mitigate the impact of wind turbines on bats, based on the summarised evidence. Key messages from the evidence for each intervention are provided below the table in the book. Of course these assessments should only be used as a starting point, and before any intervention is carried out the full details of the evidence should be read, to assess its relevance to the species or habitat that you are considering. The detailed evidence is freely available from www.conservationevidence.com.



3. **The journal *Conservation Evidence*** is a place to publish the results of your tests of the effectiveness of conservation interventions. It is an open access, online journal, which accepts papers that measure the success of conservation interventions. Thus we hope to encourage practitioners to add to the accumulated body of evidence about the effectiveness of different management or policy actions, allowing other practitioners to assess how effective they are in a range of situations (e.g. for different species, habitats, geographical locations). For example, if you could put up two different designs of nest box when creating breeding sites for a species, and compare their relative occupancy rates over the following breeding seasons, this would be suitable for publication in *Conservation Evidence*. Studies should test a single intervention by appropriate objective measurements, which are ideally a time-efficient part of conservation practice. Studies must include a control or comparison for the intervention (either comparing before-and-after an intervention, a control site with a treatment site, or the effectiveness of two different types of interventions; see examples in Box 2). The article should describe the intervention so that someone else could repeat it, and the results should allow the reader to easily assess the effectiveness of the intervention.

The journal is aimed at a practitioner audience, and 72% of authors of published papers were conservation practitioners (Spooner *et al*. 2015). We aim to make preparation of manuscripts for *Conservation Evidence* as simple as possible, and do not require extensive reference lists or discussion sections, just a straightforward description of the action that was taken and its impact, compared with a control situation. Producing an article for submission should not require a large time investment: our 'Short Communications' are just a page long and standard articles are normally 3-4 pages long. We welcome pre-submission enquiries

as to the suitability of a study for consideration in *Conservation Evidence*.

We also encourage submissions describing unsuccessful interventions – it is just as important to collect and share data on things that don't work as things that do. Only by doing this will we be able to stop people repeatedly carrying out ineffective management actions, and 31% of interventions where success could be judged that were reported in *Conservation Evidence* were unsuccessful (Spooner *et al*. 2015).

We understand that studies will often be undertaken with a number of limitations and constraints relating to experimental design. However, we encourage you to think about where research might be possible, and if it can be used as an incentive to clients through improvement of their own business through evidence-based practice. Obviously all studies should comply with legal requirements but good guidance on, for example, mitigation techniques should provide scope for use of professional judgement and innovation to allow new techniques or designs to be tested. Undertaking small-scale research can contribute to CIEEM members' CPD obligations and will enable members to meet some of the relevant competency requirements of membership and Chartered Ecologist as set out in CIEEM's Competency Framework. We recognise that some projects will be subject to confidentiality clauses, and encourage you to explain to your client the aims and benefits of sharing the results of management actions. In addition, at commercially or ecologically sensitive sites there is no need to provide precise location information, so long as the general region, site and habitat type are described.

In conclusion, Conservation Evidence aims to enable more effective decisions to be made about conservation management, by providing easily accessible evidence to conservation practitioners. We hope that you find it useful and will look for opportunities to carry out evidence gathering and publication during your own practice, and welcome contributions or feedback.

Box 1. Conservation interventions where evidence exists, and the effectiveness category to which they are assigned

Birds

- Provide artificial nests for songbirds – **beneficial**, based on 66 studies from across the world.
- Use decoys to attract birds to new sites – **likely to be beneficial**, based on 10 studies which found that birds nested or landed more in areas with decoys than in areas with controls.

Amphibians

- Pond restoration– **likely to be beneficial**, based on 15 studies in Europe and the USA.
- Install barrier fencing along roads – **trade-off between benefits and harms**, based on 8 studies from Europe and the USA.

Box 2. Conservation interventions where insufficient evidence is currently available, and ideas of how these could be tested

Bats

- Restrict timing of street lighting for bats – compare foraging bat numbers in areas with lighting switched off between say midnight and 6am with areas with all-night lighting.
- Close off nacelles on wind turbines to prevent roosting bats – compare the impact of closing off nacelles in one part of a turbine development on roosting bat numbers with those across the rest of the development.

Amphibians

- Add woody debris to ponds – compare the number of newts or frogs that colonise comparable ponds (similar conditions, size etc.) with woody debris added relative to ponds with no woody debris.
- Changing mowing regime – assess the number of amphibians in comparable ponds with narrow buffer strips of unmown vegetation around the ponds compared to those without buffer strips. You could also compare the effect of mowing on two different dates, or two different widths of buffer strip, on amphibian numbers.

References

Spooner, F., Smith, R.K. and Sutherland, W.J. (2015). Trends, biases and effectiveness in reported conservation interventions. *Conservation Evidence,* **12**: 2-7.

Sutherland, W.J., Dicks, L.V., Ockendon, N. and Smith, R.K. (2015). *What Works in Conservation*. Open Book Publishers, Cambridge (free to download from http://www.conservationevidence.com/).

More information and resources available from

www.conservationevidence.com

Adapting to the Challenges of a Changing Environment

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ACCE (Adapting to the Challenges of a Changing Environment) is a doctoral training partnership (DTP) between the Universities of Sheffield, Liverpool and York and the Centre for Ecology and Hydrology (CEH). The partnership, which is led by the University of Sheffield, brings together 28 other partners from the research, education, policy and industrial sectors to complement the disciplinary components of ACCE. It is the only Natural Environment Research Council (NERC) funded DTP with an explicit emphasis on the whole-organism aspects of environmental research. ACCE will recruit five PhD cohorts (110 students) over five years (2014-2018) and thereby form a multi-disciplinary research training community. Members of this community receive advanced training in the most important research skills in environmental science, in addition to complimentary training in professional and transferable skills essential in today's public and private sector workplaces.

ACCE includes a strong element of cross-institutional co-supervision of students and whole cohort training events designed to reduce institutional boundaries and ensure students experience world-class training that will enable them to become leaders of the next generation of environmental scientists. The ACCE DTP focusses on four key areas of future science innovation: securing ecosystems services and environmental resources; predicting and mitigating impacts of climate change; understanding the dynamic of biodiversity; and investigating the mechanisms of evolutionary change.

CASE Partnerships

ACCE has committed to awarding a significant proportion (>40%) of its scholarships to CASE (Co-operative Awards in Science and Engineering) studentships. The CASE scheme aims to promote partnerships between Higher Education and other bodies, to enhance the training received by PhD students and help them gain hands-on experience of work outside a purely academic environment. ACCE's ambitious target for CASE partners reflects the importance we place on the benefits our students and our partners receive by the interaction fostered by CASE.

CASE projects must provide a sound training in methods of research and a stimulating intellectual challenge for doctoral students. CASE partners benefit from the opportunity to develop novel research collaborations or strengthen existing relationships, facilitated by a high-quality doctoral student undertaking research relevant to the organisation's priorities. Students engaged in CASE projects benefit from enriched training experience that allows them to acquire novel skills and expertise, and better understand the wider impact of their research.

CASE partnerships take time to explore and develop and we are currently seeking new partners to initiate CASE projects for October 2017 cohort. If you are coming from a non-academic research organisation (e.g. public research, NGO, commercial/private sector institutions) and wish to initiate a research project you should contact one of the ACCE academic partner supervisors with relevant research interests – descriptions of researchers from ACCE partners (Universities of Sheffield, York and Liverpool, CEH) can be found on the ACCE website (https://acce.shef.ac.uk). You can also contact the ACCE management directly for support and guidance (see below). Projects must be suitable in scale and challenge for a three and a half year doctoral research project and fall within the ACCE remit. NERC requires that CASE partners also supplement the student's maintenance grant (at least £1,000 p.a. for three years).

Short-Term Placements

Students and partners may also benefit from short-term placement opportunities. ACCE can provide financial support for students undertaking placement opportunities with CASE partners or other parties for up to three months. Placements may support a range of activities, including, but not limited to:

- seeding new relationships with partners that might then progress into longer term engagement;
- improving the student's understanding of how research is used in society and hence help them to design better research; and
- embedding the culture of Knowledge Exchange with external partners, students and supervisors.

ACCE Recruitment Timeline

A call for ACCE project proposals is made each summer. Project proposals are submitted by a lead supervisor from one of the ACCE academic partners and, following the submission deadline in mid-September, research proposals are selected for advertising from October to January. PhD candidates apply for specific projects and supervisors then nominate one candidate for interview, which takes place in February. Candidates are selected on the basis of their application and interview performance. Successful candidates begin their doctoral research at the start of the academic year in October. Some flexibility of the start date is possible, at the discretion of the host institution.

For further information

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Sharing Ecological Data Using GIS Files

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Nationally, only 3.5% of all records collated by record centres, originate from consultants[4]. This is shocking, but understandable bearing in mind the barriers we face with lack of time, cost implications and client confidentiality hampering our best intentions. A meeting of minds from across the industry have identified potentially simple solutions and its importance to the industry.

Introduction

Data sharing is part of our responsibility as CIEEM members[5], but sharing data is often hampered by a lack of time and our concerns over confidentially. Data sharing also has cost implications and so is best addressed at the company level, through office protocols. Yet, clearly something is not going to plan, with such a low percentage of records being collated despite the numbers and quantity of surveys per year. To investigate why more wildlife information is not currently being shared, a group of Build UK members teamed up with ALERC, GiGL, and The Ecology Consultancy to help resolve the problems.

The Issues

Time

The current methods of sharing species data can be time consuming and costly as the vast majority of records are contained within a number of species-specific reports. Records need to be manually collated and sent to Local Environmental Record Centres (LERCs) or uploaded online, such as at iRecord[6]. This is a task only possible during the quieter winter months or by a work experience person.

Cost

Time is costly, and even with the best intentions, members may find their time stretched. Currently the cost of sharing data is absorbed by individual members or companies. This can be quite onerous, particularly for the larger or more complex projects where numerous protected species surveys may be undertaken.

Confidentiality

Client confidentiality and the commercially sensitive nature of data is a significant barrier to data sharing. Consultants don't like asking clients and often getting permission takes time that neither parties have time for. Permission may not be granted due to a lack of understanding of its value to the industry or the fear of its potential misuse in the wrong hands. In most cases, data within ecological reports is eventually made public via planning portals, so passing data on to LERCs should not pose a significant problem to clients.

The Solutions

Ecological Scope of Works

Having been explained the potential issues, a number of Build UK[7] members have looked at revising their Ecological Scope of Works to promote better data sharing within their organisation. Encouraging members to share their data should help to reduce barriers in practice and any incurred costs by the ecologist will be able to be passed back to the developer. However, finding data sharing methods that are quick and cost effective will still be of critical importance.

Sharing data using GIS files

Members are thus encouraged to consider sharing data created in GIS, a method that was tested successfully by The Ecology Consultancy, with GIGL, ALERC, and Wiltshire LERCs. Originally created for displaying wildlife data in reports, the features created in GIS can be easily shared with LERCs, who use a similar system for managing and storing data. There is no need to create separate spreadsheets, upload data or dig it out of reports, reducing administrative time for both consultants and LERCs. However, it does require the consultancy to use GIS and attribute information to features with a GIS environment. The level of detail may vary between companies and clients depending on how GIS has been used or for what purposes it was intended. It is likely that for large or complex sites or projects that implement a GIS or BIM[8] system, data is sorted and managed digitally for efficiency and project specific data sharing.

Sharing habitat data

Another benefit of sharing data created in GIS, is the ability to share habitat maps, something not currently possible via the Consultants Portal or web-based recording sites. This could include both existing habitats (e.g. Phase 1 or NVC maps) and proposed habitats (e.g. for BREEAM, EIA reports or Green Infrastructure audits), examples are illustrated in Figure 1 and 2. We know this data is in demand by planners, citizen science projects and academics. LERCs provide a practical location for all this data to be stored and made available for the public good.

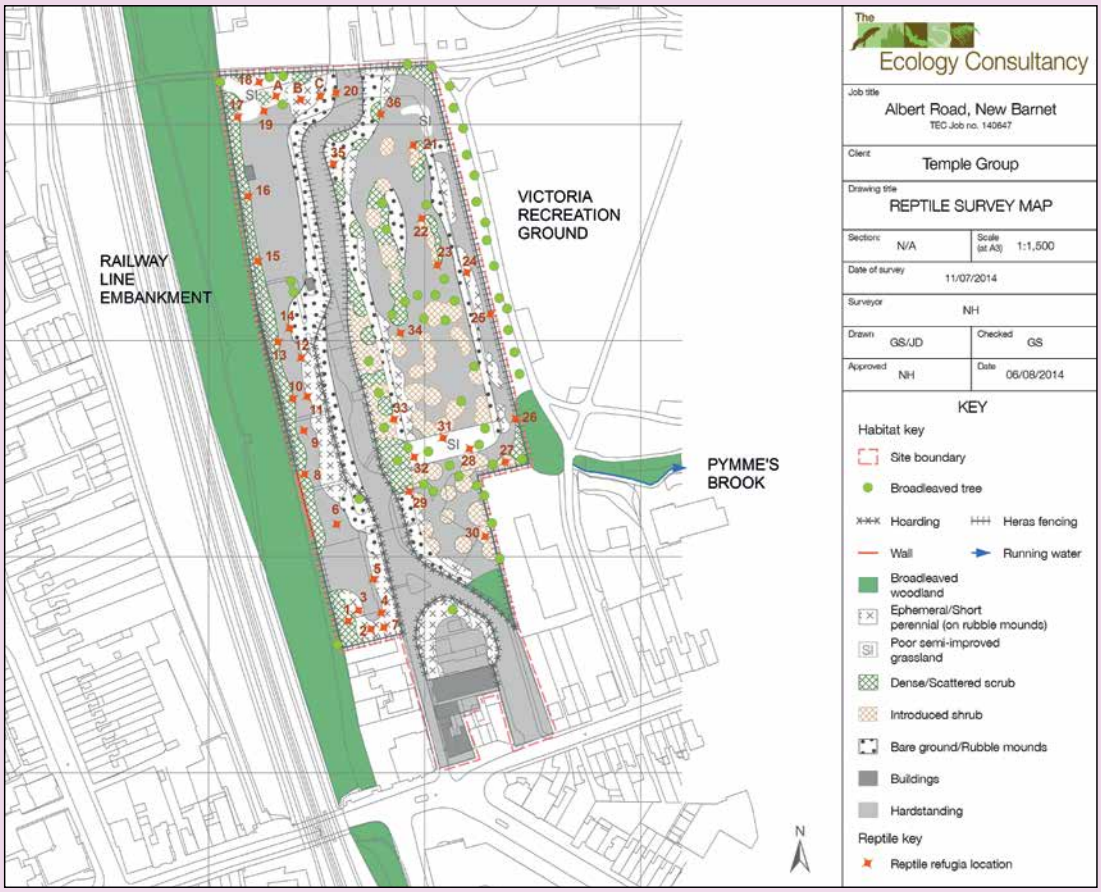
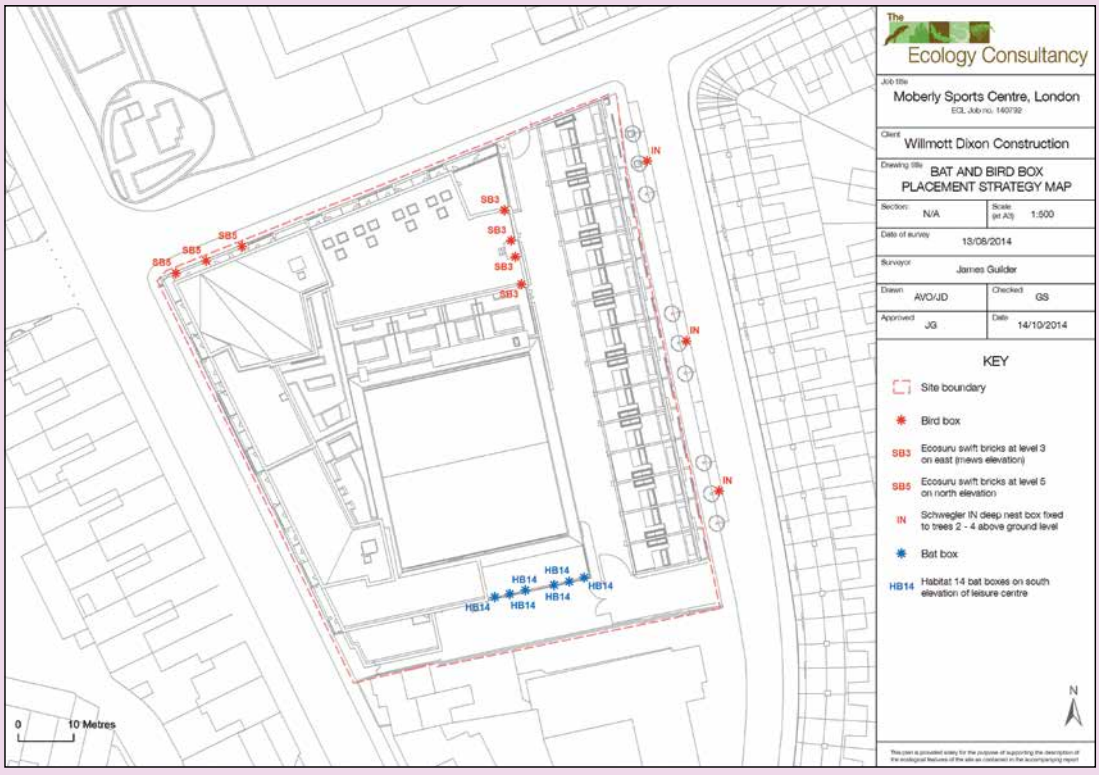


Figure 1. Habitat and Protected Species Surveys Survey data such as a Phase 1 habitat map or a reptile survey map (as shown) will typically be used to present the findings in a report. If the data is mapped in GIS, then it's already in a format that can be easily shared with minimal re-configuration. Although a large proportion of our data is for development purposes, historical information is useful to local planning authorities and for research purposes, to understand how habitats are changing over time and across different parts of the country.

Figure 2. Ecological Enhancements
From the smallest enhancements such as bird and bat boxes (as shown) to large-scale habitat creation, information on any kind of enhancement is useful to all sorts of people and professions. In this context, installed boxes can be maintained by landscape contractors, monitored by local residents and local planners can ensure mitigation measures are working long-term.



Conclusions

We hope consultants will find the method of data sharing that suits them, whether using GIS data files, iRecord or the Consultants Portal (reported on by Ella Vogel in the last edition of *In Practice*), so that LERCs receive significantly more data from consultants than 3.5% this year. We also look forward to progress by Build UK members (and those in similar organisations) in changing their scope of works, as we believe this will help enormously. Maybe we will even see an annual league table being set up for the 'Big Data Sharers' – something we could all help to work towards.

Further Reading

Surveying Consultants Attitudes to LRCs and Biodiversity Data, available at www.alerc.org.uk/uploads/7/6/3/3/7633190/ieem_-_alerc_survey_article.pdf, accessed on 18/01/2016.

Notes and References

1. The Ecology Consultancy www.ecologyconsultancy.co.uk

2. Geographical Information for Greater London (GIGL) www.gigl.org.uk

3. Association for Local Environmental Record Centres (ALERC) www.alerc.org.uk

4. Tom Hunt, *pers. comm.* (2015)

5. CIEEM (2013) Code of Professional Conduct, available from www.cieem.net/data/files/Resource_Library/Professional_Conduct/Code_of_Professional_Conduct_June_2013.pdf [Accessed on 18/01/2016]

6. iRecord more information at http://www.brc.ac.uk/irecord/, accessed on 18/01/2016

7. Build UK brings together 27 of the construction industry's largest main contractors and 40 leading trade associations representing over 11,500 specialist contractors, providing a strong collective voice for the contracting supply chain in construction. Build UK focuses on key industry issues that can deliver change and enable the contracting supply chain to improve the efficiency and delivery of construction projects to the benefit of the industry's clients. Build UK was created as a result of a merger between the NSCC & UKCG. http://builduk.org/

8. Business Information Modelling

About the Authors

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Related CIEEM Training

QGIS for Ecologists and Conservation Practitioners

7 -8 April 2016, Stanmore, Middlesex

17-18 May 2016, Gloucester

www.cieem.net/training-events

Great Crested Newt HSI Calculator Tool

Owen Crawshaw GradCIEEM

The great crested newt (GCN) Habitat Suitability Index (HSI) has long been used by ecologists to assess waterbodies in terms of their suitability as aquatic habitat for the UK's largest and most heavily protected species of newt. In the time since its development by Oldham *et al*. 2000, and its publication in *The Herpetological Journal*, completing an HSI assessment has required numerous steps including: gathering of field data, consultation of multiple graphs, and the manual running of several calculations in order to obtain a final value and subsequently an appropriate classification of a waterbody's suitability for the species. This article presents, and describes how to use, a new tool capable of automatically calculating HSI scores when provided with 10 variables currently required of the assessment.

Introduction

In the past year CIEEM members have witnessed several changes in GCN survey methods and the management of mitigation for the species by Natural England. The development of environmental DNA (eDNA) sampling, implementation of 'pilot projects' in Woking to produce local conservation plans for GCN, as well as the recent reshuffle of mitigation licence application documentation for newts by Natural England, show the continuing need for enhanced efficiency, for consultants, clients and licensing bodies themselves, when addressing sites that have the potential to support GCN.

The newly developed tool, presented in this article, aims to simplify the process of HSI assessment for ecologists and GCN workers by providing a faster and more efficient route of GCN habitat assessment using the tried and tested method developed by Oldham *et al*. over 15 years ago.

How the Tool Works

The HSI Calculator is a tool designed to provide a simple alternative to the manual checking and calculating currently required to complete an HSI assessment for a pond or other self-contained waterbody. The tool set outs the 10 suitability indices (SI), as defined by Oldham *et al*. 2000, used to determine the suitability of a waterbody for GCN (e.g. pond area, presence of fish, macrophyte coverage, etc.)

By using the many functions offered in Microsoft Office Excel each SI features a drop-down menu allowing the user to quickly assign a measurement or description to the waterbody in question. Having selected the appropriate value/description for an SI an inputted formula within the adjacent cell automatically assigns each SI a separate value (in the example given SI_2 = 125m^2 resulting in an SI value of 0.25), required for the ultimate calculation of an HSI score.

Upon inputting the required 10 measurements/descriptions the HSI Calculator uses the formula developed by Oldham *et al*.: $HSI = (SI_1 \times SI_2 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/10}$ to automatically produce an HSI value reflecting the proportion of waterbodies with the defined SI variables that support breeding populations of GCN.

In addition, the tool uses the same functions as those already described to include the work published by Brady (2010) and automatically categorises a waterbody as having 'poor', 'below average', 'average', 'good' or 'excellent' suitability for breeding newts according to its HSI score.

Application and Advantages

Various internet searches for pre-existing tools that serve a similar function to the HSI Calculator have not produced any results. It is acknowledged that the current version of Natural England's Great Crested Newt Mitigation Licence Method Statement does calculate an overall HSI score, however, it still requires the manual calculation of each individual SI.

While the values for several of the suitability indices such as SI_1 (location) can been obtained relatively quickly (i.e. Zone A = 1, Zone B =0.5, Zone C = 0.01) others require the consultation of graphs and in the case of SI_8 (ponds), the calculation of ponds/km^2 using π before reading off a graph, can be calculated automatically using this new tool.

It is the aim of the HSI Calculator to minimise the need for manual calculation and reference as much as possible and to contribute in a small way to help improve efficiency for all involved in producing GCN habitat assessments, impact assessments and mitigation strategies.

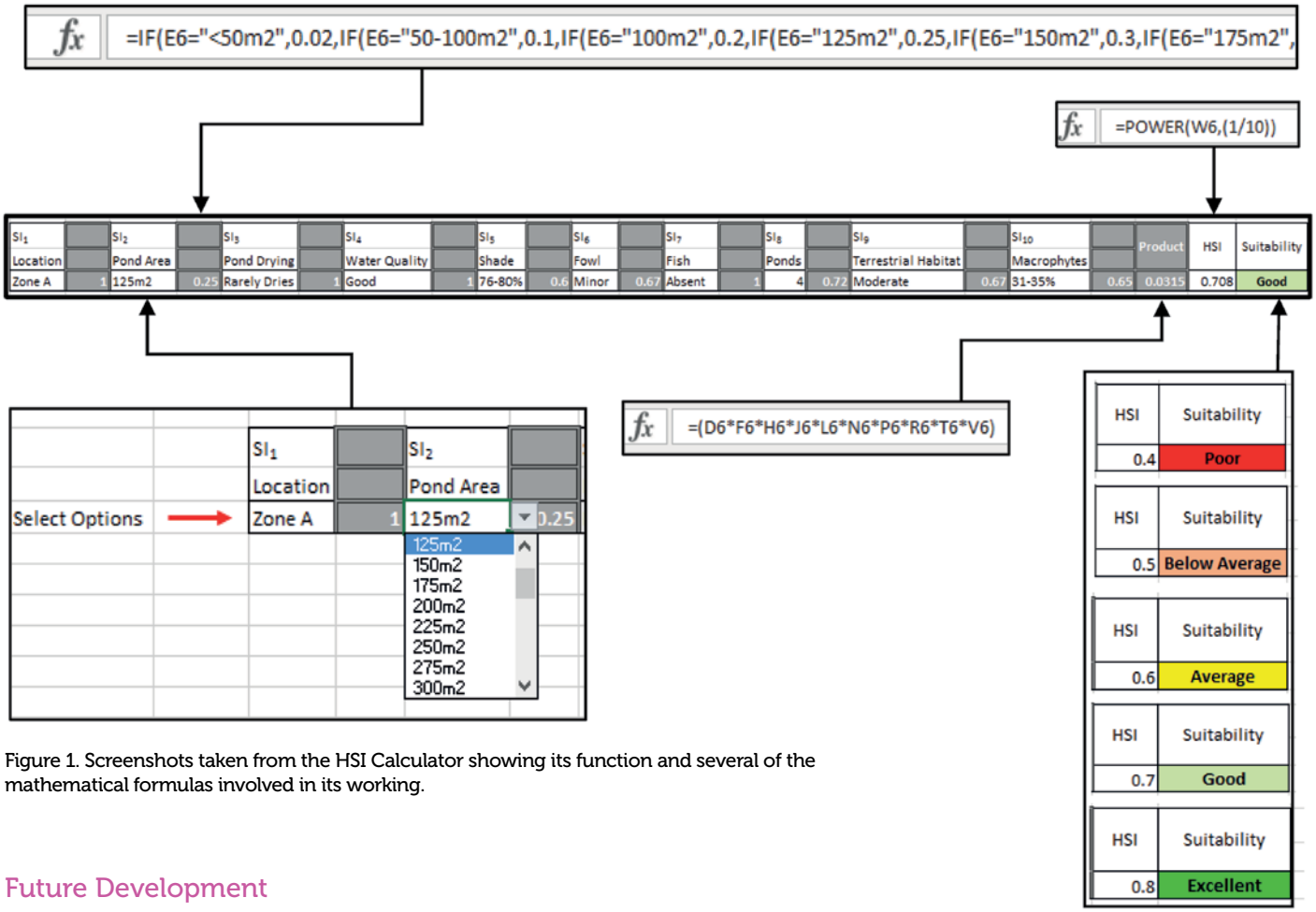

Figure 1. Screenshots taken from the HSI Calculator showing its function and several of the mathematical formulas involved in its working.

Future Development

Continued advancements in GIS mapping and mobile technology mean that many applications are now allowing the electronic storage of data while in the field. This data can be rapidly uploaded for incorporation within reports; providing an organised and efficient way of managing field data.

It is hoped that further work could see the inclusion of the HSI Calculator within a mobile application allowing surveyors to calculate HSI scores while in the field. This could prove particularly advantageous when presented with the task of surveying multiple ponds during a single site visit.

How to Access the HSI Calculator

The HSI Calculator is a freely accessible tool and can be accessed through the Windrush Ecology website:

www.windrushecology.com/hsi_calculator

References

Brady, L. (2010). *Great Crested Newt Habitat Suitability Index.*

Oldham, R.S., Keeble, J., Swan, M.J.S. and Jeffcote, M. (2000). Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). *The Herpetological Journal* **10**: 143-155.

About the Author

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Smart, Savvy and Succinct – Advertising Tips

Engaging the right audience to promote your products or services to is often more of a challenge than you initially envisage it to be. Larger generic publications, whilst covering a wider demographic, may not be niche enough to engage the appropriate audience. It is usually far more effective in promoting a specific service or product if you adopt a more strategic approach in relating your audience to your advert.

There are a few key points when embarking on a new advertising campaign:

- Determine who you are advertising to, who is your customer/consumer?
- Research appropriate publications within your field, find ones that include relevant content to your sector.
- Contact the publication and ask for their media pack. The media pack will include information on the demographic of their readers, their distribution figures, costs and package options available – which will help you make informed decisions on whether advertising with them will deliver the most return for your investment.
- Ensure that the method of advertising is succinct with who you want to engage – if you want to promote a new form of technology then advertising within a website may be more relevant than in print, especially if you have a limited budget. Appropriating expenditure to the most successful method of advertising is essential.

CIEEM's *In Practice* magazine provides a gateway to industry professionals, it is distributed to over 5,000 professionals in the ecology and environmental management sector – making it an ideal publication for advertisers in the same sector. Each issue contains technical articles, sector news, professional updates and members contribute to providing content through articles in each issue. We also offer advertising on our website, www.cieem.net.

For information and prices on advertising in *In Practice* or on the CIEEM website you can visit www.cieem.net/ip-advertising or alternatively request a media pack from emmadowney@cieem.net.

Pragmatism, Proportionality and Professional Judgement

CIEEM Professional Standards Committee

The definition of 'pragmatism' used in this article is where *conduct, action or policy is dictated by consideration of the immediate practical consequences rather than by theory, principle or dogma.* So in a professional sense, being pragmatic means dealing with things realistically in a way that is based on practical rather than theoretical considerations.

Likewise, in order to keep things in perspective, we must also strive to apply 'proportionality'. Clause 5.5 of BS42020 *Biodiversity – Code of practice for planning and development (2013) reminds us that: "The work involved in preparing and implementing all ecological surveys, impact assessments and measures for avoidance, mitigation, compensation and enhancement should be proportionate to the predicted degree of risk to biodiversity and to the nature and scale of the proposed development."*

Introduction

In the current economic and political climate, as a profession – more than ever – we must be able to demonstrate that we are not adding unreasonable delays, complexity and costs to development and infrastructure projects. Our advice and recommendations need to be fundamentally pragmatic and focused on delivering practical and effective outcomes for biodiversity and the natural environment. At the same time, however, we need to be careful not to be so 'pragmatic' that we risk losing a sense of proportionality, as might be the case if we chose a cheap, quick form of mitigation that could be easily implemented without regard to whether it would be an adequate response to the scale and type of impact we are seeking to address.

In attempting to get this balance right, we are faced with a challenge because professional practice generates a need for complex analysis and decision-making in a world of multiple issues and corresponding options. It is therefore not surprising that the ability to identify what is pragmatic and proportionate does not come automatically to any professional. This ability comes gradually as we gain experience through our careers and it is commonly expressed as part of what we call our 'professional judgement'. And in working in a discipline that so often involves subjective – albeit well informed – assessments, ecologists must continually hone their individual professional judgment to ensure that it has been exercised conscientiously. We must also strive to avoid complacency, which will always undermine our judgement.

Exercising Professional Judgement

The ability to exercise professional judgement may be the single most important attribute that differentiates professionals from non-professionals. This is because professionals should use their training, accumulated knowledge and

experience to make 'informed' decisions. As such, our professional judgements should be impartial, based on sound science (where it exists), and have regard to what is in the 'public interest'; they should take into account legal and policy issues, as well as our obvious obligations to employers and clients. As professionals we should also base our judgements on ethical considerations (that is why, as members of CIEEM, we are bound by a *Code of Professional Conduct*); and all of this while at the same time dealing with the technical matters related to a particular case or project. Furthermore, in attempting to juggle all of these elements, we should be mindful of the potential for conflicts between these various interests; hence the need for professional judgement.

Also, with regard to judgements over biodiversity conservation, it is entirely possible for two different ecologists, faced with the same facts and circumstances to choose two different courses of action. That is the nature of professional practice and ecology is not an exact science. Both options could be 'correct' and could be legitimate choices for a substantial number of ecologists if faced with that particular situation. However, a professional ecologist should be able to justify clearly the decisions or recommendations that they have made, and should be able to show which issues and interests have been considered and the weight attached to each in reaching that judgement.

Justifying Our Position

The thought processes that underpin professional judgements are often not expressed explicitly but instead are almost a sub-conscious exercise where we do not verbalise or put into writing how we have arrived at a particular position. In many instances, this subliminal approach is more than acceptable. However, there are some situations where it is particularly important to actually *demonstrate* how we have arrived at our judgement; for instance where:

- any advice given or course of action to be taken is adapted and thus deviates from published and industry-accepted good practice;
- a gap in knowledge must be bridged because adequate information is not available or does not provide clear direction;
- a methodology or technique is unproven, meaning there is no clear picture, based on past experience or success, to guide advice given or action to be taken;
- it is apparent, faced with the facts of a case, that many different courses of action are available and the one chosen requires explanation and justification;
- one set of evidence contradicts other information available;
- views between two or more ecological experts are in direct conflict;
- other information brings into question the reliability of data and/or documents provided;
- important *limitations*[1] on the work have been underestimated or overlooked and consequently not reported nor taken fully into account; and/or
- analysis and interpretation of results, and/or conclusions and recommendations, are based on very little underlying ecological evidence.

When confronted with any of the above, we should present sufficient information to ensure that another experienced ecologist having no previous connection or experience with the project can understand the significant professional judgements made in reaching conclusions on potentially controversial matters arising during the project.

In other words, we should be prepared to justify and demonstrate how our own professional judgements have been reached. To do this we may usefully break the thought and working process down into smaller steps in order to:

a) Identify the professional issue(s) clearly

b) Gather all the relevant information
   - evidence and data
   - laws and policy
   - professional standards
   - good practice and technical guidance

c) Identify possible options or view points

d) Weigh-up the advantages and disadvantages of each option/viewpoint

e) Choose an option or view point and present it in a succinct and transparent manner, ensuring that the final decision can be justified and that the benefits and risks compared with other options/positions are made clear

NOTE: The advice given in maths lessons at school holds true for the professional exercising their professional judgement – 'show your workings out'.

Care When Using the Term 'Professional Judgement'

Professional judgement should not be used as justification for decisions that are not otherwise supported by the facts and sufficient ecological evidence.

We must therefore be careful not to *exploit* professional judgement as a cover to take the most convenient choice, or the one most preferred by our client or employer, or most expedient for timing or logistical reasons. Professional judgement should be exercised properly, logically, objectively and for valid reasons. For instance, if there were a well established good practice methodology available for a specific type of survey, then it would be highly questionable (and possibly in breach of CIEEM's *Code of Professional Conduct*) to choose a 'less suitable' alternative *without sound justification*.

It is important to distinguish 'professional judgement' from 'personal opinion'. Professional judgements can be substantiated through well-reasoned explanation and evidence, whereas a personal opinion is something less robust and often influenced by our bias and misconceptions. For instance, it may be my personal opinion that unicorns are flourishing in a secret enclave just outside of Budleigh Salterton! However, irrespective of how forcefully I express this opinion, when challenged, I am unlikely to be able to provide the evidence to substantiate my position.

Unfortunately, in some cases, personal opinions can be the exact opposite of professional judgement and can instead become an unintended expression of an individual's ignorance and/or lack of competence over a specific subject. And at worst, a forcefully expressed personal opinion may be a sign of professional malpractice where that simple opinion is deliberately wrapped up and presented as a professional judgement. A tactic used cynically to win a point, rather than to justify a position.

It is therefore important that we are alert to mistakenly giving or accepting

personal opinion in *lieu* of true professional judgement. Claims are often made that advice, recommendations or a strongly held position over a particular issue (e.g. as might be presented in a public inquiry), are an expression of the individual's professional judgement. However, if such statements cannot be substantiated, they are no more than a simple personal opinion and should be challenged actively until the position is either proven to be false and consequently withdrawn or is supported through reasoned argument and backed up with adequate evidence.

Testing Professional Judgement – Professional Scrutiny

Where ecological information and accompanying professional judgements enter the public arena to support a formal decision-making process (such as within the planning process), it is vital that the decision-maker applies adequate scrutiny to test the professional judgements made by others.

Without adequate scrutiny, there is a risk that a planning consent might be granted for a development that inadvertently leads to significant harm or damage to biodiversity features and resources. This could be in breach of the decision-maker's statutory obligations and may lead to legal challenge on the grounds that the consent was not determined lawfully.

The veracity of ecological information submitted with an application should therefore be subject to adequate scrutiny by both the decision-maker and their advisors and consultees.

This means that professionals receiving and reviewing ecological information within a decision-making process (e.g. planning) should be alert to the need for closer scrutiny and be prepared to conduct a critical assessment of all of the ecological evidence and information submitted.

NOTE: A cautious mind does not amount to an investigative mind. With a cautious mind a person starts off with the assumption that everything is fine until something contrary is found for which they are always alert. Whereas an investigative mind starts off straight away doubting everything and thus requires confirmation for everything presented to them which is not the case with caution. Caution suggests that a person can accept the information received unless they obtain information which contradicts the old information or expectation and only then should they start investigating and not before.

When applying professional caution an individual should:

a. not necessarily accept evidence gathered at face value and therefore critically assess evidence without being overly suspicious;
b. be prepared to request evidence to confirm the competency of the person(s) submitting the information, providing advice and/or making recommendations;
c. corroborate, where necessary, methods used, data collected and proposals and recommendations made;
d. identify information that brings into question the reliability of other documents and evidence;
e. establish whether evidence is misleading, incomplete or contradictory; and
f. consider whether the person providing the evidence or information lacks competence in key areas or has provided evidence that is incomplete, incorrect, false, biased, misleading, exaggerated or unsubstantiated.

Of course, the decision-maker should have sufficient ecological competence to establish if the ecological evidence provided with a planning application is adequate and accurate. This may be particularly difficult where a planning authority lacks access to such ecological expertise (e.g. has no in-house ecologist). Alas, the remedy to this last challenge is a much bigger issue than can be addressed in this article.

Applying Professional Judgement to Good Practice Guidelines

It is especially important to provide evidence of how professional judgement has been applied where ecological work does not follow, in full or in part, the recommendations set out in good practice guidelines.

However, good practice guidelines cannot and should not be unreasonably prescriptive due to the vast range of scenarios that may be encountered. Consequently, professionals may apply their professional judgement to decide what, if any, level of deviation from the guidelines is acceptable in a particular situation. However, such professional judgements should only be made where individuals are able to demonstrate clearly that they have sufficient competence and experience and have shown uncompromising integrity in reaching their judgement. In other words, any deviations from the guidelines are capable of being justified robustly.

Professional Judgement and the Law

As ecologists and environmental managers we must be wary of attempting to impose our 'own interpretation' of the law on others in the mistaken belief that we can justify it because it is our professional judgement. This is especially so when our viewpoint is different to the commonly accepted interpretation of a particular statutory requirement. In such a situation, our own judgement runs a high risk of being incorrect and at worst could lead to actions or decisions that are unlawful.

While there may be room for a degree of interpretation of the law in some situations, there are instances where the law is absolutely clear and does not allow for interpretation – at least not by individuals with no legal training or background, as is the case for most CIEEM members. Personal judgements over matters of law are therefore very likely to be outside of a member's area of competence, and could constitute a breach of the Institute's *Code of Professional Conduct*. The appropriate means to test whether an alternative or novel interpretation of a piece of statute is correct or not is, first, by seeking formal 'legal opinion' and ultimately of course to seek a legal judgement through the courts.

There are, however, situations where as ecologists we may need to exercise our judgement in a legal context. From experience, these seem most common in cases involving the EU Habitats Directive (1992). One example that involves a particularly tricky professional judgement call is where a bat roost is threatened with damage or destruction.

Under normal circumstances, the law is clear: where the main characteristics and features of a roost are to be altered during and/or after works (resulting in damage, deterioration or destruction) then *compensation* measures will be required. EU guidance states that such measures always require a licence[2]. This is because, by definition, compensation measures are compensating for a residual negative impact (e.g. the detrimental effect or harm cannot be avoided) and therefore – in the absence of a derogation licence – an offence would be committed.

In contrast, where it can be demonstrated that works can proceed in a manner that ensures the *Continued Ecological Functionality* (CEF) of the roost[3], it may be possible to establish that no damage or destruction will occur, and therefore no offence is likely to result[4].

However, professional judgement capable of making a distinction between situations where CEF can be maintained versus those that will lead to damage to, or actual destruction of, a roost require years of applied professional practice. In other words, situations like this demand that judgement is based on high levels of competence (knowledge and experience) gathered over a considerable period of time and across a wide range of circumstances. It is not sufficient to just 'state' that everything will be alright because we think or hope so!

Conclusion

We can all increase the confidence that can be attached to our conclusions and advice and reduce the need for in-depth scrutiny from others by providing transparency to support what may otherwise be controversial recommendations or practice.

Greater transparency and a requirement for less scrutiny should bring wider benefits to the systems with which we work, For instance, the planning process should become smoother and subject to less objection and delay because transparent robust professional judgement brings with it greater trust, confidence and certainty over what is to be provided. In turn, confidence and certainty should foster a culture and environment where innovation can hopefully be encouraged, where there is strong emphasis on achieving positive outcomes, rather than adhering to stifling dogma and a particular process for the sake of process.

Also, being able to exercise transparent professional judgements should provide us with a means to respond to any professional challenge in a manner that is genuinely both 'proportionate' and 'pragmatic'. However, to do so also requires that we have a clear and honest idea of what we are ultimately trying to achieve. For ecologists, this aim should be consistent with international and national biodiversity targets; in other words, not only to halt the decline of biodiversity but to strive for the Holy Grail… measurable and significant biodiversity enhancement.

Notes

1. An illustration of the 'limitations' that should be taken into account when preparing ecological reports is provided in BS42020 Clause 6.7.
2. See paragraphs 79 of the EEC (2007) Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC. This document focuses on the main statutory obligations under Articles 12 and 16 of the Directive.
3. The roost will still remain at least the same size (or greater) and retain the same quality (or better) for the species in question.
4. For further legal interpretation and guidance around these issues see paragraphs 72-79 of the above guidance.

References

Fewings, P. (2009). *Ethics for the Built Environment*. Taylor and Francis Group.

Martin, M.W. and Schinzinger, R. (2004). *Ethics in Engineering 4th Edition*. McGraw Hill.

EEC (2007). Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC.

CIEEM (June 2013). *Code of Professional Conduct*. Chartered Institute of Ecology and Environmental Management.

Using the 'My CPD' Tool

The CIEEM 'My CPD' online planning and recording tool was launched earlier this year and we hope that this will prove to be of real benefit to members.

'My CPD' is an online planning and recording system for keeping track of your CPD goals and achievements. Your records are safely stored online for you to review and update at any time via a simple login linked to your membership details.

The tool, which can be used from your PC, laptop, tablet or mobile phone, is integrated with the Competency Framework, allowing you to plan your CPD in line with the technical and transferable competencies identified for the profession.

How to Use the Tool

The steps to using the tool for the first time are straightforward but there are 'hover over' prompts for all the actions and FAQs if you need further guidance.

Step 1. Login (Screenshots 1 and 2)

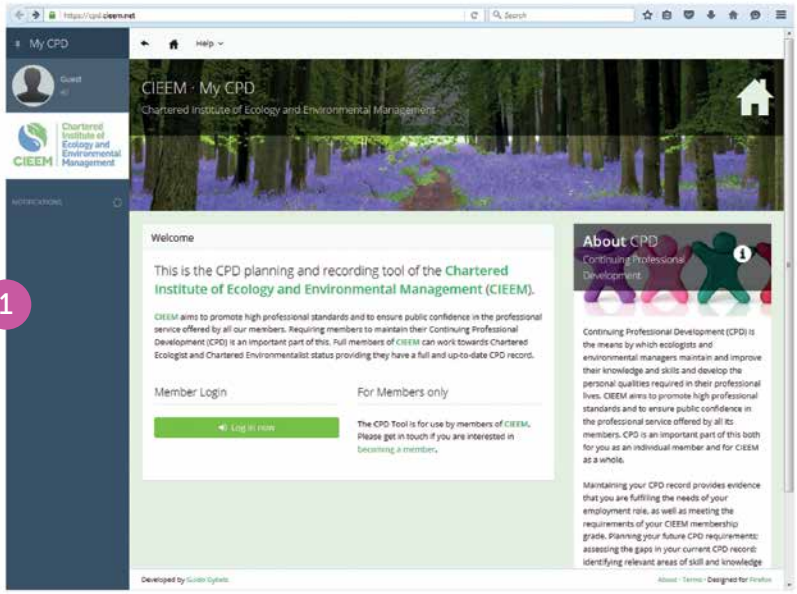
Access My CPD from the members' area of the CIEEM website and log in using your membership password. Update your personal details if necessary.

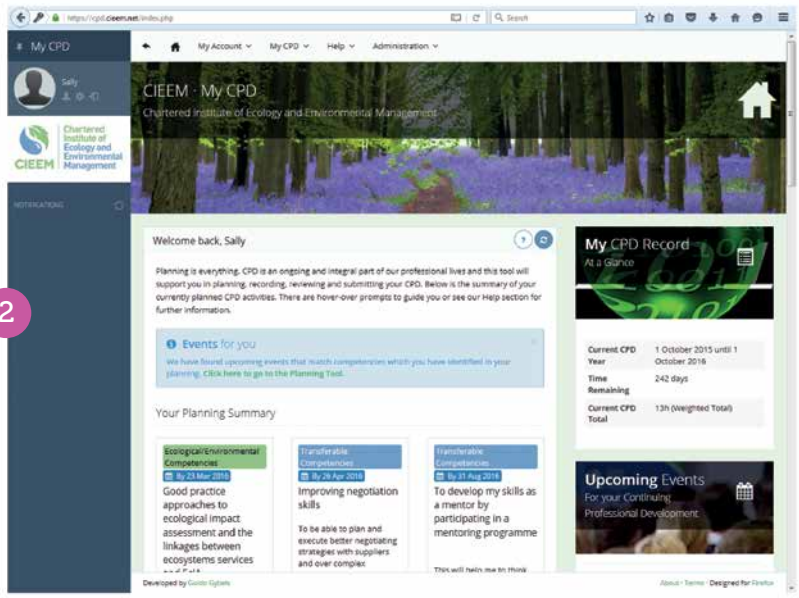
Step 2. Get Planning! (Screenshot 3)

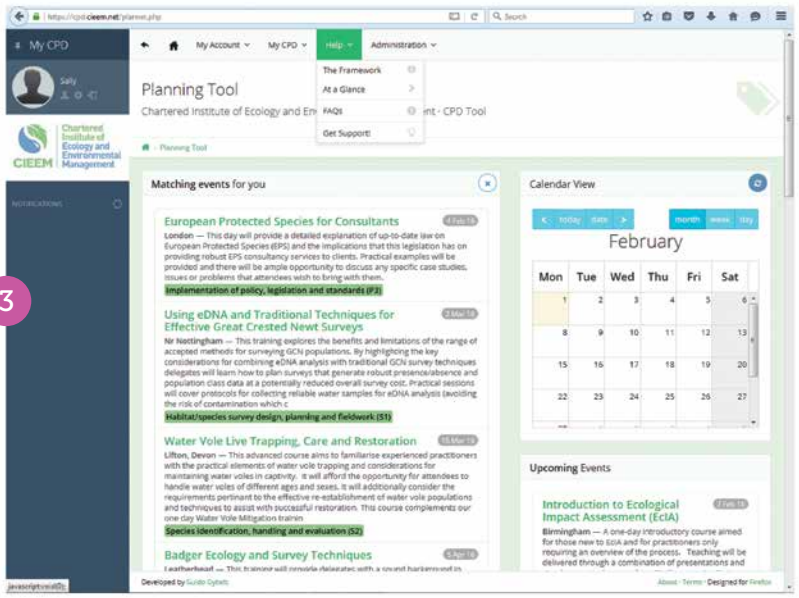
Welcome! Straight away you can add a new item to your CPD plan, adding in the learning you want to achieve and the competencies you aim to develop, as well as a target date to achieve this goal. You can also add additional information, such as any costs you foresee, and then save this information to your plan.

It is important to plan your CPD so that you can provide this as evidence should you be behind on the required number of CPD hours within an annual CPD period. The plan will also be reviewed when members exit an abeyance agreement.

(Tip: Visit the 'Help' area for information about the Competency Framework – in depth or at a glance.)







Step 3. Record Your Activities
(Screenshot 4)

Click through to your CPD record and add any new activities you have undertaken to start populating your online record. You can copy across your activities from the previous CPD recording form to make things easier.

Step 4. Review (Screenshot 5)

Update your plan by moving completed activities across to your CPD record; delete or update your planned goals and check you are on target with your CPD hours by using the 'At a glance' table.

Submitting Your CPD (Screenshot 6)

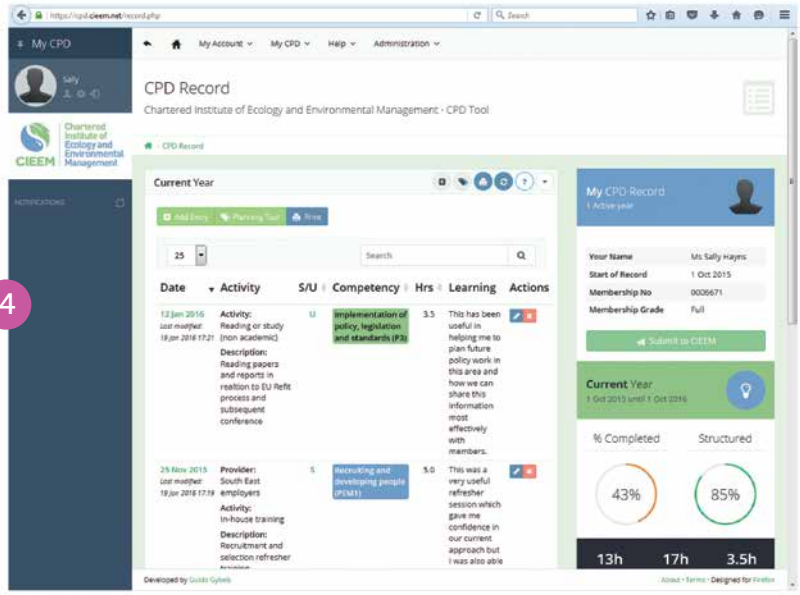
You are no longer required to submit your CPD annually. If you are asked to submit your CPD, for example because you are randomly selected as part of the annual CPD audit, or because you are applying to upgrade your membership or applying for chartership, or for any other reason, then you can quickly and easily do so by clicking 'submit'. This will automatically generate an email to the Secretariat who will then be in touch to confirm your records have been accepted.

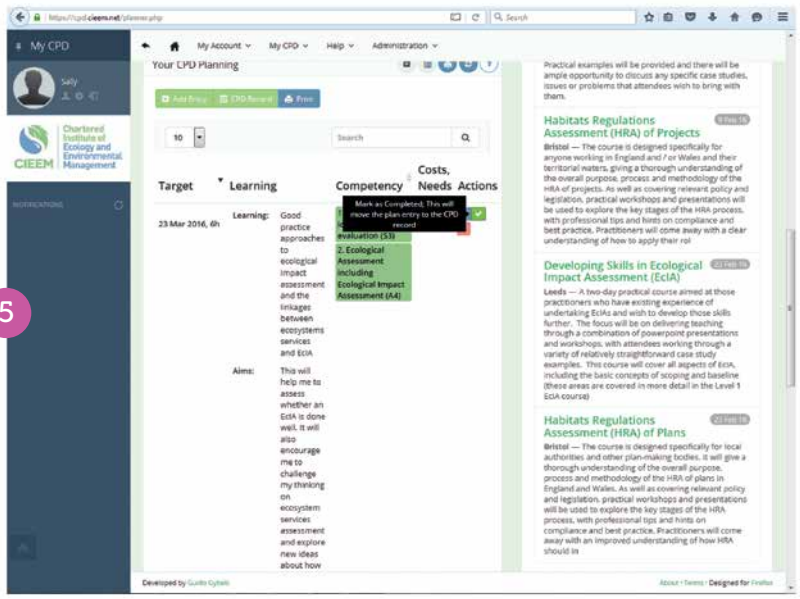
Why Use 'My CPD'?

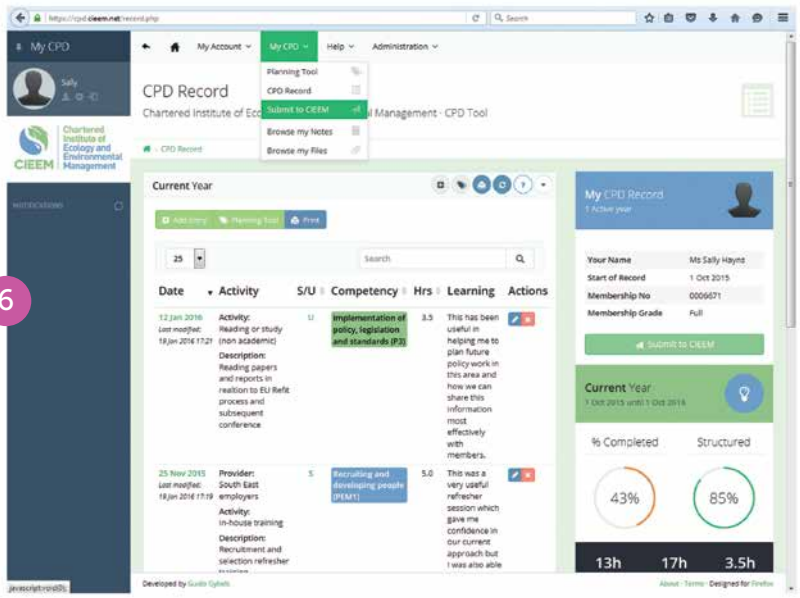
As well as providing a secure area for members to plan and record their professional development, 'My CPD' offers many more benefits including:

- A guide to upcoming CIEEM Events to help plan your CPD activities, including a personalised calendar.
- The capacity to add supporting documents and notes to your own CPD records, such as certificates and training notes, so that everything is stored in one place and easily accessed.
- The opportunity to set review dates to remind you when training needs to be refreshed.
- Periodic gentle reminders to let you know your CPD needs updating, to keep you on track with meeting the annual requirement.
- The ability to print a summary of your CPD Plan or CPD Record to discuss with your line manager, if appropriate.

We hope you will find the 'My CPD' tool useful. As with any online device, the more you use it the easier and more useful it will be.







The Alternative Decalogue for CIEEM Members:

Towards Improving Standards in the Profession

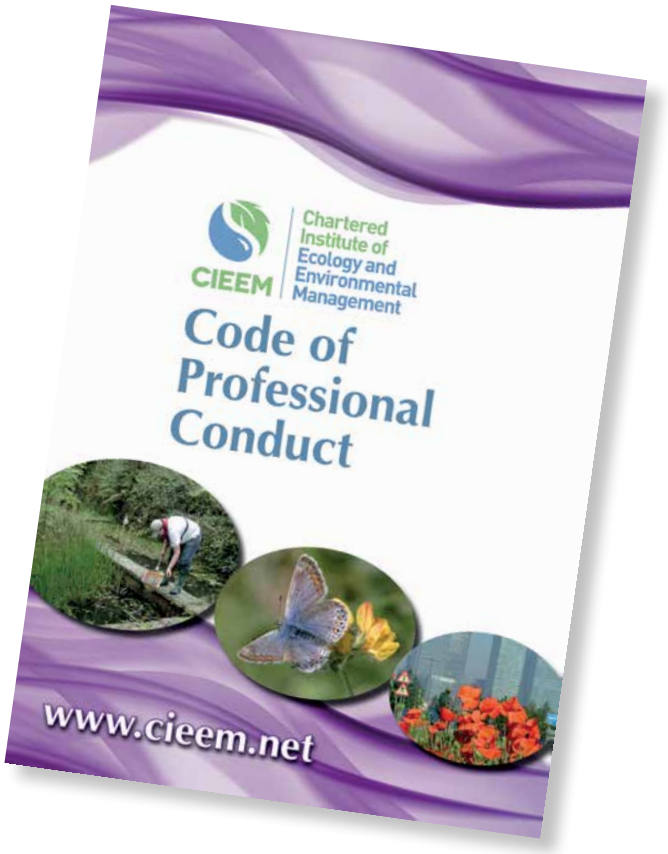
Des Thompson FCIEEM FRSE
Principal Adviser on Biodiversity, Scottish Natural Heritage.
Member of CIEEM Disciplinary Pool

Richard Graves CEcol CEnv FCIEEM
Director, Richard Graves Associates Ltd.
Member of CIEEM Disciplinary Pool

Sally Hayns CEcol MCIEEM
Chief Executive Officer, CIEEM

Deborah Alexander
Professional Standards Assistant, CIEEM

In each issue of *In Practice*, there is a section under 'Professional Updates' giving details of members (all categories) of CIEEM who have had complaints against them upheld. Ideally, we would not need this, but we do – and the list is not short. As members of the Disciplinary Pool who have to determine such complaints, face to face with the parties concerned, we felt it would help the profession if we produced a 'top ten' list of dos and don'ts to help members avoid finding themselves in such a situation.



We can all learn from admonishments

First though, some words for those of you who have featured in the above named section. All of us make mistakes in professional life, and many of us are far better for the lessons learnt. In the Disciplinary Hearings we have heard reasons and excuses ranging from understandable to arrogantly nonchalant. Some members have put themselves under intolerable pressure (e.g. too much work, too little knowledge and experience) to the extent that complaints have arisen as a result of oversights and errors in hastily conducted work.

All of us can improve our work, and peer review of scientific papers is just one example of how criticism and correction helps. For those of you named in *In Practice*, do not view the reprimand as permanent – it is not, and some of you have already attended to the shortcomings and have moved on. This is important, for we do not want named members to feel they are disadvantaged in their work – some are far better professionals as a result of what they have gone through, just as a student essay or scientific report benefits from critical feedback.

Ten steps to improve the profession

We are nonetheless seeing repeated examples of poor practice, and what we propose below is intended to reduce these. Most of the advice is straightforward.

1. **Write clear reports**. Some of the reports seen by us are awful, and have clearly been written not to be read! Some do not follow CIEEM guidelines http://www.cieem.net/guidelines-for-ecological-report-writing (giving no justification for doing so), miss key

sections, and lack clarity. Typical errors include:

- No purpose of the report given;
- No details on who has written the report and who did the work;
- Limitations not expressed clearly enough, if at all;
- Gaps or lack of detail in key sections e.g. methodology, recommendations for mitigation;
- Failure to use or, if used, correctly use desktop data available (see 3.);
- Not reporting what was done, but instead what was intended to be done or what the client wanted;
- Text and data 'cut and pasted' into reports without appropriate revision (or due referencing and acknowledgment);
- Failure to justify approach taken, or the use of professional judgement when deviating from standard procedures; and
- Absence of details of the required copyright licences in the report.

Such shortcomings are damaging to the profession. Be clear, concise and open about what you have done (or not done). When you cut and paste material from your, or others' work do take the trouble to credit what you have lifted. To avoid lengthy reports, simply reference work published elsewhere – in our experience, clients are not impressed with impenetrably turgid reports. And remember, obfuscation wastes everyone's time.

2. **Peer review your work**. A lot of complaints arise because people have not had their work reviewed. Why would you not have someone check your work, when virtually every aspect of education and science is predicated on critical improvement? What has disappointed us particularly has been the lip service paid to quality assurance within consultancies. Meaningless audit trails on report checking are listed, when our checks have revealed that sometimes 'senior' reviewers have not even opened documents pronounced as fit for publication or release! Some common issues include:
   - Failing to ensure appropriate quality assurance measures are in place – either working with others within the same organisation or, for 'lone' members, with appropriately qualified peers – and hence failing to pick up errors;
   - Signing off work that is of insufficient quality – as a reviewer/manager, don't do it, and if you have reservations say so; and
   - For matters relating to EU legislation, seek a second opinion on implications of findings in terms of impacts of proposals on species, habitats and protected areas.
3. **Carry out a sufficient desk survey**. A lot of background information can be gathered from 'desk surveys' e.g. for sites, or on environmental issues. It is surprising how inadequate these surveys prove to be, with errors including:
   - Failing to undertake an adequate search of appropriate sources, especially statutory ones, and missing key details on legal status or implications of the law;
   - Treating such a search as an optional extra for the client, not as (in most cases) a requirement;
   - Misusing data from the NBN Gateway in breach of the licence conditions (notably, not seeking permission for use); and
   - Not checking the provenance of data and information included in the report, with some of it out of date by decades.
4. **Survey and monitor to a sufficient standard**. Some serious problems arise here where work is inadequate in terms of its seasonality or frequency. Field surveys for hibernating mammals in their foraging range will not be fruitful, and wintering and breeding ranges for many birds do differ. Where possible, ensure you have replicates, and give consideration to detectability and individual variation in detection rates. Common errors reported to us were:
   - Failing to properly scope the survey area (more likely if the desk survey is inadequate);
   - Surveying at inappropriate times, with no justification;
   - Insufficient or inexperienced surveyors, with poor equipment and lacking appropriate licences (e.g. for bats and reptiles);
   - Not following biosecurity good practice; and
   - Failure to follow prescribed methods (e.g. given by CIEEM, the British Trust for Ornithology, Bat Conservation Trust etc.) without professional justification.
5. **Analyse and interpret data appropriately.** Given that many members are qualified to at least science degree level, it is very disappointing to see no, or shoddy, use of statistics (e.g. non-parametric and parametric tests used wrongly). We have seen examples of conclusions derived from no or insufficient data, analysed poorly, and asserted with confidence. We would prefer to see Confidence Limits rather than limitless confidence in data. Typical errors include:
   - The wrong analysis of data;
   - Unjustified conclusions drawn from scant data available; and
   - Failure to include the data in the report.
6. **Be objective.** For a growing number of reports brought to our attention by complainants it is clear that the author has made up his/her mind on what the report will conclude. This is of concern as members must have an open mind in undertaking work – don't be influenced by hearsay or third parties telling you what to expect. Be self-critical of your work and findings – healthy scepticism is an asset. Common issues are:
   - Deriving conclusions not supported by the evidence;
   - Making recommendations that do not flow from the conclusions, and not underpinned by data or findings from any analysis; and
   - Asserted remarks that betray inadequately conducted work ("it was obvious from a preliminary visit to the site that it was unsuitable for species x" – the visit being made at the wrong time of day/year).
7. **Be sure of what you are contracted to do.** Where complaints were upheld here, the issues sometimes reflected poorly on both parties. As a member, be clear about what you have been asked to do, what you have agreed to do under contract, and what you have reported – often the three are different. Don't be afraid of discussing the

contract with your 'client'; clarification on basic points at the outset saves immense time and expenditure later on. Four common problems were:

- Absence of a contract setting out terms and conditions;
- A poorly worded contract vague in purpose, detail, reporting requirements, and the basis of the fee being charged (quotes are often too low for what is eventually done);
- The member having his/her 'clear' idea of what was required, which did not meet the expectations of the client; and
- Work being done that was not asked for or required.

8. **Be courteous in your dealings.** This has been one of the particularly disappointing areas. Email exchanges have often been downright rude, and relations with hard pressed local authority and statutory agency staff have come across as unnecessarily poor. A common failing was for members to ignore clear (often unpalatable) advice given by experienced officers/advisers. Why would you ignore or object to this when you are being offered helpful advice, often from experienced individuals? Email trails cover pages when a simple phone call can clear up areas of misunderstanding. Examples of poor 'customer' care include:
   - Failure at the outset to communicate with the client on work planned, timescales, and reasonable estimate of costs;
   - Reports submitted late, to a poor standard, and seeking additional payment for work not agreed to;
   - Evident unwillingness to address constructively and empathetically the client's concerns and queries regarding draft material (why ask for comments, and then ignore them?);
   - Knowingly taking on work that you have insufficient time (or experience/expertise) to do;
   - Recommendations for further work that is not necessary;
   - Rudeness. This is inexcusable, yet we have members who are impolite to clients, colleagues and on occasion to CIEEM staff; that will not be tolerated; and
   - Putting comments in emails that embarrass you, your organisation or client – every line of what you write in an email, blog, tweet or article may be read by an unintended reader, so be mindful of that to save yourself reputational damage, and worse.
9. **Keep your CPD up to date.** Unfortunately, many members had CPD records out of date by at least two years; we have taken direct steps to address this. CPD recording is a good way of monitoring progress in developing skills and experience, and identifying further development opportunities and needs. It need not take long to complete, and much of your CPD work is derived from 'unstructured' learning http://www.cieem.net/news/141/changes-to-cpd-regulations-effective-from-1-october-2013 As part of this, do be accurate in stating your grade of membership (several complaints have arisen from members inflating their membership grade on reports – often accidentally). Three issues here are:
   - Not keeping a record of CPD;
   - Undertaking insufficient relevant CPD to meet CIEEM's mandatory requirements for professional grade membership, and to demonstrate maintenance of knowledge and skills; and
   - Failing to recognise the value of 'unstructured' CPD, such as attending seminars, reviewing reports, carrying out 'own time' fieldwork – often with more experienced peers.
10. **Work to your limitations.** Finally, we come to a fundamental piece of advice we have offered several colleagues – work within your sphere of competence and experience. Several complaints have been upheld where members have strayed far beyond their span of expertise. This is unnecessary, and if members need support or help in an unfamiliar area use the CIEEM network to secure help or advice. Familiar problems have arisen where members have:
   - Not recognised limits of competence, and gone on to undertake work for which knowledge or experience is lacking;
   - Insufficient awareness and understanding of relevant standards and guidance;
   - Not taken steps to plug gaps in knowledge or experience; and
   - Stated incorrectly the level of experience or expertise, which has been exposed subsequently – and sometimes giving rise to personal and organisational reputational embarrassment.

Closing remarks

We hope this advice helps members – it is intended to reduce the number of breaches of the 'Code of Professional Conduct'. Of course, we are all busy, and find professional work increasingly challenging as the complexity of demands grow. But five minutes taken to review these points could save a considerable amount of angst later on. We would be happy to receive comments from members, and will review the scope of these points as time marches on.

Acknowledgements

We thank those of you who have been in discussion with us over specific complaints. Several experienced members and non-members have kindly provided some additional comment we have included by way of supplementary detail. We are particularly grateful to: Alan Fielding, Paul Haworth, Phil Whitfield and members of the Disciplinary Pool.

About the Authors

Professor Des Thompson is Principal Adviser on Biodiversity with SNH where he manages policy, research and advisory work. A member of CIEEM's Disciplinary Pool, and chairman of several boards, Des led some of Britain's upland nature conservation work for the government and its agencies. Chairman of the Technical Advisory Group advising the UN Convention on Migratory Species on the conservation of migratory birds of prey in Africa and Eurasia, he is co-author of *Raptors: a field guide for surveys and monitoring* (3rd edition, TSO). He is Chairman of the Field Studies Council, Associate Editor of *Journal of Applied Ecology*, a Senior Research Fellow at Hatfield College, Durham University, and a Fellow of the Royal Society of Edinburgh.

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Richard Graves is Director of Richard Graves Associates Ltd. Richard runs a successful consultancy specialising in major development projects and protected species issues. Involved with CIEEM's disciplinary procedures since chairing the first Disciplinary Board, Richard has also appeared in front of it as a supporter witness for the subject of a complaint. Richard is author of, and contributor to, guidance and best practice for CIEEM and the Bat Conservation Trust.

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Sally Hayns has been CEO of CIEEM since June 2010. Prior to joining the Institute she was Head of People and Wildlife at the Hampshire and Isle of Wight Wildlife Trust.

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Deborah Alexander is CIEEM's Professional Standards Assistant. Her role includes supporting the Professional Standards Committee to help raise and maintain standards within the profession, and assisting members of the Disciplinary Pool with investigations into alleged breaches of the *Code of Professional Conduct*.

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DeborahAlexander@cieem.net

Chartered Members

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

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

The adjacent 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

New Chartered Ecologist Members:
Dr Judy England CEcol CEnv MCIEEM
Dr Charlotte Packman CEcol MCIEEM
Mrs Laura Thomas CEcol MCIEEM

Chartered Ecologist application deadlines

CEcol Application due date	CEcol Interviews	Ratification
7 Jan 2016	7 March 2016	Late March 2016
10 March 2016	6 June 2016	29 June 2016
10 June 2016	26 September 2016	13 October 2016

Chartered Environmentalist application deadlines

CEnv application due date	CEnv report submission deadline	CEnv Interviews
31 Aug 2015	30 Nov 2015	1-12 Feb 2016
31 March 2016	23 June 2016	29 Aug – 9 Sept 2016
1 September 2016	24 November 2016	13-24 February 2017

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

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

Victoria Forder CEcol CEnv MCIEEM

Principal Ecologist, Jacobs UK Ltd

Why you joined CIEEM: I joined CIEEM at the graduate level about eight years ago to keep abreast of recent updates and as CIEEM offers a wide range of training course and conferences. In addition to this, I recognise that being part of CIEEM is important when working in this industry, as it highlights to others your competence as an ecologist.

Why you applied for Chartered status: At Jacobs, anyone at a Senior level or above is expected to be Chartered and although I already have CEnv status, I believe Chartered Ecologist status is more relevant to the work I undertake. It also helps to demonstrate that you meet the professional standards required to undertake your role as an ecologist.

How you found the process: After I had familiarised myself with CIEEM's competency framework and decided upon the themes that I was going to assess myself against, then the process was relatively simple. I did have to spend a good couple of days reading through all the relevant information and completing the application form, ensuring that I had provided sufficient information for each competency. I was quite nervous prior to the interview, however both my interviewers put me at ease and providing you can talk confidently about your listed competencies, the interview stage should run fluidly.

How has achieving Chartered Status impacted on the types of work you undertake: I have only had CEcol status for a couple of months, so this has not impacted the type of work I undertake or we are offered as a company, however I believe it will benefit my career in the long run.

Would you recommend applying for CEcol to your peers and colleagues: Yes I would definitely recommend applying for CEcol status. I initially looked at the application process in 2014, however was put off by the amount of work involved especially during the busy survey season. I revisited the application over winter when things had got quieter so I had time to look at the competencies in detail. I would say don't be put off by the amount of work required as its worth it in the long run and would urge my colleagues with sufficient experience to apply.

Education: I have an MSc from Royal Holloway University of London with distinction in Research and a BSc from Royal Holloway University of London (2:1) in Environmental Biology.

Volunteer work: As well as my consultancy work, I am an active volunteer and roost visitor for the Surrey Bat Group. I also monitor a woodland in Kent on behalf of the National Dormouse Monitoring Programme (NDMP) and train others towards obtaining their dormouse handling licences.

What is the best thing about your job: A good balance between being on site and in the office, every time I hold a dormouse, being complimented on work by satisfied clients and a good working relationship with my colleagues.

The British Ecological Society

Jackie Caine
Policy Manager, British Ecological Society

Communicating ecological knowledge to decision-makers is a core part of the British Ecological Society's mission. We actively engage with policy development by collating and presenting timely and relevant scientific evidence and upskilling ecologists in the science-policy interface.

The practical application of ecological knowledge is inherently linked to all science policy work, and many of our policy activities take a 'pipeline view' of the evidence from academic research through to management regimes. For instance, in our recent consultation response on Soil Health, we collated input from soil scientists in universities, NGOs and environmental consultancies, as well as land owners and managers to outline the threats to soil quality and the impact this will have on the many services that soils deliver. We also highlighted the need for a range of measures and indicators for soil quality which are needed alongside a comprehensive soil strategy that integrates soil health into decision-making and land use planning. This inquiry is currently ongoing and we await the outcomes later in the year.

Evidence-based policy-making is no easy task and, from 11-13 April this year, we will be partnering with the Cambridge Conservation Initiative to take a fresh look at how the links between ecological science and conservation policy can be strengthened. In our symposium 'Making a Difference in Conservation', we will assess how to improve the flow of research into decision-making, and to enable the latest evidence to better inform policies and practice.

The meeting includes a keynote talk by Defra Chief Scientist Ian Boyd, a public lecture from Sir John Beddington, and presentations from policy active researchers including Dame Georgina Mace DBE and Charles Godfray. We will hear innovative, interdisciplinary talks on a range of issues including campaigning to bring about change, horizon-scanning, the use of systematic reviews and economic models in decision-making, and the role of the media in influencing policy. Skills-based workshops will focus on the principles of policy-making, structured decision-making, the use of experts, how to influence parliament, policy publications and more.

By bringing together ecologists with decision-makers in this way, we aim to develop novel techniques to move towards a truly evidence-informed approach to conservation and to find out how to overcome many of the barriers we encounter when trying to find evidence informed solutions. The meeting is supported by DICE, RSPB, the Centre for Conservation Science, and Conservation Evidence, along with our Conservation Ecology Special Interest Group – a group that facilitates exchanges between theoretical ecologists, applied ecologists and practitioners interested in conservation issues. Both the symposium and the Special Interest Group will be of interest to CIEEM members, and we encourage you to join and share your expertise.

Policy-making is set against an ongoing background of various political and economic pressures and influence, not least the upcoming EU referendum, an issue which CIEEM is already heavily engaged with. Since much of the UK's wildlife and environmental legislation is based on EU Directives, a change in this legislation may have a significant impact on the work of both BES and CIEEM members. It is as yet unclear what UK nature legislation would look like if we were to leave the EU, and this will be a focus for the upcoming 'People, Politics and the Planet' event taking place in London in May 2016. We will partner with the Sibthorp Trust and the Royal Geographical Society to host a panel of senior politicians, business representatives and the media to answer questions on the matters of environmental concern in the run up to the referendum. The event will be hosted and chaired by political commentator and writer Jonathan Dimbleby and will take the format of an 'Any Questions' style event, with questions submitted in advance and on the night put to our panellists by members of the audience. Please come along with questions for the panel.

To keep up to date with our policy activity and to register for our events, follow @BESPolicy and @BritishEcolSoc.

For further information

Contact us at:
Policy@BritishEcologicalSociety.org

Visit www.BritishEcologicalSociety.org/public-policy

Making a Difference in Conservation
11-13 April 2016, Cambridge
Follow #BEScci for updates
Register at
www.BritishEcologicalSociety.org/AS2016

CIEEM's Member Networks:

Geographic Sections and **Special Interest Groups** are run by members for members to provide opportunities to network, share knowledge and learn more about the science and practice of our profession. There is also a role to play in promoting professional standards, feeding into consultations and representing the views of members at a local, national and international level.

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

SCOTLAND AND NORTH EAST ENGLAND

Measuring the effectiveness of River Restoration – the Eddleston Water project

28 October 2015

This event, looking at river restoration at a catchment scale, was organised by the Scottish Section in partnership with the North East England Section and Tweed Forum. The focus was the restoration of Eddleston Water, a meandering gravel river which is a tributary of the River Tweed; a Special Area of Conservation. CIEEM members from a variety of organisations including academics, charities and private organisations attended and spent the day visiting locations across the Eddleston catchment, seeing first-hand the completed works on the river, with discussion from those involved in the restoration and management directly.

Read more at: www.cieem.net/scotland

Hugh informs the group on river meandering

EAST MIDLANDS

CIEEM at the BSBI Annual Exhibition Meeting

James Whiteford of the East Midlands Committee took a CIEEM stand to the BSBI Annual Exhibition Meeting on 28 November. He enjoyed a really positive day and met some interesting and enthusiastic people who came to talk to him and find out more about CIEEM.

Read more at: www.cieem.net/east-midlands

WALES

Welsh Section Spring Seminar & AGM 2016

Environmental Issues in the Marine Environment: A Welsh Perspective

8 April 2016, Swansea University

The Welsh Section Committee is planning a Spring Seminar at Swansea University to look at marine issues in Wales.

For further details please visit: www.cieem.net/events/1058/welsh-section-spring-seminar-and-agm-2016

WALES

New Events Planned for 2016

The Welsh Section Committee is working hard to put together a programme of Section events in Wales during 2016. Plans include a Spring Seminar and AGM in April and various field trips to look at species such as bryophytes, dormice, nightjar, invertebrates, reptiles and plant species at various marine and terrestrial sites throughout Wales. There are also plans to hold a careers event for students.

The Committee is always happy to hear from members who have specific ideas for events, especially if you are able to help run it!

To contact the Committee and keep up to date with details of these events as they are made available please visit www.cieem.net/wales.

SCOTLAND

Scottish Section Conference and AGM 2016

Wildlife Crime in the Spotlight: A closer look at wildlife crime fighting initiatives in Scotland

27 January, Glasgow

This one-day conference, held in Glasgow, explored what constitutes wildlife crime and what wildlife protection legislation means to environmental practitioners. Speakers from Scottish Government, Police Scotland and SNH provided a thorough overview of how crime legislation applies to the practicing ecologist, including the WANE (Scotland) Act. Taxa specific case studies looked at crime involving raptors, bats, badgers and plants, and there was also a look at the role of the Ecological Clerk of Works.

Read more about the conference at www.cieem.net/previous-conferences

SOUTH WEST ENGLAND

South West England Section Conference and AGM 2015

Promoting a Landscape Scale Approach to Wetland Biodiversity

15 December 2015, University of Exeter

Eighty-five delegates from a wide range of organisations and interests gathered in Exeter to listen to a range of speakers on this locally high profile topic, triggered by the unprecedented flooding events in Somerset in 2014. Having held field trips to WWT Steart Marshes and RSPB Ham Wall reserves and heard a fascinating talk on the impact of flooding on wildlife at the 2014 AGM, hosting a conference on this pressing local issue seemed a good way to pull together the associated topics and give delegates a holistic view of the issues and approaches being taken.

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

IRELAND

Irish Section Members' News

The new-look Irish Section Members' Newsletter includes details of CIEEM's activities across the whole of Ireland and all the great work of the Irish Section Committee, with the help of the Irish Section Support Officer, Kate Flood.

Read more at www.cieem.net/ireland

IRELAND

Irish Section Conference and AGM 2016

Advances in Technology and Analysis in Ecological Assessment

10-11 February 2016, Glenview Hotel, Co. Wicklow

This two-day conference, held at the Glenview Hotel in the beautiful surroundings of Wicklow, focussed on the latest developments in methods, technological aids and data analysis techniques for use in ecological survey and assessment.

Read more about the conference at www.cieem.net/previous-conferences

Liam Murphy and Kevin Tracey (Coastway Surveys) demonstrate their DJI S1000 drone for use in aerial surveying of habitats

MEMBER NETWORK ELECTIONS

Some of you may have noticed that, over the last couple of months, we have started moving to a new online format for all of our Member Network elections. For each committee election a short biography for nominees will be provided, along with an electronic ballot. This new format provides for increased transparency and ease of access for those unable to physically attend their Section AGM to take part in their elections.

Going forward it is intended that all CIEEM elections will be held electronically each autumn and made available in this way. Look out for emails about how you can join your committee and/or take part in your elections.

To find out about vacancies on CIEEM's committees please visit www.cieem.net/cieem-committee-vacancies.

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

For information on vacancies in your Member Network committees visit www.cieem.net/cieem-committee-vacancies.

New Members

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

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

ADMISSIONS

Full Members

Mrs Morgan Bowers, Dr Mat Cottam, Dr Frances Giaquinto, Ms Rachael Henderson, Dr Sally Mackenzie, Mr Gianpaolo Pontiggia, Ms Kirsten Velthuis

Upgrades to Full Membership

Miss Laura Cobden

Associate Members

Ms Sarah Gelpke, Ms Rebecca Jones, Mr Sam Marles, Miss Alice Quinney, Miss Sarah Sanders, Miss Helen Simmons, Mr Ross Stewart, Mr Allan Taylor

Upgrades to Associate Membership

Dr Christopher Cockel, Mr Jonathon Crewe, Mr Alexander Gray, Miss Samantha Rogers, Mr Alexander Sams, Dr Lyndsey Stewart

Graduate Members

Miss Emmanuelle Amiral, Miss Charlotte Armitage, Miss Victoria Baldwin, Mr Andrew Barrett-Mold, Mr Calum Campbell, Miss Amelia Coleing, Mr James Coupe, Miss Naomi Foot, Miss Lily Gilbert, Mr Andrew Heideman, Miss Rachael Heptonstall, Miss Briony Hill, Mr Anthony Hiscocks, Ms Kate-Marie O'Connor, Mr Anthony Robb, Mr Francisco Rubio Fedida, Miss Victoria Sellen, Miss Nicola Shearer, Mr Henry Sturgess, Miss Emma Sumner, Miss Emily Wallace, Miss Jasmine Walters, Miss Elisabeth Weidt, Mr John Wildsmith, Miss Rhiannon Williams

Upgrades to Graduate Membership

Miss Lucy Boyer, Miss Georgina Flower, Mr Markus Jaskari, Miss Charlotte Keightley, Ms Juliette Linford, Mr Alexander Meadows, Ms Emily Power, Miss Shona Smyth, Miss Olivia Winter, Miss Natalie Woollacott

Student Members

Mr S M Tuhinur Alam, Miss Monica Amaral de Paula Souza, Miss Chloe Andrews, Miss Amy Ashe, Miss Georgia Bailey, Ms Maya Baker, Mr Daniel Bardey, Mrs Lynne Barnett, Miss Francesca Brailsford, Miss Emily Bull, Miss Hazel Cuenca, Miss Stephanie Davies, Miss Cyrielle Delvenne, Miss Samia Dumbuya, Miss Catherine Dyason, Miss Natalie Fairchild, Miss Jemma French, Miss Harriet Fuller, Mr James Gamble, Mr Thomas Henry, Mr Adam Hicks, Mr William Kitts, Mr Juan Lincango, Miss Francesca McDowell, Miss Leonie Morphett, Mr Robert Nicholas, Ms Siffreya Pederson, Miss Katie Sanders, Miss Jessica Sanders, Mr Dharitri Sarkar, Miss Rachel Seddon, Miss Emma Shipsides, Miss Giuliana Sinclair, Mr Adam Smith, Mr Alex Southern, Miss Anna Spence, Ms Abigail Strickley, Miss Jodie Twose, Sagir Wapa, Mrs Jackie Wells, Miss Kelly White

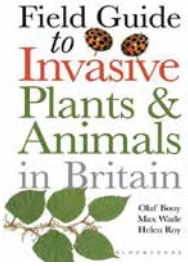
Qualifying Members

Miss Rebecca Harvey, Miss Charlotte Richardson

Supporter Members

Mrs Sheila Dyason

Recent Publications



Field Guide to Invasive Plants and Animals in Britain

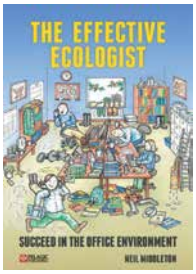
Authors: Olaf Booy, Max Wade CEcol CEnv FCIEEM and Helen Roy

ISBN: 9781408123188

Price: £22.49

Available from: www.bloomsbury.com

This field guide will enable the identification of a range of invasive plants and animals now found in Britain.



The Effective Ecologist: Succeed in the Office Environment

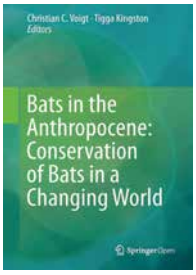
Author: Neil Middleton ACIEEM

ISBN: 978-1-78427-083-4

Price: £19.99

Available from: www.pelagicpublishing.com

This publication covers the stuff that no-one told you about at university – how to develop your office-related and business skills to succeed in your career as a professional ecologist.



Bats in the Anthropocene: Conservation of Bats in a Changing World

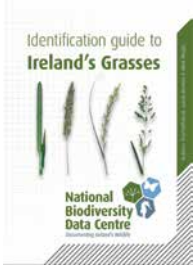
Authors: Christian C. Voigt and Tigga Kingston

ISBN: 978-3-319-25218-6

Price: Free download

Available from: http://link.springer.com/book/10.1007/978-3-319-25220-9

This book summarises major topics related to the conservation of bats, including; land use changes; diseases; our perception of bats; and human–bat conflicts and possible resolutions.



Identification Guide to Ireland's Grasses

Authors: Úna Fitzpatrick, Lynda Weekes, Mark Wright

Price: £12.50/€16

Available from: www.nhbs.com

A guide to help beginners and intermediates tackle grasses. This attractive field-friendly 164 page guide simplifies grass identification.

In the Journals

Inter-observer variation in habitat survey data: investigating the consequences for professional practice

Cherrill, A.

Journal of Environmental Planning and Management 2015, DOI 10.1080/09640568.2015.1090961

A survey of environmental professionals revealed that misidentification of habitat types within survey reports was relatively common. Approximately 40% of respondents who had encountered erroneous reports stated that these had led to inaccurate initial site ecological assessments. Additional field surveys and discussions with surveyors were commonly used to resolve these issues, but for Phase 1 and NVC 26% and 34% of respondents, respectively, had encountered one or more cases where errors resulted in negative consequences for clients commissioning surveys. Net loss of biodiversity arising from inaccurate reports was reported in at least one instance by 32% and 38% of respondents for Phase 1 and NVC surveys, respectively. The potential benefits of introducing an accreditation scheme are also discussed.

http://www.tandfonline.com/doi/full/10.1080/09640568.2015.1090961

Other journal articles, which are all open access:

Three-dimensional tracking of a wide-ranging marine predator: flight heights and vulnerability to offshore wind farms

Cleasby, I.R. *et al.*

Journal of Applied Ecology 2015, 52: 1474–1482. doi: 10.1111/1365-2664.12529

http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12529/full

Ecological traits affect the sensitivity of bees to land-use pressures in European agricultural landscapes

De Palma, A. *et al.*

Journal of Applied Ecology 2015, 52: 1567–1577. doi: 10.1111/1365-2664.12524

http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12524/full

REVIEW: Translocation tactics: a framework to support the IUCN Guidelines for wildlife translocations and improve the quality of applied methods

Batson, W.G. *et al.*

Journal of Applied Ecology 2015, 52: 1598–1607. doi: 10.1111/1365-2664.12498

http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12498/full

FORUM: Indirect leakage leads to a failure of avoided loss biodiversity offsetting

Moilanen, A. and Laitila, J.

Journal of Applied Ecology 2016, 53: 106–111. doi: 10.1111/1365-2664.12565

http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12565/full

EDITOR'S CHOICE: How much would it cost to monitor farmland biodiversity in Europe?

Geijzendorffer, I.R. *et al.*

Journal of Applied Ecology 2016, 53: 140–149. doi: 10.1111/1365-2664.12552

http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12552/full

Supporting local diversity of habitats and species on farmland: a comparison of three wildlife-friendly schemes

Hardman, C.J. *et al.*

Journal of Applied Ecology 2016, 53: 171–180. doi: 10.1111/1365-2664.12557

http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12557/full

Forthcoming Events 2016

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

Conferences		
Date	Title	Location
28 June 2016	Summer Conference 2016 – Linear Infrastructure and Biodiversity: Impacts and Opportunities	Birmingham
1-2 November 2016	Autumn Conference 2016 – Skills for the Future	Nottingham

Training Courses		
15 March 2016	Otter Ecology and Surveys	Cirencester
16-17 March 2016	Water Vole Live Trapping, Care and Restoration	Launceston
21 March 2016	Ecological Clerk of Works	Inverness
22 March 2016	Environmental Advisor for Construction sites	Inverness
5 April 2016	Article and Feature Writing for Conservation Practitioners	Sheffield
5 April 2016	Badger Ecology and Survey Techniques	Leatherhead
5 April 2016	Using eDNA and Traditional Techniques for Effective Great Crested Newt Surveys	Mold
6 April 2016	Badger Ecology and Survey Techniques	Telford
7-8 April 2016	QGIS for Ecologists and Conservation Practitioners	Middlesex
7 April 2016	Badger Mitigation	Telford
8 April 2016	Great Crested Newt Ecology and Survey Techniques	Leatherhead
12 April 2016	Ecological Report Writing	Bristol
13 April 2016	Great Crested Newt Ecology and Survey Techniques	Culross
13-14 April 2016	Reptile Survey, Ecology and Handling	Alresford
13-14 April 2016	Pine Marten and Wildcat Ecology and Surveys	Birnam
14 April 2016	Great Crested Newt Assessment and Mitigation	Culross
14 April 2016	Introduction to Bat Surveys	London
19 April 2016	Habitats Regulations Assessment (HRA) of Projects	Manchester
19 April 2016	Water Vole Surveys and Ecology	Cirencester
20 April 2016	Habitats Regulations Assessment (HRA) of Plans	Manchester
20 April 2016	Water Vole Mitigation	Cirencester
26-27 April 2016	Train the Trainer for Ecologists	Birmingham
28-29 April 2016	Vegetative Grass ID	Donabate
4 May 2016	Introduction to Bats and Bat Survey	Dunblane
5 May 2016	Bat Impacts and Mitigation	Dunblane
5 May 2016	Appropriate Assessment	Galway
11 May 2016	Early season grass and sedge identification	Salisbury
12-13 May 2016	Introduction to Phase 1 Habitat Mapping and Plant Identification	Newark
14 May 2016	Using the Vegetative Key	Dublin
17 May 2016	Peregrine falcon: Ecology, Survey and Mitigation	Birmingham
17-18 May 2016	QGIS for Ecologists and Conservation Practitioners	Gloucester
23 May 2016	Grass and Sedge Identification – Neutral and Calcareous Grasslands	Salisbury
24 May 2016	Grass, Sedge and Rush Identification – Heathland, Acid Grassland and Bogs	New Forest
25 May 2016	Badger Ecology, Survey and Reporting	Lincoln
26 May 2016	Badger Impacts and Mitigation	Lincoln
1-2 June 2016	Introduction to Phase 1 Habitat Survey	Middlesex
8 June 2016	Introduction to the National Vegetation Classification	Chester
11 June 2016	Bat Handling and Identification	Herne Bay
16 June 2016	Barn Owl: Ecology, surveying and mitigation	Tamworth
21 June 2016	Otter Surveys and Ecology	Cannock
22 June 2016	Otter Mitigation	Cannock
22 June 2016	Using Indicator Species for Habitat Assessment (Phase I and NVC) – Grasslands	Salisbury
23 June 2016	Using Indicator Species for Habitat Assessment (Phase I and NVC) – Heathlands and Acid Grasslands	New Forest
29 June 2016	Beginners Guide to the National Vegetation Classification (NVC)	Carlisle

Member Network Events		
16 Mar 2016	North West England Section AGM	Liverpool
8 April 2016	Welsh Section Spring Seminar – Environmental Issues in the Marine Environment: A Welsh Perspective	Swansea
2 July 2016	Welsh Section Field Visit to Cors-y-Llyn National Nature Reserve (NNR)	Cors-y-Lynn

Senior/Principal Ecologist
Bioscan UK Limited - Oxford

Salary £TBC dependent on calibre and experience

About Bioscan:

Bioscan is a compact but high profile ecological consultancy. We have a long-standing reputation for excellence, scientific integrity and success within the development industry and in the planning, legal and conservation sectors. We don't advertise or engage in marketing as the majority of our work is repeat business and direct instruction. We recruit rarely, due to a combination of low staff turnover and because we maintain an active brake on expansion – believing that staying small and 'fleet of foot' is the best means of maintaining the high quality of our outputs. This opening therefore represents a rare opportunity for a candidate of exceptional calibre to join one of the most highly regarded names in the field.

Job Description

We are seeking a further senior/principal ecologist to relieve some of the pressure on apex staff, and to respond to recent increases in direct appointments. The successful candidate can expect a high degree of autonomy in managing projects from inception to completion, including; client liaison (including issuing initial strategic advice); setting and managing budgets; marshalling teams of surveyors and partaking in fieldwork directly; liaising with other senior members of staff and with other consultants in project teams; managing and mentoring less experienced/entry level staff; obtaining relevant protected species licences; producing written outputs that stand apart for their precision, thoroughness, readability and robustness, and delivering on time. Commensurate with these responsibilities, we will require a high standard of taxonomic and ecological knowledge of UK flora and fauna (ideally including a specialist area) as well as relevant legislation and the workings of the planning system. The following attributes will also be essential:

- Relevant degree and at least five years postgraduate experience in consultancy;
- A full current UK driving licence;
- Excellent written, oral and interpersonal communication skills;
- The ability to work with external consultants in multidisciplinary teams;
- The ability to think independently and strategically and work with minimal supervision.

Chartered Ecologist status or demonstration of equivalence will also assist your application, as will proven expert witness experience.

Applicants should send a CV and covering letter including your full contact details, postal and email address to: ***lindseychurch@bioscanuk.com***

Please note that applicants invited for interview will be expected to partake in simple identification and data assimilation tests.

Closing date: 15th April 2016