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Freshwater Ecology

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

Invasive non-native crayfish in the UK

Welcome

Servicing freshwater ecosystems

Much of our environmental future – and the quality of life for billions of people – will be determined by water. Already, people appropriate more than half of the fresh water available on Earth, mostly for agriculture. In regions such as North Africa or the Eastern Mediterranean, people exploit all of the supply available – or even more by depleting aquifers at rates faster than they can be replenished. Now, factor into this scenario UN population projections for the next 3-4 decades of continued growth: around 50-80 million people per year at rates that will be fastest in Africa and largest in Asia – overlapping with some of the world's most waters-stressed regions. In the next 30-50 years, as demand outpaces the capacity to develop new supply, over 1 billion people will live in burgeoning cities under perennial water shortage. Even more alarming, over 4 billion will have insufficient water for food production unless there is major water efficiency, rapid expenditure to increase water exploitation, or large increases in food export from more humid regions.

The environmental costs and risks are enormous. The abstraction of water – coupled with agricultural runoff and the inadvertent or purposeful use of the world's waterways for the disposal of pollutants – has already caused dramatic changes in global water quality. For example, nitrogen loads in the world's rivers are more than 2-20 times greater than background. Add the effects of climate change; extensive physical changes to lakes, rivers or their catchments; widespread problems with invasive species, and it becomes easy to understand why freshwater ecosystems are incurring rates of species extinction that are among the fastest of all ecosystems. Over 10% of the Earth's species and >30% of vertebrates occupy these environments covering < 1% of Earth's surface. These organisms are now slipping through our fingers in a major conservation tragedy that is hidden from our eyes beneath the water surface.

In the UK, our water environment has seen mixed fortunes. The £250 billion we've invested in infrastructure for supply, treatment and distribution illustrates that water has disproportionately high importance. Some of this spend – driven from the early 1990s by the Urban Wastewater Treatment Directive (91/271/EEC) – has led to a major clean-up of Britain's urban rivers to engender dramatic ecological recovery. Where the habitat is appropriate, Atlantic salmon, otters and dippers are back. Where we've removed gross pollution, clean-water invertebrates typical of well-oxygenated waters are increasing in richness and abundance. But many challenges remain. Some problems persist where surface drainage and foul water are discharged to rivers through combined sewer overflows. Other chemicals whose effects we don't yet fully understand give cause for concern: pharmaceuticals, antibiotics and other complex organic compounds. Many of our rural rivers also need action: while a substantial recovery is underway from some diffuse issues such as acid rain, there are now extensive low-level problems from sediments, nitrates from agriculture or phosphates from septic tanks. Other restoration challenges arise from the fact that more than half of the UK's river length (389,000 km) has been modified physically for drainage or flood-risk management. Climate change is a current and growing issue that affects freshwaters directly, and through interaction with other pressures such as the release, dilution and effect of pollutants or the spread of invasive non-natives. Given all these issues, it's no surprise that so many of the UK's waters are failing against the requirements of the EU Water Framework Directive.

All of this – from individual river basins to the global water challenge – takes me to the conclusion that we need a stronger, better and more integrated approach to freshwater ecosystems than ever before. Supporting freshwater biodiversity for its intrinsic importance and role in key ecosystem processes requires us to strengthen regulation and protection. But, as an adjunct to this, we also need to grasp the opportunity provided by the ecosystem approach and the ecosystem services paradigm. In a world where human pressures on resources will grow to become irresistible, revealing the importance of the world's freshwaters and their organisms to our own life-support offers a politically solid route to conservation: our reliance on freshwater ecosystem services requires us to safeguard and service our freshwater ecosystems in perpetuity.

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Information

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Natural Environment White Paper implementation updates

Since its publication in 2011, Defra has published periodic Natural Environment White Paper implementation update newsletters. The latest document summarises this information against all 92 commitments.

<https://www.gov.uk/government/publications/natural-environment-white-paper-implementation-updates>



Select Committee publish report on invasive species

Environmental Audit Committee report calls for a change in the law to control invasive species. It says the Government must implement new legal powers for tackling invasive plants and animals.

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/environmental-audit-committee/news/invasive-non-native-species/>

Select Committee publish report on HS2 and environment

The Government's Environmental Audit Committee has published its report on HS2 and the environment. The report says that the Committee has examined the rationale for the HS2 aim of delivering 'no net biodiversity loss' and the mechanisms for environmental protection in the project. The report says the Government should aim higher than that objective of no net biodiversity loss.

<http://www.publications.parliament.uk/pacm/201314/cmselect/cmenvaud/1076/1076.pdf>

Defra publish strategic reform plan for regulations

Defra has published *Defra better for business: A Strategic Reform Plan for Defra's Regulations*. This report outlines the progress made by Defra since the Red Tape Challenge was launched in April 2011. Defra has reviewed over 1,200 regulations since then. As part of Red Tape Challenge reforms, Defra anticipates that there will be 80% less guidance, resulting in easier, faster and cheaper access for users. Defra has 336 reform proposals including improving 428 regulations, mainly through simplification or consolidation. Through Defra's Red Tape Challenge 350 obsolete regulations will also be removed.

<https://www.gov.uk/government/publications/defra-better-for-business-strategic-reform-plan-for-defras-regulations>

New annexed bat licence launched in England

A new simpler licensing process for bats, which came into force on 31st March 2014, will save developers and consultants time and money. The new annexed licence will reduce the number of licence re-submissions and will help Natural England meet its target to reduce the costs for those it regulates. It follows the establishment of a similar system for great crested newts, which was launched last year and has so far reduced the number of newt licence resubmissions by up to 25% and produced savings of £85,000.

http://www.naturalengland.org.uk/about_us/news/2014/260314.aspx

New licence makes it easier to solve problems of bats in buildings

Churches, historic monuments, schools and residential houses have all been benefitting from Natural England's new bat licence trial, designed to reduce administrative burdens and financial costs for businesses and householders tackling problems caused by bats in their premises. So far, the low impact bat class licence trial has covered 120 sites in England, saving customers more than £150,000, reducing delays by an estimated 360 weeks and enabling a speedier licencing process to take place. The licence, permits development work that affects low conservation status roosts, such as day, night or feeding roosts, affecting small numbers of common bat species.

http://www.naturalengland.org.uk/about_us/news/2014/200314.aspx

MMO publishes marine plans

England's first ever plans for the future of our seas have been published by the Marine Management Organisation. The marine plans cover the coast and seas from Flamborough Head to Felixstowe. Marine plans will inform and guide decisions on development in marine and coastal areas, while conserving and enhancing the environment and recognising leisure uses too. An interactive tool explaining how marine plans affect your area has also gone live – the Marine Information System.

<http://www.marinemangement.org.uk/news/press/140402.htm>

Welsh Government Nature Fund

The Nature Fund ideas have been reviewed and a programme of funding packages is currently being designed to drive the joined up and collaborative action needed to improve the resilience of nature and support the social, economic and wider environmental use and sustainable management of our natural resources. They have now published the ideas online, complete with an index which should make it easier to access.

<http://wales.gov.uk/topics/environmentcountryside/consmanagement/natural-resources-management/nature-fund/?lang=en>

Natural Capital Committee second State of Natural Capital report

The Committee has released its second State of Natural Capital report. In this second report, the Committee recommends that the Government endorses their proposal to develop a 25-year, landscape-scale plan to deliver its generational objective.

<http://nebula.wsimg.com/1f06ffa9eaf0af134d7022af36fe17cf?AccessKeyId=68F83A8E994328D64D3D&disposition=0&alloworigin=1>

Law Commission report on Control of Invasive Non-Native Species

The Law Commission has published *Wildlife Law: Control of Invasive Non-native Species*. This is the first item to be delivered from the full project. This element of the project was brought forward at the request of Defra and the Welsh Government to enable them to consider whether to introduce early legislation.

<http://lawcommission.justice.gov.uk/publications/2612.htm>

37 MCZs to be considered in 2015

Defra has released the list of 37 sites for a second tranche of Marine Conservation Zones (MCZs), which are due for consultation in 2015.

<http://www.naturalengland.gov.uk/ourwork/marine/mpa/mcz/default.aspx>



Europe's seas: A valuable asset that must be used sustainably

Many of Europe's marine species, habitats and ecosystems have been under threat for decades. As maritime economic activities are predicted to increase in coming years, a new briefing from the European Environment Agency (EEA) argues that the cumulative impact of human activity should be better managed.

<http://www.eea.europa.eu/publications/marine-messages/>

New mapping method for green infrastructure

A new report from the European Environment Agency (EEA) proposes a method for mapping green infrastructure.

<http://www.eea.europa.eu/highlights/new-mapping-method-for-2018green>

Natural England publish biodiversity vulnerability to climate change model for conservation practitioners

Natural England has developed a new map-based modelling approach to help assess the vulnerability of priority habitats to climate change. The National Biodiversity Climate Change Vulnerability Model (NBCCVM) indicates the relative vulnerability of priority habitats in different geographical areas and helps guide interventions which can increase their resilience. The report demonstrates how the model will inform the development of national and local adaptation strategies for biodiversity, and help prioritise the actions to be taken as part of these strategies.

http://www.naturalengland.org.uk/about_us/news/2014/030314.aspx

IPCC report on impacts, adaptation, and vulnerability

The assessment of impacts, adaptation, and vulnerability in the Working Group II contribution to the IPCC's Fifth Assessment Report (WGII AR5) evaluates how patterns of risks and potential benefits are shifting due to climate change. It considers how impacts and risks related to climate change can be reduced and managed through adaptation and mitigation. The report assesses needs, options, opportunities, constraints, resilience, limits, and other aspects associated with adaptation.

http://ipcc-wg2.gov/AR5/images/uploads/IPCC_WG2AR5_SPM_Approved.pdf

<http://www.bbc.co.uk/news/science-environment-26810559>

<http://www.sciencedaily.com/releases/2014/03/140331100633.htm>

<https://www.gov.uk/government/news/foreign-secretary-welcomes-second-ipcc-report-on-climate-change>



Bovine TB and badger culling in England

A comprehensive Strategy to achieve TB free status in England by 2038 has been announced by Environment Secretary Owen Paterson.

<https://www.gov.uk/government/news/plans-to-eradicate-bovine-tb-in-england-unveiled>

A strategy for achieving Officially Bovine Tuberculosis Free status for England has also been announced.

<https://www.gov.uk/government/publications/a-strategy-for-achieving-officially-bovine-tuberculosis-free-status-for-england>

And the findings and recommendations of the Independent Expert Panel on the pilot badger culls in Somerset and Gloucestershire have been published.

<https://www.gov.uk/government/publications/pilot-badger-culls-in-somerset-and-gloucestershire-report-by-the-independent-expert-panel>

<http://www.bbc.co.uk/news/science-environment-26868650>

The House of Commons debated the issue on 3rd April 2014.

http://www.publications.parliament.uk/pa/cm201314/cmhansrd/cm140403/debtext/140403-0002.htm#140403-0002.htm_spm1

CAP reform: New environmental scheme for farmers to prioritise biodiversity

Improving biodiversity and water quality will be prioritised in the new environmental land management scheme as part of the Common Agricultural Policy. Farming Minister George Eustice has announced that the new environmental land management scheme will provide funding for farmers and land managers who deliver benefits for wildlife, improve water quality and create woodland.

<https://www.gov.uk/government/news/new-environmental-scheme-for-farmers-to-prioritise-biodiversity>

New CAP schemes and payments

A new Defra leaflet provides an introduction to the new 2015 CAP schemes, and an overview of what they will mean. The leaflet includes: some details of the Basic Payment Scheme, the greening rules and young farmers payment; an overview of the new Rural Development Programme; a timetable over which the new schemes will be introduced; and an introduction to the new online service.

<https://www.gov.uk/government/publications/common-agricultural-policy-introduction-to-the-new-cap-schemes>

Scottish High Nature Value Farming and Forestry Indicators published

Scotland's Chief Statistician has published statistics on High Nature Value Farming and Forestry Indicators, 2009 to 2013. High Nature Value Farming and Forestry (HNVFF) refers to farming and forestry systems important for the environmental benefits they provide, including support for a range of habitats and species considered to be of high nature conservation importance.

<http://news.scotland.gov.uk/News/High-Nature-Value-Farming-and-Forestry-Indicators-2009-2013-adb.aspx>

GI Planning Obligations - useful information

Central Bedfordshire Council has written guidance notes on Green Infrastructure Planning Obligations that may be of use to members.

<http://ecosystemsknowledge.net/sites/default/files/wp-content/uploads/2014/2/Application%20form%20and%20guidance%20notes%20for%20GI%20Planning%20Obligations%20January%202020.pdf>

New research projects announced to help save UK forests, woods and trees

The Centre for Ecology & Hydrology (CEH) is leading one of seven new research projects which will improve understanding of tree pests and pathogens, and associated plant biosecurity. The projects have received a share of £7m to help address threats to UK forests, woods and trees. The multidisciplinary Tree Health and Plant Biosecurity Initiative (THAPBI) will generate knowledge to tackle pests and diseases and to support the future health of the UK's woodlands, commercial forests and urban trees.

http://www.ceh.ac.uk/news/news_archive/uk-forests-woods-trees-health-resilience-research_2014_14.html

Forestry Commission publish Practice Note on brownfield regeneration

The Forestry Commission has published a Practice Note entitled: *Planning for brownfield land regeneration to woodland and wider green infrastructure*.

[http://www.forestry.gov.uk/PDF/FCPN022.pdf/\\$FILE/FCPN022.pdf](http://www.forestry.gov.uk/PDF/FCPN022.pdf/$FILE/FCPN022.pdf)

National inventory of wildlife-rich brownfield habitat launched

The first ever national inventory of wildlife-rich brownfield habitat has been launched on a new interactive website in partnership with Natural England, Buglife, and Defra. The inventory distinguishes priority Open Mosaic Habitat (OMH) on Previously Developed Land from other brownfields, providing an essential tool for local authorities, strategic planners, ecologists, local wildlife groups or others. It is designed to work alongside Buglife's brownfield hub, a one stop shop which offers detailed information on the management of priority OMH.

<http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/brownfieldhabitatinventoryfeature.aspx>

Buglife reports common pesticides more toxic than originally thought

A new study has found that a number of commonly used pesticides are far more dangerous to humans than we have been led to believe. The study undertaken by a team in France looked at nine pesticides, three fungicides, insecticides and herbicides, including two neonicotinoids and Roundup, the most frequently used pesticide worldwide. The study compared the toxicity on human cells of the 'active ingredient' to the overall product used by the consumer. They found that 8 out of 9 products were up to 1,000 times more toxic than the approved active ingredients with Roundup being one of the most toxic.

<http://www.buglife.org.uk/news-%26-events/news/common-pesticides-more-toxic-originally-thought>

Biodiversity offsetting in England – Government response to Select Committee

The Government has responded to the Environmental Audit Committee's report on biodiversity offsetting by saying that the Committee's recommendations raise important issues which the Government recognises and agrees are important to consider. The Government will follow the EAC's recommendation and wait until the pilots have been assessed before making any policy decisions. Those policy decisions will be made in light of the EAC's enquiry, as well as feedback from the public consultation and the pilots themselves.

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/environmental-audit-committee/news/government-response-biodiversity-offsetting/>

Mapping habitats to describe European ecosystems

A new report, *Terrestrial habitat mapping in Europe: an overview*, includes in-depth information on recent mapping work, a historical perspective and a review of current methods.

<http://www.eea.europa.eu/highlights/mapping-habitats-to-describe-ecosystems>

New planning guidance published online to support NPPF

New planning guidance to support the National Planning Policy Framework has been published online.

<http://planningguidance.planningportal.gov.uk/blog/guidance/natural-environment/>

Planning Minister Nick Boles has made a written statement on the matter.

<https://www.gov.uk/government/speeches/local-planning>

Members should note that *Planning for biodiversity and geological conservation: a guide to good practice* has been cancelled as of 7 March 2014.

<https://www.gov.uk/government/publications/guidance-documents-cancelled-by-the-planning-practice-guidance-suite>

<https://www.gov.uk/government/publications/planning-for-biodiversity-and-geological-conservation-a-guide-to-good-practice>

Circular 06/2005: biodiversity and geographical conservation - statutory obligations and their impact within the planning system remains current.

<https://www.gov.uk/government/publications/biodiversity-and-geological-conservation-circular-06-2005>

EEA report shows Green Infrastructure covering quarter of Europe

The European Environment Agency (EEA) has announced the release of a report, entitled *Spatial Analysis of Green Infrastructure in Europe*, which shows a way of mapping networks of natural and semi-natural spaces and other environmental features that deliver ecosystem services in the region.

<http://www.eea.europa.eu/publications/spatial-analysis-of-green-infrastructure>

All of Britain and Ireland's birds mapped digitally

For the first time ever, over 3,500 maps showing the distribution, range change and abundance for over 500 species of bird that have been recorded in Britain and Ireland since 1968 are freely available online.

<http://www.bto.org/news-events/press-releases/all-britain-and-ireland%E2%80%99s-birds-mapped-digitally-first-time>

Natural England's MAGIC free interactive mapping website

MAGIC is Natural England's main mechanism for sharing geographic information about the natural environment. The interactive mapping website has been amalgamated with Nature on the Map, offering the user greater functionality and a single site where they can access mapped information covering the rural, urban, coastal and marine environments of Great Britain. Anyone can use and explore these online maps, using a variety of mapping tools to view the latest information on the whereabouts and condition of protected sites, species, habitat types, agri-environment schemes, landscape classifications, scheduled monuments and more at a particular location.

<http://www.naturalengland.org.uk/publications/maps/magicfeature.aspx>

Scottish birds of prey poisoning maps published

The number of reported and confirmed illegal bird of prey poisoning incidents in Scotland has increased to six in 2013 from three in 2012. The birds involved were a red kite, a golden eagle and 4 buzzards. The maps now also show not only poisonings but all recorded crimes against birds of prey.

<http://news.scotland.gov.uk/News/Birds-of-prey-poisoning-maps-acf.aspx>



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RSPB Big Garden Birdwatch results

Almost half a million people who took part in this year's RSPB Big Garden Birdwatch have discovered some interesting changes among our most popular garden birds.

<http://www.rspb.org.uk/birdwatch/>



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Pine marten ally to red squirrels

The results of a recent Irish national squirrel survey suggested that the normally invasive grey squirrel had gone into decline in the Irish midlands, which was anecdotally attributed to an increase in European pine marten range and numbers. A follow up study aimed to quantify changes in squirrel distribution in Ireland and to investigate the role, if any, of the pine marten in red and grey squirrel population dynamics. A distribution survey of the midlands was carried out which confirmed the grey squirrel population has crashed in approximately 9,000 km² of its former range and the red squirrel is common after an absence of up to 30 years. This study suggests that European pine marten abundance may be a critical factor in the American grey squirrel's success or failure as an invasive species.

<http://www.irelandswildlife.com/squirrel-pine-marten/>



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Pine Marten Recovery Project

The Vincent Wildlife Trust has embarked on a Pine Marten Recovery Project. For the next two years they will be undertaking a study to assess the feasibility of reinforcing pine marten populations in Wales and England. This will inform any future translocations of pine martens to these areas.

<http://www.vwt.org.uk/our-work/projects/pine-marten-projects>

eDNA detects the presence of great crested newts in water

Natural England has welcomed the publication by Defra of a study which includes an evaluation of the use of environmental DNA (eDNA) to detect great crested newts in water. The use of eDNA testing makes it possible to detect newts simply by taking water samples whereas conventional sampling for the protected species often requires several repeat visits during the breeding season which can be costly and time-consuming. Natural England will accept eDNA test results as evidence of presence or absence of great crested newt from consultants and developers, provided they strictly follow the method set out in the published technical advice note.

<http://www.naturalengland.org.uk/ourwork/regulation/wildlifegcn-eDNA-feature.aspx>
<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18650&FromSearch=Y&Publisher=1&SearchText=vc1067&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

2014 Northern Ireland environmental statistics report released

The report contains environmental indicators focusing on eight key themes, ranging from biodiversity to waste management. The indicators show changes in a variety of aspects affecting our environment. Regarding biodiversity, the report states that between 1994 and 2012 the wild bird population has increased by 44%. However not all bird populations are increasing. For example the Blackbird and Chaffinch are increasing whereas the Mistle Thrush, Skylark and Meadow Pipit are all decreasing.

<http://www.northernireland.gov.uk/index/media-centre/news-departments/news-doe/news-doe-060314-latest-environmental-trends.htm>

BES publish report on equality and diversity in ecological education and career pathways

The British Ecological Society has published the results of a research project seeking member views and experiences in respect of equality and diversity. The project used surveys, membership data and a workshop to understand the diversity of the ecological community and what barriers and challenges people faced when entering or progressing within ecological careers.

<http://www.britishecologicalsociety.org/about-us/equality-and-diversity-in-ecology/>

<http://www.britishecologicalsociety.org/wp-content/uploads/Public-Report-v0-3.pdf>

Meeting with Irish Minister for Arts, Heritage and the Gaeltacht

Following a very successful two-day conference in Dublin last year CIEEM was invited to a follow-up meeting with the Minister last month. CIEEM Vice President (Ireland) Jenny Neff, Irish Section Convenor Anne Murray and Section Support Officer Mairead Stack met with Minister Deenihan and took the opportunity to raise a number of issues of interest and concern to Irish members. The successful meeting highlighted the benefits of closer liaison between CIEEM and the relevant Government departments with opportunities to influence/input into policy, producing guidance to help deliver good practice and raising professional standards. More detailed information about the meeting will be circulated to Irish members.

Welsh Section 'networks' with Natural Resources Wales CEO

Following his presentation at the Welsh Section's conference and AGM in March the CEO of Natural Resources Wales (NRW), Dr Emyr Roberts, was so impressed with the passion and professionalism of our members that he agreed to be 'Linked In' to the Welsh Section's group for several weeks in order to respond to questions on NRW policy. Topics covered included wildlife crime, data mapping, research funding, wildlife law reform and development planning. The thread was very informative and we are hoping that Dr Roberts will be happy to repeat the engagement in the future.

BES Virtual Issue of *Journal of Applied Ecology* on Freshwater Ecology

The British Ecological Society has agreed to make the latest virtual issue of *Journal of Applied Ecology*, entitled *Freshwater Ecology - Understanding ecosystems and reducing anthropogenic environmental stress*, freely available for two months to coincide with this edition of *In Practice* on freshwater ecology.

<http://www.journalofappliedecology.org/view/0/freshwatervi.html>

CIEEM asked to partner Natural England on Earned Recognition Project

In March this year CIEEM was approached by Natural England to see if we would be willing to work with them in a project to develop ideas around Earned Recognition for consultants working with protected species. We said yes!

Natural England were keen to explore the scope and potential for developing a scheme which would give consultants 'earned recognition' with regard to receiving class licences for low risk activities involving protected species. Following a successful bid to the Department of Business Innovation and Skills' Better Regulation Delivery Office we are now working collaboratively on a review of NE's protected species licensing operations to identify the best opportunities for applying an 'earned recognition' approach.

Should the review be positive and NE decide to make the necessary technical changes to its scheme then the next stage will be developing and delivering appropriate training for a pilot cohort of consultants.

Irish and Scottish Sections respond to consultations

The CIEEM Geographic Sections have been actively engaged in policy issues in recent months.

The Irish Section Support Officer, Mairead Stack, along with Irish Section members have responded to the following two consultations:

- National Peatlands Strategy (Department of Arts, Heritage and the Gaeltacht)
- National Raised Bog SAC Management Plan (Department of Arts, Heritage and the Gaeltacht)

Likewise the Scottish Section has responded to the following consultation:

- Scotland Rural Development Programme (SDRP) Proposals

For information on past and forthcoming consultations please see www.cieem.net/policy. If you are interested in contributing to a consultation or inquiry please contact jasonreeves@cieem.net.

Defra/Natural England Predictive Modelling Pilot

CIEEM was pleased to be invited to sit on the Advisory Group for the Predictive Modelling pilot set up by Defra's Great Crested Newt (GCN) Task Force which was established as part of follow-on from the review of the implementation of the Habitats Directives in England. Earlier this year Natural England went out to tender with a project to improve the understanding of statistical and spatial modelling of the GCN in England. It is intended that the project will inform future investment in GCN data and modelling and secure value for money by developing a measured programme of field work and model development. This, in turn, will enable NE to take evidence based decisions to benefit GCN.

Defra Smarter Environmental Legislation

CIEEM has been invited to participate in a new initiative of the Smarter Environmental Regulation Review (SERR). The first meeting of the Smarter Environmental Legislation group was a natural environment roundtable on the future of environmental legislation, and the regulation that flows from it. The natural environment has been selected as a cross cutting theme where it could be argued that the time is right for a fundamentally new approach, possibly underpinned by a new Act (or Acts). The aim of the first workshop was to explore what such a new approach could achieve and how it could be framed.

Review of Bat Surveys Good Practice Guidelines

The Bat Conservation Trust has announced that it will shortly be reviewing the Guidelines with a view to producing a 3rd edition early in 2015. We are pleased to have been invited to take part in the review and grateful to a number of members who have agreed to respond to the consultation on CIEEM's behalf under the auspices of the Professional Standards Committee. Look out for further updates in *In Practice*.

Defra Environmental Professionals Working Group

CIEEM has been involved in Defra's Environmental Professionals Working Group on guidance and data. The aim of this group is to input into the Government's plans to reform guidance and simplify reporting for businesses. This is part of the Government's drive to migrate all information to the gov.uk website.

Diversity Working Group

Following a very successful call for members the newly-formed Diversity Working Group had its first meeting at the end of April. The Group's approved terms of reference are:

1. To undertake research in order to identify:
 - a. how diverse ecology and environmental management really is and how this compares to other land-based professions;
 - b. what, if any, the barriers to diversity within the profession are;
 - c. what are the key benchmarking data against which to measure progress.
2. To assess how diverse CIEEM is in its operations and to identify changes in order to maximise engagement of all members and to improve support for all members.
3. To identify existing best practice in relation to promoting diversity in the workplace, within industries and within professional bodies.
4. To identify, present business cases for and lead on new innovative ideas, projects or initiatives to promote and support diversity within the profession.
5. To advise the Governing Board on diversity-related issues and to recommend appropriate targets in order to measure success.

An update on the Groups's initial work will appear in the next issue of *In Practice*.

2014 Professional Development Programme

We have recently added a number of new workshops and training courses to our programme which is available online. We have tried to respond to ideas and suggestions for new courses, especially those covering the transferable skills elements of the Competency Framework. Take a look at the website for further details.

<http://www.cieem.net/events>

Warranty and Contract Vetting Service from MFL

A reminder that our insurance partner, McParland Finn Ltd, has made the decision to take this service back in-house from the current provider. The provision of this advice is an essential tool in your risk management process and the service offered is intended to flag up contractual conditions that may expose you and your business to liabilities which exceed the scope of your professional indemnity insurance. The service is not a full contractual review. If you require a more detailed review, MFL can recommend an experienced legal firm who will provide preferential terms to you as a membership benefit. For more information please contact Darren Hewitt (T: 0161 237 7748, E: darrenh@cieem-insurance.co.uk) or Gabrielle Church (T: 0161 237 7730, E: gabriellec@cieem-insurance.co.uk).

Spring Conference 2014

Presentations from the very well received Spring Conference, held on 18th March 2014 in Birmingham on the theme of 'Biodiversity Offsetting: From Theory to Practice' are available online at: www.cieem.net/214-spring-conference

Autumn Conference 2014

We are pleased to confirm that this year's two-day Autumn Conference will be at Edinburgh University's John McIntyre Conference Centre on the 11-12 November 2014. The theme of the conference is 'Progress in Effective Habitat Restoration, Translocation and Creation'. We currently have a call for papers out and further details are available on our website.

Accommodation on site at the University's Pollock Halls is limited and can be booked on a first come first served basis online through <http://www.book.accom.ed.ac.uk> at a reduced price of £65.45 quoting the code CONF14. However we will be supplying a list of other hotels and accommodation options nearer the time.

Staff Changes

Last month we were sorry to say goodbye to our Senior Membership Officer, Gwen Heywood-Waddington, who left us after three years to take up a new role with the Sailors' Society. We are sure that she will enjoy her new role and wish her well.



CIEEM engaged with Europe

The European Network of Environmental Professionals (ENEP), of which CIEEM is an active member, has had a busy past few months.



ENEP members recently had a productive one-to-one meeting with EU Environment Commissioner Janez Potočnik. The Commissioner has become increasingly aware of, and supportive of, ENEP and its work and has helped the network make strategic contacts within DG Environment.

The network held its Spring 2014 General Assembly in Bucharest, Romania in April at which a new Activity Plan and budget were approved.

ENEP has yet again also secured an exhibition stand at Green Week. The 2014 edition of Green Week, the biggest annual conference on European environment policy, will take place in early June in Brussels. The theme is Circular Economy, Resource Efficiency & Waste.

Justin Smith MCIEEM

CIEEM is sad to announce the death of Justin Holger Smith, who passed away unexpectedly in early 2014, aged 46. He is survived by his wife, Lucy, and son, Wilf.



"Justin had a special interest in lichens and fungi to add to his wide knowledge and expertise in general ecology. He was very quick to learn and soon turned into a teacher. His field skills were absolutely remarkable. Without hesitating he knew where to go to make interesting finds. He noticed and took on the smallest little lichens and fungi that others would overlook. He made an immensely valuable contribution to lichens and fungi in the Bristol area and Bristol City making thousands of records and discovering numerous unexpected species. His sunny personality, cheerful enthusiasm and delightful sense of humour made him a very special friend to all naturalists who met him and worked with him. Through his courses and training as well as informally on walks and field trips, he helped hundreds of people see what they may have overlooked and learn what they may have been unaware of. He had a national reputation as an excellent lichenologist and mycologist and was known and admired by members of the British Mycological and Lichenological Societies from all over Britain."

"Justin was a born teacher – he ran training courses for his fellow professional ecologists in the Chartered Institute of Ecology and Environmental Management and he engaged children in the little things they spotted. Always the same with whoever he was with, wherever and whenever and whatever the weather."

David J. Hill MCIEEM, University of Bristol

Letter to the Prime Minister

**Landscape
Institute**
Inspiring great places

18th February 2014

Dear Prime Minister

Open letter with regard Water Management in England and Wales

I am co-ordinating this letter on behalf of a group of professional bodies whose members regularly work together on projects designed to manage water, prevent flooding and increase resilience. The various professions comprise landscape architects, architects, engineers, hydrologists, ecologists and other specialists, who bring together the experience necessary to tackle the problems of flooding and water management. We have taken the unusual step of writing to you at this difficult time so that the government is aware that the knowledge, training and expertise of all of the professions is available to you, and we believe, urgently required.

We are concerned that the response to these major problems must be appropriate, technically sound and contribute to the long term goals of improved and sustainable water planning and management, whilst acknowledging the needs of those living and working in agriculture and the affected rural areas. We are clearly facing a wide range of difficult situations across England and Wales but it is clear that in Somerset, for example, dredging is not the sole cause of the problems that we are witnessing, and a major dredging programme may be inappropriate if the consequences are increased flooding to towns downstream.

The current situation needs clear leadership and a commitment to both an emergency response and long-term planning to avoid a future recurrence, so whilst we are pleased to hear that you will provide that leadership, it is essential that government actions are based on an informed and balanced response that builds on best practice developed over many years.

There has been much confusion about the most appropriate response to this situation. Clearly a range of emergency measures are in order to tackle the immediate crisis facing so many people. However, in the long-term, the way in which we manage, store and distribute our water, and how we rethink and plan both the natural environment, and the built environment of our towns and cities to make

them more resilient, requires a clear strategy. This must be coherent and adaptable to local circumstances, to allow it to be rolled out countrywide.

We need to look at the larger catchment management issues, and how forestry, land management and soft engineered flood alleviation schemes can hold back water in the upper reaches of rivers, and how dredging may assist in the lower reaches, whilst in towns and cities we need to be considering the planning of new development and regeneration schemes, and embark on a wide range of flood alleviation and protection measures. At the same time we need to comprehensively retrofit Sustainable Drainage Systems, alongside SuDS schemes for all new buildings as soon as possible. Buildings and land that cannot be properly protected, but need to be, should be made resilient to withstand flooding, and we must consider carefully how and where we plan new development, and that all new housing in flood plains must be resilient when built.

A comprehensive range of water management techniques could have helped prevent the effect of water through villages, towns and over the surrounding land seen in the last few weeks.

This will require co-operation and coordination not only between the professions, but with the Water Companies, Internal Drainage Boards, local authorities, the Environment Agency, and Natural Resources Wales, all working alongside landowners and residents if the outcome is to be effective. There is a great wealth of expertise in the Environment Agency, people who are experienced in addressing these problems, as well as amongst the membership of each of our organisations. We need to mobilise and utilise that joint expertise effectively.

Whilst there will be time in the future to reflect on today's problems and to prevent their recurrence, the professions are keen to assist you now in addressing these problems, and ask that a cross departmental conference including the professions with DECC, DEFRA, DCLG, the EA and NRW, in a similar manner to that which was convened to address the problem of ash-dieback, is constituted without delay.

The commitment to provide essential funding is a useful step, but it is even more essential

that this is invested appropriately, and provides the best and most sustainable outcome to both society and the affected communities.

Yours faithfully

S E Illman PLI, Hon FSE
President, Landscape Institute
(Co-ordinator)

Cc Rt Hon Owen Paterson MP
Anne McIntosh MP
Lord Smith, Environment Agency

Supporting Institutions

George Adams
President, CIBSE



Heather Barrett-Mold
Chair



Martin Baxter
Executive Director – Policy
IEMA



Shireen Chambers
Chief Executive
Institute of Chartered Foresters



Adam Donnan
Chief Executive Officer
Institution of Environmental Science



Michael Doran
SocEnv RICS Council Representative
Royal Institution of Chartered Surveyors



John Gregory
Institute of Fisheries Management



Sally Hayns
Chief Executive Officer
Chartered Institute of Ecology and Environmental Management



Louise Kingham OBE
Chief Executive
Energy Institute



Steve Lee
Chief Executive Officer
Chartered Institution of Wastes Management



Karen Martin
Chief Executive
Arbicultural Association



Dr Peter Spillett
President
Institute of Fisheries Management



Alastair Taylor
Chief Executive
Institution of Agricultural Engineers



Professor William Pope
Chairman of the Environmental Policy Forum

Mike Summersgill
President
CIWEM



Jim Whelan
Council Member
Institution of Environmental Science



Time to rethink our relationship with water

Sue Illman

The Landscape Institute & Illman Young Landscape Design

Since the Landscape Institute wrote to the Prime Minister in February urging the government to adopt an integrated approach to water management, £140m has been identified in the 2014 UK budget to repair and restore vital flood defences. A long-term strategy has also been mooted to redirect the £2.3bn of capital funding allocated in the 2013 Spending Review. But until this strategy is implemented it is impossible to know whether that budget will be adequate to address further extreme events.

Resilience requires an awareness of the impact of development on all stages of the water cycle – and the past few years of floods and droughts have exposed the UK's weaknesses. The implementation of National Standards for the Flood and Water Management Act has been subject to continual delays. They should have come into force in April 2014. They still haven't. The National Standards are the last piece in the jigsaw puzzle that will require Sustainable Drainage Systems (SuDS) to be used for all new development. But that alone won't be enough. The Act needs to be coupled with a comprehensive programme of retrofitting SuDS, and should be a first step in prompting a collective rethink about our relationship with water.

A report published in March last year by the Construction Industry Research and Information Association (CIRIA) set out the challenge we face: "Water shortages,



Manor Fields Gateway Sheffield. Public access to rain garden. © Ian Stanyon

Feature Article: Time to rethink our relationship with water (contd)

flooding and watercourse pollution are all signs of stress where developed areas have a troubled interaction with the natural water cycle and where, conversely, water has become a risk or a nuisance rather than an asset or an opportunity." Green infrastructure and Water Sensitive Urban Design (WSUD) approaches to water management encourage the harvesting of rainwater, and the recycling and cleaning of both grey, and potentially black water. Managing water through planted features not only improves the quality of surface runoff from sites and recharges groundwater, but provides opportunities for habitat creation, as well as protecting banksides of existing rivers and streams and improving aquatic health.

A survey of built environment professionals conducted as part of the report showed that 83% of respondents believe water management is considered too late in the planning and design process of developments. We need to encourage an open dialogue on the adoption of WSUD with local authorities, and where it is too late for this to be included in their Local plan, then new Supplementary Planning Documents (SPD) should be used to align policies relating to flood risk, sustainable drainage, public open space, green infrastructure and biodiversity, as a minimum. Promotion of an understanding of both SuDS and WSUD needs to be followed coherently through from policy, to pre-application advice, to planning conditions, and ultimately through building regulations and inspections to ensure its effective delivery.

Evidence already exists to suggest that adopting WSUD in UK cities is not only economically viable but delivers long-term economic benefits. An impressive report, *The Ripple Effect*, commissioned last year by the UK Technology Strategy Board and Defra and carried out by AECOM among others, found that the benefits of retrofitting green SuDS at a city-wide scale in Coventry are valued at more than £1.5bn over 40 years. If infrastructure is included to store and recycle water runoff, benefits increase dramatically to nearly £8.3bn across the city.

The report concedes that "this type of opportunistic approach to adaptation requires a commitment to rethinking the

traditional approach to both development and water systems, and requires organisations and stakeholders to work together early to create a shared vision." We should not be deterred. Winter rainfall in the West Midlands alone is expected to increase 13% by 2050 increasing flood risk from rivers, surface water runoff and groundwater. Now is the time to start having these conversations.

My concern is that few people, as yet, really understand what WSUD is all about. In our recent ideas competition for London's Royal Docks, most treated it as a form of 'super SuDS', rather than a process that fundamentally informs the design, layout, functionality and use of a site. The real problem, however, is that the engineers see it as an engineering problem; the architects generally don't quite know what to do with it but are aware that they should; the quantity surveyors don't know how to price it unless its hard construction; clients and project managers are scared of it, because unless they understand it, they see it as a risk item, and therefore (by definition) likely to cost more. This is why landscape architects need to engage with, inspire and educate design teams about it.

One project that is bucking that trend is the development of a masterplan for a major extension on University land to the north-west of Cambridge city centre. According to the early proposals for this 60 ha site, from the concept stage, sustainable drainage measures and extensive green corridors have been integrated into the site to treat and store surface water above ground while also supporting urban design and place-making aspirations. A site-wide strategy for water management is also being developed to utilise opportunities to integrate the entire water cycle and progress towards water neutrality. This includes consideration of site-wide wastewater recycling for non-potable reuse; site-wide storm water harvesting, using sustainable drainage system features to filter water for non-potable reuse; and specifications for water efficiency in buildings and the landscape.

WSUD is only a relatively small step beyond what we do already – or rather what we ought to already be doing. So if you assume that we embrace SuDS, and as part of that we integrate rainwater harvesting

for toilet flushing or garden watering, and then utilise runoff from roads, then we are already making progress. Persuading developers to embrace grey-water recycling from bathrooms through planted features, and then reusing the water from centralised tanks for garden watering or toilets is not a large step practically, but quite a large one mentally – embracing black water recycling on site tends to be more difficult for most people to get their heads around.

This is part of a broader question about how we can ensure that our cities and urban centres are 'liveable' through landscape-led sustainable design. So a fundamental part of a water sensitive city is that those features are designed into the fabric of our towns and cities as attractive liveable landscapes. However, any long-term strategy must involve a proper exploration of the larger catchment management issues, and how forestry, land management and soft engineered flood alleviation schemes can hold back water in the upper reaches of rivers. Without this we are choosing to ignore many of the factors that accelerate problems further downstream in our towns and cities. We need to combine the skills of landscape architects, planners, engineers, hydrologists and ecologists working across entire drainage systems to get our planning right both for now and the future.

Flood and Water Management Act

After floods in 2007 cost 13 lives and £3.2bn, the Pitt Review recommended a slew of improvements, which led to 2010's Flood & Water Management Act. Schedule 3 of the Act requires all planning authorities to establish SuDS approval bodies, or SABs, to ensure that this happens. But this has yet to be implemented. Before it is, Defra needs to finalise the National Standards consulted on in 2012 and the guidelines for both planning authorities and applicants. Councils and developers must also reach an agreement on who should pay to maintain any SuDS created in the long term.

Case studies

Manor Fields Park in Sheffield

Conceived in 2004/5, the Manor Fields Park's SuDS schemes have demonstrated how investment in multifunctional landscapes can provide a long-term 'win win' for the community, the local economy and the environment. Devised by Sheffield City Council landscape architect Ian Stanyon, the park plays host to sustainable drainage for surface water drainage from a new housing development at half the cost of building a new sewer, while providing a community park and a wildlife haven.

Completed in 2012, a formal 'Gateway' now connects the park via good public transport links to the whole of Sheffield making it truly a Regional Park. Landscape architects have delivered an innovative design that incorporates another sustainable drainage scheme incorporating a water garden rarely found in the UK and a porous paved car park together negating the need almost entirely for piped drainage.

All surface runoff is taken by the system and clean 'treated' water runs directly into a nearby wetland area. This is currently being further designed by the landscape architect and managed with a mind to create a further recreational, aesthetic, biodiverse and a wildlife-rich resource. The approach has resulted in an environment that is well adapted to forecast climate scenarios as well as reducing the impact on future climate change.

Melton Vale Post-16 Centre in Melton Mowbray

There are already examples in the UK where a holistic approach to designing with water has been central to the project's success. Take Melton Vale Post-16 Centre in Melton Mowbray, Leicestershire, designed by David Singleton. Here, everything about the school from its orientation and form, to the size and location of the car park, was planned and built with water in mind. The 3 ha site surrounding it is defined by wetlands, grassland and woodlands, while ponds, reed beds and swales carry water from hard surfaces through wetlands to a main basin.

SuDS are not an isolated aspect of the landscape, but rather it is the landscape itself. It defines how the landscape is used and managed. The bioswales are very shallow and have carefully graded sloping sides to enable mowing, while pond areas brim with marginal plant species. Rain from roofs and the car park is used to flush toilets in the school and the grey-water recycling levels are linked to the school's computer system to show how many litres have been saved. But the secret of Singleton's success is that the school has retained his team in order to educate the children about the landscape around them.

Greenstreets@Counters Creek

Counters Creek is one of the 'lost rivers' of London. The catchment forms part of the local sewerage network, draining all surface water from buildings and roads, as well as draining wastewater from properties. An analysis of aerial photography over the last 40 years suggests that around 17% of green space has been lost in this catchment. In the case of the Counters Creek catchment this has resulted in street and basement flooding.

Greenstreets@Counters Creek, a pilot project funded by Thames Water, has been launched to investigate the benefits of SuDS in managing urban flooding. The aim of the project is to investigate how SuDS could be retrofitted into London neighbourhoods, to manage rainwater in a better way and reduce the pressure of rainwater runoff on the sewer network.



Manor Fields Gateway Sheffield. Rain garden overflows into wider public park. © Ian Stanyon



Manor Fields Gateway Sheffield. Rain garden taking runoff from paved activity space. © Ian Stanyon

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About the Author



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How much water do rivers need? Hydroecology and environmental flows

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Current public perception of water availability in the UK has been heavily influenced by recent media coverage of winter flooding. However the fact remains that there is great spatial and temporal variation in water availability. Water stress in the Thames Valley for example is comparable to that of Syria, Spain and Australia (Gassert *et al.* 2013). The effects of climate change and population growth are predicted to place even greater demand on water resources, setting our future requirements on a collision course with ecosystem services and biodiversity conservation. Ecologists and environmental managers need to be capable of supporting water resource management by ensuring activities such as public water supply are not environmentally damaging or ecologically degrading. Environmental flows has become a widely-used term to describe the quantity, timing, duration, frequency and quality of flow to sustain freshwater, estuarine and near-shore ecosystems; also the human livelihoods and wellbeing that depend on them (Acreman and Ferguson 2010). The concept of environmental flows provides a structure to improve the protection of river ecosystems whilst allowing more sustainable development of water resources. Here we introduce the concept of environmental flows and present a recent case study for hydroecological management in practice.

Introduction

Rapid industrialisation, population expansion and urbanisation in the 18th and 19th Centuries turned many European rivers into open sewers. By the early 20th Century, the freshwater arteries of our landscape had become severely degraded, with iconic British species such as Atlantic salmon *Salmo salar* functionally extinct from many of their natural catchments in the UK.

Not surprisingly, river ecosystem management in the UK historically sought to address water quality issues first and foremost, with early drivers being largely anthropogenic (i.e. public health related). Over many years, UK research, legislation and river monitoring has been shaped towards tackling water quality pressures, with great success. This has resulted in widespread improvements in water quality

and the return of a host of freshwater biota to some of our most impoverished riverine habitats (Vaughan and Ormerod 2012). Yet, whilst UK river water quality has been improving, the inaugural 2013 State of Nature Report estimated that 57% of freshwater and wetland species in the UK have declined over the last 50 years (SON 2013). If river water quality is improving, why are the species that depend on rivers in decline?

The reality is that rivers are subject to a complex mix of pressures; in the broadest terms these include physical habitat, flow regime and water quality modification (Dunbar and Acreman 2001), as well as invasive species. Recent improvements in water quality mean the limiting role of physical structure and hydrological regime has become increasingly apparent (Vaughan *et al.* 2009).

With the Office for National Statistics predicting UK population growth of up to 35% by 2050 (pop. 85 million) (ONS 2013), the demand for water resources will continue to grow. Current projections of UK climate change are also predicting regional reductions in summer precipitation of up to 28%, and winter increases of up to 23% (as central probability estimates) (UKCP 2012). Against this backdrop it is essential that we answer a seemingly simple question: how much water do rivers need?

Ecological impacts of artificial flow regulation

Abstractions and discharges are necessary to sustain vital services such as Public Water Supply (PWS), agricultural irrigation,

(Left) Figure 2. River Lark, Suffolk. © Atkins Ltd.

waste removal and hydro-electric power generation. However, alteration of the natural flow regime can elicit various physical, physicochemical, quality and thermal property impacts within the riverine environment. There is significant potential for these impacts to cause undesirable effects within aquatic (and associated) ecological communities:

- reduced flows and levels exacerbate the impact of barriers such as weirs to the passage of migratory species;
- increased sedimentation rates associated with lower water velocities affect sediment-sensitive communities and fish spawning;
- reduced connectivity with natural floodplains can result in the loss of fish nursery areas and wetland communities;
- changes in erosion and deposition patterns affect morphological diversity;
- reduced aeration through mixing lowers dissolved oxygen levels;
- reduced dilution exacerbates water quality issues;
- changes in thermal gradients can increase physiological stress, and increase susceptibility to disease.

Legislative responsibility

The European Water Framework Directive (WFD; 2000/60/EC) (European Commission 2000) has established objectives for the 'ecological status' of all waterbodies across EU Member States which need to be achieved by 2027. In England and Wales only 26% of river waterbodies currently achieve these objectives (EA 2013). In Scotland, only 56% of river waterbodies are meeting their objectives (SEPA 2013).

Three elements define the ecological status of river waterbodies (see UKTAG 2009), all of which may be affected by alteration of the natural flow regime:

- biological quality elements (benthic invertebrates, fish, phytobenthos and macrophyte communities);
- general chemical and physicochemical quality elements (e.g. dissolved oxygen, ammonia and phosphate); and
- hydromorphological quality elements (e.g. morphology and hydrology).

Hydrology is assessed for all river waterbodies and therefore underpins

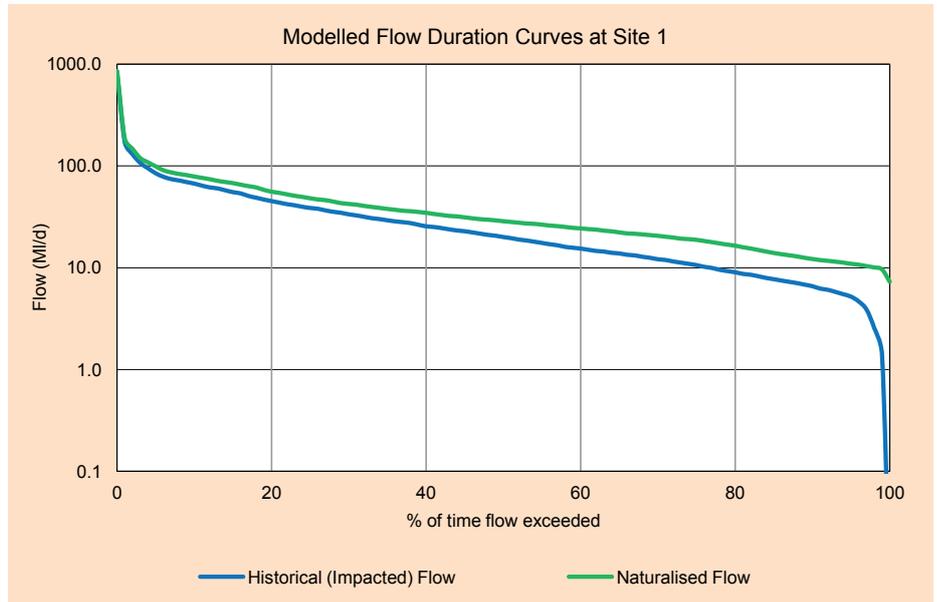


Figure 1. Example Flow Duration Curves showing the Naturalised flow regime for the site, and the Historical flow regime impacted by abstraction activities.

ecological status. Recently, over 650 river waterbodies in England and Wales were reported as having hydrology that did not support the minimum legislative requirement of 'good' ecological status (EA 2012). Taking account of the role of hydrology for 'high' ecological status (near-pristine status), it represents a limiting factor in approximately 60% of all river waterbodies in England and Wales (EA 2012).

Although the WFD provides the main structure for water management in the UK, there are further legislative considerations. The Natural Environment and Rural Communities Act (2006) requires public bodies to have regard for biodiversity conservation when carrying out their functions. The UK is also committed to halting overall loss of biodiversity by 2020; commitments intrinsically linked to the appropriate management of our freshwater habitats and, by extension, their hydrological regimes.

Current applications: the Environment Agency In-River Needs Programme

Atkins is supporting the Environment Agency in its Anglian Region to assess river environmental flow requirements through the In-River Needs Programme. The programme investigates river waterbodies where water resource activities (such as public water abstraction and discharges)

have altered the natural flow regime to such a degree that it no longer supports a healthy riverine ecosystem (i.e. good ecological status under the WFD).

The initial flow impact screening test for river waterbodies is undertaken using Environmental Flow Indicators (EFIs). The EFIs represent generic river flows required to support good ecological status, expressed as a percentage of allowable flow reduction (i.e. net water abstraction) from the 'naturalised' scenario for the river under investigation. They have been developed through expert consensus (Acreman *et al.* 2008) and vary according to the abstraction sensitivity of the ecological communities present. The allowable impact is expressed at key points on a Flow Duration Curve (FDC) as presented in Table 1. The FDC is a plot used by hydrologists to summarise the hydrological characteristics of a river, showing the percentage of time that a given flow is exceeded (see Figure 1).

By way of example, at Q_{95} (the flow exceeded 95% of the time) on the 'most sensitive' rivers, the permissible abstraction impact is up to 10% (i.e. flows must be maintained at 90% of the natural flow). If the abstraction impact is greater than this, the waterbody is prioritised for further investigation under the In-River Needs Programme. To date, 77 waterbodies have been investigated.

Feature Article: How much water do rivers need? Hydroecology and environmental flows (contd)

Table 1. Environmental Flow Indicator (EFI) thresholds for permissible abstraction

Abstraction Sensitivity	Flow Exceedance Value (Point on Flow Duration curve)			
	Q ₃₀	Q ₅₀	Q ₇₀	Q ₉₅
	<i>Permissible Impact on Naturalised Flow (%)</i>			
Most sensitive	24	20	15	10
Moderate	26	24	20	15
Least sensitive	30	26	24	20

Case Study: River Lark Catchment

The Environment Agency identified the River Lark and a number of its tributaries as failing to achieve the EFIs. The River Lark is a chalk stream rising 1.5 km to the south of the village of Whepstead in Suffolk (Figure 2). It flows for approximately 47 km, through Bury St Edmunds before discharging to the River Great Ouse. The upper reaches are naturally ephemeral, with lower reaches underlain by unconfined chalk which supports river flows. Over 7,000,000 litres (7 MI) of water are abstracted every day through groundwater and surface water abstractions on the Lark catchment alone, mainly for public water supply. The challenge is to define acceptable abstraction levels that sustain a healthy ecosystem. The steps taken are outlined below.

Step 1: Confirm hydrological impact on ecology

The Environment Agency's Regional Groundwater model was validated by reviewing available hydrometric (gauged) flow and level data within the catchment, ensuring it was accurately representing impacts across the catchment.

Fish and aquatic macroinvertebrate monitoring data were analysed to ascertain whether hydrological stress was apparent. At this stage, detailed water quality and morphological characterisation were integrated in the assessment, ensuring that habitat limitations and water quality impacts were not falsely attributed to hydrological stress. The flow-sensitive biotic metric, Lotic-invertebrate Index for Flow Evaluation (LIFE; Extence *et al.* 1999) and the sediment-sensitive metric, Proportion

of Sediment-sensitive Invertebrates (PSI; Extence *et al.* 2013), were central to this assessment and water quality-sensitive metrics were also considered.

Step 2: Define bespoke ecological targets (environmental flows)

Where riverine communities were identified as suffering from hydrological stress due to water abstraction, the next step was to derive more ecologically meaningful targets. Three distinct methods were employed, making the overall assessment more robust:

- **Macroinvertebrate Flow Regression (MFR)** regresses the LIFE biotic metric

against a range of antecedent flows (e.g. the annual Q₉₅) prior to each macroinvertebrate sample over the monitoring period (Figure 3). If a strong statistical response is established between antecedent flow and the resultant LIFE score, the trend is used to identify flows that should sustain the target community.

- **Rapid Hydro-Ecological Flow Thresholds (R-HEFT**, an example of hydraulic habitat modelling) involves topographic and hydrometric surveys at flow-responsive locations suitable for sensitive species such as brown trout *Salmo trutta* (Figure 4). This establishes the relationship between river flow, and the provision of depth and velocity targets for key species given the channel characteristics.
- **Ephemeral analysis** takes flow time-series data from the regional groundwater model along the waterbody length, defining the natural extent of ephemeral reaches. By developing a baseline 'heat map' of ephemeral distribution, it provides a functional target in terms of restoring the natural extent of ephemeral and perennial reaches.

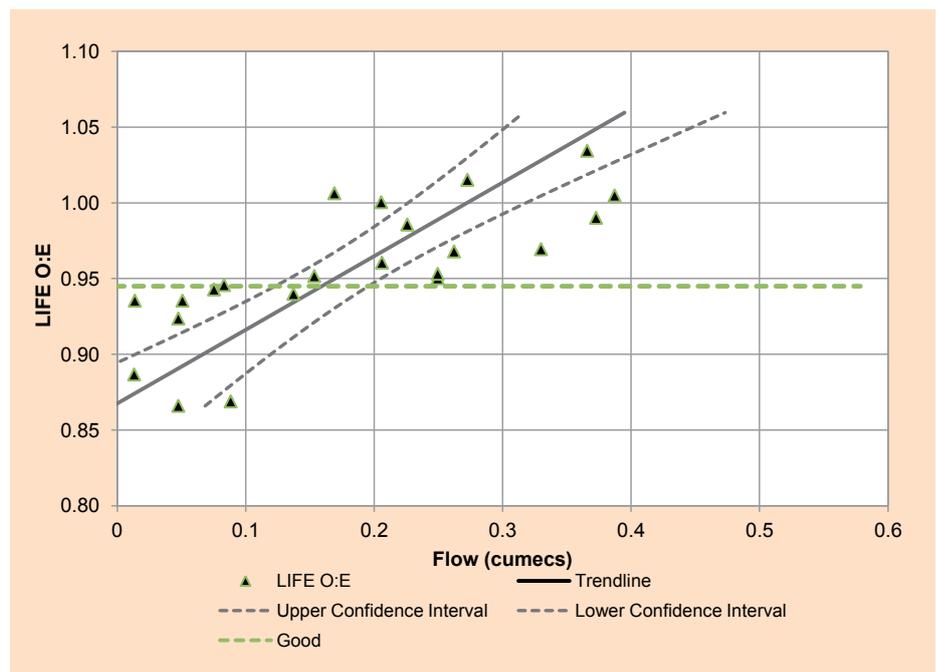
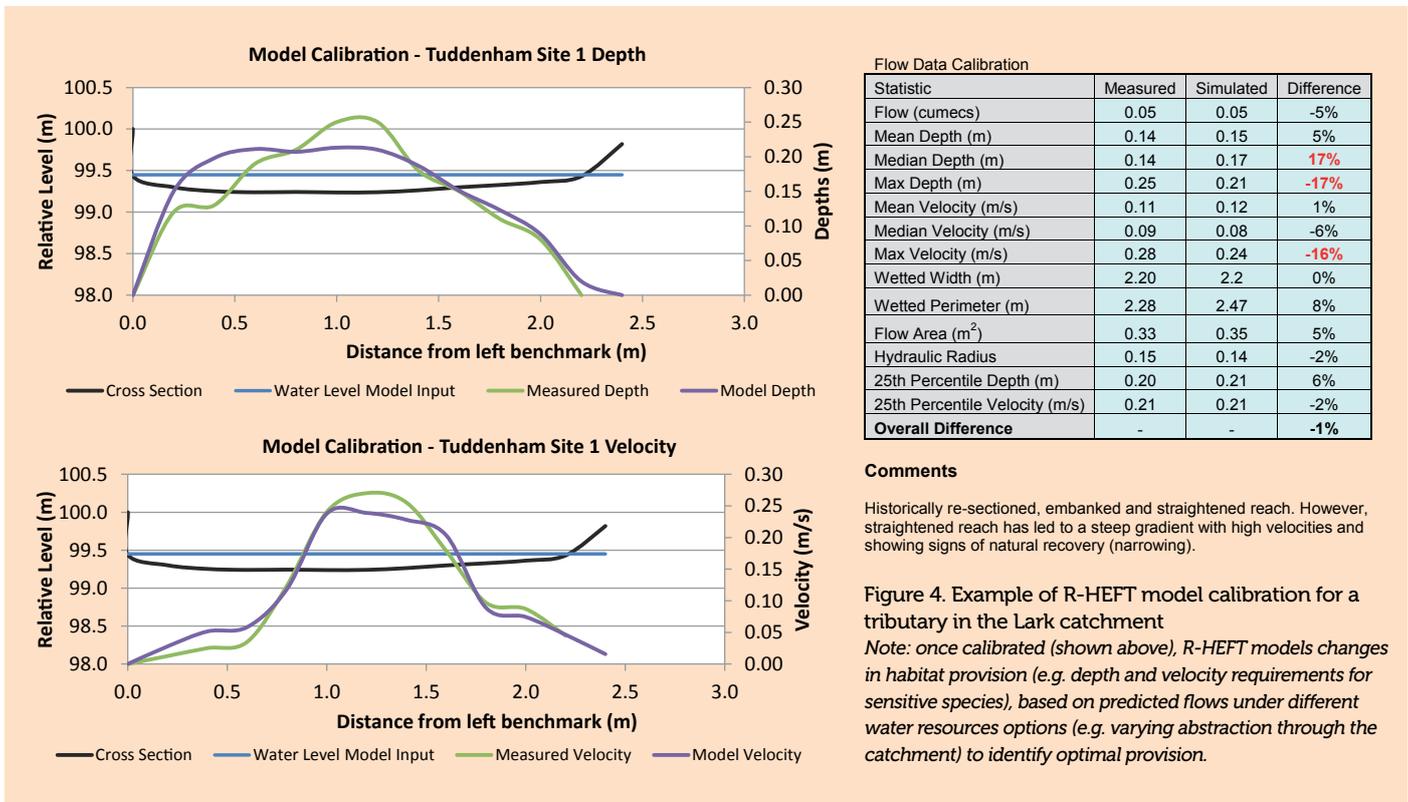


Figure 3. Example of MFR analysis output

Note: the intersect of the target and trendline help define the flows required to sustain the target macroinvertebrate community. In this example tributary site, a minimum flow of approximately 0.15 cumecs is likely to support the target macroinvertebrate community.



Step 3: Appraise options for water resource management

Derived environmental flow targets were set as benchmarks, against which catchment options for water resource management were assessed. Options included changing the abstraction regime (e.g. relocating abstraction points or reducing abstraction volumes) and providing river flow support (e.g. supply from groundwater). By producing a range of bespoke flow targets across the catchment, the relative advantages and disadvantages of the options could be assessed with confidence. A key observation was that sites within the Lark catchment with very similar natural hydrological regimes exhibited significantly different flow requirements to restore target ecological communities. This provides an excellent example of the limiting role of other factors (in this case, habitat structure), and again highlights the importance of an integrated approach to water resource assessments. Consequently, the investigation was able to identify the benefits of holistic solutions for the Lark catchment including hydrological mitigation, but also revised maintenance and river restoration.

Discussion

Our knowledge of the environmental requirements of rivers will most likely remain incomplete for the foreseeable future (Dunbar and Acreman 2001). Objectives may be set too low, resulting in damage to a river, or too high, resulting in potential waste of resources, or the exploitation of other sensitive water resources. Nonetheless, we must meet legislative requirements and, more fundamentally, ensure water resource management supports functioning aquatic ecosystems. To achieve this we are obliged to apply the best and most proportionate methods available to define environmental flows. Bespoke hydroecological monitoring programmes and detailed hydraulic modelling are costly and time-consuming; reliance on new programmes is not feasible at a national level. The In-River Needs Programme in Anglian Region provides a blueprint for utilising available monitoring and modelling data, augmented with focussed site-specific data collection. However, there remains an urgent need for more formal integration of multiple pressures (morphology, water quality, etc.) in hydroecological models that utilise existing monitoring data.

Pressures on the aquatic environment are interdependent (for example, flow reduction can lead to deterioration in water quality, resulting in the misdiagnosis of a water quality pressure). Considering any single pressure (e.g. flow) in isolation from the wider factors (e.g. channel dimensions, sediment loading, water quality, etc.) will inevitably be misleading. Atkins is actively developing multiple linear regression approaches to help overcome some of this uncertainty. Together with models under development by the Environment Agency, such as Dried-Up With Incremental Droughts (DRUWID; M. Dunbar, pers. comm., February 2014), we can be optimistic that hydroecological assessments will continue to improve. However there remain some important underlying issues, such as questions over the appropriateness of WFD objectives (cf. Moss 2008) and also our concept of "natural". Where we have fundamentally altered the physical character of a river and its floodplains, the flow regime will never be truly natural, even in the absence of abstractions and discharges. What regime should we seek to restore? Should we make sacrifices in some areas

Feature Article: How much water do rivers need? Hydroecology and environmental flows (contd)

for the concentration of resources in others? How much weight should be given to environmental protection in the face of water shortage? The science of environmental flows goes some way to telling us how much water riverine ecology needs, but the drivers behind their implementation remain rooted in what

society values. In the end, environmental flows are socio-economic tools as much as they are science-based. It may be that the optimisation of anthropogenic benefits through river ecosystem protection (or ecosystem services) is ultimately where the balance is struck.

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

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New guidelines on surveying water voles *Arvicola amphibious* and techniques to mitigate the impact of development will be published later this year. These will promote 'best practice' amongst ecological consultants undertaking surveys and designing and implementing mitigation measures for water voles in the context of development projects. They are also intended to guide decision makers in their role in assessing projects that impact upon water voles and to set a clear standard of requirement for appropriate mitigation.

This article provides a summary of the most significant proposed changes to the guidance with particular reference to the use of the displacement technique, licensing of displacement, timing of live capture projects for water voles, and revised recommendations for water vole surveys in the context of planning applications for development.

Introduction

A variety of concerns regarding the interpretation and understanding of techniques described in the Water Vole Conservation Handbook (2011) were raised by consultant ecologists (see Gow *et al.* 2012). One of the principal issues was uncertainty over the efficacy and use of the 'displacement' techniques for the species, and its employment at scales that are inappropriate.

Another concern was over the legality of the displacement technique and whether the 'incidental result' defence was justifiable. Natural England and Natural Resources Wales reviewed their interpretation of the legislation relating to water voles, and have advised that some elements of displacement are likely to constitute an offence, and therefore should be licensed. However, the mechanisms for licensing displacement of water voles in England and Wales have yet to be determined.

These developments have prompted the compilation of new guidelines on water vole survey and mitigation techniques in the context of development and construction activities. They will be published in the second half of 2014, following consultation with the Statutory Nature Conservation Organisations and other relevant bodies, including CIEEM and the UK Water Vole Steering Group.

Background

Water voles were given legal protection under the Wildlife and Countryside Act in 1998. Their initial, partial protection was extended to full protection under Section 9 of the Act in 2008. This legal

measure was prompted by the results of surveys undertaken in the late 1980s and early 1990s, which demonstrated that the species had undergone a significant decline during the course of the twentieth Century. This constriction in their range was largely attributed to a combination of habitat loss and fragmentation coupled with the establishment in the British countryside of the North American mink *Neovison vison*, a non-native predator against which they have no defence. Following their inclusion in the Wildlife and Countryside Act 1981 (in 1998), guidelines on how to mitigate the impact of development projects on water voles were produced. These included the second edition of the Water Vole Conservation Handbook published in 2006 (Strachan & Moorhouse 2006) and revised in 2011 (Strachan *et al.* 2011), and Natural England's 'Water voles – the law in practice' and Technical Information Note TIN042 'Water voles and development – licensing policy' (both in 2008). These documents included guidance on the use of techniques to relocate water voles from the footprint of a development – using either the displacement technique or through a process of live trapping. This guidance was based on a contemporary understanding of water vole ecology, the results of case studies and small-scale research projects.

The use of the 'displacement' technique has always been controversial. In its basic form it involves the removal of vegetation, coupled with water drawdown or artificial raising of water levels. The intent of this process is to encourage the animals to

Feature Article: Water voles – a preview of new guidelines for survey and mitigation (contd)

relocate into adjacent habitat. However, radio-collared individuals tracked at sites where these processes were employed have shown a high degree of burrow fidelity (Woodruff 2000, Dean 2003, Markwell 2008, D. Tansley, pers. comm.), clearly preferring to remain within their existing territories. There is currently no evidence that displacement is effective, even on a limited scale, and there is little information on the associated survival or mortality rates of water vole populations impacted by this process.

If displacement has an effective application it is for small-scale works alone - 50 metres or less - from the beginning of March until mid-April in habitats occupied by very low numbers of individuals. Typically these footprints, for works such as pipelines crossing a watercourse, have been considered appropriate because:

- Displacement is less labour-intensive than trapping and therefore represents a proportionate level of effort in relation to the risk posed by the works to the animals in such situations, where less than one-third of the home range size of a female water vole will be affected (based on a home range size of 150 m where animals are at low density (Strachan *et al.* 2011));
- For small-scale works trapping may result in a greater impact than displacement on the local population, due to the 'sink effects' associated with an unfenced capture process; and
- To date, displacement has not been considered to require a licence in England and Wales, where it has been suggested that it is covered by the defence (Section 10(3)(c) of the Wildlife and Countryside Act), which allows for impacts that are 'the incidental result of a lawful operation and could not reasonably have been avoided'.

Despite the caution urged in the Water Vole Conservation Handbook (2011) on when it is appropriate to use displacement, it has been used in circumstances where it is inappropriate, such as:

- Over long sections of watercourse (sometimes several hundred metres in length);
- Outside of the March/April period specified in the Handbook;



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- In multiple adjacent short lengths of watercourse over consecutive weeks, in an attempt to displace water voles sequentially over a longer distance;
- For the removal or concentration, into smaller areas of their original environment, of extensively distributed water vole populations on a landscape scale.

Mounting concerns over the misuse of this technique (e.g. Gow *et al.* 2012) led to a meeting of water vole experts hosted by Jacobs in May 2013 to raise these concerns with the Statutory Nature Conservation Organisations (SNCOs). Natural England and Natural Resources Wales have now undertaken a review of their interpretation of the legislation relating to water voles, in terms of what constitutes an offence and whether the 'incidental result' defence can be used to cover displacement, given that the removal of water vole habitat using this technique is not strictly speaking 'incidental' to the development.

New guidance

New guidelines on 'good practice' regarding water vole surveys and mitigation techniques in the context of development and construction activities are in preparation with input from the SNCOs, environmental consultancies, NGO nature conservation bodies and other practitioners who regularly work with the species. The views of Mammal Society and CIEEM members were requested in a questionnaire organised by the Mammal Society in 2013. Feedback on the current approach to mitigation was requested including how regularly water vole mitigation was required, which techniques

were used, and whether there was robust evidence that these had worked or not.

This guidance will supersede that presented in Chapters 2 and 9 of the Water Vole Conservation Handbook (2011) with specific regard to legislation, impact assessment and mitigation in the context of development. Specific parts of Chapter 4, which provides guidance on survey requirements, will also be amended in relation to ecological or environmental assessments for development.

Changes to the guidance on displacement

There is no mechanism for issuing licences for the purpose of development under the Wildlife and Countryside Act 1981 (in England and Wales), and activities aimed at displacing water voles in this context were routinely undertaken without a licence, with developers relying on the 'incidental result' defence. Natural England and Natural Resources Wales have reviewed their position and now advise that displacement activities, which constitute an offence, cannot rely on the 'incidental result' defence, and therefore should be licensed. However, the mechanisms for licensing displacement of water voles in England and Wales have yet to be determined. It is intended that these will be clarified shortly in advance of publication of the new guidance but it should be noted that this means for displacement to be licensed, as with trapping, there will need to be a demonstrable conservation benefit. In the meantime, developers and their consultants should seek further advice from the relevant SNCO with specific regard to individual projects.

Scottish Natural Heritage considers displacement to be a licensable activity and can issue such licences under the Wildlife and Countryside Act 'for any other social, economic or environmental purpose' under the Wildlife and Natural Environment (Scotland) Act 2011.

Given the uncertainty over the technique's effect, stringent criteria for when it is appropriate to use displacement will be set out in the forthcoming guidance document in detail. In summary these are likely to be that:

- i) Displacement is only to be used over a maximum length of 50 m (on both

banks for watercourses) where water voles are present at low density, or 30 m where water voles are at high/medium density (the forthcoming guidance document will provide a definition of high, medium and low densities); and

- ii) Displacement is only to be used during the period 1 March to 15 April inclusive (although some seasonal variation is accepted in certain parts of the UK); and
- iii) Displacement is only to be used where this is sufficient available alternative habitat for water voles to move into which is not already occupied by other water voles. (advice on interpreting this will be provided in the forthcoming guidance document).

It is acknowledged that there is still considerable concern over the use of displacement as a technique for relocating water voles. It has not been proven to be effective, either in causing water voles to move from the footprint of construction works, or in ensuring the long-term survival of individual animals that do move. However, until robust experimental research can be undertaken, it is still considered to have some application in certain limited contexts, particularly for small-scale works (see above). In all other circumstances the live capture of water voles and their translocation, to a standard of operation identified in the new guidance, will be the only alternative technique for their removal. Development projects seeking to move water vole populations in this fashion will be required to demonstrate a clear conservation gain to obtain a project licence.

Changes to the guidance on when to trap water voles

It is not appropriate to trap water voles during their principal breeding season, for welfare reasons, and because it can have a significant effect on the breeding success and therefore status of the population. Water voles should therefore only be trapped during early spring (March-early April) and autumn (late September-November). The precise timing of the available windows for trapping will be set out in the new guidance. Trapping during

late spring and summer will no longer be recommended. Water voles trapped during the autumn period should be over-wintered in captivity before being released the following spring, as they are otherwise unlikely to survive the winter.

Guidance on undertaking water vole surveys in the context of development

Water vole surveys for development purposes have often been undertaken in accordance with the methodology used for the national water vole surveys carried out by the Vincent Wildlife Trust in the late 1980s and 1990s. This uses a sampling approach to record specific information within a 500 m length of watercourse over a timed survey visit. In other cases a 'habitat suitability index' has been used to determine where water voles are likely to be present and to trigger the need for a detailed survey. It is not appropriate to use either of these approaches to inform a planning application or as a pre-construction survey – this is not the purpose for which the national water vole survey methodology was designed.

The new guidance document provides a description of the methodology that should be used in such scenarios. Water vole surveys for development purposes are not time-limited and should not follow a sampling approach. The surveyor needs to invest sufficient effort as is required to achieve the aims of the survey. It is important that surveys are compiled by experienced ecologists with a sound knowledge of water vole field signs and ecology. Surveys that provide an unclear or partial result can lead to delay or failure of a planning or licence application.

The baseline information used to inform an assessment of the effects of a development on water voles should be based on

a combination of desk study, habitat assessment and field sign survey. In many cases, field sign surveys will require a metre-by-metre search of the suitable habitat to determine the presence or (likely) absence of water voles. For relatively homogenous sites where the presence of water voles has been confirmed, a less intensive survey is acceptable (recording field signs every 5 m to estimate the overall numbers), where this is more efficient, safer, and reduces the damage to bankside vegetation.

Traditionally water vole surveys have been undertaken during a single site visit. Given that the species has a clear tendency to contract into limited over-wintering habitats and then rapidly expand to occupy wider landscapes in the summer months, the extent of water vole activity can vary significantly at a site over the course of the breeding season. Water vole surveys for planning applications should therefore be based on searches for field signs undertaken during at least two separate visits, carried out sufficiently far apart to account for variability in habitat suitability over the course of the survey season. One visit should be undertaken in the first half of the season (mid-April to end of June) and one in the second half of the season (July to September); the survey visits should be undertaken at least two months apart.

The authors are aware of a number of cases where it has been incorrectly concluded that water voles are absent from a site based on the habitat being 'poor' or 'sub-optimal'. The national surveys indicated that water voles exhibit a preference for watercourses that are 1 m wide, 1 m deep and with steep banks. Whilst this may represent the 'average' ideal water vole habitat, there are many examples of water voles using other habitat types such as shallow, narrow watercourses with sloping banks; extensive



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Feature Article: Water voles – a preview of new guidelines for survey and mitigation (contd)

areas of bramble; corroded areas of revetments; wooded bank-sides with an understorey of ivy; or the edges of grazed pasture. In the east end of Glasgow, water voles have been found in entirely terrestrial sites. It is possible that there are other terrestrial populations of water voles in the UK, which have been overlooked. Surveyors must therefore be aware that the species is versatile in its habitat use and can be found in marginal and unusual sites.



1 © Derek Gow

As with many species, a considerable amount of experience is required before conclusions on the presence or likely absence of water voles can be made with confidence. Where any doubt exists, a field sign survey should be undertaken. The photographs below show a suburban site well known for its water voles, which several experienced ecologists have mistakenly assessed as unsuitable. The site actually supports a good population of water voles: the animals are often seen by local residents on a summer's evening. In this specific case the habitat changes very significantly over the course of the breeding season, and an assessment in April can produce a very different result to an assessment in July.



2 © Mike Dean



3 © Mike Dean

What happens next?

The authors would welcome comments on the new guidance previewed in this article. (email mike@mdecology.co.uk). The new guidelines will be published by the Mammal Society later this year. They should be considered to be 'interim' guidance and will be updated as new evidence emerges.

Photo legends

- 1 - Terrestrial habitat used by water voles in Scotland. Burrow entrances plugged with droppings and woven grass are present below the 'mole hill' type structures.
- 2 - Late April, before in-channel vegetation has developed; there are few field signs of water voles visible at this time of year.
- 3 - The same site in July, when in-channel vegetation has developed; field signs of water voles are present, and animals are often seen on rafts of vegetation.

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This article is dedicated to Rob Strachan, who passed away on the 17th May. Rob was a truly inspiring individual who was immensely knowledgeable, talented, kind and funny. He leaves behind an incredible legacy through his many books and publications, as well as the countless people with whom he has enthusiastically shared his knowledge of the natural world. Rob was instrumental in bringing the decline of the water vole to national attention, and was clearly the UK's leading authority on the species. We would like to acknowledge the enormous contribution he made to the proposed new guidelines on survey and mitigation for water voles, to the preparatory discussions that have informed this paper, and to the conservation of water voles in general. He will be greatly missed.

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Out of sight, out of mind? Monitoring freshwater fish

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European rivers are considered to be amongst the most human-degraded ecosystems worldwide. Rehabilitation of riverine ecosystems is currently being driven in the European Union by the Water Framework Directive 2000/60/EEC, which requires waterbodies to be assessed on their ecological status and improved if found lacking. Fish are a key biological indicator used to assess ecological status, as well having inherent conservation value covered by UK and EU legislation.

There are many different techniques for surveying fish populations; matching the appropriate methods with the objectives of the survey and the target environment are essential to collecting high quality representative data. This article gives CIEEM members a summary of why they need to think about freshwater fish, and outlines different methods for assessing both fish communities and their activity.

Introduction

Anthropogenic influences on riverine ecosystems have led to numerous impacts that have compromised fish communities. Water quality has historically been



European BAP species the bullhead

affected by point sources from industrial and sewerage discharges, as well as from diffuse sources such as agricultural run-off, impacting the aquatic ecology and habitats of rivers. The long-term degradation of rivers has also been caused by river modification and regulation. Areas adjacent to rivers which are routinely inundated with water during wet weather are referred to as the aquatic / terrestrial transition zone or the floodplain. River floodplains have been at the centre of human settlement from the origins of civilization, providing goods and services for society (e.g. drainage, transport, water resources, food, power generation and recreation), and, as such, society has

modified river channels and floodplains for our own purposes, reducing their size and ecological functionality.

Seasonal variability in lateral and longitudinal connectivity is a key ecological feature for fish species, with the diversity of floodplain habitat providing vital species-specific niches. The construction of dams, locks, weirs and impoundments has caused barriers which separate fish from specialised / essential resources or habitats vital for the completion of their lifecycle (e.g. spawning gravels) leading to population fragmentation. Migratory species are often lost locally, species diversity declines and the sustainable use of

Feature Article: Out of sight, out of mind? Monitoring freshwater fish (contd)

resources can be lost. These impacts have been long understood; in 1215 the Magna Carta demanded the removal of numerous weirs along the River Thames so that Atlantic salmon *Salmo salar* (L.) and sea trout *Salmo trutta* L. could pass upstream to access spawning grounds.

Why survey fish?

Traditionally the monitoring of freshwater fish populations in England has been driven by the regulator's (The Environment Agency) statutory duty to 'maintain, improve and develop' freshwater fisheries under the Salmon and Freshwater Fisheries Act 1975 (SAFFA). Fisheries monitoring techniques have evolved over the last forty years and new technologies have been utilised to gather increasingly detailed information on this group of animals that can sometimes be out of sight and therefore out of mind.

Survey methodologies allow for quantitative data collection usually within an isolated area, e.g. between stop nets, which prevent fish entering or leaving the survey site. By removing the fish after each survey of the same area, removal sampling statistics can be applied to produce population estimates. In addition, data can be presented as catch per unit effort (CPUE).

Fisheries monitoring data is most often used to generate current status information, e.g. Water Framework Directive (WFD) classification or Special Area of Conservation (SAC) designation species assessment. Data can be reported locally or at the international level, e.g. International Council for the Exploration of the Sea (ICES). Fisheries surveys provide intelligence, and long-term monitoring programmes are able to detect trends that can be attributed to natural variation, driven by climate change or associated with habitat degradation. Data can also be used to predict a response to a proposed altered habitat quality or quantity regime (e.g. abstraction, discharge, impact assessments, flood risk management, etc.) through modelling as well as informing management decisions and targeting improvement schemes through habitat enhancements or river restoration. Fisheries surveys can inform legal actions following pollution incidents by comparing historic/pre- and post-incident survey results. Data can also demonstrate the benefits of

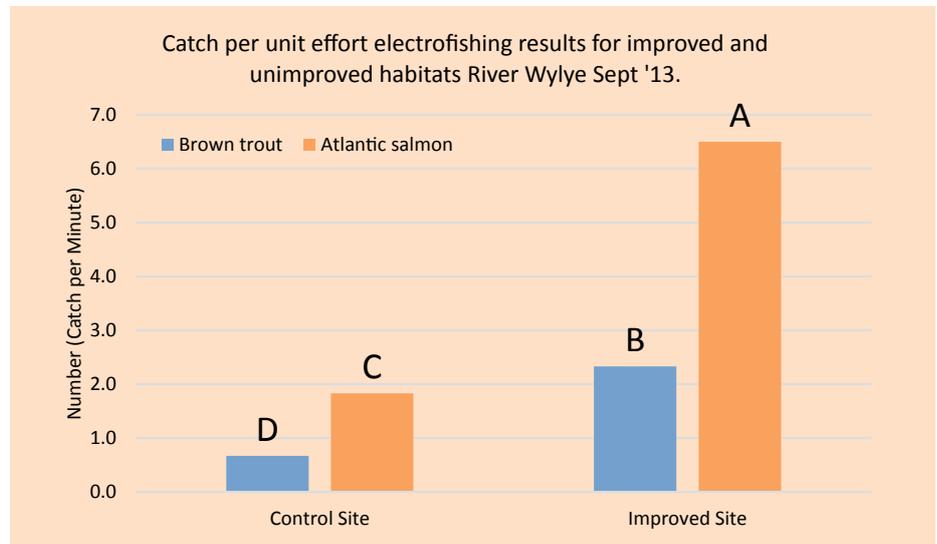


Figure 1. Results of catch per unit effort (CPUE) electric fishing surveys demonstrating the benefit of habitat enhancements on the River Wylde, Wiltshire. Control site vs enhanced site, letters above each column denote salmonid density classifications (A= excellent, B= good, C= fair, D= poor, E= absent); from Crozier & Kennedy (1994).

habitat improvements and river restoration schemes (Figure 1), informing and aiding future funding bids.

Legislative framework

Rehabilitation of riverine ecosystems is currently being driven in the European Union by the Water Framework Directive (2000/60/EEC). This legislation establishes a framework for the protection of groundwater, inland surface, estuarine (transitional), and coastal waters. Objectives are to prevent water ecosystem deterioration, to protect and to enhance the status of water resources and, most importantly for rehabilitation, to achieve a 'good ecological status' for all waters, by 2027. The ecological status is based upon the biological (phytoplankton, macroalgae, macrophytes, benthos and fishes), hydromorphological and physicochemical qualities of the waterbody (UKTAG 2008). Other legislation underpinning fisheries monitoring include the:

- **Salmon and Freshwater Fisheries Act 1975** – provides legal protection for salmon and freshwater fish.
- **Eel (England and Wales) regulations 2009** – facilitating free passage for migrating eels *Anguilla anguilla* (L.).
- **EC Habitats Directive: Annex II** – requiring designation of SACs for lamprey (sea *Petromyzon marinus* L.; brook *Lampetra planeri* (B.); river *Lampetra fluviatilis* (L.)), salmon, allis

shad *Alosa alosa* (L.), twaite shad *Alosa fallax* (La.), spined loach *Cobitis taenia* L., bullhead *Cottus gobio* L.; **Annex IV** – strict protection of sturgeon *Acipenser* spp.; **Annex V** – Exploitation subject to management restrictions for allis shad, twaite shad, barbel *Barbus barbus* (L.), vendace *Coregonus albula* (L.), powan *Coregonus clupeoides* La., grayling *Thymallus thymallus* (L.), salmon, river lamprey.

- **BAP Priority list:** sturgeon, allis shad, twaite shad, eel, spined loach, vendace, whitefish, river/sea lamprey, smelt *Osmerus eperlanus* (L.), salmon, brown/sea trout, Arctic char *Salvelinus alpinus alpinus* (L.).

Using the appropriate methods & techniques

Huet (1959) described how river habitats progress from upstream starting with the trout zone, i.e. upland river habitat dominated by salmonids, towards the bream zone, i.e. lowland habitat with extensive macrophyte growth dominated by limnophilic species. Table 1 gives a simplified classification for fish species of modified European floodplain rivers into guilds by their habitat requirements. These well-known key habitat types provide a useful guide when selecting fisheries monitoring methodologies, as appropriate survey methods are affected by the physical characteristics of the watercourse.

Table 1. Fishes of modified European floodplain rivers classified into guilds by their habitat requirements.

Simplified from Schiemer & Waidbacher (1992) and Nunn et al. (2007).		
Guild	Spawning, nursery and adult habitat requirement	Example species
Rheophilic	Flowing water to spawn and are usually found in fast-flowing, well oxygenated stretches of river where substratum is characterised by sand or gravel.	Dace <i>Leuciscus leuciscus</i> (L.), chub <i>Leuciscus cephalus</i> (L.) & barbel
Limnophilic	Low velocity habitats such as floodplain waterbodies, back waters and oxbow lakes.	Tench <i>Tinca tinca</i> (L.) & common bream <i>Abramis brama</i>
Eurytopic	Less strict requirements for spawning and are thus able to establish populations in a wide range of waterbodies.	Perch <i>Perca fluviatilis</i> L. & roach <i>Rutilus rutilus</i> (L.)

Key consideration when selecting a survey methodology should be the aims and objectives of the survey (e.g. quantitative stock assessment), ensuring that the method used is capable of delivering the data required. Other considerations will include time and manpower available, budget, and the timing of surveys in regard to both the behaviour and life stage of fish species being targeted. The specific aims and objectives of surveys will dictate what factors should take priority.

Like most ecological surveys, fisheries surveys rely on catching the target species (fish or fishes) against a known constant, time or space. Due to the diversity of aquatic ecosystems, no single fish catching method is effective or efficient in all niche environments commonly found in riverine ecosystems. Different fisheries survey methods are required depending on the target environment and life stage being monitored. For example monitoring salmon smolts (juveniles migrating to sea) can yield valuable information on this early life stage, providing an unambiguous measure of freshwater production for any given year (Cowx & Fraser 2003). However, as these fish actively migrate through the river towards the sea during the night in April/May, monitoring methodologies must be appropriate if meaningful data is to be collected. In this case, trapping with a rotary screw trap at night during the spring months would be most appropriate.

Survey methods

All methods that rely on fish capture require consent under the Salmon and



Measuring a juvenile barbel

Freshwater Fisheries Act 1975 (SAFFA). Some of the most relevant techniques applicable to the freshwater environment are summarised in Table 2.

Fish pass monitoring

Fish passes (fishway, fish ladder or fish steps) are structures on or around artificial barriers (such as locks, weirs and dams) to facilitate the natural movement or migration of fishes. Fish passes enable fish to pass around barriers by swimming up a series of relatively low steps or through a channel containing flow characteristics that allow fish passage. Water velocity has to be great enough to attract the fish to the pass, but should not be so great that it prevents free passage (see Environment Agency 2010). Monitoring the efficiency of fish passes or the impacts of obstructions can be done with less direct methods, e.g. redd count surveys upstream and downstream of fish passes. However, direct monitoring can include telemetry, fish counters (resistivity & infrared), video cameras (Figure 2) and acoustics. Each is applicable to different situations and should be selected dependent on specific study objectives.

Restoring habitat connectivity is a universal rehabilitation strategy for freshwater fish populations and fish passage solutions have been implemented on virtually every river in England and Wales. However, fish passes must operate as intended and few such projects receive much in the way of post-installation monitoring. Fish passes often do not operate as intended, frequently preventing or delaying the passage of fishes. This highlights the need for effective monitoring and, given the large capital investment, individual monitoring of schemes should be practiced more widely to assess and improve design features.

Recommendations

In summary, we would encourage ecologists to be more aware of the dynamics of aquatic ecosystems and the organisms they contain. When working on a project that has potential to impact on a stream, river or lake, obtain specialist advice on the aquatic fauna and hydrology of the area. As with all ecological survey, careful consideration of the methods and techniques available is vital before starting work. The key is to choose the appropriate survey method to address study aims and objectives, that is also appropriate for the physical characteristics of the target watercourse.

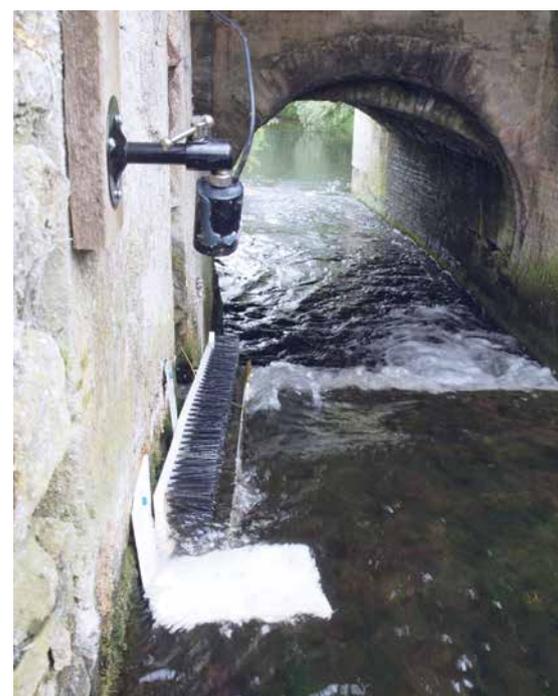


Figure 2. Video camera monitoring on an eel pass.

Feature Article: Out of sight, out of mind? Monitoring freshwater fish (contd)

Table 2. Summary of the most relevant fisheries survey techniques applicable to the freshwater environment.

Survey type	When used	Target species	How it works
Electric fishing / electrofishing	Water up to 2 m; trout/grayling and barbel zones. Electric fishing can also be used to target specific species in specific habitats, e.g. juvenile salmonids (see Cowx & Fraser 2003) or lamprey (see Harvey & Cowx 2003).	Any	Electrodes immersed in the water deliver an electrical charge that causes fish to swim involuntarily towards the positive electrode where they can be caught with a net. Fish recover quickly and can be held in aerated tanks for identification and measurement (see Beaumont 2011; Figure 3).
Seine netting	Larger homogeneous slow flowing rivers / stillwaters	Any	Rectangular netting with weights along one long edge and floats along the other, which allows the net to be worked through the water collecting or herding fish so they can be caught (see Hickey 1996). Stop nets can be utilised at either end of the survey site to produce quantitative results with the 'wrap around' survey technique. Figure 4.
Hydroacoustics	Larger homogeneous slow flowing rivers / stillwaters. Night time survey window since fish are more active and evenly distributed throughout the water column during the hours of darkness.	Any, but as fish are not captured does not ID to species.	A pulse of sound is transmitted through the water column (either vertically or horizontally) to effectively count the number of fish present (see Duncan & Kubecka 1993). Delivers stock assessment of the fish population at the community level.
Dual Frequency Identification Sonar (DIDSON)	Larger homogeneous slow flowing rivers / stillwaters; can also be used to study fish behaviour at structures like pumping stations, weirs and fish passes.	Any, but ID to species is rarely possible although method can be used to count downstream migrating silver eels.	High resolution acoustics technique used for studying fish and their behaviour at fixed locations.
Fyke nets and traps	Larger homogeneous slow flowing rivers / stillwaters	Mostly eels and salmonids.	Fyke nets are based on the minnow trap principle (fish easily enter a small opening and cannot find their way out again) and have traditionally been used to catch eels commercially. Other types of fish trap include rotary screw trap (Figure 5) used to capture downstream migrating, surface orientated fish (i.e. salmon and sea trout smolts) and eel racks which essentially sieve a proportion of a river's flow to catch downstream migrating silver eels.
Telemetry	Freshwater & marine	Any large enough to carry tag (2% rule; Winter 1983).	Modern telemetry technology offers a powerful tool for studying the long-term movements of individual fishes, with high temporal and spatial resolution (Lucas & Baras 2001). Individual fish are caught and tagged, their behaviour can then be studied remotely. Surgical implantation into the body cavity is regulated by The Home Office under Animals (Scientific Procedures) Act 1986. Radio tracking generally requires manual data collection, restricting temporal resolution, but delivers high spatial resolution (within a few metres). With acoustic tracking data, collection is automated with stand-alone data logging receivers offering lower spatial resolution (100s of metres) but with complete temporal coverage. Passive integrated transponder (PIT) tags offer the potential for long-term study as they require no batteries and are cost effective (£2 per tag as opposed to £200+ for radio or acoustic tags).

Figure 3. Boat-based electric fishing survey in progress.

Figure 4. Hauling seine nets to survey a large lowland river.

Figure 5. Rotary screw trap in use to catch actively migrating salmon smolts on the Hampshire Avon.



Equipment	Manpower
Generator, control box, anode(s), cathode, retention cages, boat (if required), waders / drysuit, life jacket	Minimum 2 people
Nets, retention cages, boat (if required), life jacket	Dependent on net size, but generally 4-8 people.
Echosounder, computer, transducer, boat, life jacket	Minimum 2 people
DIDSON, computer, life jacket	Minimum 2 people to install
Trap and ancillary equipment	Minimum 2 people to install and check/run
Study dependent. Battery operated tags have a limited life span, hence there is a trade-off with tag life and size. Radio transmitters are suitable in low conductivity (< 500 µS/cm) environments. Acoustic tracking can be used in all but the shallowest of riverine environments (including marine); passive integrated transponder (PIT) tags can be used in restricted environments because tags are detected by loop antennae (1 x 10m).	Minimum 4 people to catch and tag fish

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The role of beaver-generated landscapes in flood prevention

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One of the Eurasian beavers at the Devon Beaver Project site, coppicing willow. (© David Plummer – <http://www.davidplummerimages.co.uk>)

The winter floods of 2013/14 focused attention on the role of land management in the exacerbation of flood events. Various commentators advised on the need to slow and retain water in the wooded, upper reaches of river catchments. Trial projects such as that developed by the Environment Agency at Belford in Northumberland demonstrate that the installation of Runoff Attenuation Features such as storage ponds and bunds, in

combination with the provision of significant quantities of woody debris in the riparian zone, can provide an effective system of flood mitigation. These artificial features mimic the structures and environments that are naturally created by both Canadian and Eurasian beavers. There is evidence from North America, Europe and Britain that beaver-generated landscapes in the upper reaches of watersheds can play a significant role in flood dissipation.

Historical context

The water management abilities of both the Eurasian beaver *Castor fiber* and its North American cousin, the Canadian beaver *Castor canadensis*, have been recognised by humans for millennia. Evidence from archaeological sites, historic accounts and place names all indicate that beavers were once a widespread British species (Coles 2006). While the principal reason for their decline was over-hunting for their fur, meat and anal glands (Gurnell *et al.* 2008), the last surviving individuals may have been exterminated when conflicts arose over irrigation water for agriculture (B. Coles, pers. comm.). The last recorded payment of a bounty for a beaver's head in Britain was in 1789 (Coles 2006).

There have been historic attempts to recreate the features of a beaver-engineered landscape for human purposes. In his book *'Three against the Wilderness'* Eric Collier graphically described how the eradication of the beavers from his ranch at Meldrum Creek in British Columbia directly resulted in the disappearance of wetlands (Collier 1959). The winter floods that destroyed the beaver dams were followed by acute summer droughts. Pasture in the lower catchment dried out and large numbers of cattle trying to drink from the last remaining deep pools got stuck in the mud and died. Wild fires raged unchecked through the dense, dry undergrowth of the valley bottoms destroying huge swathes of forest. The community of fur-bearing mammals, which formerly had been abundant, disappeared along with the fish, wetland birds and large game. In response, the Colliers rebuilt over 25 ruined beaver dams with felled spruce. Each dam flooded an area of between 80 and 500 acres. Maintenance of the dams was labour intensive and ultimately unsustainable. Gaps washed through the barriers by winter floods led to dam collapse, with the released water then destroying other structures further downstream. The nearest beaver populations were several hundred miles away and natural re-colonisation was not possible. Eventually the Game Department provided two pairs of young beavers to repopulate the creek and their activities eventually stabilised the wetlands. As beavers had existed in Meldrum Creek within the living memory of Collier's Indian neighbours, he was able to understand the ecological impacts of their loss.

Throughout much of their former European range, familiarity with the beaver, and knowledge of the niche they occupy and the function of the habitats they create, has been lost from recollection.

Flood Risk Management

In response to the floods of 2007, the Government-commissioned Pitt Review

included a number of measures aimed at slowing water and keeping it in areas where it would less likely to be a problem. This report also cited the wider amenity and biodiversity benefits which would accrue from this process (Pitt 2008). The Flood and Water Management Act 2010 encouraged the restoration of natural processes wherever possible as a method of reducing flood risk (Parliamentary Offices of Science and Technology 2011). These policies, coupled with concerns about climate change, called for the development of sustainable solutions for flood management (Parrott *et al.* 2009).

In 2007 a joint project between Newcastle University and the Environment Agency was developed to assess the potential of a 'soft' engineering system to afford a sustainable system of flood relief for the village of Belford in Northumberland (Nicholson *et al.* 2012). Although Belford had been flooded annually for seven years it failed to qualify for grant-in-aid funding and conventional flood defences would have been technically difficult to construct. (Wilkinson and Quinn 2010). A series of different Runoff Attenuation Features (RAFs) were developed with the cooperation of landowners in the catchment of Belford Burn upstream of the village. These included storage ponds, barriers, and planting and positioning of woody debris in the riparian zone. The holding structures were designed to fill and release water slowly during periods

of heavy rainfall (Nicholson *et al.* 2012). Other features such as large woody debris in the watercourse, forced the floodwaters to rise and spill into the floodplain where further woody debris was installed to increase friction (Wilkinson *et al.* 2010). The combined impact of these structures has proven to be highly effective at storing and slowing the run-off from the catchment over time. Additional benefits include improved water quality, the capture of sediment picked up during overland flow and the development of small wetlands, which have resulted in increased biodiversity. The success of this project has led to other initiatives such as the 'Slowing the Flow' multi-agency process currently under development in the Vale of Pickering, Yorkshire (Forestry Research 2014).

All the forgoing features are characteristics of beaver-generated landscapes. They are sustainably created, repaired, renewed and replaced by the natural ecology of an animal. Ironically this parity is acknowledged in the description of an artificially created log-installation in a dry stream bed at Belford in the RAF Handbook as a "A woody debris beaver dam" (Wilkinson and Quinn 2010)

Beavers as water engineers

Both species of beaver are highly territorial and employ scent marking coupled with aggressive displays or interactions between neighbouring colonies to maintain their



Beaver-generated landscape in a former conifer plantation in the headwaters of the River Danube.

living space (Campbell-Palmer *et al.* 2014). They exist in multi-generational family units from which their offspring migrate in their second spring. Dispersing individuals must run the gauntlet of neighbouring families while trying to establish territories of their own. A re-establishing beaver population gradually expands its range through a catchment by initially selecting the best available habitats. On large river systems these are typically well-vegetated and wooded river banks that are friable enough to allow burrow construction. In these environments beavers do not construct dams. Once these habitats are fully occupied migrants are forced to colonise the less favourable environments of the headwaters and tributaries where they readily construct dam systems to afford protection against predators and expand their riparian foraging range. Depending on the character of the watershed that is re-colonised, it may take many years before a reintroduced population begins to develop these specific habitats. For example the beaver population reintroduced to Bavaria in 1965 is only now beginning to influence landscapes on a larger scale in the upper reaches of tributaries to the River Danube (G. Schwab, pers. comm.). This process can be accelerated by direct re-introduction into small, well-wooded catchments, which are spatially isolated from other riparian systems.

Both North American and Eurasian beavers are capable dam builders (Gurnell *et al.* 2008). The wetland landscapes created by their dam building activities afford highly complex environments with an abundance of standing, fallen and submerged dead wood providing living space for a wealth of associated wildlife. These habitats are typically established where narrow, stream systems with a channel depth of less than 60 cm triggers dam building activity (Coles 2006). Beavers generally utilise timber for dam construction but will in rocky landscapes combine stones bound together with mud. In other treeless locations they can exploit the roots of aquatic plants or rushes to create very broad dams (Gurnell *et al.* 2008).

The impact of beaver dams on hydrology can be dramatic. In one North American study, water took 3-4 hours to travel 2.6 km where there were no beaver dams.



The largest beaver pond at the Devon Trial site is now over 335 m² (© Mark Elliott, DWT)

When a single, leaky beaver dam, 1.5 m high, was established, it took 11 days to travel the same distance (Müller-Schwarze and Sun 2003). In the Belgian Ardennes where beavers were reintroduced in 2003 a series of six beaver dams on the River Chevral resulted in a significant lowering of discharge peaks on the downstream, reaches of the river (Nyssen *et al.* 2011). These dams increased the recurrence interval of a 60 m³ reference flood from 3.4 to 5.6 years (Nyssen *et al.* 2011). The number of impoundments created by beavers in any given territory will vary according to the number and density of beavers in a colony, the availability of building materials and the topography of the surrounding landscape. In France, at Keriou in Brittany the channel capacity prior to the development of the beaver dams was calculated at 535 m³ over a distance of 120 metres. With six well-maintained dams *in situ* this rose to 3250 m³. Prior to its colonisation by beavers, the St Roman stream, a tributary of the River Roudoudour, was a very shallow, narrow watercourse with no natural ponds or associated wetlands. It was estimated to contain 9.7 m³ water over a 90 metre stretch with no beaver dams; with the dams in good repair a thirty-fold increase to 288 m³ was estimated (Coles 2006).

The Devon Beaver Project

Although there are free-living populations of beavers in Scotland in the Knapdale Forest in Kintyre and throughout the basin of the River Tay in eastern Scotland (R. Campbell-Palmer pers. comm.), they currently exist at low densities. No known colonies currently inhabit environments with multiple dam features. In March 2011 a pair of Eurasian beavers was released into a 3 ha enclosure as part of the Devon Beaver Project. This project, led by the Devon Wildlife Trust in collaboration with a private landowner, is designed to investigate the impact of beavers on the ecology and hydrology of a semi-natural area of "Culm grassland." Prior to the introduction of the beavers, a small release pond was constructed in the enclosure. Apart from this and a few temporary pools that had formed under the root plates of fallen trees, the only open water was a trickle, which flowed over the ground surface of the wet woodland from a small spring on its boundary. The pair of beavers (and the three kits they produced in 2013) have dramatically altered this environment. The trickle of water has been extensively dammed and canalised, and a series of approximately eight ponds, associated marshes and interconnecting beaver 'canals' have been constructed. Detailed

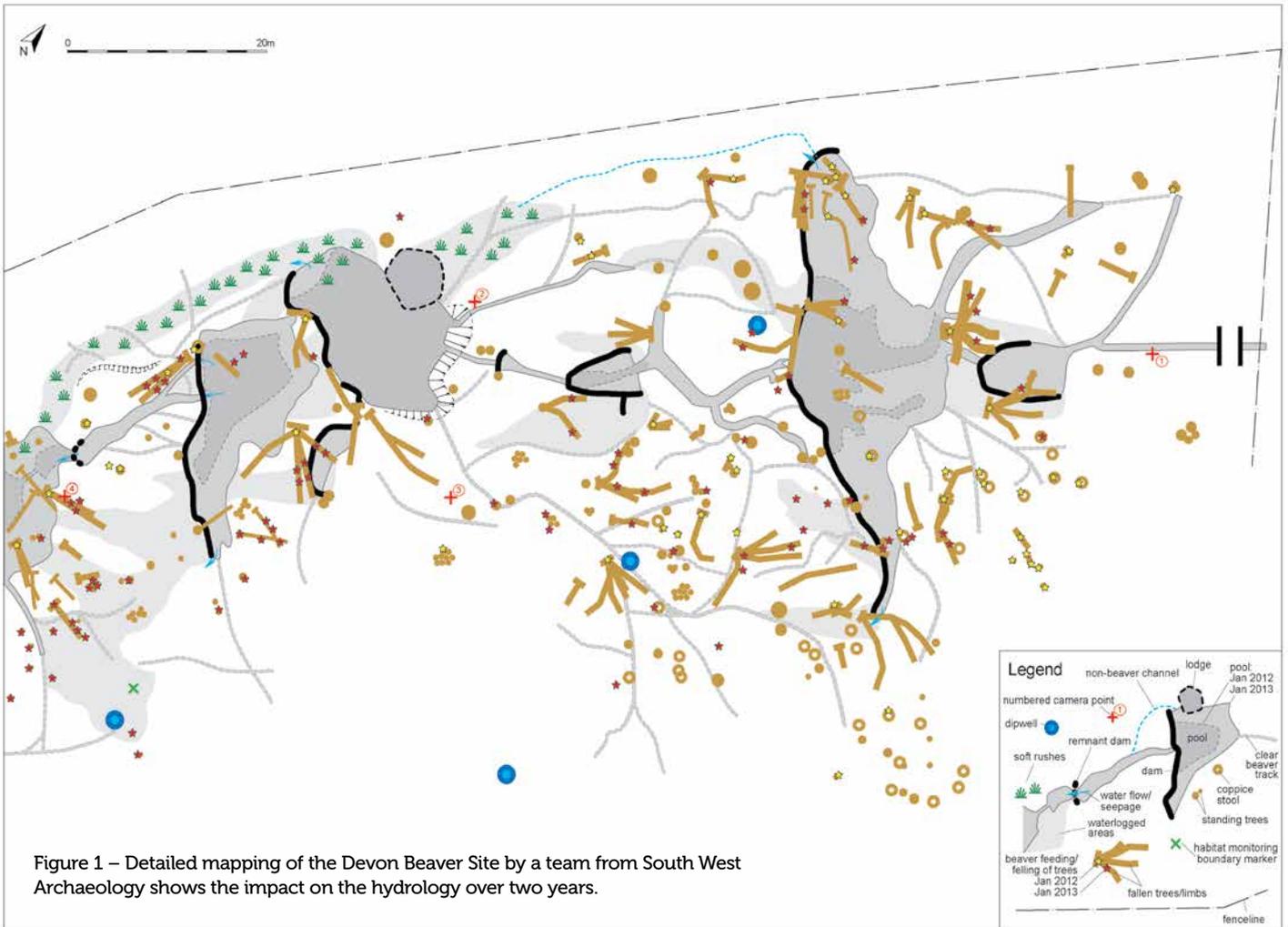


Figure 1 – Detailed mapping of the Devon Beaver Site by a team from South West Archaeology shows the impact on the hydrology over two years.



Water spills over, through and round a beaver dam creating a varied wetland mosaic immediately below the pond. (© Mark Elliott, DWT)

hydrological and topographical maps have allowed these to be accurately measured and the pond volumes calculated.

The eight ponds alone have a total volume of 416 m³. They vary in surface area from 6 m² to 335 m² within a 100 m length of watercourse (Elliott & Burgess 2013). If this process was extrapolated throughout a larger catchment, the impacts on flood flows and droughts would be significant.

The change from a single overland flow passing through the woodland to a highly complex mosaic of ponds and braided channels emanating from the numerous dams has been particularly interesting. Many of the dams are now several metres in height and although their impact was anticipated, the complexity of the wetland habitats that have rapidly developed has been surprising. The dams are permeable and seep at a number of points along their length. The beavers expand them rapidly in response to the availability of

water by damming flooded foraging trails or major areas of novel flow. As the dams gradually increase in height and extent, the seepage points appear over a longer length forcing the water out laterally over minor watersheds. This process creates a dynamic pattern of new, complex channels running in totally different directions to the original source of flow. This aspect of their character is of note. A series of ponds that are permanently full afford a limited capacity to capture floodwater. The constant flow of water from the beaver dams results in their levels dropping dramatically between rainfall events, which renews their capacity for further storage. Beaver dams are resilient structures that are ramped from their pond base at an approximate angle of 45 degrees to the top of their structure. This design partly results from the way in which the beavers deposit material and partly from their natural retention of significant amounts of

Feature Article: The role of beaver-generated landscapes in flood prevention (contd)

silt over time. As a consequence, during heavy rain, water flows up and over the main dam wall rather than pressing against it. When dams do breach, they usually do so at a specific point - rather than the whole structure collapsing - leaving the main wall in place. If the breach is not repaired by the beavers, the main structure can remain in situ for many years (D. Gow, pers. obs.). In addition to the ponds, canals and streams, water is also stored in the surrounding soil. Although the soils were already saturated throughout much of the Devon site, the network of beaver dams, canals and pools has raised ground water levels in places to creating quaking bogs with liquefied soil. A network of eight dip-wells sunk into the ground to measure these changes has identified a higher and

more stable water level (see Figure 2). These initial findings have resulted in the development of a more detailed research project in collaboration with the University of Exeter.

The early stages of the Devon Beaver Project clearly demonstrate the potential of beaver-generated wetlands to retain water. Studies elsewhere in Europe and Canada have shown that beaver dams play a significant role in the reduction of peak flow flood events (Beedle 1991). During dry periods the discharge of low flows is increased (Parker 1986) and this process may even convert temporary rivers into permanent ones (Yeager and Hill 1954, Rutherford 1955, Collen and Gibson 2000). Where beaver dams are removed, the subsequent change in channel structure can

increase the mean flow velocity by five-fold (Green and Westbrook 2009).

In the lower lying reaches of river systems in Western Europe there are occasional conflicts between beaver activity and the requirements of developed human infrastructure. However, while beavers sometimes burrow into flood defence structures or riverbanks, block drainage ditches or road culverts and flood areas of productive farmland, there are established management techniques which mitigate their impact (Gurnell *et al.* 2008). Since the beginning of the 20th Century a host of reintroduction projects followed by an accelerating process of natural re-colonisation has resulted in the widespread recovery of both species (Halley and Rosell 2002). It is clear that beavers can adapt to and exist quite successfully in highly engineered, riparian landscapes.

Next steps

Beavers have a low reproductive rate and are slow to cross catchment boundaries (Halley and Rosell 2002). These aspects of their ecology provide the opportunity to gradually assess their effectiveness as agents of water management without committing to a national process of reintroduction in the first instance. Over time, as the results of release trials are clarified, any process or restoration could be expanded or terminated with ease. Beaver-generated landscapes have the clear potential to provide natural, sustainable, expanding systems of effective water management. In their most basic form their pertinence would equally apply to both flood dissipation and water storage. Although there would be costs associated with the species' restoration, three independent feasibility studies commissioned respectively by Natural England, Scottish Natural Heritage and the Countryside Council for Wales (Macdonald *et al.* 2000, Gurnell *et al.* 2008, Jones *et al.* 2012) have all recommended that trial reintroductions of beavers should be explored in Britain.

As flood risks increase and the costs of conventional mitigation rise, the restoration of the Eurasian beaver could become a social and political priority.

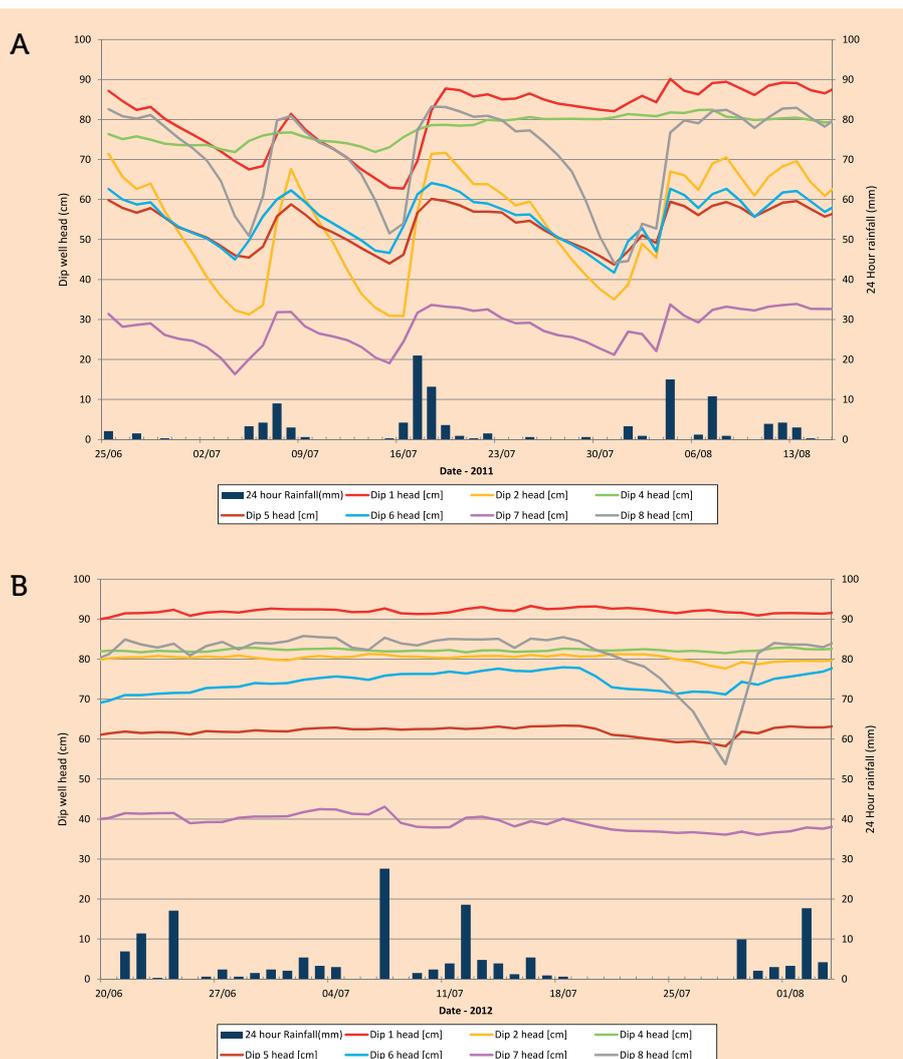


Figure 2 – Comparison of soil water levels at the Devon site in 2011 (Fig. 2a) and 2012 (Fig. 2b) showing much less fluctuation after beavers occupied the site in 2012.

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Beaver canals are used to explore and exploit the territory from the relative safety of water, and for transporting cut wood. (© Mark Elliott, DWT)

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Claws for thought – invasive non-native crayfish in the UK

Adam Ellis MCIEEM MIFM

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Invasive non-native species are known to cause significant economic, social and biodiversity issues across the globe. Aquatic invasive species often go unnoticed but have the potential to significantly alter native communities and impact ecosystem functioning. There are a number of non-native crayfish species in the wild in the UK, with potential for more new arrivals. As environmental professionals we need to have a greater awareness of invasive non-native species so that we can act as an early warning system for new populations as well as being ambassadors for good biosecurity practices.

Awareness of invasive non-native species, particularly aquatic invaders, has increased in the last five years as a result of campaigns such as 'Plantwise' (see <http://www.nonnativespecies.org/beplantwise/>) and 'Clean-Clean-Dry' (see <http://www.nonnativespecies.org/checkcleandry/>). The media have also picked up on a number of 'alien-invader' stories, many of which include the dreaded invasive crayfish.

The introduction and subsequent spread of signal crayfish *Pacifastacus leniusculus* into England, Wales and Scotland has been well documented, as has the concurrent decline of our native white-clawed crayfish *Austropotamobius pallipes*. However, the sequential arrival of multiple crayfish species has received much less attention. Do we need to worry? Are multiple species



Large virile crayfish

going to be more of a problem than signal crayfish alone? To help us answer that question, this article summarises what we already know.

There are UK records of seven established, invasive, non-native crayfish species:

signal *Pacifastacus leniusculus*, **Turkish** *Astacus leptodactylus*, **noble** *Astacus astacus*, **spiny-cheek** *Orconectes limosus*, **virile** *Orconectes virilis*, **red swamp** *Procambarus clarkia* and **white river** *Procambarus acutus* (Table 1).

A further species is present legally in

the aquarium trade, **red claw crayfish** *Cherax quadricarinatus* (often sold as blue lobster). This species has not been recorded in the wild in the UK to date and it is widely considered to have a low risk of establishment in relatively cool climates. However, there are many more species present in mainland Europe that could pose significant threats to aquatic ecosystems in the UK, two of the worst offenders being **rusty crayfish** *Orconectes rusticus* and the parthenogenetic **marbled crayfish** *Procambarus* sp.

Table 1. Invasive non-native species of crayfish in the UK

Species	Introduction	Distribution	Characteristics	Crayfish plague
Signal crayfish <i>Pacifastacus leniusculus</i>	From North America for aquaculture in 1970s; escaped &/or deliberately introduced to waterways.	Widely across England, Wales & Scotland.	Aggressive, fecund.	Vector
Turkish crayfish <i>Astacus leptodactylus</i>	From North America for food trade in 1970s; escaped &/or deliberately introduced to waterways.	Declining due to susceptibility to crayfish plague, e.g. several populations in Greater London disappeared in the 2000s.	Aggressive, fecund, fast-growing.	Susceptible
Noble crayfish <i>Astacus astacus</i>	From Europe for aquaculture in 1980s.	Originally found in small number of sites in south-west England; current distribution unknown but unlikely to spread further due to susceptibility to crayfish plague.		Susceptible
Spiny-cheek crayfish <i>Orconectes limosus</i>	From Europe in early 2000s.	First population in Warwickshire in 2001; subsequently at two sites in Lincolnshire and Nottinghamshire (site connected to River Trent so likely to be present in main river).	Smaller and less aggressive than other species but attains high population densities.	Vector
Virile crayfish <i>Orconectes virilis</i>	From North America and southern Canada.	First found in southern England in 2004 in small pond adjacent to River Lee. Spread quickly through catchment and now co-exists with signal crayfish. Currently confined to River Lee and adjacent gravel pits (although linked to the Thames, Regent's Canal/Lower Grand Union Canal).	Fecund – early sexual maturity allows rapid establishment (e.g. within 7 years). Most northerly range of any crayfish and able to withstand very cold conditions. Also thrives in warm waters.	Vector
Red swamp crayfish <i>Procambarus clarkii</i>	Early 1990s.	First found in Hampstead Heath Ponds, North London. Now in Regent's Canal and lower section of Grand Union Canal. Probably in other water bodies in North London.	Can survive in burrows in seasonal wetlands. Able to quickly cover large distances including over land. Easily adapts to cool climates but likely to benefit from climate warming.	Vector
White river crayfish <i>Procambarus acutus</i>	2012.	First found in southern England in 2012. Current distribution unknown.	Little known. Relatively small. Naturally suited to temperate climates.	Likely carrier



CIEEM Invasive non-native course in 2013, left to right: Red Swamp, Virile, White-River, White-clawed, Signal, Spiny-cheek and Turkish.

Feature Article: Claws for thought – invasive non-native crayfish in the UK (contd)

Crayfish invasion

In the 1970s and 1980s, aquaculture schemes promoted crayfish production as part of farm diversification, resulting in their widespread distribution. In addition, there is little restriction on the movement of live crayfish in England as long as they are destined for the food trade; these crayfish sometimes escape in transit or are released. Crayfish have been intentionally introduced to seed waters for further harvesting, as well as being unwittingly introduced by people not wanting to kill specimens that have been previously caught or found. Some introductions have been linked to the aquarium trade as well as to introductions of fish into commercial fisheries.

Management implications

So does it matter if we have signal crayfish in a watercourse, or even a cosmopolitan mix of species? As shown in Table 1, many introduced crayfish carry crayfish plague and some are both aggressive and highly fecund. The detrimental impact on native white-clawed crayfish is well-documented and negative effects on other species are inevitable. However, management is difficult (see *Natives and aliens on the River Glaven*, this issue). Prevention is far better than cure. Once populations are established, there is very little that can be done to control them. In certain circumstances eradication may be possible through the use of biocides, but it is vital that new populations are found early.

As ecological and environmental professionals, we need to raise awareness of the range of species present, and do as much as possible to educate the public, especially water users, on the risks associated with spreading invasive non-native species. Without proactive management, non-native invasive crayfish will slowly and inexorably spread to new catchments over forthcoming decades; only a small number of careless introductions would see this spread increase exponentially.

If you come across unusual looking crayfish, please take a photo and contact the regulatory body for your area or alternatively you can contact the author on adam.ellis@ahernecology.co.uk.



Signal crayfish marketing material from the late 1970s, hindsight is a wonderful thing!



The first instance of Virile and Signal crayfish co-existing in England, River Lee, Hertfordshire



Spiny-cheek crayfish from a private fishery in Warwickshire



Turkish crayfish from a fishery in Hertfordshire



Red Swamp crayfish from Regent's Canal

Further reading on invasive non-native crayfish in the UK

(Journal papers are open access)

Ahern, D., England, J. and Ellis, A. (2008). The virile crayfish, *Orconectes virilis* (Hagen, 1870) (Crustacea: Decapoda: Cambaridae), identified in the UK. *Aquatic Invasions*, **3**: 102-104.

Ellis, A., Jackson, M.C., Jennings, I., England, J. and Phillips, R. (2012). Present distribution and future spread of Louisiana red swamp crayfish *Procambarus clarkii* (Crustacea, Decapoda, Astacida, Cambaridae) in Britain: Implications for conservation of native species and habitats. *Knowledge and Management of Aquatic Ecosystems*, **406**: 05.

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Holdich, D. and Sibley, P. (2009). ICS and NICS in Britain in the 2000s. In: J. Brickland, D. Holdich and E. Imhoff, E. (eds), *Crayfish Conservation in the British Isles*, pp. 13-33. British Waterways, Leeds.

For general crayfish information including ID, legislation and overviews of current projects: <http://www.buglife.org.uk/uk-crayfish>

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Natives and Aliens on the River Glaven – a crayfish control case study

Martin Pugh MCIEEM
EECOS

This case study charts the fight to protect the River Glaven's white-clawed crayfish against invading signal crayfish and provides some insights into practical crayfish conservation – attempting to contain the spread of non-native crayfish whilst using the remaining indigenous population to set up safe 'Ark' sites.

A huge white-clawed crayfish *Austropotamobius pallipes* carcass discarded by an otter on the banks of the River Glaven, triggered a crayfish survey of this small chalk catchment during autumn 2006. Records for native crayfish date back to 1879, and it was exciting to re-confirm their presence: 90 were found across an 8 km central stretch (12 sites) and the presence of adults in burrows within vertical clay banks, as well as juveniles netted amongst marginal vegetation, indicated a healthy recruiting population (Pugh 2008). The River Glaven is one of the north Norfolk coastal rivers meeting the sea at Cley marshes, and is isolated from the larger catchments of the Great Ouse and Yare-Wensum, which have been extensively colonised by non-native crayfish. It was therefore hoped that the Glaven could provide a last refuge or 'Ark' for native crayfish in the region.

Signal Crayfish Threat

Hopes were dashed when a large male signal crayfish *Pacifastacus leniusculus* was spotted by torchlight ambulating down 'Water Lane', a minor tributary of the River Glaven. Some detective work quickly traced the crayfish back to a garden pond



River Glaven (White-clawed crayfish – inset)

Feature Article: Natives and Aliens on the River Glaven – a crayfish control case study (contd)

at Lawn Farm, where a small number were introduced in one of four ponds in ca. 1975 (Figure 1). A familiar story, the owner introduced the American species for the plate unaware of the potential consequences on native crayfish within the catchment. The middle farm pond now supports a large population – eight nights trapping with 20 traps removed 622 specimens (J. Compton, unpublished results). The farm ponds are hydrologically linked to the River Glaven, forming a cascade via over-flow pipes and feeding into Water Lane. This small drainage channel descends 1.8 km to discharge into a disused fishing lake, Letheringsett Lake, via a vertical fall and invert siphon inflow. The lake outflow falls over a steep concrete culvert and flows a further 550 m to join the Glaven. A signal crayfish must negotiate all of these obstacles to reach the main river. The lake probably represents the most important barrier to downstream movement, with a large carp and eel population, heavy siltation and a history of pollution from a nearby sewage works providing inhospitable conditions; trapping has recorded no crayfish.

Containment Measures

Once signal crayfish had been confirmed, the priority was to contain this aggressively invasive species within the sub-catchment to allow for any future control measures; complete eradication using biocides is technically possible within standing water sites or isolated sub-catchments, but is practically impossible once signal crayfish have reached the main river (Peay 2011). The non-native species has had over 35 years to become established and it was encouraging to find only white-clawed crayfish on the Glaven during initial survey work from 2006-10. However, it was clear that without intervention signal crayfish would eventually reach the main river and thereby precipitate the demise of native crayfish and threaten the sensitive aquatic fauna, which supports 14 fish species including stone loach, bullhead, brown/sea trout and brook lamprey. The local River Glaven Conservation Group (RGCG) in collaboration with the Environment Agency (EA), Norfolk Non-native Species Initiative (NNSI) and Essex Ecology Services Limited (EECOS), considered a range of containment methods.

i) Interception traps

In 2007 a novel method was trialled within Water Lane, in the form of two 'interception' traps. The small size of this tributary – 1.4 m wide and <0.10 m deep (normal flows) – and the absence of non-target species such as fish and water voles, made it possible to construct traps that span the entire channel. These could a) monitor numbers of signal crayfish moving downstream and b) remove them from the system to reduce chances of successful colonisation. The 'mark I' design (2007) involved five 'Trappy' crayfish traps lined with 8 mm² mesh covering the downstream funnel, strapped together in a simple wooden frame. This rudimentary design caught 12 adults between 3 September and 6 November 2007, proving signal crayfish were on the move. The 'mark II' design (2009) was inspired by a mink trap, consisting of a metal cage (8/12 mm² grid) fitted with 4/5 crayfish trap funnel entrances; access panels allowed

regular inspections. Traps were weighed down using cobbles, secured with wooden stakes and fitted with small escape holes with wooden slats for small mammals. Trap licences and a Flood Drainage Consent were obtained from EA before installation.



Interception traps

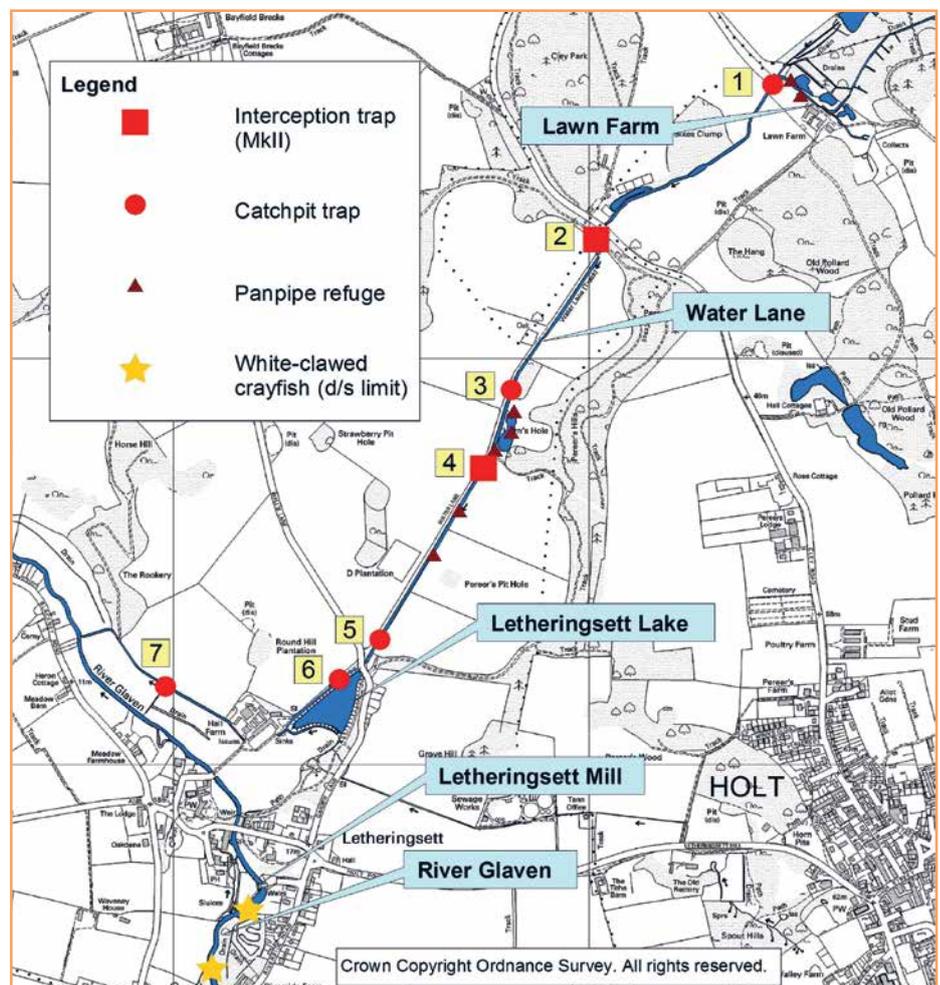


Figure 1. Locations of traps along Water Lane

ii) Catchpit traps

Seven catchpit traps were installed along Water Lane, ranging from a plastic storage container (330 mm depth) to a plastic water tank (600 mm depth). This method essentially involves a plastic settling tank sunk into a small stream by hand or digger. It can detect crayfish that are too small for traps in a watercourse with seasonally very low flows. Some traps were modified with a downstream-facing lip, making escape during high flows less likely. The majority of catchpits were installed during April 2011 in response to engineering works on Letheringsett Lake, involving de-silting and bank stabilisation; this resulted in a complete draw-down and the creation of a new cut-off channel. The new channel bypassed the lake connecting the sub-catchment directly to the River Glaven for the first time in 200 years, allowing almost free passage to signal crayfish. This was a major set-back and meant that the various Heath Robinson-like interception devices were all the more important.

iii) Artificial refuges

Water Lane has few refugia for larger crayfish, except in some of the undercut banks. 'Panpipe' style refuge traps were installed and attracted several larger crayfish. Trap types i) and ii) were checked on a daily basis using sweeps of a metal-framed invertebrate net. Signal crayfish were humanely dispatched and biosecurity measures were taken to stop the spread of crayfish plague. The traps are high-maintenance as the catchpit acts as a silt

trap whilst interception traps become blocked by leaves and woody debris, reducing the efficacy and damming the flow; regular clearance is necessary and the 'mark II' trap is removed during winter and periods of high flows. Trapping is therefore probably not sustainable in the long-term; however, it does provide a means of monitoring crayfish invasion, and buying valuable time whilst biocide treatment is being explored. To date, 873 signal crayfish have been removed en-route to the River Glaven, thanks to the heroic efforts of Robin Combe of the RGCG. The results show the importance of using multiple traps, as a surprising number of crayfish 'slipped through the net', appearing in traps further downstream. The interception traps tended to catch adults whilst catchpit traps were particularly effective with immature crayfish (Table 1).

Biocide Feasibility Study

A feasibility study was carried out in 2010 examining the potential for eradication of signal crayfish using natural pyrethrum (Pyblast) biocide treatment (Peay and Bryden 2010). Pyblast is highly toxic to crayfish, other invertebrates and fish but has very low toxicity to mammals and birds, degrading harmlessly with no persistent effects or bioaccumulation (Peay and Hiley 2006). The hydrology of Lawn Farm ponds is complicated and includes a number of springs upstream. However, the ponds themselves are easily isolated during low flows by vertically extending the outflow pipes. The main challenges were Letheringsett Lake, (0.75 ha, up to 2 m

deep, volume ~15000 m³), and Water Lane, which would have to be treated in sections (30-300 m depending on gradient), using bunds and pumps – all on a shoestring budget. During spring 2010, the potential for eradication using biocide treatment looked good – surveys for great crested newts, invertebrates, water chemistry, fish and hydrology had been completed and the various licences/consents were being prepared. Unfortunately, landowner consent proved the biggest obstacle, and permission from both major landowners was eventually withdrawn.

Trapping

Intensive trapping has never successfully eradicated signal crayfish from a water body, including in standing waters (Gherardi *et al.* 2011, Peay 2011). Many control attempts have shown that, although you can reduce the size classes by trapping and removing larger adults, the population responds by breeding at smaller sizes and juvenile/immature crayfish remain unchecked; this can inadvertently increase the overall crayfish biomass. Trapping can also stoke public interest, resulting in an increased chance of further (intentional or accidental) introductions and spreading crayfish plague to native populations; illegal, unlicensed traps have drowned several otters and water voles in recent years.

Despite these limitations, RGCG started trapping (following strict biosecurity measures) at Lawn Farm pond during autumn 2010 in the hope of lowering the density and reducing numbers of crayfish entering the catchment – until a time when landowner consent for biocide treatment of the entire system could be secured. In certain instances signal crayfish expansion can be as a direct consequence of increasing population density (Bubb *et al.* 2004) although other studies indicate that the rate of immigration is similar with or without removal of crayfish (Moorhouse and Macdonald 2010). As of 27 November 2013 after almost three years of trapping, 19,527 signal crayfish have been removed from the farm pond. Size classes and numbers of crayfish caught have reduced noticeably and crayfish 'on the move' along Water Lane appear to have declined. However, they continue to be found in traps despite the large number removed.

Table 1. Signal crayfish intercepted during 11-week period (3 April – 18 June 2011)

Trap type (up-stream to down-stream order), see Figure 1	Signal crayfish	Carapace lengths (CL)	No. >25mm
Panpipe refuge (7 traps)	10	19 - 38 mm	6 (60%)
1 Catchpit	2	38 - 42 mm	2 (100%)
2 Mark II interception	10	27 - 43 mm	10 (100%)
3 Catchpit	61	8 - 56 mm	30 (49%)
4 Mark II interception	15	17 - 52 mm	13 (87%)
5 Catchpit	53	7 - 55 mm	12 (23%)
6 Catchpit	10	12 - 40 mm	3 (30%)
7 Catchpit	3	14 - 39 mm	1 (33%)
Total	164		

Feature Article: Natives and Aliens on the River Glaven – a crayfish control case study (contd)

Lessons Learned

Sadly, the first signal crayfish – eight large males and one female – were found on the River Glaven located close to the confluence with Water Lane during 10 weeks of trapping started in August 2012. The greatest hope for native white-clawed crayfish now is a steep concrete weir at Letheringsett Mill, which separates them from the alien species downstream. Although this presents a formidable barrier, it is unlikely to prevent signal crayfish colonising upstream in the long-term. At this stage, there is therefore little benefit in continuing trapping; anything that may increase the interest in wild harvest would be a major risk for the future of white-clawed crayfish in the central part of the catchment. Instead, conservation action should focus on i) maintaining and upgrading the barriers (Rosewarne *et al.* 2013); ii) annual monitoring of the native and alien populations; and iii) salvaging white-clawed crayfish to establish new 'Ark' sites within Norfolk.

The efforts on the River Glaven have shown the challenges and opportunities in controlling invasive crayfish. The first priority must be to prevent an introduction in the first place. Once a catchment has been breached, then time is of the essence – successful eradication during these early stages may be possible if the landowner is on board from the start and all feasible containment measures are used to confine alien crayfish until potential biocides treatment. These options should be explored to the end if there is even a small chance of saving a river from a crayfish invasion.

'Ark' Sites – A New Hope

A contemporary approach to white-clawed crayfish conservation is to establish isolated 'Ark' sites where new populations can become safely established. A number of criteria determine Ark site suitability, including water quality/chemistry, suitable habitat and distance from non-natives (Kemp *et al.* 2003). The River Glaven represents an ideal donor site as it still supports one of the best native populations in the region; these are imminently threatened, and could be lost within days of a crayfish plague outbreak. In this instance, there was a therefore a sense of

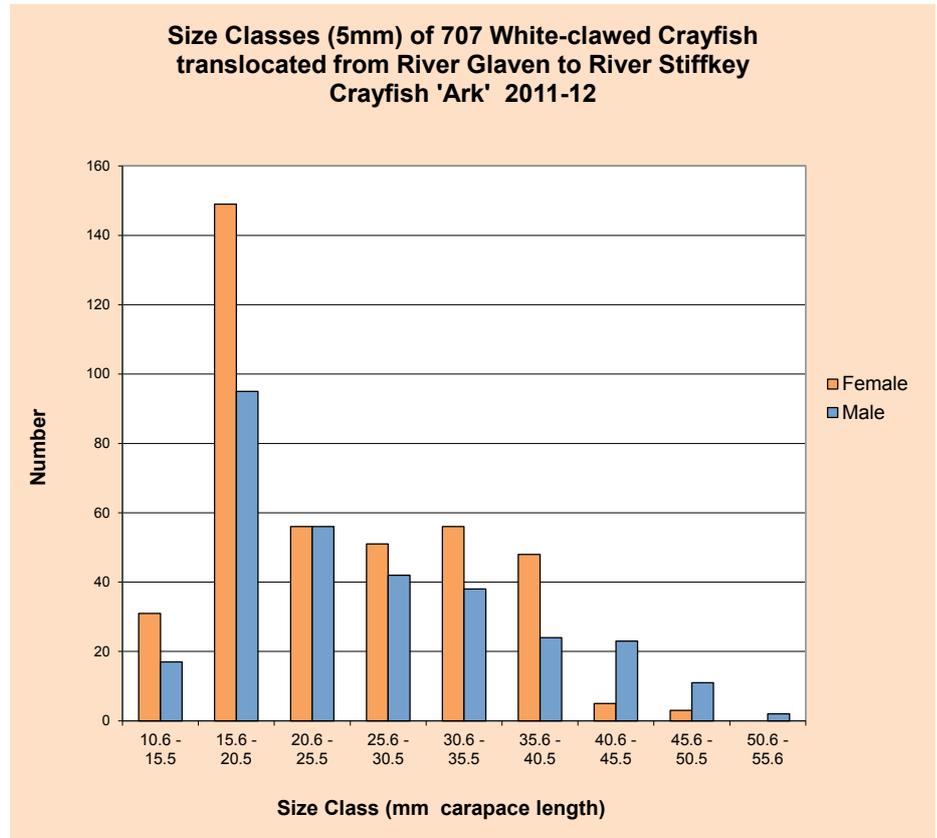


Figure 2. Graph showing size classes of 707 white-clawed crayfish moved to the River Stiffkey Ark

urgency to identify suitable Ark sites to stock. The River Stiffkey is a westerly sister-catchment of the Glaven, being a seaward draining chalk river with high water quality. The Stiffkey was identified as a suitable Ark candidate during crayfish surveys and water analysis carried out during 2009-10 (Pugh 2010, Watson 2011). No crayfish species – native or alien – were found but three historic records proved that the river supported white-clawed crayfish until 1981. This made it an ideal site for re-introduction within their natural range.

The first translocation took place on 23 September 2011 when a team of ten surveyors, armed with waders and pond nets, caught 211 healthy crayfish spanning the age ranges from small immature to large adults – required to set up a healthy viable population. The larger crayfish were enticed from numerous bankside burrows by careful prodding which usually prompted the crayfish to leave its burrow voluntarily; this shows that this technique – used with caution to prevent harm to crayfish and surveyor – can be useful during translocations from lowland rivers with few stony refuges. Dozens of

juveniles too small to positively identify as well as delicate moulting crayfish were returned to the river. In fading light, crayfish were released into their new home on the River Stiffkey, where they quickly crawled under tree roots or into bankside burrows – several hundred new burrows had been created for them using a metal bar. A further two translocations have since brought the total to 707 white-clawed crayfish moved to the River Stiffkey across three discrete sites to give the species the best chance to establish successfully (Figure 2). A further two Ark sites have since been stocked, including a pond in an isolated estate within the Glaven valley. The aim is to establish several more suitable Ark sites across Norfolk.

Two years on, monitoring efforts re-found three healthy individuals on the River Stiffkey and the early signs are promising. In donating a fraction of its population, the River Glaven has stocked what is currently the only catchment in East Anglia to contain only native crayfish. The River Stiffkey Ark site represents a significant step towards securing the future of white-clawed crayfish in Norfolk.



Acknowledgements

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Collecting and recording white-clawed crayfish ready for translocation to the River Stiffkey Ark



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Marine planning around England

Dr Paul Gilliland

Head of Marine Planning, Marine Management Organisation

Many CIEEM members will be familiar with the terrestrial planning system and its relevance to environmental and ecological matters. But what about the marine equivalent? Some readers may have heard of marine planning but are they aware of its progress and what marine plans might mean for the coastal and marine environment? The publication of the first marine plans around England in April of this year (for the East Inshore and Offshore) was a major milestone following substantial developmental work, engagement and evidence gathering over three years. The plans are now being put into practice and should inform decisions that may involve CIEEM members. Planning is underway in the next areas – South Inshore and Offshore – incorporating lessons learnt from the first plans.

The recent winter storms were a sharp reminder of challenges at the coast including how to take an appropriately integrated approach to the interface between land and sea. The seas around the UK are also of interest in their own right - home to over 8000 species, supporting a £49 billion maritime economy, which has the potential to grow significantly, and providing enjoyment to thousands. Marine planning can help ensure sustainable development by balancing environmental, economic and social interests. In the face

of increasing demand for use of marine space and resources that may impact on the sustainability of the sea, it makes sense to move away from a 'silo approach' to individual sectors and interests and to follow a more integrated, public and forward-looking process (see the animation at <http://www.marinemmanagement.org.uk/marineplanning/about/index.htm>).



The resulting plans will inform and guide marine users and regulators across England, managing the sustainable development of marine industries, such as wind farms, fishing and aggregate extraction, alongside the need to take account of local communities and protect leisure uses, the environment and marine species and habitats. Marine plans are expected to deliver a range of benefits such as:

- Greater certainty for investors/ developers – bringing substantial savings by helping developers avoid pursuing projects in the wrong place.
- Considering the environment at an early stage and in a more strategic way – providing context for regulators, developers and others to inform their decision-making.
- Earlier and better involvement of nearby communities – liaising with local authorities, local coastal groups and others to understand each area.
- Shared use of busy areas - so that as many industries as possible can benefit.

Through the Marine and Coastal Access Act (MCAA) the Marine Management Organisation (MMO) was delegated as the statutory body to undertake marine

planning in England although the Defra Secretary of State remains the marine planning authority. Marine planning officially started in April 2011 and plans for all areas are due to be produced by 2021 (Figure 1). In April 2014, marine planning reached a major milestone with the adoption of the first ever plans for England, for the East Inshore and Offshore areas stretching from Flamborough Head to Felixstowe, and up to 200 miles offshore or to the border with other countries. It is the culmination of three years of work by government, industry, voluntary organisations and individuals not only on the East marine plans but also on setting up the marine planning system and process from scratch. The process involved evidence gathering, stakeholder engagement, policy analysis, consultation across government and work with delivery partners.

Given strong interest in the coastal zone, it worth noting the requirement to have regard to existing measures, such as Shoreline Management Plans, and to take all reasonable steps to ensure marine plans are compatible with terrestrial plans, which has been achieved largely through working closely with local authorities (see also a guide at <http://www.marinemmanagement.org.uk/marineplanning/about/index.htm#la> and local plan 'soundness' checklist from the Planning Advisory Service at http://www.pas.gov.uk/web/pas-test-site/local-planning/-/journal_content/56/332612/15045/ARTICLE).

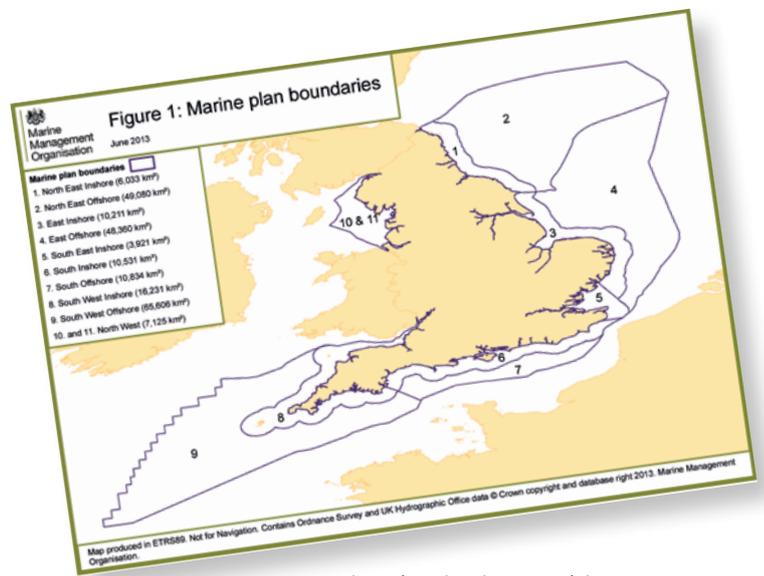
The planning process was supported by a great deal of evidence gathering including collation of data and research. Projects were commissioned across a wide range of subjects, many of direct interest to CIEEM members such as modelling fish habitats, addressing cumulative effects, use of seabed habitat maps, and applying an ecosystem approach (see a full list at <http://www.marinemmanagement.org.uk/evidence/register-reports.htm>).

Extensive consultation was essential during the development of the East marine plans, including:

- Stakeholder workshops attended by over 300 people.
- 350 one-to-one meetings with marine users.
- Local liaison officers based in Lowestoft and Grimsby meeting with many local stakeholders, attending their meetings and events.
- 12 public drop-in sessions across the East for over 600 people during development of the plans.
- Workshops and discussion with bordering countries and interested parties including Belgium, Netherlands, Germany, Denmark, Norway and the European Commission.
- Consultation at different steps in the planning process, including evidence and issues, vision and objectives and options. Consultations in 2012 alone generated more than 2,000 comments on draft documents from 70 different organisations.
- A Sustainability Appraisal (SA) Advisory Group made up of statutory bodies (including Natural England, JNCC and English Heritage), industry representatives and non-governmental organisations.
- 12-week public consultation on the draft East marine plans supported by 11 public drop-in events along the East coast and various other meetings and media reports, resulting in more than 2,000 individual comments taken from over 100 responses.

The East marine plans and associated documents, including a Sustainability Appraisal and a Habitats Regulations Assessment, can be found at http://www.marinemanagement.org.uk/marineplanning/areas/east_plans.htm. The plans include 11 plan objectives and 38 policies across a wide range of topics and sectors. There are objectives to do with the wider ecosystem, biodiversity, and marine protected areas and associated policies such as on cumulative

Figure 1: Marine plan areas around England.



effects. Some signposting to existing measures and policies has been included in response to stakeholder requests, for example the arrangements in place to address shoreline management and coastal flooding and the different protection currently afforded to biodiversity beyond designated sites, rather than duplicating these in new plan policies. As these are the first marine plans, and given not only limitations in the evidence base but also stakeholder views, there is a mix of 'strategic' as well as the equivalent of 'development control' policies. And the latter tend to be indicative, providing a signal towards what is required or to be avoided, rather than being prescriptive, for example indicating areas of importance for fishing or for fish habitat that new developments should seek to avoid compromising.

Of course the publication of the plans is not the end of process, as they need to be put into practice and the effects monitored. Plans will be implemented through being taken account of in decisions affecting the marine area – that includes decisions not only by the MMO but also by others such as Local Authorities, the Environment Agency, Inshore Fisheries and Conservation Authorities (IFCAs) and relevant government departments in the case of nationally significant infrastructure projects. If a CIEEM member is based in such public authorities, working for applicants or acting in an advisory capacity, it is likely that they will want to be familiar with the plan policies particularly where their interests are in or adjacent to the East marine areas. To assist applicants, developers and advisors, as well as decision-makers, an interactive tool has been developed, the Marine Information System <http://www.marinemanagement.org.uk/marineplanning/mis/index.htm>, to help understand how the East marine plans apply to different marine sectors and geographic areas.

Marine planning is an evolving process that will be adapted as more evidence and stakeholder feedback is gathered. As well as learning from the implementation of plans, lessons from the development of the East marine plans are informing the next plans. Work is already underway on the South Inshore and Offshore areas – from Folkestone to the River Dart in Devon and offshore. The evidence and issues that marine plans can address in the South plan areas was presented in the 'South Plan Analytical Report' (SPAR), which was subject to consultation including workshops delivered in conjunction with Coastal Partnerships along the south coast. The comments will contribute to the next step in the process on the vision and objectives for the South marine plans. See http://www.marinemanagement.org.uk/marineplanning/areas/south_spar.htm for further details. So, if you're interested in the future of marine planning, watch this space! If you would like to know more about marine planning, please sign up for our newsletter by emailing planning@marinemanagement.org.uk. If you're so inclined, you can also follow us on Twitter @The_MMO #marineplanning.

About the Author



Dr Paul Gilliland has been closely involved in the establishment of marine planning in the UK, most recently with the MMO. He has over 20 years' experience of marine and coastal management, working

with different public authorities across a wide range of issues to do with biodiversity, Marine Protected Areas, environmental assessment and management of human activities, and associated research and policy interpretation.

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Meet the Author – Sue Illman

What do you do?

Managing Director of Illman Young, a landscape architectural consultancy. Whilst I have ultimate responsibility for running the practice, I also lead on water management issues, Landscape Assessment projects and Historic Landscape work.

What or who first inspired you to get into landscape architecture?

Like many people, I didn't know it existed as a profession, until one day I happened to call into a Careers Office, and found a leaflet about it on a shelf. Having read the information I immediately realised that it provided everything I was looking for in a career – creativity, the practical application of design, trees and plants, environmental issues and organised thinking. I phoned round the universities the next day, immediately went for an interview, and started on the course the next Monday. All within 7 days!

How did you get to where you are today?

I had another career prior to changing to landscape, and had been self-employed, so I always knew that I would end up running a practice. I also took two years out after completing my degree, prior to the Diploma year, and during that time had fantastic experience in UK landscape, interior landscapes and working for 15 months in South Africa. Having completed my course, I was then very much a square peg, with only round holes available, so ultimately it wasn't that long until I set up in practice with a long-standing friend from college, Yvonne Young, who was also a fully qualified architect. Over the years the practice has

gradually grown, with our specialism in water starting in earnest around 8 years ago. As they say, the rest is history.

What have been the most important steps along the way?

Initially, being two women, we were adamant that we had to have an office from day one, to prevent it being seen as a 'kitchen-table' type of business, so having a clear professional image was key. Having a background in business management and accounting has been of immense value over the years, as we have always had a strong understanding of our finances (especially when times are tough). We wouldn't be here without it. Being part of the Landscape Institute, and serving in their Committee system has allowed me to see the world through other's eyes and experiences, which when you have been in one practice for 26 years otherwise only gives you a relatively narrow focus on the world. Developing our expertise in water, has clearly been a major step – but we obviously didn't know how important it would be at the time, it was just something I was interested in, and thought we could and should deal with better.

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

Completing your training and becoming chartered please.

Do you have any advice for someone setting out on a career in landscape architecture?

Have fun whilst doing your course, but work hard. Take a year out if you can to broaden your horizons. Don't specialise too early if

you can avoid it, so that you can understand the variety that the profession offers, and thereby find your niche. Find a mentor.

What's the best thing about your job?

The variety and the challenges of difficult projects.

What's the downside?

That there are still some people who don't value and understand what we do, and how essential it is for society if we are to address the pressing issues of population growth and climate change.

What's next for you?

After my Presidency, it's back to the practice, but who knows? Perhaps the Government would like to appoint me as their Water Czar to ensure some of these essential issues related to water management are effectively rolled out around the country?

What is your top tip for success?

Believe in what you do, be tenacious and be prepared to talk about it fluently.

For further information



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Chartered
Institute of
Ecology and
Environmental
Management

2014 Autumn Conference

Progress in Effective Habitat Restoration, Translocation and Creation

11-12 November 2014, Edinburgh University



Example of a large scale restoration project - The Great Fen Project, Cambridgeshire

Call for Papers

We are now inviting the submission of papers. If you are interested in presenting a paper at the conference, please visit the CIEEM website, download and complete a pro-forma and return to enquiries@cieem.net by 30th June 2014 to be considered.

Accommodation

Accommodation is available on site at the university's Pollock Halls. This is however limited but can be booked online at: www.book.accom.ed.ac.uk at a reduced price of £65.45 (please quote code CONF14). Delegates are advised to book accommodation early to avoid disappointment.

For further information please visit www.cieem.net

Accessing and Using Data from the New NBN Gateway

Mandy Henshall

NBN Trust

The new version of the NBN Gateway (<http://data.nbn.org.uk>) was released in October 2013. NBN Gateway 5 gives better performance and stability due, in part, to the investment in servers that can cope with the increasing volume of data and increased usage of the system. It is also more flexible in terms of accessing and downloading data and there is a totally new interactive map which makes it possible to select and query multiple records and create maps of two or more species in different colours.

There have also been improvements for the data providers, with data security and Data Exchange Principles remaining paramount. Data providers can now get more detailed information on who has been using their data and for what purpose, which helps them to report to their stakeholders and recorders.

The new system also includes a tool for requesting access to data or downloading data within certain filters, for example, a combination of spatial, taxonomic, datasets, date range and designation filters. Users need to log in to the NBN Gateway before requesting access to data or downloading data and also have to state the reason for the access request or data download by selecting a use category from a dropdown list. If the data is to be used for consultancy work, such as a desk study for a client, the correct description to

select is "Data provision and interpretation services (commercial)". Please note that the NBN Gateway Terms and Conditions remain the same as they were on the old website, which means that **written permission is needed from the data providers, if the data is going to be used for commercial purposes.**

It is also important to note that although the NBN Gateway can provide access to over 90 million records, 80% of these records are not fully publicly accessible, meaning that the resolution may be blurred to 10km. This means that the data should not be used to inform decision-making at the public level of resolution, but you can apply for enhanced access, as noted above. Remember that Local Record Centres can provide current, local detail, so should be contacted for the most accurate and up to date information available.

Since the launch of the new NBN Gateway, NBN Trust staff and data providers have responded to several enquiries about the Terms and Conditions governing use of the NBN Gateway by ecological consultants. We are working hard to make these easier to understand and the following key points should be noted:

- All data downloads and access requests are logged and details are sent to the data providers, who may follow up with the user for more information. Incomplete or misleading information entered into the text box when requesting enhanced access is likely to lead to an email asking for more details from the data provider.
- The download logs are not intended as a way of 'policing' data use. Unless there is an exceptional circumstance, the NBN Trust will not get involved in following up with data users who do not seem to have used the download/access request wizard in a sensible way. However, as mentioned above, data providers may get in touch for further information.

- A data download is not evidence of data 'misuse' or even of intention to 'misuse' data. However, we continue to take proven contraventions of the NBN Gateway Terms & Conditions seriously, such as a report that contains data from the NBN Gateway without permission, acknowledgements or a waiver statement.
- The download logs are intended to provide useful metrics on data use. This is for all our benefit. It helps make the case for the importance of biodiversity data, the NBN and all its component parts and helps us all improve the service we provide to data users. We are doing everything we can to minimise user error, but it should be accepted that there is always likely to be an element of this. As long as it is within acceptable levels, we can still provide meaningful metrics.

The changes to the NBN Gateway meant a major update to the system and unfortunately initial teething problems were encountered, but these are now fixed. The NBN Trust continues to review the functionality and welcomes ongoing feedback on the new system. It would like to thank all the users and data providers for their patience whilst the issues were resolved and hopes that everyone is now enjoying using an enhanced NBN Gateway. If you have any comments, questions or feedback, especially in relation to improving the download and access request tools, please do get in touch at access@nbn.org.uk.

Our Professional Responsibilities

Andrew Mackenzie MCIEEM

Founding Partner, MBEC

This short article assumes that the reader is a Graduate, Associate, Full member or Fellow of CIEEM and currently on a related career path or intending to be so in the future. It has been written to raise awareness of our individual responsibilities as professional ecologists and environmental managers.

There is no such thing as a free lunch, or a free beer if you prefer.

We are all part of CIEEM, and have decided to be so probably for quite a wide variety of reasons. This provides us individually and collectively with numerous benefits. Such professional recognition through CIEEM also comes with individual responsibilities. It is very important that we all understand these and work to them, with an aspiration to continually develop professionally. We never know everything, we can always improve our skills and ways of working. The fascination to learn and understand more about the natural environment may well be one of the key reasons you are a professional ecologist/environmental manager in the first place.

By joining and subsequently maintaining membership, all the people within the CIEEM 'club' agree to be bound by the rules. In our case the core rules are given in the Code of Professional Conduct (termed the 'Code' for the remainder of this article). The Code has been updated and the new version has been in use since 1st June 2013. The following sentence emphasises the all-encompassing responsibilities we all have:

"This Code applies to all members in all aspects of the delivery of their work (within and without Britain and the island of Ireland)."

The Code provides the key set of rules for us all to work to. If you have not read the updated Code recently, I suggest you do so forthwith (available on the CIEEM website).

In addition to the CIEEM Charter and Byelaws (the legal basis of CIEEM), the Code directly links to two other CIEEM core documents. The first is the Competency Framework which aims to identify an individual's requirements for membership and provides a path for further development of skills and the second is Continuing Professional Development (CPD). There is mention of the continued development of one's skills in several places within the Code but importantly the last point in the Code states the following:

"Undertake such continuing professional development as CIEEM shall require."

This direct link in the Code to CPD makes it clear that the individual member is also bound by the CPD rules (available on the CIEEM website).

By being part of CIEEM, the critical thing, I would suggest, is that we are furthering our profession, which is to all our and the natural world's advantage. As you will be aware, ecology and environmental management is a relatively young and rapidly evolving science and profession and it can be an uphill battle to get the recognition we, and our subject, deserve. CIEEM helps tremendously in this regard, through a variety of direct and indirect channels including, for example, awareness raising and representation at policy level meetings with other organisations.

We also gain a significant range of other benefits from our membership, which are worth remembering. For example, we have access to a wide range of directly

applicable and current professional instruction and back-up. Personally, I particularly value feeling part of an organisation of like-minded people who I know understand my take on things and my outlook on life. Others will, no doubt, value and rank the various CIEEM benefits differently but the key point is that we all benefit individually and collectively from our membership.

Please read the updated Code. Do not take the Code lightly. This is what you have signed up to and it is up to all of us to strive to improve ecological and environmental management practice in all the diverse spheres we work in. The higher the standards we work to, the higher the standards we can demand of others.

About the Author

Dr Andy Mackenzie has been a professional ecologist for over 20 years. He is a founding partner of MBEC, a Scottish-based ecological consultancy practice which has been running for over 10 years. He is a member of the Professional Standards Committee of CIEEM and also serves on the CIEEM Scottish Section Committee.

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Disciplinary Matters

Mick Hall CEnv MCIEM

Chair, CIEEM Professional Standards Committee

Every year we report the number and nature of complaints received about CIEEM members that have resulted in disciplinary investigations. The number of complaints has increased in recent years and the Professional Standards Committee (PSC) regularly reflects on why this is so. Undoubtedly with more members there are likely to be more complaints but PSC also considers whether other factors come into play, such as:

- a lack of suitable training for members;
- a higher profile for the Institute leading to more false claims of membership;
- increasing confidence in the disciplinary process;
- a lack of clarity for clients on what level of service to expect or a lack of clarity for our members on the standards of service they should provide; and
- pressures on members to work beyond their areas of competence.

The disciplinary process is our method for investigating whether members have fallen short of the standards required by the Code of Professional Conduct, and as such a rigorous disciplinary process protects both members and the wider public. The more we apply the disciplinary procedures the more we learn about how to do this efficiently and effectively, and accordingly we have recently revised our disciplinary procedures. All members have been sent an email link to the revised document, and although hopefully you will never need to use them either as a Complainant or as the Subject of a complaint, it is worth taking the time to ensure that you understand the process.

Some key points to note are:

- The disciplinary procedures are comprised of 3 stages:-
 - **Stage 1** – a complaint is checked (validated) to make sure that it falls

within our remit and then referred to PSC for a preliminary investigation. The preliminary investigation determines whether there is a case to answer, and if so, refers the case for further enquiry by a Disciplinary Board.

- **Stage 2** – the Disciplinary Board enquires further into the complaint and holds a hearing at which the complaint is either upheld or dismissed.
- **Stage 3** – the Appeals stage where either the subject or the Complainant may appeal the outcome of the disciplinary hearing.

It is a fundamental principle of fairness that the investigation into any complaint should be open and transparent. Accordingly Complainants are required to allow their name and the details of the complaint to be identified to the Subject from the outset. In exceptional cases, where PSC judges that it is appropriate to do so, anonymity for the complainant is allowed up until the end of Stage One. In such

cases the complaint will go forward in the name of the Chair of PSC. However this is conditional on the Complainant accepting that they must allow their identity to be revealed to the Subject if the case is referred to a Disciplinary Board.

Where appropriate, the outcome of an individual case is reported in *In Practice*. In cases where a non-member/lapsed member is found to be fraudulently claiming membership, a report is made to the relevant trading standards body, local planning authority and statutory agencies.

Over the coming months PSC will continue to help ensure CIEEM members operate in accordance with the Code of Professional Conduct. In parallel PSC will continue to explore ways of raising standards, including developing many of the themes and suggestions raised during the recent Raising Standards project.

The following table sets out the current status of complaints that are in the disciplinary process.

Complaints Report 1st April 2013 – 31st March 2014

Complaints under enquiry prior to April 2013 and investigation completed during 2013 - 14					
Complaint type	Number of cases considered	Number of cases referred to Disciplinary Board for further enquiry	Outcomes		
			Not upheld/ no case to answer	Upheld	Enquiry not yet completed
Claim of use of membership by a non-member / lapsed member	2	n/a	0	2	0
Claim of incorrect membership grade by a member	1	1	0	1	0
Survey/reporting standards	6	5	3	2	0
Unprofessional conduct	0	0	0	0	0
Objection to membership	1	1	0	1	0
Complaints reported and investigated during 2013 - 14					
Claim of membership by a non-member / lapsed member	7	n/a	3	2	2
Claim of incorrect use of membership grade by a member	4	1	0	0	2
Fraud	1	n/a	0	0	1
Survey/reporting standards	5	3	3	0	1
Unprofessional conduct	1	1	0	0	1
Objection to membership	1	0	0	0	1

Complaints Update

Breaches of the Code of Professional Conduct

Case 1

Paul Hudson (Penarth) was found to have breached the following clauses of the Code of Professional Conduct: 7.i, 7.iv, 7.vi and 7.x.

These breaches related to:

- Undertaking and allowing work to be undertaken without a valid licence.
- Deviating from good practice guidance and minimum requirements without sufficient justification or explanation.
- Failing to undertake adequate data searches and misuse of NBN Gateway data in breach of their terms and conditions.
- Undertaking surveys and producing reports of insufficient quality for their intended purpose and signing off work of others under his authority that were also of insufficient quality.

Mr Hudson has been reprimanded with conditions. This will be reviewed by the Disciplinary Board after six months to see whether further sanction is appropriate.

Case 2

Lauren Bell-Misri (Epsom/Singapore) was found to have breached the following clauses of the Code of Professional Conduct: 7.vi. and 7.vii.

These breaches related to false claims of membership:

- Grad CIEEM claiming Director (IEEM) and Chartered Ecologist

Ms Bell-Misri has been reprimanded with conditions.

Case 3

Dr Robert Stebbings (Peterborough) was found to have breached the following clauses of the Code of Professional Conduct: 7.i, 7.iv and 7.vi.

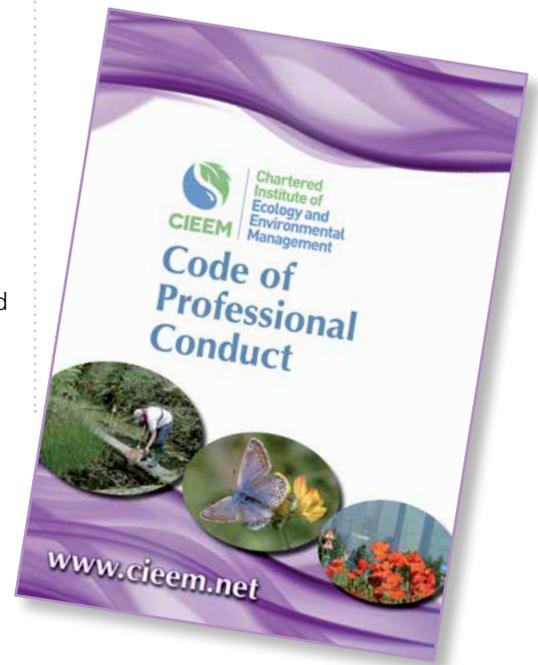
These breaches related to unsubstantiated and/or inaccurate statements.

Dr Stebbings has been reprimanded.

False Claims of Membership

The following people have made false claims relating to membership of CIEEM:

- Brendon Buck (Dalkey)
- Jane Nordstrom (Fordingbridge)
- Justine Oakes (Harleston)
- James O'Neill (Belfast)
- Mark Smyth (Whitehead)



Featured CIEEM Training

Japanese Knotweed

(16 July, Swansea)

Trainer: Sean Hathaway MCIEEM

Level: Intermediate

Japanese knotweed has gained a formidable reputation as the UK's most invasive non-native plant. This new course addresses the identification and spread of knotweed, as well as the associated problems, legislation and the treatment options that are available. There will be plenty of fresh samples to examine and site visits to see some knotweed sites in Swansea. This course complements the Invasive and Non-native Flora course on 8 September.

Invasive and Non-native Flora

(8 September, Swansea)

Trainer: Sean Hathaway MCIEEM

Level: Beginner to Intermediate

This course presents an introduction to the problem of invasive flora from a local to global perspective. The course covers legislation, identification, problems and treatment of both terrestrial and aquatic plants. There will be plenty of fresh samples to examine and a quick look around the estate to see some specimens *in situ*. This course complements the Japanese knotweed course on 16 July.

Using the Vegetative Key to the British Flora

(10 September, Southampton)

Trainer: John Poland CEnv MCIEEM

Level: Intermediate to Advanced

The Vegetative Key to the British Flora enables the user to identify nearly 3000 native and alien plants when they are neither in flower nor fruit. The senior author of the Key will deliver this intensive classroom and field-based course teaching identification using solely vegetative features.

Freshwater Fish Monitoring

(2 October, Wilton, Wiltshire)

Trainers: Adam Ellis MCIEEM and Dr Chris Gardner

Level: Beginner to Intermediate

Participants on this course will gain understanding of different freshwater fish communities in the UK, with the local Hampshire Avon presented as a case study. The morning classroom session will cover regulation and a variety of survey techniques including remote monitoring. Survey equipment will be available for inspection. The afternoon session will consist of a site visit to observe an electric fishing survey and to practise basic fish identification.

Water Vole Ecology

(14 October 2014, Lifton, Devon)

Trainer: Derek Gow

Level: Beginner to Intermediate

This popular course covers the lifestyle, behaviour and ecology of the water vole. Participants will examine live specimens and field signs of water voles as well as bank voles, field voles and brown rats. Field sign assessments of all four species will be undertaken in three linked sites: wet woodland, agricultural landscape and fishing lakes. This course complements the Water Vole Mitigation for Development course on 15 October.

Water Vole Mitigation for Development

(15 October 2014, Lifton, Devon)

Trainer: Derek Gow

Level: Beginner to Intermediate

This popular course reviews existing and historic case studies relevant to the species. Participants will also benefit from a review of legal requirements pertinent to the species and licensing requirements. It will consider and advise on the criteria for licence applications and explore mitigation and conservation techniques. This course complements the Water Vole Ecology course on 14 October.

Presentation Skills

(25 November, Birmingham)

Trainer: Liza Booth

Level: Beginner to Intermediate

This new workshop is a step by step guide to the writing and delivery of presentations. Participants will discover the essential ingredients of a great presentation, how to make presentations creative and memorable and how to overcome communication anxiety.

Conflict Resolution

(26 November, Birmingham)

Trainer: Liza Booth

Level: Beginner to Intermediate

From time to time conflict in the workplace is unavoidable. This workshop will help participants to be rational conflict managers. The course will identify seven categories of difficult types of person, develop communication skills needed in disagreements and design creative solutions to problems.

Communication Skills

(3 December, Birmingham)

Trainer: Liza Booth

Level: Beginner to Intermediate

Communication is not just about what you say, but more especially about how you say it. This new workshop will instil confidence that the message being received is exactly what is intended. Participants will explore two communication models, discuss different aspects of communication, assess appropriate methods for particular situations and examine rapport building, questioning and listening skills. The workshop covers some theory but is mostly experiential, practical and interactive.

Details of all CIEEM's courses and on-line booking can be accessed at:

<http://www.cieem.net/training-events>

Update from the Advisory Forum: You Can Make a Difference

Karen Colebourn MCIEEM and David Tyldesley FCIEEM

The Institute's 'Advisory Forum' was created as a part of the new governance structure. With meetings planned every six months it has met three times. It comprises the President, Vice Presidents, Standing Committee Chairs, Geographic Section representatives and elected members (including ourselves) with the aim of representing a cross-section of views. Whilst willing volunteers to help the Institute to develop over the next few years, we confess to wondering just how influential an 'advisory forum' could be, when the decisions are rightly taken by those on the Governing Board and Committees who carry the responsibility. Would it be worth putting time into thinking about issues, preparation, travelling and attending the meetings if it was merely a 'talking shop' for airing opinions?

The Forum meetings have been well planned and conducted. Its views have been reported effectively to Committees and to the Board. Within six months of the first meeting, the Forum's 'advice' had clearly influenced important matters such as the new CPD requirements, the procedures for the Chartered Ecologist Register and inter-disciplinary working. We are keen to see the Geographic

Sections flourish as the Institute continues to gain strength, so we were delighted to see how the Forum's advice, as to the approach to improving support for the Sections, had contributed to the shaping of the new Section support staff posts. Yes, really important things happened, and quickly, within months of the Forum's deliberations. By participating in Institute affairs, even in an 'advisory' capacity you can make a difference. Views expressed by the Forum, whether via Section representatives, or otherwise, will influence those who must make the decisions on our behalf.

Whilst maintaining the highest standards of professionalism we both still share a commitment and dedication to the well-being of the natural environment, a passion for nature conservation. It is why we do what we do. We are therefore encouraging the Institute to consider when and how it might be involved in campaigns that matter to professional ecologists.

More recently the Advisory Forum has offered relevant and practical advice on these diverse and challenging issues:

- how to increase the membership to the President's target of 10,000 by 2023;
- better exploiting and protecting the CIEEM 'brand';
- influencing environmental policy agendas;
- working more closely with other institutes;
- terms of reference for the Institute's Diversity Working Group;
- benefits that might be valued by existing and potential members and how best to promote them;
- improving opportunities for graduates through internships, apprenticeships and other quality placements;
- effective networking for members;

- e-learning and its role in supporting continuing professional development;
- maximising the value to the profession of the new British Standard BS 42020;
- promoting the award of Chartered Ecologist;
- making better use of social media; and
- increasing the take up of CIEEM training courses.

Re-read Karen's article on page 60 of the September 2013 edition of *In Practice*. Keep an eye on the Institute website for the issues coming up and feed in **your** views to your section chair or to any of us who are there trying to represent the views of the membership. Otherwise we are merely expressing our own 'advice' and not necessarily that of the wider membership. Our email addresses are there to be used. We and the other elected Forum members listed in Karen's article will be delighted to hear from you. Help us continue to make a difference.

For further information

Contact Karen at:
Karencolebourn@epr.uk.com

Contact David at:
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Applying to be a Chartered Ecologist: Some Advice for Prospective Applicants

Penny Anderson CEcol CEnv FCIEEM
Chair, CIEEM Registration Authority

Having been involved in developing the Chartered Ecologist (CEcol) application criteria and process, it has been very interesting to see the response. I aim here to assist any of you who have had your CEcol application returned or are looking at the forms wondering how to fill them in.

The first step is not only to read the guidance, but to evaluate and digest it honestly. You will see that we have positioned CEcol between Full membership of CIEEM and being a Fellow. You need to satisfy 12 competencies at Accomplished level for CEcol but fewer will be needed for becoming a Full member of CIEEM. You need time, therefore, to gain sufficient experience and develop your expertise to progress from Full member to CEcol. I am assuming here that you are applying through the generalist route: we would expect a longer period to achieve an Authoritative standard.

Moreover, we are looking for rounded ecologists in either route, with a broad range of expertise, not just limited to one or two protected species groups. If you tend to work mostly on a single subject area we will be looking for other areas of achievement to demonstrate a broader knowledge and experience base.

There is a real difference between the generalist and specialist approach here, with a much higher level of attainment to reach Authoritative standards (again refer to the criteria for Authoritative level of competence), and although the specialist is likely to be a leader in a particular area, we would still be looking for a rounded,

broad ecological background on which the specialism is based. The advice set out here is directed more at those contemplating the generalist route.

Having decided you qualify on the grounds described so far, your next step is to fill in the form. Use the guidance to do this, but remember:

- we are looking for **evidence** of achieving the Accomplished level of competence;
- you need to **show** that you are **Accomplished** not **Capable** in the mandatory competencies and your chosen sub-themes;
- we do not read between the lines: you must spell out your evidence.

This seems to be a major stumbling block. Too many of you are listing or describing what you have done, sometimes only with a couple of examples. These are interesting, but they do not **prove** that you have achieved an Accomplished level of competency – it merely tells us what you do. Make sure you have the expanded list of criteria to hand when writing at all times (see extract below).

Look at the differences between Capable and Accomplished levels of competency – I have emphasised the key words under Accomplished. Draw out differences before you write anything. That between **understanding** the terminology and concepts, for example, and being **knowledgeable** in the subject and **capable of explaining** it to a range of audiences is significant. The same applies to the other criteria. You need to **use** what you know/do/have done to provide evidence for this. If you wish to claim Authoritative levels of competency in any sub-theme, conduct the same exercise comparing the Accomplished and Authoritative criteria.

Let me give you an example for species and habitat identification and evaluation for Accomplished level competency. You might stress that you have conducted many, for example, botanical surveys covering all the key lowland habitats except X and Y. That you have applied a wide variety of methods, including Phase 1, NVC and detailed quadrat recording for monitoring Z projects where all species had to be identified, including bryophytes and lichens. Use examples of some of the projects/cases to show that you have **extensive** experience and are very **knowledgeable** at conducting these surveys, that you always (for example) ensure that your team/colleagues **train** on site together first to ensure consistency, that they ask you to **help** with difficult species, that you are a **specialist** in A and B groups in particular (relate this to being able to explain the subject in different ways to different audiences). The outcome is that you are **fully competent** at identifying some 70% (or whatever) of the British flora in these habitats, including rare species, that you can identify most in leaf/fruit, but need the flowers for grasses/sedges. You collect samples of any difficult bryophytes for confirmation of your identification and have built up a valuable herbarium for reference and checked by an expert. You could refer to more **complex** projects where perhaps the NVC was particularly tricky, or where you had to cover a range of important sedges in the wrong season etc. – how were any of these problems resolved – show that you are **competent at resolving the issues** and that you were **confident** in doing so – perhaps suggesting that a manager/senior colleague supported your decisions on this? Don't copy what I have suggested here – but use the approach and ideas to put your own competency together.

Table 1. The Accomplished and Capable Competency Criteria

Capable	Has the knowledge and experience essential to carry out standard activities unsupervised confidently and consistently. Is likely to need to seek advice before carrying out complex or non-standard activities.	<ul style="list-style-type: none"> • You understand the terminology and concepts and are aware of any drivers supporting this activity. • You have experience of putting this activity into practice. • You can carry out this activity to the expected standard when straightforward, following advice and guidance if necessary. • You know where to source guidance and information regarding this activity and use this confidently. • You can identify when things are generally being done as they should and can spot if things are not right. • You can judge your own limits with regards to this activity and, if appropriate, who to defer to in the event of needing further advice.
Accomplished	Has the knowledge and experience of this activity to carry out complex, specialist or non-standard tasks confidently and consistently. Is aware of alternative options and approaches and can provide guidance, instruction and advice to others on this activity.	<ul style="list-style-type: none"> • You are knowledgeable in this subject and are capable of explaining it to a range of different audiences. • You have extensive experience of this activity in both straightforward and complex situations. • You can deal effectively with difficult or complex issues relating to this activity and consider alternative solutions. • You can make decisions confidently regarding this activity. • You can provide guidance, instruction and advice relating to others and may provide mentoring and/or coaching in this activity.

Finally, we suggest you use your personal statement to demonstrate your achievements – not in terms of the numbers of projects/reports/etc. that you have produced – but more in relation to the successes you have had and how you have supported the profession and worked to reach your personal goals. This will help to support and reinforce the 250 word statements you make demonstrating your competencies.

I hope this helps you apply for CEcol when the time is ready. Good luck.

For Chartered Ecologist sub-theme competence examples please see: http://www.cieem.net/data/files/Resource_Library/Membership/Chartered_Ecologist_sub-theme_competence_examples.pdf

Don't forget the 'evaluation' part of the sub-theme. How do you place the data in context once collected? Have you developed or adapted a standard set of criteria? Do you use the SSSI site selection or County Wildlife Site criteria, BAP/RDB/ etc. or other relevant system? How expert are you in these?

Perhaps you also contribute voluntarily to some recording scheme or monitor management somewhere – include this if it shows you explain things to a different audience, that your skills are respected by those involved, proven perhaps by being asked to do more or take over a patch/ tetrad etc. If you have developed keys for selected groups, or prepared guidance for colleagues, others/volunteers, or helped out in your local school etc. – add this as evidence of an ability of being able to share material at all levels of interest.

The job of squeezing the required information into 250 words with enough information on the work you do plus using this to prove the competency is a challenge – but that is part of the application requirements. We might re-examine the word limit if it is proving a major constraint.

The guidance spells out the STARE approach to describing your competency. This should help you order your thoughts – what have you done, what actions **you** took that show your competency in this sub-theme, what the outcome was in terms of acceptance, approval, support of your actions (i.e. use this to show how others respect your approach/expertise). This ties in with the emphasis on proving your competency.

New Membership Eligibility Now in Effect!

We are excited to announce that changes to our eligibility criteria for membership have gone live. As of 11th April 2014, membership eligibility is now based upon CIEEM's Competency Framework. Each level of membership will require a minimum level of relevant competences.

We have also introduced two new membership categories – **Supporter** and **Qualifying** member, which have replaced the existing Affiliate grade of membership.

- **Supporter member** – will suit non-practitioners who have an interest in the work of CIEEM and its members.
- **Qualifying member** – will be reserved for applicants employed in a relevant role who are working towards Associate membership through the practitioner route.

Details of the new eligibility requirements, the Competency Framework and detailed guidance for those seeking to join or upgrade their membership are available on the membership pages of the website (www.cieem.net/members).

If you are thinking of upgrading your current membership or you know someone that is interested in applying please see the new eligibility table below to help you assess which level of membership best suits your competence. Please see the website for full details.

If you are having trouble deciding which level of membership is most suitable for you to apply for or upgrade to, please do not hesitate to contact our friendly membership team.

CIEEM membership is recognised by other professions as the benchmark for ecologists and environmental managers. The new eligibility criteria is designed to ensure that membership continues to reflect the highest levels of professional competence and integrity.

Membership Levels – Summary Chart

CIEEM Grade	Studying for a CIEEM relevant degree	Has a CIEEM accredited degree or relevant degree	Expected relevant professional experience in the last ten years	Required CIEEM competences
Supporter	No	No	None	N/A. Must be a non-practitioner with an interest in CIEEM and the work of its members.
Qualifying	No	No	None	N/A. This category is reserved for applicants without relevant qualifications who are working in relevant roles towards Associate membership through the practitioner route.
Student	Yes	No	None	N/A. Only course tutor signature required.
Graduate	No	Yes (Accredited Degree)	None	Applicants with qualifications that are CIEEM accredited degree programmes are automatically admitted to Graduate membership on application on the basis that the degree programme has been scrutinised and accredited as delivering the core areas of knowledge and skills expected of graduates entering our profession.
Graduate	No	Yes (Non-Accredited Degree)	None	Must be able to demonstrate competence at the Basic level in a total of 7 sub-themes, one of which must be Professional Conduct. A minimum of 3 of the sub-themes should be from the ecological/environmental list and 2 from the transferable list (other than Professional Conduct).
Associate	No	Yes	≥ 3 years	Must be able to demonstrate competence at the Capable level in a total of 7 sub-themes, one of which must be Professional Conduct. A minimum of 3 of the sub-themes should be from the ecological/environmental list and 2 from the transferable list (other than Professional Conduct).
Associate	No	No	≥ 6 years	Must be able to demonstrate competence at the Capable level in a total of 7 sub-themes, one of which must be Professional Conduct. A minimum of 3 of the sub-themes should be from the ecological/environmental list and 2 from the transferable list (other than Professional Conduct).
Full	N/A	Yes	≥ 4 years	Must be able to demonstrate competence at the Accomplished level in a total of 7 sub-themes, one of which must be Professional Conduct. A minimum of 3 of the sub-themes should be from the ecological/environmental list and 2 from the transferable list (other than Professional Conduct).
Full	N/A	No	≥ 8 years	Must be able to demonstrate competence at the Accomplished level in a total of 7 sub-themes, one of which must be Professional Conduct. A minimum of 3 of the sub-themes should be from the ecological/environmental list and 2 from the transferable list (other than Professional Conduct).

A Question of Judgement

Claire Wansbury CEcol CEnv FCIEEM

Atkins Global

On 26th June 2014, CIEEM will be announcing the winners of the 2014 Awards at a prestigious lunch in Birmingham. Over the last few years I have been fortunate enough to be on the judging panels for several awards. This year I have been on the Panel of Fellows advising on the presentation of the CIEEM Medal. The Medal is CIEEM's highest accolade, and the nominations are inspiring.

All CIEEM members are invited to nominate candidates for the Medal. A panel of five CIEEM Fellows is then invited to evaluate the nominations and present their preferred candidate to the Governing Board for approval.

CIEEM's awards have evolved and expanded gradually before a dramatic increase this year to include the Medal, the four categories of Best Practice Awards plus the Tony Bradshaw Award, the Outstanding Professional and Promising Professional Awards, the NGO Impact and Corporate Achievement Awards, the Undergraduate and Postgraduate Student Project Awards, and the *In Practice* Award. Seeing the exciting proliferation of awards, it seemed a good moment to ponder a few questions:

- What benefits do the awards give the applicants?
- What benefits do they provide to our profession?
- What benefits to they provide to those, like me, who get involved in the judging process?

Winning an award or being shortlisted obviously benefits the applicants by demonstrating the quality of your work and advertises this to potential employees and clients. However, it has more subtle benefits as well, because in itself the process of applying helps ecologists understand the value of their highest quality work, challenges them to innovate, and helps our non-ecology colleagues see us as a true profession. Also, the process should be very positive for the individuals, as entering for an award shows how their employer values them and their achievements.

The benefits to the profession are that the awards raise our profile and, alongside the Royal Charter, demonstrate that Ecology is a credible profession that has come of age. The awards showcase the positive value of our input to projects, both the value to clients and to the natural environment.

Finally, what do the judges get out of the process? Just to clarify, judges are automatically excluded from the panel for any award where they or colleagues are involved in a submission, so there is no risk of conflicts of interest. To me, it has been

a real privilege to be able to read through the full details of submissions. I love the opportunity to read about inspiring projects and people. It is also great to be making a real contribution to the Chartered Institute by doing something that doesn't take too much time and is so interesting.

This year I have been encouraged by the increase in applications, but from conversations with ecologists through the year I know the competition for awards could, and indeed should, be much fiercer. However, have you actually looked at the application forms? It is not onerous, and the forms have been streamlined over recent years, making the process of applying that bit simpler. So why not give a thought to the categories now, and even have a quick look at the awards information on CIEEM's website. Nominations and entries for the 2015 awards will open in the next few months, so why not put a note in your diary to submit an entry or make a nomination for next year?

The opinions expressed in this article are the author's own.

Geographic Sections: What has Been Going On?



Vicky Bowskill

CIEEM Geographic Sections Coordinator

It's been nearly a year now since I joined CIEEM as Geographic Sections Coordinator and it certainly has been a busy year! I started out by getting round to meet all the Sections last summer and since then I've supported Committee members to run conferences for Ireland, Wales and the West Midlands, as well as a full programme of Section AGMs. The two remaining Shadow Sections – East of England and East Midlands – have now been formalised with their inaugural AGMs and all 11 Geographic Sections are now formally

constituted. A Sections Toolkit has also been set up on the CIEEM website, providing a wealth of useful information to support Committees in their activities.

Mairead Stack also joined CIEEM last September as the new Irish Section Support Officer and she has been busy supporting the Irish Committee with their conference last November and organising a programme of training and events for members in Ireland.

In addition to running events, Sections have been getting increasingly involved in engaging with students and universities, especially those with programmes newly accredited by CIEEM. This contact has been well received by students across the UK and is important in encouraging new

students and graduates into the profession and supporting them as they develop into their career.

I have very much enjoyed getting out and about to meet all the Section Committees and have been struck by the dedication and enthusiasm from those who volunteer their time to make the Sections a success – your efforts are very much appreciated by all at CIEEM and our members.

Let's not forget the Overseas Territories Special Interest Group, who were set up early in 2013 and who I was pleased to support at their seminar at Kew Gardens last September.

There will be lots more happening across the UK and Ireland over the year ahead, but here is a round-up of the highlights from each Section for the 2013-14 year.

Scotland

The March 2013 to March 2014 year has been a busy time for the Scottish Section. The Committee continued its strong emphasis on student events, attending seven different careers events at universities across Scotland.

In addition to the student events, the Section promoted and attended a Green Space Network GIS tool event in Aberdeen which was kindly organised by Alastair Watson and Aftab Majeed from Aberdeen Council.

The Autumn conference was held in September 2013 at the Royal Botanic



Gardens in Edinburgh and was a collaborative event with the British Ecological Society and Scottish Biodiversity Information Forum on Scottish Biodiversity Strategy. It was well attended and was an insightful conference with interactive workshops.

The Scottish Section AGM was held in January 2014 in conjunction with a workshop on the Future of Mitigation. The event was very well attended with a lot of lively discussion and outputs from this have been made available on the members' area of the CIEEM website.



Ireland

An event at the Irish Planning Institute included a number of presentations on how Appropriate Assessment (AA) in 2012 led to the establishment of an Appropriate Assessment Working Group and a meeting was held to discuss the current roles of the public and private sector involvement for the group.

A 'Raising Standards' workshop was held in April 2013, one of the first such workshops in the UK and Ireland. The workshop discussed what ecological standards exist in Ireland.



In November 2013, the Irish Section held a two day conference entitled 'Protected Habitats and Species – a best practice approach', which attracted 150 delegates. Speakers were experts in their field and this proved a very practical and enlightening event. The Minister for the Environment, Minister Jimmy Deenihan, Department of Arts, Heritage and Gaeltacht, gave a presentation at the conference. The presence of the Minister and his understanding of ecological issues in Ireland was very encouraging to delegates and he invited further representation from CIEEM in Ireland.

The Section conducted a Training Needs Analysis in December 2013 and January 2014, the results of which will be used to plan future training events in Ireland.



Wales

Over the last year the Welsh Section has been represented at the Welsh Biodiversity partnership conference in Bangor, Wales Environment

Link's Valuing our Freshwaters event in Cardiff, the Society of Biology's Careers Day at Glamorgan University and an event organised by the Welsh Government and Natural Resources Wales (NRW) on Integrated Resource Management in Cardiff.



The Welsh Section also held a very successful one day conference in February 2014 at Aberystwyth University entitled 'GIS and Remote Sensing: The End of Fieldwork?' which attracted nearly 100 delegates and sold out early. Emyr Roberts, CEO of NRW, gave the welcome address and took questions from delegates.

The Section Committee intends to develop a series of events for the year ahead, focussing on ID skills, other field skills and other topics of particular interest to Welsh members.

Keep an eye on the CIEEM website for details of upcoming events.



South East England

The South East Section has had a relatively quiet year, with five events held in the region. These included summer events looking at small mammals and autumn events looking at marine invasives at Epple Bay and at deer management in Richmond Park during the deer rut.

The Section also held stands at a Kent Field Club conference, a dormouse seminar at Reading University, and a Society of Biology event at London Metropolitan University.



An End of Season Social event at Greenwich University at the end of November 2013 provided members with a good opportunity to network after the busy summer season.

The AGM was held at RHS Wisley Gardens in March 2014 and included a fascinating tour of the Plants for Bugs project being carried out at the gardens. A Committee of nine members dropped to four by the turn of 2014, but a survey of South East members has initiated interest from several potential new Committee members and this will increase the capacity of the Section to put on events going forward.

A programme of events is planned for the year ahead, informed by the results of the recent survey, and details will be advertised on the CIEEM website.



South West England

In September 2013 the South West Section had a fascinating guided tour of Steart Marshes, at 400ha one of the

UK's largest new wetland reserves being created by the Environment Agency and the Wildfowl and Wetlands Trust. New salt marsh and freshwater wetlands are being created which will prove especially important for wildfowl and wading birds as well as providing flood defence and improved access for people. In December



2013 a well-attended AGM was followed by an excellent talk and discussion on badgers and bovine TB – this was certainly a highlight of the year particularly given the high calibre of the speakers.

The Committee has actively engaged with universities in the region to create opportunities to communicate the role of our Institute to students. Presentations have been given at careers fairs and workshops and it hopes to continue this during 2014. During 2013, Exeter University has shown interest in CIEEM helping with one of its ecology modules.

A questionnaire was circulated to South West members, the results of which will be used to plan future Section activities.



Geographic Sections: What has Been Going On?

(continued)

If you are interested in supporting your local Geographic Section, either by getting involved with the Committee, or by supporting them to run an event, please do get in touch with the Geographic Sections Coordinator or visit www.cieem.net/geographic-sections

East of England

The East of England Section held a series of events in 2013-2014 and is excited about making the next year even better. A talk on Paxton Pits nature reserve during late winter was followed up by a site visit when nightingales were singing.

A visit to Winterton Dunes NNR in May provided members with the opportunity to explore a dune habitat important for its plant, invertebrate, bird and amphibian assemblages and learn about the challenges facing managers from visitor pressure.



June 2013 saw a visit to Carlton Marshes Nature Reserve in Lowestoft, a SSSI that forms part of the Broads SAC and Broadland SPA and Ramsar sites. An overview was given of management techniques and education work carried out by the Suffolk Wildlife Trust at the site.

Summer 2013 events included a highly informative field visit to the Little Ouse Headwaters Project Fen sites in Theltham, giving an insight into the range of innovative restoration techniques employed to improve the site and the voluntary effort that was key to success of the restoration project.

The year finished with the inaugural AGM which took place at Girton College and was

followed by a highly engaging talk about research work undertaken on vegetated shingle in Britain and abroad by Professor Roland Randall.



East Midlands

The East Midlands Section is back from the dead! With -£27 in the bank and a Committee that had steadily dwindled from three at the start of 2013 to just one member in December 2013, we have rebuilt, held an inaugural AGM and have a series of events in the diary for 2014 already (details to follow in due course).



We are looking forward to a productive, engaging year and are excited about bringing student representatives into the Committee from some of the East Midlands universities. This is especially focussed where courses have recently received CIEEM Accreditation, such as the case with two courses at Nottingham Trent University.



West Midlands

After the successful reptile workshop in May 2013, the West Midlands Section held a second Reptile Survey and Translocation Workshop, including visits to reptile donor and receptor sites in Hartlebury and Crothorne in Worcestershire.

The fourth West Midlands AGM was held in September 2013 and included interesting talks on the Bromsgrove Brooks Project, Nathusius' pipistrelle bats and river rehabilitation in Staffordshire.

An open mic discussion was held in October 2013 that enabled open discussions as far reaching as people's experiences of the new great crested newt licence application



forms, how the Bat Low Impact class licence has been going, how new equipment and capabilities are affecting bat survey techniques, biodiversity offsetting, the new Biodiversity Standard and challenges facing local authorities dealing with biodiversity.

The section is forging links with Harper Adams University, who were one of the first to have a programme accredited by CIEEM, starting with a careers fair in November 2013.

A workshop was held on bat licensing and over-mitigation in January 2014, attended by a mix of practitioners including consultants, local authority ecologists and Natural England staff and resulted in some lively discussion focusing mainly on mitigation for brown long-eared bats.

All this was followed up by an excellent West Midlands Section Conference in early April 2014 entitled 'Mitigation and Enhancement: Case Studies and Best Practice', which sold out early with over 80 participants and nine excellent speakers.



Yorkshire and Humber

Following an inaugural AGM in March 2013 a positive and keen Committee was formed.

Events have been well attended with both field workshops and indoor talks providing a focus for ecologists and environmental managers to meet, exchange ideas and learn about a topic which interests them.

In common with other Sections, Yorkshire and Humber covers a large geographical area and efforts have been made to ensure a good spread throughout the region,



focussing on the areas with the greatest density of members. Events in the north of the region have been advertised to colleagues in the North East Section, which led to some positive cross border interactions.

In November 2013 a very successful 'Evening with Bats' event was held, which was very well attended. Two careers events were attended by Committee members in the 2013 autumn term at Leeds University and Sheffield University. Students were eager to engage and it is hoped that they will attend other regional CIEEM events, meet our members, and pursue a career as an ecologist or environmental manager.

The 2014 AGM was held in late March at Leeds University and was followed by an excellent marine invasives workshop.

 #cieemYH

 LinkedIn



North East England

2013-14 was another successful year for the Section with a wide range of talks and events arranged throughout the region. Highlights included a trip to the Farne Islands, a field visit to an upland bog with Penny Anderson to discuss habitat management, and a well-attended AGM in October 2013.

New for this year was the initiation of a 'Field Club' which aims to provide members



with an informal setting for improvement of ID skills and general ecological knowledge, and to contribute to CPD. This has taken the form of a field visit to an interesting site to identify all species found (within reason!) followed by online discussion via the Section LinkedIn page to confirm IDs and add to the species list. The species list has then been submitted to the local biological records centre. The focus has been on botany but we've been fortunate to have expert entomologists and marine biologists come along on some visits to impart their knowledge. We intend to continue with this in 2014 and would welcome Section

members' input on sites and habitats they would like to visit for Field Club.

 #cieemNE

 LinkedIn



North West England

The 2013-14 period was a relatively quiet time for the North West Section in comparison to previous years. One event was organised in May 2013, a visit to the managed realignment scheme on the Ribble Estuary at Hesketh Out Marsh. This proved very popular with over 40 attendees, some travelling long distances to attend. Thanks are due to the RSPB for supporting this event.



After locating the Section AGM at Liverpool Hope University for the last couple of years, the 2014 AGM was moved to Manchester Metropolitan University who have recently had programmes accredited by CIEEM. The guest speaker for 2014 was Alastair Driver, the National Biodiversity Manager for the Environment Agency.

A survey of North West Section members was carried out during early 2014, the results of which will be used to inform future activities. Planning of a programme of events for 2014 is under way and details will be made available on the CIEEM website in due course.

 #cieemNW

 LinkedIn



Overseas Territories Special Interest Group

Building on the success of the first Overseas Territories Specialist Interest Group (OT-SIG) conference held in January 2013, the OT-SIG held a technical seminar at Kew Herbarium in September 2013. The seminar was well attended with 30 delegates from a range of organisations and interest groups.

Talks included: saving *Pinus caribaea* var. *bahamensis*, the national tree of the Turks and Caicos Islands (TCI); an introduction to mapping conservation issues for the Anguilla archipelago; a summary of recent work on the Important Plant Areas (IPA)

of the Falkland Islands; and protecting the world's biggest 'no-take' marine reserve in the Chagos Islands.

This successful technical seminar meeting highlighted the wealth of the biodiversity within the UK Overseas Territories, but also the threats posed to the many vulnerable habitats and species.

The first formal Committee meeting was held in November 2013 in Coventry. Committee members were appointed and a range of topics were discussed including: ways in which the OT-SIG might support key partners for the IPA and further its application in OTs; potential

to 'internationalise' CIEEM Best Practice Guidelines; use of LinkedIn for profiling members, news, events; potential use of video-conferencing and webinars to allow OT members to 'attend' meetings; and ideas for future meetings and events for 2014.

 #cieemUKOT

 LinkedIn



West Midlands Section News

West Midlands Section Conference – Mitigation and Enhancement: Case Studies and Best Practice

The West Midlands Section held a very successful one-day conference at Deer Park Hall in Worcestershire on 9th April 2014. Delegates enjoyed the sunshine in the beautiful grounds of Deer Park Hall during the breaks and nine excellent speakers gave talks ranging from wetland mitigation and SUDS design, through mitigation for bats, badgers, small mammals, invertebrates, amphibians and reptiles to translocation of habitats and mitigation in EclA developments. Presentations from the event can be found on the CIEEM website.



(Left) Deer Park Hall

(Above) Dave Lewns talking about artificial badger setts

Greener Prospects Careers Event

On Wednesday 12th February 2014 the University of Birmingham Life and Environmental Sciences Careers Network team hosted Greener Prospects, an event for students interested in careers associated with the environment. Predominantly a networking event, students used this opportunity to meet a cross-section of employers, University of Birmingham alumni and representative organisations and gain an insight into the broad range of career areas and opportunities on offer within this sector. Speakers from ecology and environmental consultancies, landscape architecture and eco-living organisations and an EU climate change initiative shared their advice alongside our own representative from CIEEM.



The event was very well attended, with over 70 students from different year groups and departments, including Geography, Earth and Environmental Sciences, Biosciences, and Government and Society. This was a new event for the University of Birmingham and following the interest and engagement by students, as well as very positive feedback from speakers, hopefully the first of many on this increasingly popular and broad employment sector.

Welsh Section News

Welsh Section Conference and AGM GIS and Remote Sensing: the End of Fieldwork?

The Welsh Section Conference was held at Aberystwyth University on 21 February 2014 with 93 delegates attending. Dr Emyr Roberts, CEO of Natural Resources Wales (NRW), gave the welcome address. He presented examples of work that NRW has been doing to benefit ecology by the way it manages its own estate and by working with farmers to promote ecologically friendly land management practices to enable them to recognise the true value of ecosystem services. He also expressed a desire for NRW to work more closely with CIEEM and other bodies to further improve biodiversity in Wales. To that end an open Q&A discussion with Emyr (<http://linkd.in/PU1udN>) was held on the Welsh Section LinkedIn group (<http://linkd.in/1iDCJ2o>) following the conference.

The main focus of the day was on GIS and remote sensing technologies and how these can benefit the work of ecologists by enabling greater coordination of information and resources. It was made clear that there would always be a need for physical ground-truthing of remote data by experienced ecologists – so (thankfully) there does not appear to be an 'End of Fieldwork' in sight!

Excellent and informative talks were given by Katie Medcalf of Environment Systems, Pete Bunting of Aberystwyth University, Crona Hodges of Citizen Observatories Web (COBWEB), Matt Ellis of NRW, Tony Gent of Amphibian and Reptile Conservation Trust, and Marie Kelly of the Welsh Institute for Sustainable Environments (WISE)... and a very welcome



Emyr Roberts addressing the Welsh Section conference at Aberystwyth University

lunch was sponsored by WISE. Thank you to all those who attended and contributed to the day, presentations from which can be found on the CIEEM website (www.cieem.net/2014-welsh-section-conference).

Irish Section News

Landscape Strategies for Promotion of Urban Biodiversity in Ireland

Maryann Harris

Dublin City Council, Parks Services and University College Dublin, School of Biology and Environmental Science

This report is from the workshop held at the Irish Geographic Section Conference held on 18-19 November 2013 in Dublin.

Ireland has experienced considerable urbanisation in recent years, and it is now similar to the global average (of 60%) in respect of having 62% of its population residing in urban areas (CSO 2012). The opportunities for contact with nature in cities can be limited if biodiversity is not designed and actively managed for by decision-makers. Policies in Ireland for urban biodiversity are still being developed

and gaps exist as to how to promote and put into practice the aims for protecting and enhancing urban biodiversity. Biodiversity Action Plans (BAPs) exist for larger Irish cities: Dublin, Cork, Limerick and Galway. These include reliance on urban parks and green infrastructure concepts. How can cities increase biodiversity and what challenges remain to be addressed? How can ecologists provide solutions to deliver measurable results?

Irish cities and towns offer high biodiversity potential. In common with many large European cities, all of Ireland's larger cities are situated on coastal/estuarine locations which include Natura 2000 designations and which have high biodiversity due to their landscape context. While urban ecosystems worldwide are quite similar in terms of their structure,

function and constraints, the impacts of urbanisation on a landscape are greatly influenced by the original landscape context (Savard *et al.* 2000).

There is a need to recognise the characteristics of biodiversity in cities and urban areas within biodiversity action plans in Ireland. Most BAPs are prepared on a county basis, and there may be little distinct recognition of urban ecology. There are no specific objectives for protection of urban biodiversity in Ireland's National Biodiversity Action Plan (DAHG 2011a), despite the country now having a majority urban population. In contrast, one of the seven key measures in the National BAP specifically targets rural biodiversity. To date, there are no published urban biodiversity research goals on National Platform for Biodiversity Research. (*contd*)

The new Design Manual for Urban Roads and Streets (Department of Transport 2013) makes no mention of biodiversity, despite aspirations for green infrastructure (GI) in both the National BAP (DAHG 2011a) and the Government's Framework for Sustainability (DOELG 2012), which stated that Ireland will "develop an integrated approach to green infrastructure" by 2016. There is a need for Irish research and guidance. Biochange (Scully and Waldren 2011) looked at fragmentation of certain habitats and effects on species.

Characteristics of Biodiversity in Cities in Ireland and Generally

Cities often have higher biodiversity due to the influences of humans and are often situated in naturally high biodiversity areas, such as estuaries. Some species adapt better to urbanisation than others – generalists are usually better off than specialists, which can become locally extinct (Matteson and Langellotto 2011). Gradually, as cities grow and urbanisation of surrounding areas expands, specialists may become locally extinct as their range cannot expand far enough. The generalist species can become dominant in many cities in a region, to the extent that we observe the development of a distinct urban assemblage (Pecarevic *et al.* 2010). Individuals within a population can become highly adapted to urban living and exhibit behaviours unique to urban life. For example, a peregrine falcon was witnessed by members of the public as regularly hunting at night from the rooftop of Liberty Hall on the River Liffey in Dublin city centre when it would be expected to be strictly a diurnal species (Hatch 2013).

The global and Irish urbanisation phenomenon means that urban biodiversity is nature for many – an 'artificial ecosystem' of sorts. In this setting, biodiversity can be controlled by the choices people will make to favour certain habitat types or species that they are willing to co-exist with. Many species common to urban areas are deemed to be pests or nuisances. For example, recent proposals from elected representatives in Dublin City have included calls for city-wide extermination of both pigeons and foxes, based on concerns of perceived threats to human health and also nuisance. This

is representative of a section of the urban public sentiment.

Although urban biodiversity studies in Ireland have been stimulated by the development in the past five years of City Biodiversity Action Plans, in the past it was not well-studied, and the ecological literature is based on natural habitats not urban ones, which may be more complex to model. Urban biodiversity can be more complex due to multi-causal dynamics, more non-natives and more niche habitats. There can be an intricate variation of habitats over a small area due to factors of human disturbance. The Action Plan for Urban and Suburban Birds for Ireland, published by Birdwatch (2011), indicates how we still require more data on breeding rates for many urban birds. Several CIEEM delegates expressed views at the Conference that they would be keen to carry out work in urban biodiversity, but are unfortunately rarely commissioned to do so. Scales of urban biodiversity management are varied and what may meet objectives at one scale may not increase biodiversity at another level. In Ireland, biodiversity policy and legislation is largely derived from European and global approaches. There is a concentration of resources in protection at species and habitat level, with a lack of targeted measures at the landscape-city-regional levels. However, these are the levels that urban policy-makers would affect change at. Reconciliation of the landscape level with habitats and species levels was called for in the Green City Guidelines (Brennan and O'Connor 2008). More Irish case studies are needed.

If ecologists in Ireland are seeking to meet urban biodiversity objectives, in the absence of specific guidance, there are several, sometimes divergent policy documents to look toward:

- Biodiversity Action Plans – National, County
- Regional Planning Guidelines
- County/City Development Plans Green Infrastructure Strategies
- Local Area Plan GI Strategies
- Species Action Plans by the National Parks and Wildlife Service
- River basin district management plans
- Individual public park management plans

- Natura 2000 site conservation management plans
- Residential Density Guidelines
- National Landscape Strategy – still in preparation although a Strategy Issues Paper was published (DAHG 2011b)

What Influences Key Decisions on Urban Biodiversity Management?

The concept of ecosystem services is relevant to the Irish scenario. In Ireland, public parks have a nil asset valuation under Department of Finance guidelines for local authorities. This was devised to prevent speculation or sale of public parks, but has resulted in detrimental outcomes for public parks such as recent decisions to route strategic infrastructure through them to reduce costs following cost-benefit analyses. Budgets are still highly tilted toward grey infrastructure, even for parks budgets. Furthermore, decision-makers' perceptions of biodiverse areas in cities may be low, for example, for brownfield sites. Poor understanding of biodiversity concepts can mean that designs may not address ecological concerns, even when purporting as 'green infrastructure'.

Public parks represent a significant component of emerging green infrastructure strategies. Within these important structural components of a city's ecosystem, there are challenges for parks managers, designers, and ecologists. Most green space in urban areas in Ireland is dedicated to public amenity usage. Very little public land is specifically designated for conservation purposes in urban areas – it must be multifunctional. Conservation objectives must, therefore, be balanced with recreation and amenity demands and targets.

Societal challenges to urban biodiversity are evident in public parks. There can be intense public opinion in Ireland on certain attempts to constrain human enjoyment of public parks. For example, policies concerning dog control are contested, even in a public park which is a National Nature Reserve and where protected species are evidently being disturbed by dogs (McCorry and Ryle 2009). Similarly, problems of substance abuse in public parks are addressed by whole-scale removal of ground flora, and plans for new parks which include for understory

planting may be rejected at planning stage as 'creating a nuisance', despite the aims of statutory plans to promote biodiversity. At the CIEEM Conference, delegates were asked to complete a questionnaire which will inform ongoing research at University College Dublin in urban biodiversity.

Preliminary analysis of the results indicates that a majority of respondents believe that social issues are hindering implementation of plans for biodiversity enhancement. The survey used a Likert scale and none of the respondents disagreed with this statement.

Fragmentation and deficits persist in the green space networks of Irish cities. The existing green space network has been eroded by loss of vegetation structure, a trend noted by ecologists and parks managers in recent years, as they try to defend biodiversity concepts. Some of the reasons for this loss include:

- 'Anti-social behaviour' – substance abuse, homelessness predicted to occur if vegetation cover is available in public green spaces
- Widespread installation of CCTV in Irish external public spaces – cameras require clear sight lines and bright lighting
- Litter and dumping due to changes in waste management collection policy and charges in the past decade – ease of collection is needed by local authority staff to remove it
- Type of equipment used for maintenance narrows practices used to increase efficiency and reduce labour
- Reduction in staffing levels in local authorities as part of the overall downsizing of the public sector under requirements of the International Monetary Fund
- Loss of horticultural skills and practices as services are privatised to lower-paid general operatives

- Intensification of existing open spaces (national Residential Density Guidelines permitted lower than 10% provision on new developments if a developer paid to 'upgrade' existing parks)

It is important to research and document these landscape changes to fully assess the trade-offs that are occurring and to inform decision-making processes in Irish cities and towns. Ecologists are well-placed to promote the ecosystem services approach for urban planning in Ireland and to ensure that new landscape strategies are promoting urban biodiversity. This involves addressing both structural and function components of connectivity. The responses of species to landscape changes are still poorly understood (Boitani *et al.* 2007). Ireland is re-building itself and an ecological networks approach for cities is emerging for CIEEM members to guide and implement.

A note of thanks to CIEEM Conference delegates who responded to the questionnaire survey and who participated whole-heartedly in the team questions session of the workshop.

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Bat Conservation: Global Evidence for the Effects of Interventions

Authors: Anna Berthinussen, Olivia C. Richardson and John D. Altringham

ISBN: 9781907807893

Price: £19.99

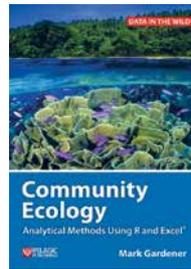
Available for pre-order (due June 2014): www.nhbs.com

This book brings together scientific evidence and experience relevant to the practical conservation of bats. The authors worked with an international group of bat experts and conservationists to develop a global list of interventions that could benefit bats.

For each intervention, the book summarises studies captured by the Conservation Evidence project, where that intervention has been tested and its effects on bats quantified. The result is a thorough guide to what is known, or not known, about the effectiveness of bat conservation actions throughout the world.

Evidence from all around the world is included. If there appears to be a bias towards evidence from northern European or North American temperate environments, this reflects a current bias in the published research that is available.

Bat Conservation is the fifth in a series of synopses that will cover different species groups and habitats, gradually building into a comprehensive summary of evidence on the effects of conservation interventions for all biodiversity throughout the world.



Community Ecology: Analytical Methods Using R and Excel

Author: Mark Gardener

ISBN: 978-1-907807-61-9

Price: £39.99

Available from:
www.pelagicpublishing.com

Interactions between species are of fundamental importance to all living systems and the framework we have for studying these interactions is community ecology. This is important to our understanding of the planet's biological diversity and how species interactions relate to the functioning of ecosystems at all scales. Species do not live in isolation and the study of community ecology is of practical application in a wide range of conservation issues.

The study of ecological community data involves many methods of analysis. In this book you will learn many of the mainstays of community analysis including: diversity, similarity and cluster analysis, ordination and multivariate analyses. This book is for undergraduate and postgraduate students and researchers seeking a step-by-step methodology for analysing plant and animal communities using R and Excel.



Birds and Climate Change: Impacts and Conservation Responses

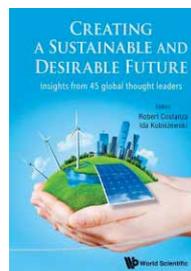
Authors: James Pearce-Higgins and Rhys E. Green

ISBN: 9780521132190

Price: £34.99

Available for pre-order (due June 2014): www.nhbs.com

From the red grouse to the Ethiopian bush-crow, bird populations around the world can provide us with vital insights into the effects of climate change on species and ecosystems. They are among the best studied and monitored of organisms, yet many are already under threat of extinction as a result of habitat loss, overexploitation and pollution. Providing a single source of information for students, scientists, practitioners and policy-makers, *Birds and Climate Change* begins with a critical review of the existing impacts of climate change on birds, including changes in the timing of migration and breeding and effects on bird populations around the world. The second part considers how conservationists can assess potential future impacts, quantifying how extinction risk is linked to the magnitude of global change and synthesising the evidence in support of likely conservation responses. The final chapters assess the threats posed by efforts to reduce the magnitude of climate change.



Creating a Sustainable and Desirable Future: Insights from 45 Global Thought Leaders

Editors: Robert Costanza and Ida Kubiszewski

ISBN: 978-981-4546-88-1

Price: £45.00

Available from: www.worldscientific.com

The major challenge for the current generation of mankind is to develop a shared vision of a future that is both desirable to the vast majority of humanity and ecologically sustainable. *Creating a Sustainable and Desirable Future* offers a broad, critical discussion on what such a future should or can be, with global perspectives written by some of the world's leading thinkers, including: Wendell Berry, Van Jones, Frances Moore Lappe, Peggy Liu, Hunter Lovins, Gus Speth, Bill McKibben, and many more.



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Research into action: grey partridge conservation as a case study

Sotherton, N.W., Aebischer, N.J. and Ewald, J. A.

Journal of Applied Ecology 2014, 51: 1–5

The grey partridge *Perdix perdix* is closely associated with open-farmed landscapes and is therefore sensitive to changes in farming intensity. The current sustained decline in grey partridge numbers began in the 1950s, when the UK's agricultural industry began the process of intensification, both increasing production per unit area and polarising production so that mixed arable/livestock farms were replaced in the west by all-grass farms and in the east by all-arable farms. Agricultural policy still has an important influence on grey partridge distribution and abundance as elements of wildlife conservation are introduced to National and European policies in the form of agri-environment schemes and as the take-up of such schemes is affected by the international price of commodity crops such as cereals.

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Freely available: <http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12162/full>

The cumulative effect on sound levels from multiple underwater anthropogenic sound sources in shallow coastal waters

Pine, M.K., Jeffs, A.G. and Radford, C.A.

Journal of Applied Ecology 2014, 51: 23–30

Underwater anthropogenic sound levels in the ocean are increasing, and the evidence for impacts of sound on marine life is overwhelming. This study investigated the propagation of anthropogenic sound in shallow waters (25-45m deep) from a single monopole (a single loudspeaker) and twin monopole (two loudspeakers) sound sources replaying tidal turbine (marine renewable energy) sound to approximate anthropogenic sound sources in this environment. Greater sound levels were observed at all observation distances from the sound source for the twin monopole compared to the single monopole. These results suggest that the sound from multiple anthropogenic sound sources installed in one location is likely to be cumulative in the environment where their sound fields overlap. Sound intensities observed in both the single and twin monopole experiments were higher than estimates derived from standard geometric spreading models for underwater sound by 3-41dB across all measured distances from the source. The greatest difference from the theoretical spherical spreading model (41dB) occurred at the site most distant (5km) from the twin monopole sound source. The results show that some geometric models may be underestimating the spatial extent to which the anthropogenic underwater sound may be propagating and creating potential ecological impacts. The authors present an alternative model to better estimate and manage ecological impacts from anthropogenic underwater sound.

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Mountain hares *Lepus timidus* and tourism: stress events and reactions

Rehnus, M., Wehrle, M. and Palme, R.

Journal of Applied Ecology 2014, 51: 6–12

Winter tourism in the European Alps has developed rapidly over the past few decades. Wildlife is often disturbed by these largely unpredictable activities, and animals may have limited opportunities to adapt. Mountain hares are affected by this increase in alpine tourism, but their physiological and behavioural reactions to tourist activity are still unknown. The authors measured the levels of faecal glucocorticoid metabolites (GCM) in wild mountain hares living in areas that had no, medium or high levels of tourist activity during winter in 2011. Field results showed that GCM excretion is positively correlated with increased tourism intensity. The authors conclude that mountain hares living in areas with frequent human winter recreational activities show changes in physiology and behaviour that demand additional energy in winter, when access to food resources is limited by snow. To bring down the frequency of stress threats for mountain hares, the authors recommend that managers keep forests inhabited by mountain hares free of tourism infrastructure and retain undisturbed forest patches within skiing areas. Other species such as black grouse *Tetrao tetrix* and capercaillie *Tetrao urogallus* are also likely to benefit from such management activities.

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Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines

Johnston, A. et al.

Journal of Applied Ecology 2014, 51: 31–41

The number of offshore wind farms is rapidly increasing as they are a critical part of many countries' renewable energy strategies. A key concern related to wind turbines is the risk of birds colliding with turbine blades. The authors present a novel method to generate species-specific flight height distributions which can be used to improve the assessment of collision risk by better reflecting the proportion of in-flight populations at risk of collision. Data describing the flight heights of birds from surveys of 32



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potential offshore wind farm development sites were combined to estimate continuous distributions for 25 marine bird species. The results demonstrate that under the conditions in which the data were collected, raising hub height and using fewer, larger turbines are effective measures for reducing collision risk.

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Improving the application of long-term ecology in conservation and land management

Davies, A.L., Colombo, S. and Hanley, N.

Journal of Applied Ecology 2014, 51: 63–70

This paper outlines the main barriers to the integration of long-term ecological data (LTE) into management. Using two UK upland case studies, it uses a choice experiment to assess the value placed on LTE by ecological researchers, policy-makers and practitioners. Respondents were able to consider how selecting or excluding different sources of evidence might affect management decisions and their environmental outcomes. The results suggest that LTE has the potential to become a valued part of the evidence base for guiding land-management decisions. By working with managers to address site-based issues, palaeoecology can provide additional insights into ecosystem dynamics and critical thresholds. Using LTE can also improve conservation effectiveness by ensuring that both rapid and lagged responses are anticipated and indicating the range of variability against which management responses can be evaluated.

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National patterns of functional diversity and redundancy in predatory ground beetles and bees associated with key UK arable crops

Woodcock, B.A. *et al.*

Journal of Applied Ecology 2014, 51: 142–151

The authors mapped the species richness and functional diversity of ground beetles and bees to provide surrogate measures of natural pest control and pollination for Great Britain. Functional diversity represents the value and range of morphological and behavioural traits that support ecosystem services. The authors modelled the rate at which functional diversity collapsed in response to species extinctions to provide an index of functional redundancy. Deficits in functional diversity for both pest control and pollination were found in areas of high arable crop production. Ground beetle functional redundancy was positively correlated with the landscape cover of semi-natural habitats where extinctions were ordered by body size and dispersal ability. For bees, functional redundancy showed a weak positive correlation with semi-natural habitat cover where species extinctions were ordered by feeding specialisation. Increasingly, evidence suggests that functionally diverse assemblages of ground beetles and bees may be a key element to strategies that aim to support pollination and natural pest control in crops. If deficits in both functional diversity and redundancy in areas of high crop production are to be reversed, then targeted implementation of agri-environment schemes that establish semi-natural habitat may provide a policy mechanism for supporting these ecosystem services.

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Upland land use predicts population decline in a globally near-threatened wader

Douglas, D.J.T. *et al.*

Journal of Applied Ecology 2014, 51: 194–203

In the UK uplands, changes in sheep and game management, and afforestation, have altered the configuration of internationally important moorland habitat and are predicted to have increased predation pressure for a globally unique suite of breeding birds. Some of these upland bird species have declined, with particular concern over ground-nesting waders. Using resurveys of the rapidly declining Eurasian curlew *Numenius arquata* as a focal species, the authors investigated whether upland land use predicts low nesting success and population decline. Curlew population changes over an 8 to 10-year period were positively related to gamekeeper density (a surrogate of predator control intensity) and inversely to the area of woodland surrounding sites, as a likely source of predators to adjacent open ground. Model predictions suggest that increasing woodland cover from 0% to 10% of the land area within 1km of populated sites requires an increase in human predator control effort of about 48%, to a level associated with high-intensity grouse production, to achieve curlew population stability. Curlew nesting success, known to be a key driver of population trends, was also positively related to gamekeeper density and inversely to woodland area surrounding sites, providing a plausible mechanistic link between land use and population change. Upland land use is associated with curlew declines, with predation a likely mechanism, and this may apply to other breeding waders. The removal of isolated woodland plantations from otherwise unafforested landscapes may help reduce predation pressure across a range of systems including moorland. However, direct predator control may also be important to conserve ground-nesting birds in these landscapes, for example, where moorland management and forestry coexist as major land uses. Predator control may also mitigate climate change effects by enhancing wader productivity, particularly where climate effects coincide with changing land use. Emerging land uses in open landscapes, including native woodland restoration and wind farms, require careful siting to minimize further impacts on open-area breeding birds.

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Offshore marine renewable energy devices as stepping stones across biogeographical boundaries

Adams, T.P. *et al.*

Journal of Applied Ecology 2014, 51: 330–338

This study used coupled biological and hydrodynamic models to investigate the spread of intertidal marine organisms with pelagic larvae (such as barnacles or gastropods) in the region around south-western Scotland. The authors assessed the impact of novel habitat on dispersal and its role in allowing transgression of physical barriers. Model renewable energy device sites provided habitat for pelagic larval particles that would otherwise have been lost offshore. They also provided a source of larvae for existing coastal sites. Many offshore devices fulfilled source and destination (or intermediate connection) roles, creating new dispersal pathways, and allowing previously impossible northward dispersal from the Northern Irish coast to Scotland. New habitat close to biogeographical barriers has implications for existing species' distributions and genetic population structure. It also affects the spread of non-native species and 'climate migrants'. Monitoring these sites for the presence of such species will be important in determining the future ecology of coastal habitat and in maintaining economic aquaculture and marina operations.

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Influence of combined pesticide and parasite exposure on bumblebee colony traits in the laboratory

Fauser-Misslin, A. *et al.*

Journal of Applied Ecology 2014, 51: 450–459

Parasites and pesticides are among the suspected principle drivers of pollinator declines. However, especially in the case of key wild pollinators, there are insufficient data on the relative impact of these individual environmental stressors and whether they interact to increase detrimental effects. Using a fully crossed factorial design, the authors investigated how laboratory exposure to neonicotinoid insecticides, thiamethoxam and clothianidin, over a 9-week period and a prevalent trypanosome gut parasite *Crithidia bombi* affects various crucial colony traits of the bumblebee *Bombus terrestris*. The authors show that chronic dietary exposure from an early stage of colony development to doses of thiamethoxam and clothianidin that could be encountered in the field truncated worker production, reduced worker longevity and decreased overall colony reproductive success. Further, the authors demonstrate a significant interaction between neonicotinoid exposure and parasite infection on mother queen survival. The fate of the mother queen is intrinsically linked to colony success, and under combined pressure of parasite infection and neonicotinoid exposure, mother queen survival was lowest. This indicates increased detrimental effects of combined exposure on this crucial colony trait. Combined effects may be exacerbated in stressful natural environments where more pronounced parasite virulence is expected.

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Landscape configuration of crops and hedgerows drives local syrphid fly abundance

Haenke, S. *et al.*

Journal of Applied Ecology 2014, 51: 505–513

The authors examined syrphid abundance (Diptera: Syrphidae) in three types of linear semi-natural habitats, differing in connectedness to annual crops and forest, forest-connected hedges, and isolated hedges, as well as in the adjacent oilseed rape or winter wheat fields. Aphidophagous syrphids were more abundant in forest-connected hedgerows than in forest edges (with isolated hedges being intermediate), and more abundant in crop fields adjacent to hedgerows than adjacent to forest edges, indicating spillover from semi-natural habitats to the adjacent crop fields. Aphidophagous syrphid abundance was higher in semi-natural habitats adjacent to oilseed rape fields than adjacent to wheat fields if the proportion of oilseed rape in the landscape was low (indicating local concentration). This study highlights the potential of hedgerows to enhance the abundances of beneficial syrphids and their spillover to adjacent crop fields, especially when they are connected with forests.

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Detection of crayfish plague spores in large freshwater systems

Strand, D.A. *et al.*

Journal of Applied Ecology 2014, 51: 544–553

Indigenous European freshwater crayfish (ICS) are threatened due to invasive North American freshwater crayfish that are natural carriers of *Aphanomyces astaci* which causes crayfish plague. Infectious *A. astaci* zoospores are released from carrier crayfish, but little is known about the spore abundance in water systems that either host non-indigenous crayfish species (NICS) or experience crayfish plague outbreaks. The authors tested two large-scale filtering approaches to generate new insight into the abundance and dynamics of *A. astaci* spores in natural freshwater systems. Depth filtration (DF) and dead-end ultrafiltration (DEUF) followed by *A. astaci*-specific quantitative real-time PCR was used to monitor *A. astaci* spores in large Nordic lakes hosting *A. astaci*-positive signal crayfish *Pacifastacus leniusculus*, the dominating NICS in Northern Europe. Crayfish and water were sampled together to compare the *A. astaci* pathogen load in tissues, *A. astaci* prevalence in the population and the corresponding spore density in water. Samples were also obtained from a river where indigenous noble crayfish suffered from acute crayfish plague. The sensitivity of the filtering techniques was evaluated using simulation of random events. The authors detected *A. astaci* spores in lakes hosting NICS with both filtering methods but predominantly at concentrations below c. 1 spore/L. They found a significant positive association between *A. astaci* spore density in water, the *A. astaci* prevalence in the corresponding NICS population and the tissue pathogen load. Water from the river with the ongoing crayfish plague outbreak contained overall c. 43 times more spores/L than water hosting NICS. Both filtering techniques proved suitable and equally sensitive, but simulations suggest that an optimisation of the spore recovery could yield a 10-fold increase in the DEUF-method sensitivity. This study demonstrates a low amount of pathogen spores are present in aquatic environments with non-indigenous crayfish species, emphasising the need for large-volume filtering techniques for successful detection.

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Exploring the consequences of reducing survey effort for detecting individual and temporal variability in survival

Lahoz-Monfort, J.J. *et al.*

Journal of Applied Ecology 2014, 51: 534–543

Long-term monitoring programmes often involve substantial input of skilled staff time. In mark–recapture studies, considerable effort is usually devoted to both marking and recapturing/resighting individuals. Given increasing budgetary constraints, it is essential to streamline field protocols to minimize data redundancy while still achieving targets such as detecting trends or ecological effects. The authors evaluated different levels of field effort investment in marking and resighting individuals by resampling existing mark–recapture–recovery data to construct plausible scenarios of changes in field protocols. They demonstrate the method with 26 years data from a common guillemot *Uria aalge* monitoring programme at a major North Sea colony and also assess the impact of stopping the ringing of chicks on their ability to study population demography using integrated population models (IPM) fitted to data including information on breeding adults. Different data sets were removed artificially to explore the ability to compensate for missing data. Current ringing effort at this colony appears adequate but resighting effort could be halved while still maintaining the capacity to monitor first-year survival and detect the effect of hatch date on survival prospects. The IPM appears robust for estimating survival, productivity or abundance of the breeding population, but has limited capacity to recover year-specific first-year survival when chick data are omitted. If productivity were not monitored, the inclusion of chick data would be essential to estimate it, albeit imprecisely. Post-study evaluation can help streamline existing long-term environmental monitoring programmes. This study is the first use of data thinning of existing mark–recapture–recovery data to identify potential field effort reductions. The framework has broad applicability to other taxa and demographic parameters, provided suitable long-term data are available.

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Lichen translocation with reference to species conservation and habitat restoration

Smith, P.L.

Symbiosis 2014, 62: 17–28

Lichen translocation techniques that may be of value in the salvage of endangered lichen species, or in the latter stages of habitat restoration, are reviewed. Successful translocation is defined here as the transfer of a target organism from a donor site to a receptor site to establish a new selfmaintaining colony; for lichens, this may or may not include co-transfer of the thallus-supporting substrate. In a time of global environmental change, many species are under threat and the need for effective translocation methods is clear. Indeed, some lichens are already amenable to translocation from one substrate to another. Global conservation requires the restoration of degraded ecosystems and translocation technology offers a tool for habitat replenishment. The reintroduction of lichenised fungi into sites from which they have been lost is an integral part of the restoration of complex habitats. In turn, successful translocation creates niches for other organisms which inhabit, or feed upon, them.

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The European Natura 2000 Protected Area Approach: A Practitioner's Perspective

Crofts, R.

Parks vol. 20.1, March 2014, pages 75-86

Natura 2000 is the first and only regional biodiversity protected area approach in the world. Over its 20 years of existence it has been a positive force for conservation, but it has certain limitations. This paper assesses some of its strengths and weaknesses from a practitioner's perspective. Overall, the assessment is positive as without it biodiversity loss would probably have been greater, and with it there is a unique transnational approach. The positive aspects identified are the biogeographical framework, pan-European classification of species and habitats, and the political will to implement it. The negative aspects are that it is a static approach to species and habitat conservation, the Natura approach to biodiversity conservation is being undermined by perverse subsidies from other EU funding mechanisms, especially the Common Agricultural Policy, and the effects of development on the fragmentation of habitats are dominant. Also, in practice, there has been a failure to implement wider countryside and connectivity measures. Lessons relevant to other parts of the world are discussed.

Freely available at: https://cmsdata.iucn.org/downloads/parks_20_1_crofts.pdf

Forthcoming Events

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

Conferences

Date	Title	Location
11-12 November	Autumn Conference 2014 – Progress in Effective Habitat Restoration, Translocation and Creation	Edinburgh

Training Courses

11 – 12 June	Introduction to Grass Identification	Settle, North Yorkshire
13 June	Wildflower Identification for Beginners	Wirksworth, Derbyshire
19 June	Barn Owls – Surveying and Reporting	Tamworth, Staffordshire
30 June	Introduction to the National Vegetation Classification	Chester
7 July	Wildflower Identification – Grasslands and Meadows	Salisbury
8 July	Wildflower Identification – Heaths, Acid Grassland and Bogs	New Forest
16 July	Japanese Knotweed	Swansea
17 July	Introduction to White-clawed Crayfish	Windermere
24 July	Wildflower Identification for Improvers	Wirksworth, Derbyshire
25 – 27 July	Working with Crayfish – Survey, Ecology and Mitigation	Malham Tarn
29 July	Identification of Invasive Alien Plants (Schedule 9 of the Wildlife and Countryside Act)	Dorking, Surrey
30 July	Bat Handling and Identification	Herne Bay, Kent
6 August	Freshwater Crayfish for Beginners: Surveying and Monitoring Techniques	Tamworth, Staffordshire
13 August	Hazel Dormouse – Handling and Survey Methods	Herne Bay, Kent
3 – 5 September	Working with Crayfish – Survey, Ecology and Mitigation	Malham Tarn
8 September	Invasive and Non-native Flora	Swansea
10 September	Using the Vegetative Key to the British Flora	Southampton
18 September	Crayfish in Britain: Natives and Invasive Non-natives	Hertfordshire
2 October	Freshwater Fish Monitoring	Wilton, Wiltshire
14 October	Water Vole Ecology	Lifton, Devon
15 October	Water Vole Mitigation – Options for Development	Lifton, Devon
23 October	Hazel Dormouse – Introduction to Survey Techniques	Lydney, Gloucestershire
24 October	Hazel Dormouse – Handling, Ecological Requirements and Mitigation	Lydney, Gloucestershire
6 November	Introduction to Biodiversity Offsetting	London
25 November	Presentation Skills	Birmingham
26 November	Conflict Resolution	Birmingham
27 November	Bat Surveys in Professional Practice	London
3 December	Communication Skills	Birmingham

Geographic Section Events

7 June	North East Section Event – Visit to Palace Leas Grassland	Morpeth
18 June	Yorkshire and Humber Section Event – Green Infrastructure and the Dearne Valley	Dearne Valley
21 June	North East England Section Event – Does History Shape Ecology or Ecology Shape History?	Middleton-in-Teesdale
19 July	South East England Section Event – Visit to Bramshill SSSI	New Forest

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