

Number 39

April
2003



Ecology & Environmental Management IN PRACTICE

Bulletin of the Institute of Ecology and Environmental Management

The Water Framework Directive

Dr Martyn Kelly, MIEEM

In December 2000, the "Water Framework Directive" (WFD)¹ was finally published. Member States of the European Union are now in the process of translating the complicated requirements into domestic legislation, with consequences for almost any IEEM member who ever dabbles a toe in an aquatic ecosystem.

When I first started working on aquatic ecology, back in the early 1980s, biologists in the water industry were still something of a rarity. Those that were employed definitely played second fiddle to the chemists and engineers who took all the important decisions. Much has changed over the past twenty years but most significant, perhaps, has been the development of aquatic ecology from a science that simply described, to one that was capable of predicting the outcome of a particular course of action. Appropriately, perhaps, this "coming of age" has led to ecology being placed centre stage in the first major piece of EU environment legislation of the new century. The Directive in question is the Water Framework Directive¹ (WFD) – a major landmark in the way that we think about, and manage, water resources.



Llyn Geirionydd

Earlier EU water legislation addressed either specific substances (e.g. the Dangerous Substances Directive) or specific uses (the Shellfish Directive and Bathing Water Directive). By the late 1990s, the result was a hotchpot of Directives, some of which had conflicting principles, definitions and methods. However, all shared a common philosophical framework in which a chemical definition of "pollution" prevailed, and which placed exploitation of a waterbody as the primary goal. Pollution, put simply, was too much of the wrong kind of chemical, with the uses of each waterbody ultimately determining the concentrations that were allowed. Several of the Directives included limits for microbiological variables as well, but there was little or no

focus on the natural biota, except in those Directives with a specific remit for conservation.

Thus, in the 1970s and early 1980s, the Dangerous Substances Directive of 1976 made regulation of heavy metals and other toxic pollutants the hot issue of the day. However, control of industrial sources of toxic pollutants often led to little obvious improvement in the biota in rivers that were still heavily polluted with sewage effluents. Later, in the early 1990s, with the privatised water companies under tighter regulation by the National Rivers Authority, there was a push to improve the quality of sewage effluents, with some success. The biology "window" of the Environment Agency's "General Quality Assessment" (GQA) in 2000, for example, shows that 67 % of rivers in England and Wales fulfil the criteria of "good" or "very good" quality based on current, invertebrate-based, monitoring techniques. However, many of the lowland rivers that fell into these categories often had dense growths of blanket weed and other aquatic plants. So, in the late 1990s attention shifted to river eutrophication, prompted by the Urban Wastewater Treatment Directive (UWWTD), with the result that a large number of "eutrophic sensitive areas" (ESAs) have been designated and large sewage works which discharge into these areas will require additional investment to install nutrient-stripping facilities.

This brief historical survey shows a pattern of European and national legislation evolving gradually over the last quarter of the twentieth century and mirroring the gradual increase in environmental awareness within the electorate. However, tackling water quality in such a way is a little like peeling away the layers of an onion – peel away one "layer" of pollution and another, previously unseen, is revealed underneath. Simply bolting on additional Directives to the creaking edifice of EU water legislation was not really a long-term solution for improving the European environment. What was needed was a root-and-branch rethink of how environmental quality was measured.

The first step towards this was a realisation that we had been asking the wrong questions. Instead of defining targets by the absence of something undesirable, we needed to turn our whole conceptual approach to pollution on its head and define our targets by the presence of something desirable. In other words, aim for waterbodies in which balanced and natural aquatic ecosystems thrive. This led to an attempt in the early 1990s to develop an Ecological Quality Directive that would have replaced chemical targets for water quality with ecological targets. However, this Directive foundered as legislators realised that it did not go far enough to unify existing approaches. Out of the wreckage of the Ecological Quality Directive arose the idea for a Framework Directive.

The unity for which the Commission is striving is summarised in the first Article of the Directive (Box 1). It is a bold statement, underlined by the first paragraph of the preamble which states that:

'Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such.'

Legislation concerning "water quality" used to be quite distinct in both objectives and methods from that concerning conservation; however, as this sentence shows, the WFD is now bringing these two strands of thought together into one seamless whole. At the heart of the WFD is the concept of

Ecology and Environmental Management

In Practice No. 39, April 2003. ISSN 0966-2200

Editor for this issue: Jim Thompson, Assistant Editor Joel Bateman.

Photo Credits: John Ball, Nigel Barter (Cartoons), Bat Conservation Trust, Channel Tunnel Rail Link, Cresswell Associates Ltd., J.J. Kaczarow, Jim Thompson.

In Practice is published quarterly by the Institute of Ecology and Environmental Management. It is supplied to all members of IEEM and is also available by subscription (£30 per year, UK. £40 overseas).

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Original design by the Nature Conservation Bureau Limited. Tel 01635 550380.
In Practice is printed on Revive Silk, a 75% recycled paper (35% post consumer).

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Iraq and the Marshes

By the time this *In Practice* is circulated the war in Iraq will be dominating the news. But everyone should be well aware that apart from the kind of destruction seen on TV screens, war can inflict severe damage on biodiversity and protected areas as evidenced by the conflict in Croatia following the break-up of the former Yugoslavia.

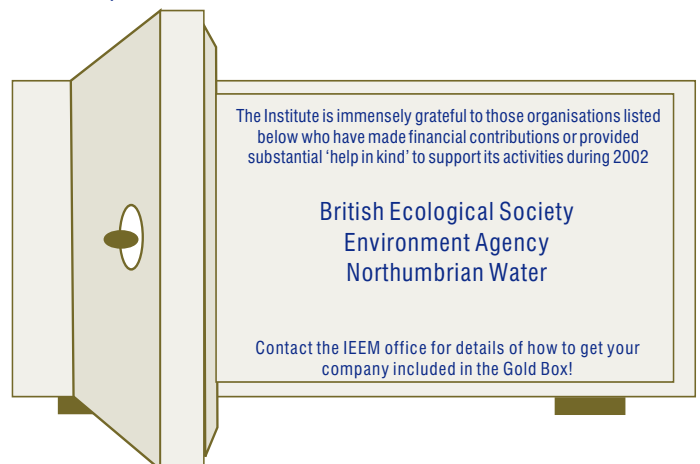
Conservationists should be thinking now of the possibilities for a new, sustainable and restored environment for the country. In terms of overall biodiversity Iraq must be high on any list. Mountains reaching up to 3728m in the Kurdish north, deserts in the south of the country – add the lakes and marshes bordering both the Tigris and the Euphrates plus the marsh area around Basra and you are talking conservation big time. There could be a lesson to learn from its neighbour Jordan where at the recent IUCN congress in Amman it was encouraging to see how green tourism was developing using some of the quite spectacular nature reserves in Jordan as a basis. The potential for Iraq to do the same must be much greater. Ecological reconstruction of the country will have to be loudly voiced if it is to stand any chance among the vital demands for humanitarian aid that will surely follow. Much is going to depend on how much damage is caused and in particular how much destruction of the oil wells takes place. The destruction in Kuwait was widely hailed as an environmental disaster – air pollution, oiled birds, even reports of birds landing on oil lakes because they mistook them for water.

One of the tragedies of the Saddam Hussein regime has been the destruction of the marshes in southern Iraq. This is the traditional home of the Shi-ite Marsh Arabs. Apparently there were 6,000 square miles of marshlands between the Basra, Amarah and Nasiriyah. During the Iran – Iraq war this area was a centre of hostilities. Massive engineering works were then constructed to drain the Euphrates. This drainage appears to have gathered pace following the first Gulf war in 1991 to the extent that over 90% of the marshes have now disappeared, and with them, of course, the Marsh Arabs' culture, if not the population itself. The marshes contain quite a list of rare, endemic and now threatened species such as the Sacred Ibis and African Darter.

It might just be worth remembering that during the first world war the British occupied Iraq from 1915 onwards as part of the campaign against the Turks. British hold was then maintained under a League of Nations mandate confirmed at the conference at San Remo in April 1920 and it was during this time that the first attempts to penetrate the marsh areas and to introduce services were made. The initial welcome for the British after the liberation from the Turks was very short lived – there were several rebellions and finally full independence was achieved in 1932 – perhaps a lesson for any idea of a long term allied presence!

All of this will be quite a challenge for sustainability!

Jim Thompson



“good ecological status” (see Box 2) that will be achieved through a process of River Basin Management Planning (RBMP). In England and Wales, the well-established practice of catchment management planning will form the basis of RBMP, which should produce an overview of the ecological status of each river basin, plus a “Programme of Measures” designed to raise those water bodies at moderate, poor or bad status up to good status. There is a further requirement for Member States to “take account of the principle of recovery of costs of water services . . . in accordance with the polluter pays principle”. Again, existing regulatory structures in the UK already go a long way to satisfying these requirements.



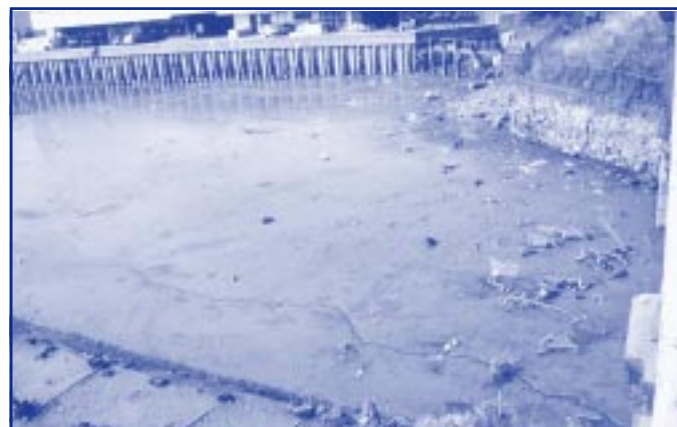
Water Lilies

Which leaves us, conveniently, with the thorny topic of “good ecological status” as the issue most likely to interest IEEM members. Box 2 outlines the definitions of ecological status as given in the Directive. Anyone familiar with RIVPACS² will recognise the principle at work here: in effect, sites with “high ecological status” will be used to define “type-specific reference conditions” against which the ecological status of other sites will be assessed. In the case of RIVPACS, the “expected” fauna of a site is predicted on the basis of physical habitat variables, and this is then compared with the fauna that is actually found at a site in the form of an observed:expected ratio. The difference in the WFD is that this process has to be repeated for a number of “biological quality elements”. For rivers, these are phytoplankton, macrophytes, phytobenthos and fish, in addition to benthic invertebrates. There is also a requirement for hydromorphological conditions to be in a more-or-less natural state. Broadly similar criteria also apply to lakes, transitional waters (estuaries and other brackish waters) and coastal waters.

If you doubt the scale of the challenge that the WFD poses, it is worth noting that the definition of high ecological status given in Box 2 is very similar to the criteria for “best of their type” used by English Nature when selecting rivers as Sites of Special Scientific Interest (SSSI). By the standards of only a decade ago, using such sites as benchmarks for environmental quality improvements throughout the country would have seemed preposterous. Good ecological status, which will be the level that all sites will be required to have reached by 2016, is a little more pragmatic than this (see Box 2). However, it will almost certainly be substantially more stringent than the categories of “good” and “very good” biological quality that the Environment Agency uses at present, if only because it is based on a wider range of organisms than just benthic invertebrates. If we assume

that ESAs, as defined by the UWWTD, can be no better than moderate ecological status (see Box 2), then all those ESAs that occur in rivers that are classed as “good” or “very good” using the present GQA biology classification will need to be downgraded. This may well be the case for hundreds of kilometres of rivers throughout the country, as well as for the large number of smaller rivers that fall outside the scope of the UWWTD. To put it bluntly, the percentage of rivers that are classified as having “good ecological status” is likely to be much lower than the figure of 67 % that currently fulfil the criterion of “good” or “very good” biological quality. In this age of spin and counter-spin, it will take a bold politician to stand up and explain apparent fall in water quality to a sceptical electorate.

Finding objective measures of good ecological status is a major challenge, but it is still only a first step. Having assessed ecological status in a River Basin, the next step will be to state issues and objectives for that Basin and then to derive a “Programme of Measures” designed to get waterbodies with moderate ecological status or lower up to good status. DEFRA has, apparently, conducted a Regulatory Impact Assessment, but the results of this are still confidential. One can expect, however, that if the Directive is implemented in the spirit intended, the effects are going to be far-reaching. To play Devil’s Advocate for the moment, I suspect that almost all small sewage works will, in the future, require nutrient-stripping in addition to normal secondary treatment. The costs of these improvements will find their way onto our water bills. And if nutrients are perceived to be a problem in rural catchments, then agriculture too is likely to be required to manage and control its own diffuse inputs. Both of these will raise the political stakes of water and the environment once again. We have, at present, a Government that is both pro-Environment and pro-Europe and has a large majority. Change the domestic political climate to one that is highly Eurosceptic and the odds for such changes may well shorten.



Lower reaches of the River Lee

¹ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Official Journal of the European Communities L327: 1-73.

² RIVPACS: River Invertebrate Prediction and Classification System. See “Assessing the Biological Quality of Freshwaters: RIVPACS and Other Techniques” (Edited by J.F. Wright, D.W. Sutcliffe & M.T. Furse) Freshwater Biological Association, Ambleside.

Box 1. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

Article 1: Purpose

The purpose of this Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which:

- a) prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystem;
- b) promotes sustainable water use based on a long-term protection of available water resources;
- c) aims at enhanced protection and improvement of the aquatic environment, inter alia, through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances;
- d) ensures the progressive reduction of pollution of groundwater and prevents its further pollution, and
- e) contributes to mitigating the effects of floods and droughts.

Box 2. General definitions of ecological status classifications for rivers, lakes, transitional waters (i.e. estuaries and other brackish environments) and coastal waters. (Table 1.2 from Annex V of the Water Framework Directive)

High status: There are no or only very minor, anthropogenic alterations to the values of the physico-chemical and hydromorphological quality elements for the surface water body type from those normally associated with that type under undisturbed conditions.

The values of the biological quality elements for the surface water body reflect those normally associated with that type under undisturbed conditions, and show no, or only very minor, evidence of distortion.

These are the type-specific conditions and communities.

Good status: The values of the biological quality elements for the surface

water body type show low levels of distortion resulting from human activity, but deviate only slightly from those normally associated with the surface water body type under undisturbed conditions.

Moderate status: The values of the biological quality elements for the surface water body type deviate moderately from those normally associated with the surface water body type under undisturbed conditions. The values show moderate signs of distortion resulting from human activity and are significantly more disturbed than under conditions of good status. Waters achieving a status below moderate shall be classified as poor or bad. Waters showing evidence of major alterations to the values of the large portions of the relevant biological communities normally associated with the surface water body type under undisturbed conditions are absent, shall be classified as bad.

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An Interview with Professor Basil O'Saurus

In Practice's Special Correspondent was able to gain an exclusive interview with Basil O'Saurus, Professor of Tauroscatology at University College, Neasdon, to explain the intricacies of the Directive to us.

So, Professor, can you explain, very simply, what the Water Framework Directive means to you?

Air miles.

I beg your pardon?

Air miles. One key objective of the Directive is to create a level-playing field for water policy right across the European Union. This means that experts like myself have to attend meetings all over the place to make sure that all Member States have agreed the same definitions for ecological status.

Ecological status? What's that?

It is the jewel in the crown of the WFD, and the main reason why ecologists such as myself, who have previously played second fiddle to chemists and engineers, can now start accumulating air miles.

So what is Ecological status?

I've just told you.

Surely there is more to it than just air miles?

I think that you're right. Unfortunately, until we've finished all of our meetings, I don't really know what ecological status is myself, let alone feel able to explain it to you.

Pretend I'm offering you a lucrative contract ...

Well, in that case, ecological status is a simple concept. The heart of the Directive is the idea that the target for all water management activities should be water bodies containing the biota that would be expected if man's impact on them was negligible. The Directive then tells Member States to express "ecological status" as the distance between the observed reality and this predicted target.

If it is that simple, then you don't need a lucrative contract?

Oh yes I do. It is one thing to explain it in general terms, but something else altogether to translate the terms of the Directive into objective measures. This idea of "ecological status" has to apply in a consistent manner to all lakes and streams from northern Scandinavia, all the way south to Spain and Italy. Now, about this contract ...

Hold on, this idea of ecological status sounds suspiciously like the principle behind RIVPACS?

It is, except that RIVPACS applies only to invertebrates in United Kingdom rivers, whilst the WFD will apply to all of Europe, and encompass macrophytes, algae, plankton, fish and hydromorphological characteristics as well as invertebrates. It will also cover coastal and estuarine waters, and groundwater.

Wow. But what about our traditional chemical-based definitions of water quality?

These are included too, as the WFD repeals a lot of earlier legislation, including the Dangerous Substances Directive. The WFD makes similar provisions to this Directive, but the term "dangerous substances" is replaced by "priority substances" but ...

But what?

Your readers aren't interested in this.

How do you know?

If they were, they'd have joined CIWEM.

True. So let's get back to the ecology then.

Where was I? Oh yes, I was talking about ecological status. The first need is to make sure that we have robust methods to make all these different measurements, and the Environment Agency and SNIFFER (Scotland and Northern Ireland Forum For Environmental Research) have already let contracts to start method development. In several cases – such as macrophyte survey, for example – there is already a basic technique on which to build. As in the case of RIVPACS, these new methods will be built around a dataset of "reference sites" that are in pristine, or near pristine condition.

Stop – I'm getting lost. Where do we find aquatic sites in pristine or near-pristine condition in lowland UK?

In the case of lakes, palaeoecological techniques are being used to establish historical baselines, using diatoms and other fossils, whereas in rivers we will probably use the best sites available. But, please stop interrupting, especially with such difficult questions. Where was I?

We were talking about methods for the WFD ...

Oh yes. If we know the characteristics of reference sites, then we can measure deviations from this state using various numerical techniques, and then define a boundary when we can say that there is a statistically high probability that the site has a different biota to that which was expected. And that is where the fun starts.

Just a minute

Not another interruption. What now?

Can you be more specific about the numerical techniques that will be used?

Yes. Remember the point when, as an undergraduate, you dozed off during a lecture on multivariate statistics?

Yes.

The techniques that will be used were described approximately 15 minutes after that point.

B*er. Let's gloss over this and get back to what happens once a site has been shown to have a different biota to that expected.**

The Statutory Agencies then have to identify the pressures causing the problems at the site, and take steps to bring the site back to good ecological status. Because this boundary between "good ecological status" and moderate status is so important, a lot of effort is being spent ensuring that each State defines this boundary in roughly the same way. Whilst this is not

a great problem in mainland Britain, it is important that Northern Ireland and the Republic of Ireland have a similar approach to defining this boundary. Hence the need for international collaboration in developing approaches to the Directive. Which reminds me, I must dash off to catch a flight

Wait a minute; I've got a few more questions...

...and we still need to discuss the lucrative contract that you mentioned earlier...

First, what about waterbodies such as canals and reservoirs that are obviously artificial?

The WFD allows such water bodies to be described as "artificial waterbodies" and these will need to meet "good ecological potential" rather than "good ecological status". Good ecological potential is hard to define, but will probably be interpreted as "as good as it can be". This term will also apply to water bodies that are subject to heavy physical modifications. I think that we can expect navigable rivers such as the Thames to be included, along with rivers subject to extensive flood protection or internal drainage, plus the many lochs and rivers in Scotland that are affected by hydroelectric schemes. I would also guess that the WFD will make it hard for any new tidal barrage schemes to gain planning consent.

...and finally, I really wanted to ask what this all means for IEEM members.

In the long-term, the WFD puts ecology at the heart of water management and gives us all a great opportunity to raise the status of the profession. In theory, there should be more opportunities for ecologists both within the Statutory Agencies, and outside. However, because the results of ecological surveys will have a greater influence on how a water body is managed than in the past, the work of ecologists will be subject to more intensive scrutiny.

What about those of us involved in conservation?

It is too early to be sure, but I suspect that the WFD will have a subtle

impact. At a prosaic level, of course, it is simply one more piece of legislation you will need to bear in mind when performing ecological evaluations and assessments as part of Statutory EIAs. The Statutory Agencies will not be able to approve anything that may lead to a decline in ecological status. There are also provisions within the Directive to designate waters as "protected areas" if special attention is required. As a minimum, this will apply to SACs and SPAs, but DEFRA might decide that these provisions apply to aquatic SSSIs as well.

The interesting point is that ecological status is defined very differently in the WFD than in previous conservation legislation and it may provide greater protection for sites that would otherwise have been vulnerable because they lacked the organisms that are the usual focus of conservationist's attention. There is no mention in the WFD of such valued ecological receptors as otters, newts and birds, for example, but it has plenty to say about hitherto-neglected organisms such as algae. And remember, too, that the steps involved in getting a stream or lake back to "good ecological status" may involve habitat creation, river restoration and all sorts of ingenuity on the part of IEEM members. Now, I really must dash, but before I go, can you please tell me a little more about this lucrative contract.

The lucrative contract? Oh yes, it concerns a taxonomic investigation of that elusive fish *Clupea harengus var. rufus*. I'll be in touch. Thank you for your time, Professor O'Saurus.

¹ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000, establishing a framework for Community action in the field of water policy.

Editors Note - who is Profesor Basil O'Saurus? - one of the many contacts of IEEM otherwise known as Consultus bowburnus

New Articles Needed

Articles for In Practice are always needed.

Each page takes about 1,200 words and papers are welcome up to 4 pages, preferably in 1-page units.

It helps to have articles with good quality illustrations, photos or slides.

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Aerial Photography for Environmental Assessment

John Ball, AIEEM

For as long as there have been aircraft and relatively fast emulsion films, photography from the air has been a useful tool in the interpretation of land and ground features. The science made enormous progress during World War 2 and both the RAF over occupied Europe, and the Luftwaffe over this country accrued vast libraries of sometimes incredibly good photographs. In peacetime, many of these new techniques were adapted to the recording, assessment and interpretation of town and country alike.

Since 1945 specialist filming and photographic companies have provided a pictorial record of the country from Lands End to John O'Groats. National and local government authorities and agencies now use such photographs for every conceivable purpose. So too do other groups of specialists; archaeologists and land management people for instance. One only has to watch television programmes such as Time Team or the Flying Gardener to realise this.

My speciality is aerial photography for nature conservation, habitat assessment and ecological monitoring and mapping. Together with the recording of landscape work done by the company employing me, I find this work most rewarding.

I have surveyed many kilometres of river and one of the most useful techniques is to overfly the course of the stream photographing it to the extent that a record of every part is obtained. By annotating features identified from the air onto large scale maps, usually 1:2500, I find that I can much more easily and accurately survey river reaches from the ground. Many features on rivers stand out when seen from the air. These include very good approximations of the areas of stream channel that are covered by vegetation. With experience it is even possible to identify species of aquatic and marginal vegetation. The use of a polarising filter can enable photographs of the river bed to show the relative amounts of demersal vegetation and mineral substrate, should the general light conditions be suitable. Also, those parts of river systems not usually seen from the banks can be effectively mapped. Backwaters, mill leets, flow character (for example the extent of rapids), extent and position of tree cover on the banks; all can be effectively determined by this technique. If possible, I like to fly over the course of a river before I perform the field survey. Then with copies of the actual



Warwickshire Wildlife Trust's HQ

photographs and the field maps already annotated with features determined from them, I find that I can concentrate on identifying vegetation species.

Wetlands and marshlands present a challenge to anyone seeking to map such areas. Yet aerial photography can be of immeasurable help to achieve these aims. It has proved its worth in determining the location of many of the ponds, ditches, reed-beds, willow carr and swamp that make up the Brandon Marsh Nature Reserve, headquarters of the Warwickshire Wildlife Trust. Moreover, by photographing these areas over long periods of time, the changes in landform and in the extent of different habitats can be monitored. When I first started photographing Brandon Marsh in 1983, there were large areas of open silty water that have since become covered with emergent reeds and willow carr vegetation and where the water itself is often crystal clear.

On one occasion I needed to survey a length of river and an adjacent wetland that comprised a complex mosaic of habitats. Subtle changes in texture and colour meant that I was able to map all the physical structures and vegetation assemblages so that when on the ground I was able to distinguish the relative proportions of branched bur-reed and true bulrush in the river and similarly of common reed (*Phragmites australis*), reedmace, greater pond sedge and reed canary grass in the various parts of the adjacent marshy complex.



In the months of April and May, the progress of trees coming into leaf can be monitored. In different years woodland becomes green according to factors such as the severity of the preceding winter or the temperature and light levels actually prevailing at the time. It is possible to monitor behavioural changes in the woodland and by comparing the colours of trees relative to one another, it is also possible to map the species distribution. In one of the larger Warwickshire Trust nature reserves, there is an area of woodland that varies from having neutral to mildly acid soils and with drainage varying from light to impeded. One photograph taken during the second week of May some years ago shows silver birch trees fully out and quite dark green in colour, small leaf lime a much lighter green, hawthorn white with blossom, oaks a lovely golden yellow as their buds were in the process of opening, and ash trees that remained grey and wintry. The distribution of the different species was immediately obvious and upon studying the photographs I found that they corresponded closely with maps showing the soil character and drainage patterns of the woodland.

More recently I have taken photographs that have been used by local government as part of their planning processes. Recently one town in Warwickshire wanted to develop new housing and commercial premises and the availability of brown field land was insufficient to accommodate this expansion. I was asked to photograph land within one kilometre of the existing built-up area and I was able to identify the extent of herb-rich semi-improved and semi-natural grassland, often (but not always) with ridge and furrow patterns that the local authority wished to conserve and protect from development.

Another type of work has involved monitoring land that historically had been subject to industrial pollution and has since undergone remediation of brown field sites in anticipation of new industrial or commercial development. This has often been done in association with the general photography of areas of urban and rural development for local authorities of Coventry and Warwickshire.

As an environmental chemist I took great pleasure a few years ago in being able to identify by aerial photography areas in a Warwickshire nature reserve owned by the county council that had become polluted as a result of the oxidation of colliery spoil. In that particular case iron sulphide became oxidised to hydrated ferric oxide, a bright orange ochre colour, and dilute sulphuric acid leading to the acidification of a pond that eventually had a pH of roughly 2.0. This particular nature reserve has a series of pools. Each one emptying into the next so that by the time the water enters a nearby stream, it is fully purified. From the air, changes in vegetation are clearly visible and again, in some cases, specifically identifiable.

Over the years, I have been asked to photograph and interpret many places and features using aerial techniques. Monitoring changes in agriculture season by season has identified an increase in the planting of crops such as oil-seed-rape, linseed (flax) and even some exotic crops. Set-aside arable land is always of interest when seen from above. Increasingly there is a need to know the location of ridge and furrow land. Most such land is relatively rich in herb species and nearly always uncontaminated by herbicides and pesticides. Soil profiles of this type of grassland are often some of the best in the Midlands. There are several ways of identifying ridge and furrow from the air. Recognition is easiest when strong sunshine in winter or late in the afternoon during the summer months illuminates the ridges leaving the furrows in shade. Light snowfall tends to accumulate in the furrows leaving the ridges dark and uncovered and in flatter low-lying areas, heavy rainfall can cause flooding of the furrows. In May and June vegetation differentially comes into flower with ridges and furrows ablaze with golden buttercups at different periods. On occasions I have been able to identify former ridge and furrow land where fields have been flattened and then ploughed for arable use. Providing that no crops are actually growing, the former ridges show up as light areas and the former furrows as darker with an ability for greater moisture retention.

In years of drought, water tables are clearly visible. In 1995 the River Avon and River Leam in Warwickshire both showed up as green ribbons surrounded by fawn and brown countryside. Land in the dampest parts of their flood plains stayed green whereas the drier parts of the flood plains and all land above took on an arid parched appearance.

In recent years I have recorded the geology of Coventry and Warwickshire by systematically photographing all the quarries, sand and gravel workings and coal mining activity. By their very nature, these sites are forever changing. New rock faces appear and landfill takes over the abandoned parts of workings. Colliery sites particularly have been redeveloped, there being only one working colliery in Warwickshire now, and the former spoil heaps

have largely disappeared with only a few exceptions (such as the one described earlier in this article). Consequently the photographic record of transient landscapes is an important reminder of our industrial heritage. Fortunately some former areas of mining and quarrying have been saved as nature reserves. In addition to the colliery area already described a number of large quarries and sand and gravel workings have become prime wildlife habitats. The best sites for breeding birds, especially water birds, are generally abandoned workings.

Great crested and little grebes, shelduck, tufted duck, redshank, ringed and little ringed plover are all found on disused sand and gravel pits.

By contrast the former limestone workings in the southern part of the county are notable for their song bird and insect fauna and relatively unusual plantlife. Because of the nature of the quarrying techniques for the extraction of white and blue lias limestone, areas of dry and wet calcareous soils develop. These show up incredibly well from the air, and again it is possible to fairly accurately map the extents of these habitats. Centaury and yellow wort are examples of common plants at these nature reserves that are almost absent from the rest of the county. In one such area can be found some of the best of Warwickshire's orchid colonies including the relatively unusual butterfly orchid.

These instances are representative of some of the uses to which aerial surveillance and photography can be applied. There are of course others, not least of which is the provision of education resources for schools and colleges. Moreover, as well as being a useful means for achieving a comprehensive assessment of landscapes, photography from the air is a most rewarding leisure activity. No wonder I have been doing it for over twenty years.

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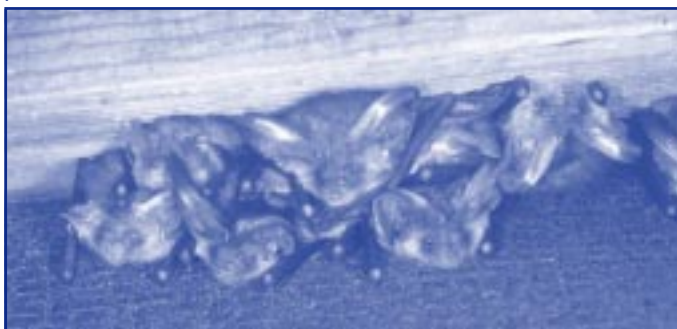
Bat Friendly Demolition Procedures

Alison Fure, MIEEM

The December 'In Practice' contained a review of current procedures in relation to protected species and development control by James Gillespie. It was an interesting look at the way in which local planning authorities (LPA's) attempt to determine the true extent of protected species interest at or near a proposed development site. Despite guidance being available for several years a high proportion of LPA's have encountered protected species at a late stage in the development control process. I undertook a small local study in January 2001 with the hope of making recommendations to the LPA's within my sphere of practice, to avoid the late discoveries of bats. These unnecessary discoveries are becoming increasingly common in my experience.

I receive requests to undertake bat surveys prior to development, road widening or lighting improvements. Planning authorities, often on the advice of their ecology officers, urge this work, especially where floodlighting is proposed. This awareness wanes when buildings are demolished. The area in which I live is no exception and bats took up residence for a short time in my extension roof after the adjacent Victorian laundry was demolished.

Pressure from procurement agents/developers seeking to convert footprints of larger properties such as pubs and Victorian/Edwardian buildings into lucrative multi-occupancy units is evident from the multiple hoardings erected in our boroughs. Many larger establishments such as green belt hospitals and old industrial premises are being demolished to meet the demand for residential property. Local opposition to demolition of these buildings can cause costly delays which may encourage contractors to demolish without regard to the Buildings Act. Demolition has proceeded sometimes over a weekend period where hoardings are erected and encased buildings swiftly razed. If bats are using these larger community buildings and operations are not carefully timed, demolition may result in loss of bat roosts and disturbance or death of bats. Should there be bat survey guidelines for local authorities dealing with Section 80 notices when certain features are present?



Brown Longeared bats

The Habitats Regulations clearly requires Member States to endeavour to encourage the management of features of the 'landscape' which are of major importance for wild flora and fauna. The UK's response to the EC Habitats Directive is the Conservation of Habitat Regulations (1994). As with the 1981 Wildlife and Countryside Act the protection against disturbance and harm to places of shelter does not apply within a dwelling house, or for bats, within the living area of a house. But many of these larger premises have often long ceased to be a dwelling.

Under the Building Act 1984 when demolition is intended a Section 80 'Notice of Intended Demolition' should be completed six weeks in advance of works. It must give details such as the property address, name of owners, contractor and developer and give an expected time scale. This Act details that the utilities should be notified, gas, water and electricity as well as the Health and Safety Executive, highways, fire brigade and adjacent occupied buildings.



Lavenham, Suffolk

Under the Act, no person shall begin a demolition unless the local authority has given a Section 81 notice. This counter notice details expectations on the demolition contractor relating to the protection of the public and utilities. This includes notification of neighbours, sealing of drains and sewers.

Method

At the beginning of 2002, 11 Local Authorities and Greater London Building Control Departments were contacted to find out how the 1984 Buildings Act was operated and how these procedures accommodated provision for investigating buildings which may be of interest to bats. These included all the boroughs I had worked in: Kingston, Merton, Sutton, Runcy, Elmbridge, Woking, Ealing, Wandsworth, Spelthorne, Richmond and Hounslow.

Efforts were made to speak to Principal Officers but if unavailable other members of staff were consulted. They were asked the following questions:

1. Do you follow usual procedures re: Section 80/81?
2. Do you send the notice to consultees and who would that include?
3. Is the 'consent' time limited?
4. What are your enforcement procedures when developers do not comply with the building regulations?
5. How many demolition requests have there been in your sector during the first quarter of this year?
6. Does that include an increase in public houses or in any particular type of building?
7. What happens when the building is a known bat roost?
8. Would you be willing to send a 'Notice of Intended Demolition' to the Bat conservation organisation?

The results were coded 1-11 to protect respondent identity.

Results

Most LPA's stated that there had not been an increase in demolition applications although admitted that these notices often went in spates often increasing toward the year-end. LPA 6 agreed they were experiencing an increase in demolitions including public houses but also small estates and rows of housing. During the first quarter of last year there were 14 applications for demolition.

Development Mitigation for Water Voles: A Research Project into the Effectiveness of 'Displacement' as a Mitigation Technique

Mike Dean

Background

Linear developments, such as new roads and pipelines, which cross watercourses that support water vole populations, are likely to affect water voles in a number of ways. The open-cut method for installing pipelines across watercourses is significantly cheaper than other, less destructive, methods and is therefore widely used. However, this method results in the temporary loss of habitat for any water vole populations encountered within the working width of the crossing, and significant disturbance during construction. The construction of temporary bridges at development sites may result in similar impacts. The construction of permanent road bridges tends to result in permanent loss of habitat, in addition to the damage and disturbance associated with construction operations, although this may be ameliorated by sensitive bridge design.

At present, water vole burrows and habitat are protected under the Wildlife and Countryside Act 1981 (as amended) in respect of Section 9(4). For developments which will result in the loss of habitat or burrows, 'reasonable effort' is required to relocate water voles into suitable unaffected areas prior to works commencing, and restore the habitat following development, create new habitat or enhance existing habitat. The most widely accepted method of mitigation for such schemes is the removal of bankside vegetation, to encourage water voles to move from the working width into adjacent sections, where there is suitable habitat. This has variously been referred to as 'displacement' or 'exclusion', and is based on the principle that water vole populations are dynamic and respond to available habitat and linked corridors for movement between colonies. At the population level, the reduction in habitat and loss of one or two individuals is not considered problematic provided that any habitat losses are restored later and that refuge areas are sufficiently large enough to maintain a thriving adjacent population. The legislation which protects water voles is currently under review, and therefore additional mitigation measures, to prevent incidental mortality of animals, may also be required in due course. At present these are recommended in any case as best practice.



Water vole with radio tracker

In certain cases, particularly where there is insufficient habitat to accommodate the displaced animals, where population sizes are small, or during the winter months when water voles are less active, it has already been recognised that this method may prove less successful in ensuring that all animals move to outside the working width. Vegetation removal is sometimes followed by fencing-off the working width and a trapping programme to relocate any remaining voles. The technique of vegetation removal is widely used and has been considered successful based on surveys of field signs and/or a trapping programme within a fenced area (Arnott, 2001; Bennet, Watson and Hill, 2001; Strachan, 1998), and is recommended as a suitable mitigation technique by English Nature (EN 1999).

Despite the number of projects where 'displacement' of water voles has been attempted, there has been no detailed monitoring of the reaction of water voles to vegetation removal, and much of the evidence that this technique is effective is based on observations at specific sites, and not on experimental manipulations. The fact that water vole field signs are generally absent from areas where vegetation has been removed (Arnott, 2001), and that animals are not captured within such fenced-off areas (Arnott, 2001) may be a direct result of the habitat being made sub-optimal for water voles, rather than an indication that they are no longer present.

The reaction of individual animals to 'displacement' is still largely unknown, as are what consequences it has for the reproductive success of the colony; exactly what level of disturbance and vegetation removal actually causes them to move; and whether or not they actually move at all. It is also not known whether fencing and trapping are required and in which situations they work. Furthermore, there have been no studies carried out on the long-term effects of this mitigation technique, which is likely to be most significant where longer stretches of watercourse are affected. Water vole populations tend to suffer high mortality over the winter, and therefore a significant decrease in a population's breeding potential, through the temporary loss of habitat during the summer months, may significantly increase the likelihood of local extinction.

Objectives

This research project had four main objectives, as follows:

- 1) To determine the effectiveness of vegetation removal from a section of watercourse in encouraging individual water voles to move to a location outside the affected width;
- 2) To determine the length of time required for water voles to move in response to vegetation removal (assuming that they are found to move at all);
- 3) To determine whether or not field sign surveys of areas of vegetation removal provide a reliable indication of the effectiveness of the mitigation;
- 4) To determine the length of time taken for water voles to re-colonise stretches of a watercourse where vegetation removal has been carried out (assuming that they are found to move initially).

Study Area

The study area was a length of the Hooborough Brook, which flows along the Derbyshire/Leicestershire border south-west of Albert Village, near Swadlincote, Derbyshire. Severn Trent Water's rising main renewals required a pipeline to be laid across the brook, which was found to support an extensive water vole colony. However, the proposed crossing point for the pipeline was through a section of less optimal water vole habitat, where water voles were present at a relatively low density compared with elsewhere on the same watercourse. Surveys carried out upstream suggested that this section was likely to represent the edge of suitable habitat available to the colony. The study area therefore extended downstream (approximately 200 metres) to include more densely occupied water vole habitat, as well as the section of watercourse to be directly affected by the proposals. The study area also extended upstream a short distance (approximately 20

metres) to a point where the habitat became largely unsuitable for water voles.

Methodology

Determining water vole territories pre-mitigation:

Water voles were trapped throughout the study area over a three week period (25th July-13th August 2002), and all animals captured were weighed and sexed. Individuals weighing 150g or more were fitted with radio-collars and released. Animals weighing less than 150g were considered too small to be safely fitted with radio-collars. All animals captured were fur-clipped prior to release to ensure that re-captures could be identified during the trapping period.

Intensive radio-tracking was carried out on a twice daily (or more frequent) basis, over the three week trapping period and the following week. The locations of radio-collared animals were plotted relative to numbered posts running parallel to the watercourse. The following data were also recorded: the bank the animal was occupying (left or right), the time and date, whether the animal was above or below ground, and whether the animal was active or inactive. This allowed the territories of radio-collared animals to be determined approximately, by plotting these locations, along with capture and re-capture locations.

A survey of the study area to record field signs of water voles was carried out immediately prior to mitigation works commencing.

Mitigation

The mitigation was designed to replicate that generally employed where a pipeline crosses a watercourse using an open-cut method. Two 15 metre sections of watercourse were selected for the study: Sites A and B. The bankside and in-channel vegetation on both banks was cut throughout the two sites using a petrol strimmer. The vegetation was cut to ground level, with the strimmer cord angled into the ground to ensure that all vegetation had been removed and bare earth remained. The 'displacement' area extended from the channel to the top of the bank, and further where burrows were present high up the bank-face (vegetation within 2 metres of burrow entrances was removed). The arisings were then removed from each 'displacement' area.

Site A: the banks within this area varied from shallow to vertical. The bankside vegetation was predominantly grasses, with some Soft-rush (*Juncus effusus*) also present. Some branched bur-reed (*Sparganium erectum*) and reed sweet-grass (*Glyceria maxima*) were present within the channel. Site A was originally intended as the working width for a proposed pipeline crossing. However, the route of the pipeline was altered as a result of a foul sewer being located within this width, and the pipeline was instead laid across an adjacent footbridge.

Site B: the left bank within this section was flat and supported a sedge bed within which extensive signs of foraging were recorded. The right bank was a steeply-sloping grassy bank containing numerous burrows at the toe.

Both areas were re-strimmed three weeks after the initial vegetation removal operations, as the vegetation was beginning to recover at this stage. The 'displacement' area was extended further back from the water's edge on the right bank within Site B, as a result of fresh burrows on the strimmed bank-face being recorded during post-mitigation monitoring.

Burrow systems in Site A were excavated by hand and topsoil scraped from the banks to ensure that all voles had moved from this location, as this was originally intended to form the working width of a pipeline crossing. The banks were then smoothed to make them as unsuitable for re-occupation by water voles as possible.

Post-mitigation monitoring:

Regular site visits were carried out following mitigation works, to determine

the effect on the territories of the radio-collared animals. The frequency of visits was approximately daily at the start of the post-mitigation monitoring, and this decreased to twice weekly after the first two weeks. The locations, level of activity and position (above/below ground) of radio-collared animals were recorded on each visit. Surveys of the 'displacement' areas for field signs were also carried out on each visit.

Results

A total of six animals were fitted with radio-collars during the study (Animals 1-6), and a further five were captured and fur-clipped prior to release (Animals A-E). Of the six animals radio-collared, one was lost from the survey area almost immediately (Animal 1), and was presumed to have been predated. A further two animals shook their radio-collars within a few days of their release (Animals 2 and 3). Radio-tracking data were therefore collected for three animals, one of which (a male – Animal 6) occupied a burrow within Site A (no females were present within this area), and the remaining two (both females - Animals 4 and 5) held territories, parts of which fell within Site B. Both of these animals were most frequently recorded within burrows which were situated within Site B.

Site A

The male water vole which occupied a burrow system within Site A was also recorded in other burrow systems further downstream. However, it was most often recorded within the burrow in Site A, and this continued for at least 17 days after the vegetation removal had been carried out. After three weeks the animal was lost from the study area and a search of suitable habitat upstream and downstream within 500 metres failed to locate him. It is therefore likely that this animal had either been predated or had dispersed.

No field signs of water voles were recorded at Site A during post-mitigation monitoring. However, fresh droppings were recorded within a burrow when it was excavated by hand. This was several weeks after the loss of the radio-collared male which originally used that particular burrow system. Furthermore an animal was observed attempting to burrow back into the bank at Site A after the banks had been scraped of topsoil and smoothed to make them 'unsuitable'. This animal was not fitted with a radio-collar, and could not be captured to determine whether or not it had been marked.



Site A: before left; after right

Site B

The radio-tracking data showed that the two study animals within Site B occupied directly adjacent burrows, and this location was favoured by both animals, although both were recorded in other burrows within their respective territories. Despite using directly adjacent burrows, the two females appeared to defend mutually exclusive territories. After the vegetation removal, both animals continued to favour the same burrow systems as before, despite the fact that this location was in the centre of the 'displacement' area.

One of the animals (Animal 4), which had approximately half of its territory affected by the vegetation removal, did not appear to significantly alter its territory boundaries after the strimming. However, this animal was lost from

the study area nine days after the vegetation removal was carried out, and it is considered likely to have been predated. The other female (Animal 5), which had nearly its entire territory affected by the vegetation removal, did alter its activity to include unaffected bankside habitat further upstream, although it continued to favour occupation of its original burrow system within Site B, despite also occasionally using other burrows outside the 'displacement' area. At this stage, Animal 5 was recorded in burrows both upstream and downstream of the territory held by Animal 4. Animal 5 appeared to extend its territory to include that of the adjacent female once that animal had been lost from the study area.



Site B: before left; after right

Surveys for field signs of water voles revealed that new burrow entrances were excavated higher and higher up the right bank soon after the area had been strimmed. The 'displacement' area had to be extended as a result of this. No other field signs were recorded within Site B during post-mitigation monitoring until one week after the second phase of vegetation removal (four weeks after the first phase of vegetation removal), when footprints were recorded within the 'displacement' areas. Latrines were not recorded until two weeks later (six weeks after vegetation removal).

Two sub-adult animals were captured which were too small to radio-collar, one either side of Site B. The extent to which these animals were using the 'displacement' area and the effect of vegetation removal on them are not known.

Assessment

The results from this study would appear to suggest that water voles are not as easily 'displaced' in response to intensive vegetation removal as was previously thought. In fact the results suggest that even where water voles shift their territories as a result of vegetation removal, they may still maintain a high level of fidelity to their original burrow systems. Furthermore, topsoil stripping and bank 'smoothing' also do not necessarily exclude water voles from attempting to re-occupy a given section of bank. The results of this study are based on a very small sample size (three animals occupying two different sections of bank), and may be specific to the time of year (late summer/autumn) and the habitat in which the work was carried out. However, the fact that a negative result was achieved for all three study animals suggests that the use of vegetation removal alone should not be considered an effective method for 'displacing' water voles without further research. It is likely that the effectiveness of 'displacement' is closely linked to the time of year at which such operations are carried out. For example, it may be the case that 'displacement' is more effective earlier in the year when water voles may show less burrow fidelity. However, further investigations are clearly needed to determine whether or not this technique is effective at any time of year.

It is not known what the reasons were for the loss of two of the three focal animals from the study area, although Animal 4 was likely to have suffered predation, as she would have been unlikely to move significant distances at the time of year of the study. The male (Animal 6) may also have been predated. Clearly, with such small numbers of study animals it is not possible to make any conclusive judgements on whether vegetation removal

increases the incidence of predation. However, it is likely that this technique would make animals attempting to continue to use 'displacement' areas more vulnerable. This may be particularly important for colonies of water voles where significant stretches of habitat are subjected to vegetation removal, and where such operations are carried out early in the year when numbers of animals are at their lowest, and the loss of individuals is more significant.

The results of this study also have implications for the management of watercourses where water voles are present. Current practices, which often result in the removal of vegetation from long continuous sections of bank, may increase the vulnerability of water vole colonies to predation and therefore local extinction. This increases the need for sensitive waterway management (as detailed in Strachan (1998)).

The study also clearly showed that a lack of field signs within the 'displacement' area (particularly within three days of vegetation removal, as recommended by Arnott (2001)) is not a reliable measure of the effectiveness of mitigation in displacing water voles. Very few signs of water vole activity



Water vole

were recorded at Site B during post-mitigation monitoring, and this was restricted to new burrow systems and footprints until six weeks after the vegetation removal operation began. No signs of water vole activity were recorded at Site A during post-mitigation monitoring until burrow systems were excavated by hand. The study did not record any water voles above ground within 'displacement' areas, with the exception of an animal attempting to dig back into a destroyed burrow system within Site A. It therefore seems likely that animals continuing to use burrows within 'displacement' areas spend little time above ground in these locations and therefore leave few signs of their presence. Burrow entrances below the water level are likely to be used more frequently than those above water level, and therefore activity level of burrows may also not be a sufficiently reliable indicator of the absence of water voles in many cases.

Recommendations for future mitigation projects and further research

These results are based on a study carried out at only one site and with only three focal study animals. Clearly, more research is necessary to enable the effectiveness and full impacts of this and other mitigation techniques to be assessed. This would need to involve a greater number of study animals at several different sites, selected to reflect a range of habitat types. Nevertheless the results from this study are sufficient to suggest that a more precautionary approach to water vole mitigation is required, and 'displacement' should not be automatically considered to be an easy and effective solution in all cases.

Despite the small sample size studied in this project, the results are sufficiently conclusive to allow some general recommendations to be made for limitations on the future use of 'displacement' at this stage, and a number of refinements can also be made to the technique to take account of the

possibility that water voles may not necessarily move in response to vegetation removal. These recommendations are based on several years experience of practical implementation of mitigation for water voles, as well as the results of this research project. In addition, given the range of constraints which generally accompany development projects of this kind, possible alternative solutions are discussed.

Limitations on the use of the 'displacement' technique

The use of this technique appears to make water voles more vulnerable to predation, and this is likely to be the case for animals which attempt to remain within areas where the vegetation has been removed, due to a lack of cover. Its use on small colonies, which are already vulnerable to local extinction, should therefore be avoided if possible. The use of 'displacement' early in the summer, when numbers of animals are at their lowest and therefore colonies are most vulnerable to local extinction, should also be considered to be a less favourable option, until more research has been carried out into the effectiveness of the technique at this time of year.

It is already considered inappropriate to use the 'displacement' technique where there is insufficient available habitat for animals to move into, as vegetation removal is less likely to cause animals to move and could promote dispersal. This study suggests that animals may be less inclined to move in response to vegetation removal than was previously considered to be the case, even where alternative habitat is available. This technique should therefore not be used in situations where water voles are particularly unlikely to move, for example where long stretches of bank are likely to be affected, or at times of year when the animals are likely to show highest burrow fidelity, particularly in autumn when animals have amassed underground food stores for the winter months.

This study has also shown that animals which continue to occupy sections of bank where the 'displacement' technique has been employed, may not leave conclusive field signs within the affected sections. Reliance on field signs to gauge the effectiveness of the technique is therefore inappropriate. Furthermore, the lack of field signs (and activity generally) makes it unlikely that trapping will be successful within areas where the vegetation has been removed, and therefore a negative return from trapping is also not a reliable indication that voles are absent. Therefore, in order to minimise the likelihood of mortality, it is important that additional safeguards are employed (see below).

Possible alternatives to the 'displacement' technique

Fencing and trap-out:

In some cases, a trap-out programme may be a more effective mitigation method, with animals either held until after the works are complete, or immediately introduced (using a soft-release technique) into areas of suitable habitat outside the development zone, from which voles are absent. The use of fencing is likely to be required to prevent animals from adjacent sections colonising the development zone or to exclude relocated animals. It should be noted that trapping whilst the vegetation is still intact is likely to be much more effective than trapping once the vegetation has been removed, and therefore trapping should precede any vegetation removal.

In addition to being potentially more effective than 'displacement' by vegetation removal alone, a trap-out programme from the outset is likely to be a more cost-effective method than the option of 'displacement' followed by fencing and trapping. However, it would be inappropriate to hold animals for long periods of time over the summer months, as this could significantly reduce the reproductive potential of a colony and is a costly process. Therefore it would be appropriate to time the operation so that development and re-instatement takes place immediately following capture and removal of animals. This is clearly not always possible, and one alternative would be to trap-out animals during autumn and hold them over the winter for release in the re-instated habitat in the spring. The mortality of animals held captive over the winter months is approximately 30-40% (Rob Strachan,

pers.comm., 2002) compared with natural winter mortality of up to 70% (Strachan, 1998), which suggests that this may be a viable and effective technique.

One important consideration with regard to trapping operations is that females may have dependent young in their nests and so each animal should be checked for signs of lactation. If a lactating female is caught she should be released and trapping suspended for 2-4 weeks to ensure that the young would survive and be captured once weaned.

De-watering to accompany vegetation removal

'Displacement' is more likely to be effective if vegetation removal is accompanied by de-watering, although this is unlikely to be practical in the majority of cases. It is possible that the use of a mesh fence within the channel and on the banks, at either end of the 'displacement' area may impede water vole movement between the trimmed area and the retained vegetation, and therefore discourage animals from remaining in burrows within the development zone. However, this may also impede the movement of animals with dependent young. Further research would be needed to determine the most appropriate type of barrier to use in different situations, and the effectiveness of this technique.

Refinements to the 'displacement' technique

This study has shown that water voles (both male and female) have a higher fidelity to their burrow system than was previously considered to be the case, and therefore mitigation to protect animals occupying a habitat which will be lost, should not rely on the 'displacement' technique alone. It is therefore recommended that, where 'displacement' is still considered the most appropriate option, a number of precautions are also taken to minimise the likelihood of water voles being killed or injured during development.

a) During 'displacement' the vegetation should be removed well away from the burrow entrances (dependent upon nature of banks), to ensure that voles cannot burrow further up the bank and locate retained vegetation within the section of bank that will be affected by the development.

b) It is particularly important to ensure that burrows are dug out by hand prior to construction/site clearance operations, to reduce the likelihood of voles remaining within the development zone or of incidental mortality.

c) Topsoil should be stripped from the bank-face and top, under the direct supervision of a suitably experienced ecologist, once burrows have been excavated, and the surface smoothed to make this as unsuitable as possible for water voles to burrow back into. Animals will often only attempt to leave the bank at this stage, and therefore an ecologist should be present to capture and hold water voles found during this process and release them at a previously agreed site, sufficiently distant from the construction site to prevent them returning, or hold them in captivity as described above. It is considerably easier to catch these animals if the water is drained from the section of watercourse/waterbody to be affected, and with careful timing this may be possible in some cases. The bank should be closely monitored up to the time of development, to ensure that animals have not attempted to burrow back in.

d) Where the loss of habitat is only temporary, the development should be timed to take place as close to mitigation operations as possible (within the above constraints), to ensure that the habitat can be restored quickly. This would minimise the chance of animals re-colonising the bank to be affected, and reduce the impact on the breeding success of the colony.

Further research

Given the evidence that the technique of 'displacement' is less effective than previously considered to be the case, the priority for future research should be the testing of alternative solutions, such as those described above. It would also be appropriate to repeat the current study at several different

Summary table on limitations to 'displacement' and possible solutions

Problem	Limitation	Solution
Increased vulnerability to predation High burrow density	Displacement in early summer/spring may increase chances of local extinctions	Avoid use of 'displacement' at this time of year until further research is carried out
	'Displacement' unlikely to be effective over long stretches	Do not use 'displacement' in these circumstances Fencing and trap-out is a more effective option
	Displacement unlikely to be effective in late summer/autumn 'Displacement' may be ineffective in all cases 'Displacement' may be less effective in all cases	Careful timing, or use an alternative to 'displacement' such as fencing and trap out Carry out research into alternative solutions Where 'displacement' is used, excavate burrows by hand and carry out supervised bank destruction prior to development
Lack of field signs within 'displacement' areas	Field signs/trapping are not reliable indicators of the effectiveness of mitigation	Carry out further research through radio tracking to gauge the effectiveness of mitigation techniques Rely on additional safeguards as above to minimise incidental mortality
Voles attempt to burrow out of 'displacement' areas	Displacement may be ineffective	Where 'displacement' is used, extend snoring well away from burrows and monitor regularly to ensure that underground connections to retained habitat are not excavated
Voles attempt to dig back into banks which have been made unsuitable	Impossible to make banks completely unsuitable for animals which have high burrow density	Careful timing to ensure that the period between mitigation and development is as short as possible, with regular searches for new burrows in the interim period

sites, to provide further information into the effectiveness of 'displacement'. It would be useful to include a variety of different habitat types within any future study sites, and to attempt to displace water voles at different times of year, particularly during April. A longer-term capture-mark-recapture study at one or more of these sites would also provide important information on long-term impacts on the colony.

Conclusions

The current research has cast doubt on the effectiveness of the widely accepted mitigation technique of 'displacement', and therefore alternative solutions need to be sought. The variety of situations and ways in which water voles may be affected, the large number of constraints which generally accompany developments crossing watercourses, and the high incidence of these types of developments, makes it unlikely that one mitigation technique will be suitable, reliable and cost-effective for all scenarios. Therefore producing a 'decision-making tree' may be the most appropriate option, to allow for the various alternatives to be considered within the practicalities of the development, and to prevent unfavourable options being considered for individual sites.

*This research project was funded by Severn Trent Water Ltd.
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Landscape Science Consultancy

Require

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Please apply in writing to: Hilary Ludlow, 12, Main Street, Sproxton, Melton Mowbray, Leics LE14 4QS
Tel: 01476 860233

Costing – For Small Businesses and Sole Traders

Hilary Ludlow, MIEEM

Why are you in business? Motivation for being in business varies but generally it is either

- to survive
- to remain stable
- or to grow

all boiling down to balancing the actual level of income with your personal and business needs. Putting aside the personal needs, what are the business needs?

The secretariat has received letters from self employed members or potential members claiming that they find the membership costs high and cannot afford to find the additional necessary to pay for Professional Indemnity Insurance. Not only is professional indemnity insurance a fundamental requirement for all members under the obligations of the code of conduct but it is professionally irresponsible not to carry insurance. The worries over potential costs if you do not have PII and contracts go pear shaped should be keeping you awake at nights – are you aware of the liabilities under contract law and the Liabilities Act?

PII and professional membership are not luxuries but essential fundamental fixed costs for any professional business.

The IEEM PII scheme offers extremely competitive rates but if you feel that these costs are beyond your reach then perhaps you should be looking at your own financial strategies.

Have you looked at your sales, overheads and profitability? Do you know when your peaks and troughs are likely to occur – seasonality being the obvious one for ecologists - and are you saving enough to cover yourself? What about profit? – are you eeking out a living or achieving enough to develop your business? What about cashflow – is it as stable as possible?

You can improve cashflow by taking more control:

- make your terms of payment clear
- send accurate invoices
- do not let people go over payment dates without querying it
- have a system of reminders and letters
- be polite but do not hesitate to take legal action

If necessary, be firm with yourself – do not work for bad clients. Why should you? Jettison them and market in new areas.

Pricing decisions: ask yourself whether the prices you are charging are really doing you any favours. If you cost in all the items you deem necessary such as salary, office, IEEM membership and PII to name a few, are you breaking even with the hourly rate you are charging or have you some profit left over to provide a financial cushion during the bad times and to provide monies for developing your resources such as field equipment, computer, soft ware packages etc. If you are not you can still be sure that your competitors will be and consequently they will gain on you in the market place.

Pricing will depend on the service you are providing and obviously can be increased with experience but what method of pricing are you using?

- plucked from the air and hope it will do
- what you think they will pay
- competitive
- cost plus
- what the market will bear

Are you really achieving all you want from your method of pricing and the amount you are charging? As a first stage, have you looked at the IEEM guidance notes on fees. Although this was written several years ago and you need to adjust the levels of fees given somewhat, the figures are still useable.

Look at your own fees – have you raised these regularly in line with inflation and your increased experience? Have you ever asked your customers what they value about your services and would they be prepared to pay more? Do you have a bottom rate below which you will not work? If the answer is yes – good, very wise. Many of us have a sliding scale depending on the type of client but taking jobs on at a loss is not doing yourself and the profession any favours. Have you thought that you may be losing contracts not because the figures you put in are too high but because they are low and the client is not sure that you can do a thorough job at that rate?

You could be giving away potential profits because you do not have a realistic pricing policy. Being over generous with your time and expertise is not good practice.

If raising prices still worries you, have you tried the “1 percent rule” that is a simple suggestion to raise your prices by one percent and to reduce variable costs and wastage by one percent. It is amazing what this simple trick can do.

Being a self employed ecologist is a splendid career but controlling the financial side of any business, be it large, small or a sole trader is also important. To be a professional avoiding professional membership fees and professional indemnity insurance charges is not an option but gaining an understanding of the financial elements of your business should put you on a firmer financial footing. This will make worries over paying essential fixed costs a thing of the past.

Hilary Ludlow is principal of the Landscape Science Consultancy; Chair of the Professional Affairs Committee and a member of IEEM Council. landscion@tinyworld.co.uk

Editors Note: Professional Indemnity and Public Liability Insurance

The requirement under the Code of Professional Conduct is that “*they should not give professional advice or undertake professional work unless they have ensured that Professional Indemnity Insurance or liability cover is in place to cover them in respect of that advice or work*”

Many members will find that they are suitably covered by their employers but small consultancies may find this a problem. IEEM has an Insurance Broker - McParland Finn who arranges the cover for our members, although some are still with a broker used in the early days of the Institute. This scheme is considered very suitable for IEEM members needs, but the premiums may come as something of a shock. This is not because they are high compared with other schemes but that rates have risen considerably during the last year due to the events of September 11th but more importantly the increasingly litigious society in which we live. Don't forget that there is also a legal helpline with the scheme which some members are beginning to use. I do get calls from members complaining about this but anyone undertaking work without insurance these days really does so at their peril. Public Liability Insurance is another matter and may often be a requirement from a landowner for people working on their land. Sometimes the requirement seems out of all proportion to the risk entailed and the secretariat would like to know of such cases. For example the Forestry Commission insists on five million pound Public Liability Insurance when working on its land.

Professional Liabilities - To the grave and beyond!

McParland Finn Insurance Brokers

It is a convenient and common misconception made by "Professionals as a whole" that claims always happen to someone else, either because the other person is not very good, or the work being undertaken is not as risky. Well, sorry to be the bearer of bad news; according to statistics, all professions are now subject to much increased volumes of claims, and if that is not bad enough, awards and legal costs are also escalating, albeit that Arbitration and Mediation are having some beneficial effect.

Rather than accept and retain these risks, the professional can elect to transfer these to an insurer, in exchange for the payment of what is a relatively small premium for IEEM professionals.

The article which follows provides a bullet point insight into the world of Professional Indemnity and opens with a question:

"Why risk your professional reputation and potential financial ruin by being uninsured?"

It is hoped that after reading this article, IEEM "Professionals" will be better informed and be able to address the question from a position of knowledge.



I promise you – there are NO protected species on this site!

1. What is Professional Indemnity Insurance? (PI)

- PI Insurance is a fairly recent development:
 - a) Some sectors of the insurance market are very entrepreneurial and responsive to the need to develop insurance for newly emerging risks and exposures,
 - b) Such covers then sometimes become mainstream insurance products,
 - c) PI became more widely demanded and available after Hedley Byrne –v- Heller & Partners in early 60's; this paved the way for financial loss claims against Professionals.

- Cover for Breach of Professional Duty:
 - a) Negligent acts, errors or omissions.
- Duty of Care:
 - a) Professional in contractual relationship with own client,
 - b) Terms of engagement may contain express obligations on part of professional to carry out services to a proper professional standard,
 - c) In practice, to exercise the level of skill reasonably to be expected of a member of that profession,
 - d) If not expressly stated, the court will imply similar obligations into the contract,
 - e) Failure to meet that standard will give rise to a breach of contract by the professional and consequent liability to the client for loss arising
 - f) Also common law liability in tort of negligence.
 - g) Common law duty of care - everybody has a duty to regulate his actions and the activities of his employees so as not to cause injury or damage to others,
 - h) Failure to exercise reasonable skill and care in conduct of professional work can give rise to liability to client in negligence, in addition to the existing contractual liability,
 - i) Can be important because longer period of time available in which to bring claims in certain circumstances,
 - j) Hedley Byrne case extended the duty of care beyond the duty already owed to clients, to other parties, in certain circumstances,
 - k) Liability can arise from advice given even where no fee involved.

• Claims Made Wording:

- a) Cover applies to claims made within the period of the policy, irrespective of when negligent act committed,
- b) Contrast with occurrence basis, as in Employers Liability or Public Liability ,
- c) Not relevant when work undertaken but when the resultant claim is actually made,
- d) Only practical way to operate insurance for projects or assignments extending over many years,
- e) Therefore cover needs to be in force when the claim is actually made, which could be years after the completion of the project or, crucially, years after the professional left the practice where he made the professional error, or even years after he retired,
- f) Liability not extinguished by the death of the professional – possibility of claim against his Estate,
- g) Run-off cover is concerned with insurance during the period after the professional activity ceased,
- h) Personal run-off cover only. Special considerations apply in the event of the discontinuation of a firm - where a firm is dissolved, or is taken over, or simply ceases to practise.

• Collateral Warranties:

- a) Impose/modify professional obligations - contractual,
- b) Require PI cover to be maintained.

2. Who should purchase Professional Indemnity Cover?

• Professionals providing advice:

- a) Vicarious Liability,
- b) Employees,
- c) Sub-consultants.

• Retiring Professionals:

- a) As we have seen, the claim can arise after the professional has retired. Potential liabilities extend into retirement

- Self Employment to Employment and vice versa:
 - a) Professionals ceasing to practise on their own account and moving into employment continue to be liable for their past work. Cover needs to be arranged accordingly,
 - b) People leaving employment can be personally liable for work which they themselves carried out while employed by the firm,
- Change of career:
 - a) Same principles apply where the change in status involves moving into and out of the profession.

3. Why should Professional Indemnity Cover be purchased?

- Transfer of Risk.
- Regulatory or Professional Body Requirement.
- Peace of mind.
 - a) Professional,
 - b) Client – regulator/professional body concerned to protect reputation of profession and safeguard the public employing them.
- Benefits- access to specialist advice:
 - a) Liabilities and cover required,
 - b) Claims Handling,
 - c) Potential exposures such as wording of collateral warranties,
 - d) Legal help lines etc.
- Protect your reputation.

4. When should Professional Indemnity Cover be purchased, and for how long?

- Professional working life.
- On retirement.
- Time period:
 - a) Standard limitation period (3 years for personal injury, 6 years other),
 - b) Contract – under hand (12 years),
 - c) Contract – deeds/under seal – eg collateral warranties (12 years or whatever agreed),
 - d) Tort – ie negligence (minimum 6 years),
 - e) Latent Damage Act (3 years after date of discovery – could be 15 years, then could be increased by 2 years in the event of contributory negligence, ie 17 years in total),
 - f) Recent case law – deliberate act.

5. Run-off Liability Cover

- The need:
 - a) Standard definition of the Insured under a PI policy includes the following, in all cases in respect purely of work carried out on behalf of the insured firm:
Current partners and directors – listed in proposal form,
New partners and directors,
Former partners and directors,
Former partners and directors remaining as consultants,
Current employees,
Former employees,
Estate of deceased persons in those categories,
 - b) Where the practice continues and where it maintains PI cover, run-off liabilities are taken care of,
 - c) Failing that, a run-off policy for the benefit of the individual is required.

6. The Current Market Place

- A whole series of unrelated events have put pressure on the Insurance sector as never before. Insurance is now a global

business and we are no longer insulated here in the UK from World events.

- For a decade or more, it is arguable that Professional Indemnity Insurers have been making an underwriting loss; this is probably very near to the truth.
- Specific events which have impacted on the professional indemnity market are:
 - WTC 2001 – took a vast amount of capacity from the market,
 - Collapse of the Independent Insurance 2001 – showed the fragility of the market, this was an A+ rated company,
 - The major utility scandals – Enron et al. Insurers facing claims in excess of £1 billion
 - Low interest rates – Insurers incapable of making up underwriting losses by way of investment income,
 - Dropping Stock Market – insurers unable to write extra business due to reducing solvency margins.
- It is no surprise that during 2002 the market has made a massive adjustment, well overdue but overdone in part.
- The prognosis for 2003 is continuing rate increases but at a much slower pace.

7. Benefits for IEEM members - Professional Indemnity Insurance

MFL Professional have had a long relationship with IEEM. The benefits for members are:

- Full Civil Liability Policy Wording,
- All limits are Each and Every per claim, not aggregated,
- Competitive Premiums,
- Full Collateral Warranty Vetting Service,
- Legal Help Line,
- Claims Handling Assistance,
- Premium Financial Facilities,

Despite market trends, the IEEM scheme Insurer has reduced rates by c.20% bringing the costs down to pre-2000 levels. Cover can now be effected for as little as £225 + IPT per annum.

It is hoped that this article has been of assistance in creating an understanding of the need for, and the scope of Professional Indemnity cover, both during and after the Professional's working life.

McParland Finn can be contacted on: 0161 236 2532.



In the Journals

Compiled by Pat Rae,

Jim Thompson, Joel Bateman

and Nick Jackson



British Ecological Society

M. O. Hill, D. B. Roy and K. Thompson.

Hemeroby, urbanity and ruderality: bioindicators of disturbance and human impact.

Journal of Applied Ecology 2002, **39**: 708 – 720.

If this is not your usual area of interest, this paper will nevertheless urge you to brush up on your urban ecology and its vocabulary, and particularly on the NERC funded Urban Regeneration and the Environment (URGENT) thematic programme (website: <http://urgent.nerc.ac.uk>). This started in late 1996 with a budget of £9.7 million over 7 years. It is now approaching its final phase, with most projects due to finish during 2002/03. Whilst one can ponder on how this particular contribution will actually be applied in the practical world of urban reclamation and management, the attempts to understand how plant species cope with “unnatural” circumstances is nevertheless fascinating. The variation between species can be quantified by indices of disturbance and unnaturalness.

The authors set out to answer four questions: How distinctive is the urban flora in central England? If a measure of urbanity can be defined, does it relate to other measures of disturbance? How internally consistent are the existing measures of disturbance? Is it even possible to measure the degree of disturbance in a satisfactory way?

An urban flora was characterized by comparing quadrat data from cities with several large data sets from the countryside. Existing scales of species response to disturbance and unnaturalness, ruderality (a plant’s ability to survive in disturbed conditions) and hemeroby (a measure of human impact) were contrasted with derived scales based on the number of associated annuals and aliens and with ‘urbanity’, defined as the proportion of urban land in the vicinity of each quadrat.

There were some interesting summary points, but on the whole the authors concluded that the urban flora of central England is not sufficiently distinctive to be characterized satisfactorily by an index. While it is possible to develop indices of hemeroby, urbanity and ruderality, these concepts are relatively complicated, and have to be carefully defined in order to give them a comprehensive operational definition. In practice, the most effective indices were not derived from environmental information but from attributes of associated species. The authors recommend that annuality and xenicity are simpler measures that can complement Ellenberg values, but definitive values for Great Britain would require additional data from southern England.

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N. Somasekhar, P. S. Grewal, E. A. B. De Nardo and B. R. Stinner.

Non-target effects of entomopathogenic nematodes on the soil nematode community.

Journal of Applied Ecology 2002, **39**: 735 - 744

This paper is about the potential ecological consequences of the introduction of biological control agents. There are risks as well as benefits. Most studies on non-target effects have been focussed above ground, but in this case the authors looked at the diversity of native fauna in below-ground food webs, namely looking at the effect of entomopathogenic nematodes on the naturally occurring nematode community in a turfgrass ecosystem. Further, they compared the impact of entomopathogenic nematodes on the soil

nematode community with that of trichlorfon, a commonly used insecticide in turfgrass.

The authors’ results indicate that inundative application of entomopathogenic nematodes changes the structure of the nematode community in a turfgrass ecosystem. Total nematode abundance significantly decreased in all the treatments relative to the untreated control, reflecting differences that could be attributed to the disturbance induced by pest control treatments. The abundance of plant-parasitic nematodes was significantly reduced in all the entomopathogenic nematode treatments while the abundance of free-living nematodes was not affected. In contrast with the nematode treatments, trichlorfon reduced the abundance of both plant-parasitic and free-living nematodes (including those that play a role in nutrient cycling: bacterial feeders, fungal feeders, predators and omnivores). These results agree with earlier observations that free-living nematodes were relatively more sensitive to chemical pesticides compared with plant-parasitic nematodes and can be considered as a beneficial non-target effect of entomopathogenic nematodes. The mechanisms causing such an effect need to be elucidated in future studies.

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J. Calladine, D. Baines and P. Warren

Effects of reduced grazing on population density and breeding success of black grouse in Northern England

Journal of Applied Ecology 2002, **39**: 772 - 780

This well reported study is a bit of a who’s who of the UK bird world. It was part of the monitoring programme of the North Pennines Black Grouse Recovery Project supported throughout by English Nature, the Game Conservancy Trust, the Ministry of Defence and the RSPB. BTO facilitated some of the analyses. The nub of the study was to consider whether management for grazing conflicts with management for game birds.

Numbers of black grouse *Tetrao tetrix* and their breeding success were monitored at 20 sites in the north of England from 1996 to 2000. Ten treatment sites included areas where grazing was reduced before and during the study to < 1.1 sheep ha⁻¹ in summer and < 0.5 sheep ha⁻¹ in winter. Each was paired with a reference site that held sheep at two (summer) to three times (winter) the density on the experimental sites. The reduced grazing sites ranged from 0.4 to 3.2 km² in size and most were part of existing agreements within agri-environment schemes that had been in place for 1-5 years before 1996.

The reduced grazing sites when compared with the normally grazed sites showed improvements in the number of males displaying, and in the proportion of hens that retained broods. Brood size was unaffected. Hen densities, also increased. The greatest rate of increase was where grazing was restricted on smaller areas of ground (0.4 km²). Declines in hen densities occurred at sites where the area of restricted grazing exceeded about 1 km². The rates of change in population density, as indicated by numbers of displaying males, peaked in the early years of grazing reduction and then declined after c. 5-7 years.

The authors conclude that although further studies are required at a landscape scale and over the greater time scales, this study demonstrates that agri-environment schemes, which encourage extensive management of grazing land, can benefit at least some organisms of conservation importance and lead to some recovery of populations.

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R. A. McDonald and S. Harris

Population biology of stoats *Mustela erminea* and weasels *Mustela nivalis* on game estates in Great Britain.

Journal of Applied Ecology 2002, **39**: 793 – 805

This is an interesting paper with some insights into the different biology of stoats and weasels. The work was prompted by the potential concern that numbers of stoats and weasels culled in Britain have been in decline since the mid-1970s. Because legal protection is often implemented for declining species, it is necessary to assess the relative merits of different techniques

for stoat and weasel control and whether culling may have a role in bringing about a decline in either species. The study looked at 25 game estates around the UK, representing the demise of some 822 stoats and 458 weasels. Simple population models were used to assess the effects of culling by trapping and shooting.

Results are biased by seasonal changes in culling effort and variation between the species and sexes and among seasons in susceptibility to the different control methods. 71% of stoats and 94% of weasels were trapped, while 26% of stoats and 5% of weasels were shot. Stoats show a sex bias in susceptibility to trapping but not shooting, and varying susceptibility to both methods with season. The sex ratio of this sample of weasels was more skewed towards males. The model studies indicated that weasel populations would continue to increase despite culling and when food is readily available. Model stoat populations declined slightly probably as a result of concerted culling effort when young stoats were dependent on maternal survival. This suggests that persistence of culled stoat populations may depend on immigration. Overall the authors concluded that to reduce stoat populations without affecting the survival of dependent juveniles, culling effort could be focused on trapping females in late winter and shooting females in early spring, where landscape and climate permit. For weasel control, trapping effort should be, and often is, focused on late spring, following a period of high natural mortality. High rates of immigration mean that culling by gamekeepers will not ordinarily lead to any long-term decline in actual stoat and weasel populations. We suggest that measures taken to enhance immigration will improve the long-term status of stoats and weasels in regions where their conservation is desirable, and whilst this persists the impact of culling will be short-lived and local.

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G. C. Smith, & D. Wilkinson

Modelling disease spread in a novel host: rabies in the European badger *Meles meles*

Journal of Applied Ecology 2002, **39**: 865 - 874

In most wildlife rabies epizootics there appears to be a single principal vector. Cases in other species tend to be the result of spill over. The red fox *Vulpes vulpes* is the main reservoir of rabies in Europe. However, badger *Meles meles* is a known spill over vector, and in these circumstances the populations are significantly affected. The authors of this paper model badger population dynamics, combined with a fox/rabies model to examine the possibility of rabies spread in high-density badger populations, such as those found in the United Kingdom.

Although some data exist on rabies epizootiology in the badger, there are no data on badger-to-badger contact rates (either healthy or diseased animals). As a starting point consensus expert opinion was used to devise contact probabilities, and the model was found to be insensitive to reasonable variation in these rates for the density of badgers at which these estimates were made.

Density-dependent (but not density-independent) contact probabilities simulated short chains of infections that may occur in continental Europe at low badger densities, and simulated true epizootics at higher densities. Another possible reason for these short chains of infections in continental Europe is a very high level of fragmentation between social groups. Given the high level of territorial contiguity and possible contact rates found in some parts of the UK, the model suggests that rabies is capable of spreading within the UK badger population.

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J. Bryce, P. J. Johnson and D. W. Macdonald

Can niche use in red and grey squirrels offer clues for their apparent coexistence?

Journal of Applied Ecology 2002, **39**: 875-887

Introduced species are, worldwide, one of the most serious threats to biodiversity. Grey squirrels, *Sciurus carolinensis*, are one of many introduced species to have threatened a native species; they are thought to have

replaced red squirrels, *Sciurus vulgaris*, throughout much of the UK as a result of competition.

The similarity of red and grey squirrels' pattern of habitat use was investigated in Craigvinean forest in Scotland, a site that has experienced apparent coexistence for up to 30 years.

Although there was overlap between red and grey squirrel ranges, there were clear differences in the macrohabitats utilized, with red squirrels selecting areas of Norway spruce, *Picea abies*, and grey squirrels selecting riparian corridors of mixed woodland for their home ranges. Within their home ranges, habitat selection by individual red and grey squirrels was similar, but again with reds selecting Norway spruce and greys selecting patches of mixed conifers and broad-leaved trees.

There was no evidence to suggest that red and grey squirrels avoided using the same areas at the same time, and potential niche overlap was considerable (0.77). However, partitioning of habitats may have reduced competition between red and grey squirrels and hence have contributed to red squirrel persistence at this site.

This paper reinforces earlier proposals that forest management offers a useful tool to assist the conservation of red squirrels. It raises the issue of determining the spatial scale at which co-existence operates, and offers an illustration of how the management of invasive species can be mediated through the manipulation of niche availability.

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C. M. M. Mols and M. I. E. Visser

Great Tits can reduce caterpillar damage in apple orchards

Journal of Applied Ecology 2002, **39**: 888-899

There is an increasing interest in the biological control of pests in apple orchards as adverse public attitudes to pesticides have intensified, resistance of harmful insects to pesticides is an ongoing problem, and legislation increasingly restricts the use of pesticides. This paper investigated whether great tits, *Parus major*, can reduce fruit damage inflicted by caterpillars in spring apple orchards. Great tits are partly insectivorous birds with a preference for caterpillars especially when they are feeding their nestlings. The great tit is also a common species that breeds readily in nest boxes, and hence the local density of great tits can be increased easily by putting up nest boxes in orchards.

In the first experiment, nets were put over trees at different times of the growing season, creating different periods that the great tits had access to the trees. In the second experiment, caterpillars were removed from trees at different times in the growing season. In both experiments, the resulting caterpillar damage to apples was assessed in the autumn.

The longer the period of foraging by great tits, from the start of egg incubation until fledgling of young, the less the overall pest damage to the fruit. Damage caused by caterpillars was greater the later they were removed, from the young apple stage onwards.

The effect of great tits on caterpillar damage to apples was small (percentage damage was reduced from 13.8% to 11.2%) but significant ($P < 0.05$), and the yield of fruit increased significantly (from 4.7 to 7.8Kg apples per tree, $P < 0.05$). Yield increased due to an increase in the number of apples rather than the weight per apple.

The authors conclude that although great tits on their own cannot reduce caterpillar within the present economic thresholds, they certainly contribute to biological control.

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O. W. Taft, M. A. Colwell, C. R. Isola, & R. J. Safran

Waterbird responses to experimental drawdown: implications for the multispecies management of wetland mosaics

Journal of Applied Ecology 2002, **39**: 987 – 1001.

Among the world's many seasonal, moist-soil managed wetlands, annual winter flooding is followed by spring drawdown to encourage germination of waterfowl food plants. Recommendations on how best to maintain flooded

wetlands for multiple species are mostly theoretical, and drawdown management typically focuses on spring for migrating shorebirds. The benefits and drawbacks of shallow-water management in winter have not been examined, especially where sizeable populations of wintering shorebirds and waterfowl occur together.

The Grasslands Ecological Area in California's Central Valley, USA, is a model wetland complex in which the authors assessed the optimal winter flood-depth for multispecies use. Examined in the paper are the relative benefits for each waterbird group (e.g. shorebirds and waterfowl) of drawdowns conducted in winter and spring. The authors experimentally dewatered wetlands of measured topography in the winter and spring of 1994-95, documenting changes in waterbird species richness and abundance associated with daily changes in habitat diversity and availability. Results indicated limited regional availability of shallow-water habitat across the landscape in winter but not spring, as use by shorebirds and teal increased on drawdown wetlands in winter only. Use by deeper-water dabbling ducks and diving waterbirds declined during the later stages of drawdown in both seasons, but not until use by shorebirds and teal had peaked. The maximum diversity and abundance of waterbirds occurred at average depths of 10-20 cm on wetlands with topographic gradients of 30-40 cm. This study has important implications for the winter management of seasonal wetland complexes, especially moist-soil systems where managers provide habitat for different waterbird groups simultaneously. In general, where topography is variable, wetlands flooded to average depths of 15-20 cm accommodate the greatest richness and abundance of waterbirds.

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F. Ecke, O. Löfgren and D. Sörlin

Population dynamics of small mammals in relation to forest age and structural habitat factors in Northern Sweden

Journal of Applied Ecology 2002, **39**: 781 - 792

In northern Scandinavia there are indications of a long-term decline in the abundance of the three dominant vole species, *Clethrionomys glareolus*, *Clethrionomys rufocanus* and *Microtus agrestis*, since the 1970s. One explanation proposes that intensified clear-cutting has created even-aged and homogeneous forest stands with poor overall conditions for survival and reproduction of the voles.

The authors investigated the relationship between forest age and structural habitat factors and its implications for the species richness and abundance of small mammals and in particular, the population dynamics of *C. glareolus*, a forest-dwelling species with rather general habitat requirements.

Extensive snap-trapping of small mammals was conducted during 1998-2000 on 24 study sites in boreal forests in northern Sweden. Trapping was carried out along transects running from immature forests of six age classes (0-50 years) into adjacent reference sites (> 100 years). At each trapping station 14 habitat variables were recorded that were reduced to three principal components (PCs). The PCs were related to late successional traits, such as forest age and cover of tree layers, cover of tall vegetation in the field layer) and structural heterogeneity in the forest floor. The species richness of small mammals, as well as the total abundance of *C. glareolus*, was positively influenced by tall vegetation and structural heterogeneity but not by late successional traits. The younger forests had higher scores for both cover of tall vegetation and structural heterogeneity compared with older forests.

The youngest forests also had the highest species richness and total abundance of *C. glareolus*. This was associated with a generally higher rate of change in numbers of *C. glareolus* during summer in the youngest forests compared with adjacent reference sites. In contrast, survival during winter was lower in the youngest forests. This result was consistent with a source-sink scenario where young individuals, primarily born in old forest stands in early summer, migrate into younger forests to breed, but where the probabilities for winter survival are poor.

The study demonstrates that both the species richness of small mammals and the population dynamics of *C. glareolus* are influenced to a great extent

by structural habitat factors that are altered by common forest management practices in northern Sweden. In order to conserve species richness of small mammals and to minimize population fluctuations of *C. glareolus* in northern Scandinavia, the authors suggest forest management practices that will provide heterogeneous environments, such as leaving logging residues on site after forest harvesting.

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P. Stapp

Stable isotopes reveal evidence of predation by ship rats on seabirds on the Shiant Islands, Scotland

Journal of Applied Ecology 2002, **39**: 831 - 840

Introduced predators are a major threat to native island populations, yet direct evidence of predation is often lacking, especially when it is difficult to detect by traditional dietary methods.

Historical declines of nesting seabirds on the Shiant Islands, Outer Hebrides, roughly coincided with the accidental introduction of ship rats *Rattus rattus* in c. 1900. Rats have been implicated in declines of seabirds, but the Shiant population is one of two remaining naturalized *R. rattus* populations in Britain, prompting calls for their protection.

Live-trapping studies with stable isotopes and gut content analysis were used to investigate whether ship rats prey on Shiant Islands seabirds. Another aim of this study was to determine whether marine-derived foods subsidize rat populations, permitting higher densities, greater productivity and larger body size than expected from terrestrial resources alone.

Comparisons of stable carbon and nitrogen isotopic signatures of rat tissues with those of seabirds, marine invertebrates, marine algae and land-based foods revealed that seabirds and other marine prey were the primary source of protein for rats living in colonies or near the shore. These results were corroborated by gut content analysis, and suggest a greater role for active predation of seabirds by rats than has previously been apparent at this locality.

Seabird colonies and especially coastal areas supported higher numbers of rats than more inland habitats. Coastal and colony-dwelling rats were more active reproductively and were larger than those living inland.

Although rats are capable of surviving solely on terrestrial foods, their ability to use marine prey may buffer populations during lean times, i.e. outside the seabird nesting season, and may in part plain their success and status as pests on islands world-wide. Overall, this work reveals the value of stable isotopes in identifying predation by exotic species, but also underscores potential uncertainties inherent in all diet-based methods in distinguishing predation from scavenging.

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W. J. Roem, H. Klees and F. Berendse

Effects of nutrient addition and acidification on plant species diversity and seed germination in heathland

Journal of Applied Ecology 2002, **39**: 937 -948

The atmospheric deposition of sulphur and nitrogen compounds in the Netherlands has been responsible for decreasing plant species diversity in heathland. To unravel the relative importance of nitrogen compounds on soil acidification and eutrophication, and hence on the vegetation, the authors carried out a factorial addition experiment and a germination experiment in heathland on nutrient-poor sandy soil. They changed nutrient availability and acidity independently in eight different treatments that, respectively, added nutrients or carbon in various combinations or added acidifying or neutralizing compounds. One treatment also involved adding Al.

The results showed that acidification was the most important factor in reducing species diversity. In addition, the germination of several heathland species was significantly reduced in plots with a pH < 5, and germination was very poor in plots where Al had been added.

The number of plant species declined particularly with increasing Al in the upper soil horizons. It was concluded that this relationship is responsible for the influence of acidification on plant species richness in heathland.

The influence of nutrient availability on species composition in heathland was subsidiary to acidity, but nutrient availability influenced species composition in an independent way. The growth of the three dominant species (*Molinia caerulea*, *Calluna vulgaris* and *Erica tetralix*) was limited by different nutrients. *Erica tetralix* was limited by N, *Calluna vulgaris* by P and *Molinia caerulea* by both N and P.

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E. Revilla and F. Palomares

Spatial organization, group living and ecological correlates in low-density populations of Eurasian badgers, *Meles meles*.

Journal of Animal Ecology 2002, 71: 497 - 512

Territoriality and group living were described in a low-density population of badgers, *Meles meles* L., by studying the patterns of spatial grouping and territory marking, as well as the differences between individuals in some of their characteristics and in their space use under strong seasonal fluctuations in the availability of the key resource (young rabbits, *Oryctolagus cuniculus* L.).

Badgers were territorial, showing a flexible system of territory marking, which included the marking of the most used areas (sett-latrines at the centres of activity) and additionally, at the smaller territories, a system of border-latrines in the areas of contact between territories.

In the study area where badgers had rabbits as main prey, territories were occupied by small groups of animals, formed by one adult female who reproduced, one adult male who also showed signs of reproductive activity, the cubs of the year and some animals born during previous years, which remained in their natal territory until their dispersal (normally during the mating season of their third or fourth year of life). This system was not strictly fixed as males, given the opportunity, expanded their territories to encompass additional females. Territories in another study site were occupied by one adult female, plus the cubs of the year and another adult individual.

In winter and spring dominant females and subordinates used only a small fraction of their territories, moved short distances, at a low speed and covering small areas per night. These seasons corresponded with the reproduction of rabbits (highest food availability). Dominant females were the only individuals using all the territory available in the summer (lowest food availability). Food availability increased again in autumn while range sizes were again reduced. Dominant males used the same proportion of their territories over all seasons. However, in winter (reproductive season) they moved faster, over longer distances, and covered larger areas per period of activity. These results indicate that use of space by dominant males was affected by different factors from that of dominant females and subordinates.

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C. Körner

Carbon limitation in trees

Journal of Ecology 2003, 91: 4 - 17

This paper was given as the Tansley lecture at the BES Winter Meeting, December, 2001 and summarizing such paper is never easy. The ongoing enrichment of the atmosphere with CO₂ raises the question of whether growth of forest trees, which represent close to 90% of the global biomass carbon, is still carbon limited at current concentrations of close to 370 p.p.m. As photosynthesis of C₃ plants is not CO₂-saturated at such concentrations, enhanced 'source activity' of leaves could stimulate growth of plants, provided other resources and developmental controls permit.

The concentration of non-structural carbohydrates (NSC) in tree tissues is considered a measure of carbon shortage or surplus for growth. A periodic reduction of NSC pools indicates either that carbon demand exceeds concurrent supply, or that both source and sink activity are low. A steady, very high NSC concentration is likely to indicate that photosynthesis fully meets, or even exceeds, that needed for growth (surplus assimilates accumulate). The analysis presented considered data for mature trees in four climatic zones: the high elevation treeline (in Mexico, the Alps and Northern Sweden), a temperate lowland forest of central Europe, Mediterranean sclerophyllous woodland and a semideciduous tropical forest in Panama.

In all four climatic regions, periods of reduced or zero growth showed maximum C-loading of trees (source activity exceeding demand), except for dry midsummer in the Mediterranean. NSC pools are generally high throughout the year, and are not significantly affected by mass fruiting episodes.

It is concluded that, irrespective of the reason for its periodic cessation, growth does not seem to be limited by carbon supply. Instead, in all the cases examined, sink activity and its direct control by the environment or developmental constraints, restricts biomass production of trees under current ambient CO₂ concentrations.

The current carbohydrate charging of mature wild trees from the tropics to the cold limit of tree growth suggests that little (if any) leeway exists for further CO₂-fertilization effects on growth.

Although not raised in the paper, this issue is surely crucial in terms of the debate over the Kyoto treaty and the idea sometimes put forward that by planting large numbers of trees, the effects of burning fossil fuels can be significantly mitigated. This is certainly a possibility but if growth is limited by factors other than CO₂ supply, it may not be as powerful a tool as had been envisaged.

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Badger, *Meles meles*.

Institute News

New President visits the IEEM Headquarters

On 14th March Sue Bell visited the IEEM headquarters to talk with staff and to see first hand how the office works. Developments with the website, issues with the organisation of the Conferences and the workshops and how to cope with the rapidly increasing number of membership applications were all discussed.

Sue was also able to meet Alison Morse who is working temporarily in the office on submitting a bid to the European Union to extend the scope of the group working on ecological impact analysis.



Sue Bell and the Secretariat

External Issues

The External Affairs Committee is achieving great success with responses to six consultation documents since its revamp in September. However, the core committee needs your support. The expertise that IEEM is renowned for comes from the membership and therefore the EAC asks the membership for volunteers to either be on the consultation response network group mailing list or to regularly look at the IEEM website to find out which consultations the Institute is responding to. The mailing list gives those involved the latest information of the consultations IEEM is responding to and the Committee member who is leading this response. The people on this mailing list will be the first people to have an opportunity to comment on the various consultations. The EAC would like to have a large list of members from a variety of backgrounds and locations (UK and beyond) who are willing to input in to the IEEM consultation responses on a wide range of issues. A further point if you come across a consultation, which you think IEEM, should comment on then inform us! Contact Joel Bateman on joelbateman@ieem.demon.co.uk or phone the office on 01962 868626. The latest consultations can be found on the IEEM Website <http://www.ieem.org.uk/consultations>

Professional Development Programme

Bookings for courses are flooding in, causing some to become fully booked. If you are thinking of going on a course, please check the website or phone the IEEM office for details of availability.

Unfortunately one of the workshops was omitted from the 2003 programme. The details of which are below:

An Introduction to Phase 1 Habitat Survey

Thursday, 3 and Friday, 4 July 2003 - NB self-book accommodation.

Location: Edinburgh, Tutor: Christine Welsh, MIEEM

Tel: 01397 704716, E-mail: christine.welsh@snh.gov.uk.

This 2 day workshop will provide an introduction to Phase 1 Habitat Survey. It will include a class based introduction, practice in field survey techniques and conclude with analysis and examples of applications of the results. No

previous experience of Phase 1 Habitat Survey is required, but basic vascular plant ID skills are preferred.

The IEEM Website - WWW.IEEM.ORG.UK

As many members will be aware the website has had the same format since its conception four years ago. Joel (the IEEM Webmaster) has worked hard to bring a new face to the website with more exciting pages, more information and easier access. The information found on the site is updated weekly and includes all the latest details on the availability of places on workshops and conferences. The website has become the first port of call for the office to disseminate information to the membership.

Further developments will include a members only section holding all the Professional Issues Series documents, all copies of *In Practice* including back copies and a whole host of other useful information. With 2001 being the last time IEEM published a directory of professionals we are pleased to inform the membership there will be a searchable online directory appearing soon on the website. This is an exciting project, which will prove very useful to a large proportion of our membership. More information is available from the office.

With over 40,000 hits, 30,000 files and 2500 new viewers each month it seems a good opening to include a jobs page. This page will give visitors the opportunity to see the latest job vacancies in the profession. People wishing to advertise on this page should contact Joel Bateman in the IEEM office either by email: joelbateman@ieem.demon.co.uk or tel: 01962 868626.

With all this electrifying progress be sure to have a regular glance at the website www.ieem.org.uk and keep yourself up to date with the Institute's activities.

MEMBERSHIP ADMISSIONS COMMITTEE

CALL FOR NEW COMMITTEE MEMBERS!!!

With the increasing number of applications for membership of IEEM, the committee would welcome more support.

Work entails careful checking of applications and attendance at 4 London committee meetings a year.

We would also welcome support from experienced members to act as mentors and reviewers for those applying by portfolio.

If you are interested in this valuable and rewarding work please contact the IEEM office for further details (01962) 868626

CPD Returns

Although very many CPD forms have been returned, there are still quite a number of members who have not yet done so. It is not too late to return your 2001/2002 form and remember, it is not necessary to list all the CPD that you may have undertaken, although you may certainly do so if you wish. The Institute would be satisfied with evidence that minimum requirement of 10 hours structured and 10 hours unstructured CPD had been fulfilled. So return the previous form if you possibly can but don't forget the 2002/2003 report.

Membership Subscriptions

Membership subscriptions have been maintained at the same level for the last 8 years and Council will be considering at its meeting in July whether a rise is now appropriate. Although referred to below there is also the issue of an extra cost to acquire the designation, C.Env. - Chartered Environmentalist. There will undoubtedly be a cost to the Institute in processing applications to join the Society for the Environment and a levy is expected to be made on all chartered members towards its running costs. This sum has yet to be agreed but could be in excess of £25.00.

Spring Conference - 4th June

It unfortunately proved impossible to put together a programme in time for the original date of April 8th and so the Conference on the Water Framework Directive and implications for site assessment and monitoring is now scheduled to take place on **4th June**. The programme will be distributed very shortly. This will fit in well with the overall long standing interest of the Institute in Practice Standards. Apologies to any members who had made any bookings and paid. These will be carried forward or refunded as required.

New Fellow

The Institute is very pleased to announce that at the March meeting of Council, **Professor Nigel Bell, MIEEM** of Imperial College was approved as the 10th Member to become a Fellow - congratulations. The official presentation of his certificate will take place at a suitable occasion in the future.

Obituary

IEEM is sorry to report the death in January of Martin Wragg, MIEEM, who joined the Institute in 1996. He was the Sustainable Development Officer for North East Lincolnshire Council and had previously worked for Cleethorpes Borough Council and the Gwent Wildlife Trust. Martin had been ill for some time and had taken early retirement.

IEEM Programme of Visits

The IEEM President, Sue Bell and the Executive Director have embarked on a series of visits to raise the profile of the Institute. These have now been held with the Countryside Council for Wales, Scottish Natural Heritage, English Nature and the Environment Agency. In all of these the current activities of IEEM were explained, the possibilities for enhanced membership were explored and some of its current activities such as the Society of the Environment and the EclA project were outlined. All of the Agencies seem to be aware of the skills shortage and all were very interested in the IEEM CPD Programme. All the meetings were successful and a series of follow up meetings have been earmarked. A further series of visits with government departments and other interested parties is planned.

Correction

Carol Crawford's book **'A Field Guide to the Common Mosses and Liverworts of Britain and Ireland's Woodlands'** continues to attract interest. It may have had even more interest from IEEM members if her email contact had been correctly listed in the last *In Practice*. It is trnc@aol.com and not trnc@aol.com as previously printed - apologies for that.

Society for the Environment

As members will know, the Society was officially launched in October 2002 by Baroness Barbara Young, Chief Executive of the Environment Agency. The next stage was to set up the Society as a Company limited by guarantee with its own Memorandum and Articles of Association and this has also been done.

The most difficult hurdle is about to start - the petition for Chartered Status. We are very fortunate to have had within the membership of SocEnv the Institute of Wastes Management which has very recently become the Chartered Institute of Wastes Management and this has given much needed recent experience of the process. The petition was submitted to the Privy Council Office at the end of March and will now be subject to consultation. If all goes well and there are no significant objections, the petition can be expected to be considered at the July Meeting of the Privy Council. If it is approved at that meeting, the Charter can be expected to be fully operational by about January 2004. Around that time those members who are eligible for chartered status, who wish to do so will be 'grandfathered in' as chartered members. It is envisaged that a very significant proportion of current Full Members will automatically qualify. Those joining later or meeting the criteria later will be subject to more rigorous screening with the probability of introducing professional interviews. The whole process will lead to a significant ratcheting up of the professional activities of the institute. The details on how an individual member can become chartered will be given later - assuming of course that all goes well with the Privy Council. All of this does not preclude IEEM from going for its own separate charter at some later date should it be the members wish to do so. It really is a question of watch this space from now on. Again much of the IEEM input has been provided by Alex Tait as former Vice-president and Jim Thompson.

The European Federation of Associations of Environmental Professionals, EFAEP

IEEM in its early days had been a member of the European Federation of Environmental Professionals, EFEP, but due to financial difficulties, our membership was suspended. In the event EFEP did not have the momentum to keep going and now appears to have gone out of existence. Its place has now been taken by EFAEP, a similar but broader federation of environmental professionals with a number of former EFEP members. In December there was a very successful inaugural meeting held in Dusseldorf attended by Jim Thompson and Joel Bateman. IEEM has joined for this first year at least, giving it an opportunity to contribute to and shape its development. The organisation seems to be off to a good start, with its statutes being approved under Belgian law and with use of offices in Brussels to allow easier access to the workings of the European Union. In due course joint conferences, training seminars and other projects can be envisaged.



Meeting of EFAEP Delegates in Dusseldorf

Recent Publications

Seaweeds

D. Thomas

ISBN: 0-565-09175-1

Price: £9.95

With more than 10,000 species, ranging in size from microscopic to 60 metres long, seaweeds are amazingly well adapted to the frozen polar seas, the tropics and just about everywhere in between. Not only can they dry out to almost nothing at low tide, withstand rapid shifts in temperature and huge fluctuations in the salinity of the water surrounding them, they can also tolerate tremendous buffeting by waves.

In this book *Seaweeds*, David Thomas introduces us to a host of algae. Their tissues contain specialised sugars and organic compounds that act as anti-freezing agents to regulate temperature and balance salt levels through osmosis.

David Thomas says, '... take a closer look and you'll see that seaweeds are a fascinating group of plant like organisms ranging from delicate filigree reds to impressive kelps that can grow larger than a mature oak tree in the space of a year...'

Seaweed plays a vital role in the sea's ecosystem as a habitat for animals. However, some species spread to areas they are not native, in some cases with serious detrimental effects. One such example discussed in the book, *Caulerpa taxifolia*, sometimes referred to as killer alga, has been introduced into Mediterranean as well as Californian and South Australian waters, causing most other native species seaweeds and sea grasses to die out. Urgent action is being taken in South Australian Waters to prevent *Caulerpa taxifolia* spreading uncontrollably and devastating local fishing and aquaculture industries.

Seaweeds is produced as part of the Natural History Museum's 'Life Series' and this pedigree shows. This book gives the reader a wonderful insight into the underwater world of seaweed. Included are some fantastic photos of both algae and the wildlife it supports, and these are supplemented with interesting text. *Seaweeds* is a beautiful introduction to seaweed and their role beneath the waves. I recommend this book to anyone who has ever gone to the coast and wondered "what on earth" it was they just slipped on!

Urban Woodland Management series

This guide is one of a series produced by the Woodland Trust, as a resource for managers creating or managing urban woods. These *Urban Woodland Management Guides* are based on the Trust's many years' experience of managing such sites across the UK and have been written by experienced urban woodland site managers.

From a management perspective, 'urban' woods are probably best defined as those that suffer a high level of public use and misuse. These pressures are often no different from those in any other wood with public access. However the key difference between urban sites and those in a more rural situation is both the sheer scale of pressure and the public's expectations of site management.

Woods can be used not only for informal recreation but also as children's playgrounds and through routes to shops, work or school. Due to their proximity to housing, minor encroachments, garden dumping, vandalism and complaints about weeds can become commonplace. This can result in high workloads and loss of motivation for site managers and high management costs merely to maintain the *status quo*. These guides outline strategies that the Woodland Trust has implemented to deal with such problems with both proactive and reactive approaches.

There are four parts to these guides: Damage and misuse, Litter and Fly Tipping, Complaints and Queries and Tree Planting and Woodland Creation. The Trust welcomes feedback on these guides, including different tactics you or your organisation may have tried, so that the contents remain as relevant and up to date as possible. Please e-mail the Trust at: urbanwoodland@woodland-trust.org.uk

Copies of this guide series can be downloaded from the Trust's website: www.woodland-trust.org.uk

The Breeding Birds of the London Area.

Jan Hewlett, MIEEM

ISBN: 0901009121

Soft back £30.00

Recording the bird life of London and its surrounding rural fringe, this important book traces changes in the capital's breeding birds in the last 30 years of the 20th century, a period of major environmental change in both town and countryside. It compares maps of breeding distribution in the 1988–94, with earlier surveys and documents both the success of species such as great crested Grebe, magpie and sparrow-hawk in colonising new areas and the decline of once familiar species such as the Barn owl and the Yellow hammer in the London Area. There are also brief notes on species, which have begun breeding in the areas since 1994. One of the most interesting sections is a review of how London itself has changed over this period from an avian perspective.

This book is most likely to be especially useful to any consultant or local Authority environmental officer with dealings with the London area and surrounding counties.

The Breeding Birds of the London Area is an insightful read. It is recommended to consultants and Environment/Biodiversity Officers working in the London Area. However, I do not feel this book should be used by these professionals exclusively. I recommend this book to all bird lovers, who are interested in the distribution and populations of birds found in London. Please note this book is not an identification guide; it is a history of a plethora of bird species from raptors to ruddy ducks.

Handbook of Ecological Restoration (Volumes 1 & 2)

Martin R. Perrow, MIEEM and Anthony J. Davy

ISBN Volume 1 :0 521 79129 4, Volume 2: 0 521 79128 6

Cost: £70 each

This handbook, organised in two volumes, provides a comprehensive account of the rapidly emerging and vibrant science of the ecological restoration of both habitats and species. Ecological restoration aims to achieve complete structural and functional, self-maintaining biological integrity following disturbance. In practice, any theoretical model is modified by a number of economic, social, and ecological constraints. Consequently, material that might be considered as rehabilitation, enhancement, re-construction, or re-creation is included. The books are intended to present the it in practical terms for those who may describe themselves primarily as practitioners, engineers or conservationists and includes a wealth of information on planning and legislative tools for planners and managers. Volume 1, Principles of Restoration, is organised into 5 parts, dealing with the overall background to restoration, the manipulation of the physical environment, the manipulation of the chemical environment, the manipulation of the biota, and the monitoring and appraisal of restored systems.

The accompanying volume 2, Restoration in Practice, outlines state of the art science practice in the restoration of a broad range of biomes within terrestrial and aquatic ecosystems.

The Handbook of Ecological Restoration will be an invaluable resource to anyone concerned with the restoration, rehabilitation, enhancement or creation of habitats in aquatic or terrestrial systems, throughout the world.

News in Brief

Britain's Heather

The Moorland Association have stated that over 1 million acres of upland in England and Wales is in a degraded state. Furthermore, heather moorland in good condition is among the scarcest habitats in the world and is in need of continued investment and care.

The Northern Uplands Moorland Regeneration Project states that over 370,665 acres of heather moorland have been saved and improved by the actions of private moorland landowners and tenant farmers in Northern England through a three-year Object 5b programme.

During the project, moorland management plans helped farmers and land owners integrate agriculture, sporting and environmental objectives, to increase farm incomes, improve job opportunities in rural areas and enhance the upland moorland environment.

The full report is available from www.moorlandassociation.org

Over £2.25 Million for moorland schemes in South West Scotland.

Continuing on with the moorland theme; Scottish Natural Heritage (SNH) has announced funding of over £2.25 million for three new moorland management schemes which could benefit up to 119 farmers and moorland owners in parts of Arran, East Ayrshire and Dumfries & Galloway over the next 8 years.

The schemes, which have been developed by SNH as part of their "Natural Care" programme, were launched by Deputy Minister for Environment and Rural Development, Allan Wilson; SNH Chairman, John Markland and Chair of the SNH West Areas Board and Chair of Scotland's Moorland Forum, Isabel Glasgow.

Owners and managers of the Arran Moors, Muirkirk & North Lowther Uplands and the Galloway Moors & Glen App proposed Special Protection Areas will be able to receive funding in return for managing their land in ways that will help sustain and enhance the populations of moorland birds and the habitats on which they depend.

The three sites hold internationally important populations of hen harriers and significant numbers of other moorland birds such as short-eared owl and golden plover.

John Markland said: "I am very pleased that these schemes are now open for business. By offering financial incentives for landowners and managers we are helping them to maintain their good stewardship of the moors and to follow land management practices which will benefit many species and habitats for years to come."

Wildlife friendly milk

Britain's best known bird watcher, Bill Oddie, was recently at Galston in Ayrshire. He helped erect the first batch of 450 nest boxes, which are to be positioned in 47 farms around South West Scotland. The boxes are being placed on the land set aside by the farmers who produce the 'White and Wild' brand of milk, championed by the Wildlife Trusts and FWAG (Farming and Wildlife Advisory Group). It is hoped that 'White and Wild' will help secure 400 native species currently listed as under threat. The installation of the nest boxes is just one element of the comprehensive biodiversity schemes FWAG has planned for the designated White and Wild farms. Steve Sankey, Chief Executive of the Scottish Wildlife Trust said: conservationists and farmers are really working together to keep Scotland farming for wildlife."

In a recent report, DEFRA (Department for Environment, Food and Rural Affairs) cited the White and Wild milk initiative as showing the way forward

to the global community. Ken Whitley, Chief Executive of Wild Care Dairy Group (the company which devised and runs the scheme) said: "This is a wonderful day for Britain's wildlife. We have proved that the consumer is prepared to pay a little bit more and reverse our slide towards a wasteland world."

White and Wild is a milk brand available in over 500 stores nationwide. For each bottle sold, 2p will go directly to the Wildlife Trusts.

For more information on this scheme visit www.whiteandwild.co.uk

Countryside Exchange

The North American/UK Countryside Exchange is recruiting for 2003. The Countryside exchange is an international programme, which aims to provide challenging learning opportunities for experienced professionals and volunteers working in a wide variety of disciplines concerned with the countryside and urban fringes.

A previous team member said: "There is no doubt that I learned a tremendous amount from the host institution and community, as well as from other team members."

The deadline for applicants is the end of May.

For more information Tel: 0161 975 6140 or email: cei@cei-associates.org

National Moth Night

Following the success of this event in 2002, which gathered 12000 recordings from 400 sites, National Moth Night 2003 will take place on the 12th April. The aims of the event are to encourage widespread moth recording, while increasing the interest in moths and raising precious funds for conservation.

Ways in which you can take part are: recording moths in your garden, visiting a new site, targeting a specific species or holding a public event. This years target species are the orange upperwing, *Jodia croceago* and the sword-grass, *Xylena exsoleta*.

For more information www.nationalmothnight.info

Rediscovery of *Andrena marginata*.

The solitary bee, *Andrena marginata*, has not been recorded in Scotland since the early 1940's. But it seems the bee is back having been recorded from Boat of Garten in Strathspey. It was rediscovered foraging on devil's-bit scabious (*Succisa pratensis*) in an area of semi-improved grassland. *A. marginata* is a small bee about one centimetre in length, dark in colour with fine hairs and is found on grasslands, heaths moors, woodland and stabilised coastal dunes.

National Biodiversity Day

International Biodiversity Day 2003 will take place on 22nd May. The focus has changed from Mountain Biodiversity to Biodiversity and poverty alleviation - challenges for sustainable development. IUCN encourages its IUCN Member organisations and Commission members to play a role in promoting biodiversity and particularly to highlight the issues around Biodiversity and poverty alleviation - challenges for sustainable development.

For more information www.biodiv.org

British Maritime Technologies

BMT have recently held their annual press conference, which highlighted some of the environmental projects they had been working on. These projects included the software expertise to ensure the safe operation of a major copper mine reservoir in Poland, the worlds largest hydro-engineering construction of its type and the environmental impact assessment of off shore wind turbines around the shores of the UK. Also included were a

range of environmental tools minimizing the impact of fuel exploration. PROTEUS predicts the physical dispersal, chemical interactions and ecotoxicological risk for discharges and OSIS was developed to model the trajectory, spread and impact of marine spills.

For more information on BMT: www.bmt.org or email: enquiries@bmtmail.com

New Chief Executive appointed for English Nature

Dr Andrew Brown has been appointed as English Nature’s new Chief Executive. Dr Brown had been Acting Chief Executive since December 2001. Dr Brown said, “I am excited to take up the challenge of leading English Nature as Chief Executive, and continue so much of the good work started by David Arnold-Forster. We have many big challenges ahead not least, ensuring that England’s special wildlife and geological sites are well managed and secured for the benefit of future generations...”

Before becoming Acting Chief Executive, Dr Brown had been Director of Operations, responsible for all work relating to over 4,000 designated wildlife sites in England.

Blast from the Past

The bones of a woolly rhino have been found at a Staffordshire quarry. Archaeologists were digging in the Whitemoor Haye Quarry near Alrewas in Staffordshire, September 2002, when Ray Davis made a most unexpected discovery in the bucket of his digger. He found the enormous skull of a 50 – 30,000 year old woolly rhino. This has caught the attention of scientists at The Natural History Museum. While the Museum has a large collection of Ice Age mammals including the woolly rhino, predators such as the spotted hyena have gnawed most of the specimens. So far the skull, lower jaw, hyoid bones (bones which support the throat), cervical vertebrae, three ribs and bones of the major part of both front limbs have been recovered. An additional interesting find was that the rhino had the plant remains of its last meal. With further exploration of the site four more skeletons were uncovered. These were the remains of a mammoth, reindeer, wild horse and a wolf. Along with the remains of these higher animals were a vast array of plant and insect remnants. This paints an extraordinarily clear picture of the environment the woolly rhino lived in. English Nature has allocated £15,000 to help fund the team’s research into the area along with these exciting finds.



Woolly rhinos

Woolly rhinos (*Coelodonta antiquitatis*) stood over two metres tall and were not uncommon in Britain during the middle part of the last cold stage. Woolly rhinos are close relatives of the Sumatran rhino. The remains of the woolly rhino are being cleaned and analysed at the Natural History Museum, London.

More Information from www.nhm.ac.uk

Water bill could benefit wildlife sites

Over 10% of England’s Sites of Special Scientific Interest (SSSIs) rely on good and clean supplies of water and so stand to benefit from the proposed changes in the draft Water Bill published. English Nature estimate that over 350 nationally and internationally important wildlife sites are affected by water abstraction. English Nature welcomes the proposed Bill as it will provide greater protection of the environment from the impacts of water abstraction.

Hans Schutten, English Nature’s freshwater adviser said, “*Our wildlife depends on a delicate balance of water throughout the seasons and the effects of too little water at the wrong time of year can be devastating to fish, or birds.*”

You can find the bill published at www.publications.parliament.uk/pa/pabills.htm

Radio Batsqueak

Tiny radio transmitters weighing less than half a gram will be attached to the backs of bats in Gloucestershire this spring and summer so that their flight and feeding patterns can be tracked.

The 15-month project on the National Trust’s 4000 acre Sherborne Estate aims to focus on the rare lesser horseshoe bats that hibernate amongst the disused Cotswold stone mines and breed in the buildings.

There is an important roost of 70 lesser horseshoes at Sherborne and it is hoped that, by using a combination of bat detectors, radio transmitters and observation, much more can be learnt about their roosting, breeding and feeding activities. Once the project has identified what types of roosts, habitat and food the bats prefer, the Trust can improve their conservation and management methods.

The project will result in the publication of a best practice guide for use by landowners, farmers, the aggregates industry and conservation organisations. The guide will provide practical advice learnt from the project for future bat conservation and habitat improvements throughout the whole of the UK.

Phil Richardson, the National Trust’s Bat Conservation officer is very excited by the project; “This is the first time there has been an opportunity to carry out such a comprehensive survey of bats over such a large area of landscape and we should be able to see the factors that influence population levels of rare species such as the lesser horseshoe bat.”

The RE-Source Award

Swiss Re has made a commitment to supporting the development and introduction of sustainable watershed management practices. One of its initiatives in this area, the RE-Source Award, was launched in April 2002.

Swiss Re’s RE-Source Award provides financial support to watershed management projects from the planning and evaluation stages through to their implementation. A total of USD \$100,000 is available in prize money. The award is designed to encourage projects that promote awareness of the ecological, social and economic significance of water resources

Winning Projects:

- New financial mechanism for forest conservation, Guatemala.
- Community-based land and water resource enhancement, Nepal.
- Jaguari river basin project, Brazil.

For more information on the winning projects or on the awards: www.swissre.com/resource

Prospective members of IEEM

The following people have applied for membership of IEEM. If any existing member has any good reason to object to someone being admitted to the Institute, especially if this relates to compliance with the Code of Professional Conduct, they must inform the Executive Director by telephone or letter before 9th May 2003. Any communications will be handled discreetly. The decision on admission is usually taken by the Membership Admissions Committee under delegated authority from Council but may be taken directly by Council itself.

Applicants for Associate Membership

Mr Daniel Ahern, Miss Carol A. Bannock, Miss Sally A. Bielby, Mr David J. Black, Mr Dale Broadbent, Dr Graham S. Burt-Smith, Miss Paula Cass, Mrs Fiona Chirside, Mr Thomas G. Clarkson, Miss Joanna V.E. Cornfield, Miss Laura Cox, Mr Philip J. Croxton, Miss Eleanor Douglas-Hamilton, Mr Abel Drewett, Miss Annabel Drysdale, Mr Kevin D. Durose, Miss Rebecca East, Miss Sian E. Edwards, Mr Thomas A. Flynn, Mrs Theresa E. Greenaway, Miss Leila R. Griffiths, Miss Sarah A. Hammond, Mr Simon D. Inger, Miss Tessa L. Jenkins, Mr Robin C. Jones, Miss Aida Khalil, Mr James E. Latham, Ms Kristina A. Lewis, Ms Estelle Linney, Miss Hannah C. Lynch, Mr Thomas M. Marlow, Miss Sophie Miller, Miss Gemma O'Connor, Mr Derek G. Pears, Dr James D. Riley, Mr Max Robinson, Mr Benedict J. Rose, Mr Alastair M. Ross, Mr James Ross-White, Miss Rebecca S. Sharp, Mr Christopher A. Shaw, Mr Thomas P. Smith, Mr Adrian D. Taylor, Miss Jane Tibbotts, Miss Emma Toovey, Ms Julia L. Verity, Mr Gavin R. Ward, Miss Ilona Weir.

Applicants for Full Membership

Mrs Eleanor J. Andison, Miss Melanie C. Archer, Ms Lucy Arnold, Mr Christian Balling, Mr Daniel J. Bennett, Mr Jonathan Bradley, Miss Andrea L. Buckley, Mr Brendan J. Burley, Miss Emma K. Burton, Mr Kenneth Campbell, Mr Brian J. Chilcott, Mr Jon Chippendale, Dr Sophie A. Clayton, Mr Jeremy H. Clitherow, Dr Mark Crane, Dr Anne J. Danby, Mr Michael J. Dean, Mr James P. Flanagan, Prof. Garth N. Foster, Miss Marlyne Good, Mr Tim Goucher, Mr Simon E. Green, Mr Gordon B. Haycock, Mr Michael Head, Ms Marie-Louise Heffernan, Mr Ian C. Higson, Mr Paul E. Hodges, Miss Tanya Holdsworth, Mr Tim D. Hounsome, Mr Oliver Howells, Dr Jonathan M. Huckle, Mr Adrian R. Hutchings, Mr Benjamin D. James, Mr Patrick James, Ms Kate Jeffreys, Dr Jennifer Jones, Mr Matthew C. Jones, Mr Anton Kattan, Mrs Tania L. Kaplan, Mr Dominic C.D. Lamb, Mr Simon C.R. Lee, Mr Frank Lucas, Mr Charles C. Morgan, Mr John N.T. Mott, Mr Duncan J. Murray, Dr Larissa A. Naylor, Mr John O'Reilly, Mr Timothy W. Outlaw, Mr Eric Palmer, Mrs Nicki C. Pearson, Mr Dominic W. Price, Mr Stephen Prosser, Dr Linda M.J. Sadler, Mr Keith R. Stevenson, Miss Jennifer Stuart, Mr Michael P. Thompson, Miss Kirsten Thorburn, Ms Penelope A. Ward, Mrs Louisa Watkins, Mr Daniel E. Wenczek, Ms Caroline J. Wilson, Mrs Yvonne M. Wright.

New admissions to IEEM

IEEM is pleased to welcome the following new members:

Associates

Miss Rachel M. Armiger, Miss Elaine C. Austin, Miss Laura E. Baines, Mr Shaun Baker, Ms Tabatha Boniface, Miss Petrina L. Brown, Mr James Davidson, Miss Josephine A. Donnelly, Mr Gary A. Emans, Mr Michael G. Freeman, Mr Richard Gill, Mr Rodney Gillatt, Miss Suzanne Glencross, Dr Joanna M. Haigh, Miss Katherine M. Hayward, Mr David H.J. Hoare, Mr Christopher John, Miss Amanda C. Lockley, Miss Carmen Mayo, Mr Peter J. Nicholson, Miss Jane Orr, Miss Michelle Rees, Miss Nicky J.W. Richardson, Mr Richard Roe, Mr Jan Skuriat.

Full Members

Dr Isabel Alonso, Mr Richard A. Barnes, Mr Andrew Bielinski, Ms Karen A. Blake, Mr Luke J. Bristow, Miss Wendy A. Brooks, Mr Patrick M. Close, Mr Mitchel A. Cooke, Mrs Valerie Cooper, Mr Niall U. Corbet, Mr Russell Cryer, Mr Christopher M. Davis, Dr Matthew J.H. Denny, Ms Nicola Farrin, Mr Tim D. Frayling, Dr Janice Fuller, Mr Dave Garner, Mr Simon Geary, Miss Maria A. Gilmartin, Mr Andrew M. Goodman, Mrs Linda L. Griffin, Ms Maria E. Hardy, Ms Philippa Harvey, Mr Stephen M. Henson, Ms Sue Lawley, Mr Jason J. Leach, Mr Matthew Low, Mr Peter Massini, Miss Fiona K. McMeechan, Mr Philip Parker, Mr Alistair Parkes, Dr Elizabeth A.C. Price, Mr Ian L. Ralphs, Mr Graham A. Rankin, Dr Niamh Roche, Dr Sheila M. Ross, Dr Deborah L. Snook, Miss Joanne K. Taylor, Prof. P. Max Wade, Mr Graham Walsh, Dr Piran C.L. White.

Students

IEEM is pleased to welcome the following as new student members:

Miss Gael Atkinson, Miss Samantha Bruntlett, Miss Tracey-Jane Butler, Miss Laura Donnelly, Mr David B. Douglas, Mr Ian D. Fraser, Mrs Brigitte Geddes, Mr Dennis Harding, Miss Jessica Holliday, Mr Callum S. Hollywood, Miss Hannah Kirk, Miss Nicola McFarlane, Miss Fiona A. Menzies, Mrs Sally Murray, Mr David Orchard, Mrs Susan M. Searle, Mr Timothy J. Smith, Mr Matthew Stevens, Miss Sarah E. Toogood, Mr Valery Votrin, Miss Clare V. Walleth, Miss Rhiannon L. Whitworth, Miss Emma C. Young

Affiliates

IEEM is pleased to welcome the following as new affiliate members:

Miss Lorraine Baker, Miss Lisa C. Bennett, Miss Claire N. Munday, Mr Stephen Peters, Mr Mark Rawlings, Mr Brian K. Stacey

Upgrades

The following have successfully upgraded their membership from Associate to Full:

Mr Simon Colenutt, Miss Rachel Cook, Miss Helen Folkard-Ward, Miss Caroline H. Gettinby, Mr Kurt Goodman, Mr Sean Hanna, Mr Kevin Harrington, Mr John Jones, Ms Zoe Kemp, Miss Sarah Lyne, Miss Kate Mastel, Miss Sally Monks, Mr Philip Morgan, Miss Jo-Ann Mosley, Miss Rebecca Osborn, Mr Richard Pryce, Mr John B. Sizer, Mr Andrew Stables, Mr Jonathan P. Winn.

The Course programmes for 2003 for the Centre for Alternative Technology, The Field Studies Council, Losehill Hall, Plas Tan-y-Bwlch and BTCV are all now available. Each offers a wide range of courses that might be of interest to IEEM members. Information from:

Centre for Alternative Technology: Further details about each course can be obtained from Joan Randle.
Tel: 01654 703743, Fax: 01654 703605, E-mail: joan@cateducation.demon.co.uk.

Field Studies Council: For a copy of the FSC Courses 2003 brochure, contact FSC head Office, Preston Montford, Montford Bridge, Shrewsbury, Shropshire, SY4 1HW. Tel: 01743 850 674, Fax: 01743 850 178, E-mail: fsc.headoffice@ukonline.co.uk. website www.fieldstudiescouncil.org

Losehill Hall: Details from Losehill Hall, Peak District National Park Centre, Castleton, Hope Valley, Derbyshire S33 8WB
Tel: 01433 620373, Fax: 01433 620346, E-mail: training@losehill.u-net.com.

Plas Tan-y-Bwlch: Details from: Plas Tan-y-Bwlch, Maentwrog, Blaenau Ffestiniog, Gwynedd LL41 3YU. Tel: 01766 590324, Fax: 01766 590274, E-mail: Plastanybwlich@compuserve.com.

BTCV Courses: - practically based. Details from: BTCV Training Programmes Unit, Red House, Hill Lane, Great Barr, Birmingham B43 6LZ.
Tel: 0121 358 2155, Fax: 0121 358 2194, E-mail: ETN@ukgateway.net

10 April. London's Green Spaces. London. Details from London Parks and Gardens Trust Tel: 0207 839 3969

12 April. National Moth Night. Further details from www.nationalmothnight.info

3 May. Bat Surveys. Dunblane, Perthshire. Details from the IEEM office or the website www.ieem.org.uk.

7 May. Establishing ground flora in woodland plantations. Milton Keynes. Details from Sue Everett Tel: 01635 847164.

7 May. Insect Conservation on Brownfield Sites. London. Details from Royal Entomological Society Tel: 0207 584 8361.

13 May. Introduction to NVC Surveying for Woodlands. Collyweston Wood, Northamptonshire. Details from the IEEM office or the website www.ieem.org.uk.

13 May. Environmental Legislation Update. London. Details from Paul Gasowski Tel: 0845 120 9605.

14 May. Freshwater Surveying. Perth, Scotland. Details from the IEEM office or the website www.ieem.org.uk.

14 May. What are the lessons learnt from the Public Inquiry? Otterburn Training Camp, Otterburn at 10.00am – 3.30pm. Part of the North East Sections members' programme. Details from Steve Pullan Tel: 0191 2661769 or email: steve.pullan@virgin.net

14-15 May. Making cities liveable. Stoke on Trent. Details from Landscape Institute Tel: 0207 350 5206

15 May. Using Bryophytes as Habitat Indicators. Orpington Kent. Details from the IEEM office or the website www.ieem.org.uk.

21 May. How Biological Diversity Influences Social, Economic and Environmental Wellbeing. Details from Rachel Edwards on 01670 542384, cone@blythvalley.gov.uk or www.workingwithwildlife.co.uk

22 May. International Day for Biodiversity. Details from www.biodiv.org.

May 30 - June 1. Working and Walking in the Footsteps of Ghosts. The Ecology, Archaeology and Management of Ancient Woods and Associated Land. Sheffield Hallam University, Sheffield. Details from Dr Ian Rotherham Tel: 0114 225 2988.

9-11 June. Identification of Sedges. Settle, North Yorkshire. Details from the IEEM office or the website www.ieem.org.uk.

17 June. Basic Introduction to Grasses. Settle, North Yorkshire. Details from the IEEM office or the website www.ieem.org.uk.

19 June. From Coral Reefs to Mangroves – Lecture. London University Institute of Education, London. Details from Earthwatch Tel: 01865 318856, E-mail: info@earthwatch.org.uk

26 June. Neutral Vegetative Grassland Identification. Somerset. Details from the IEEM office or the website www.ieem.org.uk.

30 June. Fisheries Society of the British Isles Annual International Symposium. Norwich. Details from Tricia Ellis-Evans Tel: 01223 263477 or www.leicester.ac.uk/biology/fsbi.

30 June - 1 July. Teaching and Research in Geography, Earth and Environmental Sciences. Warwickshire. Details from www.gees.ac.uk.

3 July - Identification and Habitat Management for Dragonflies and Damselflies. Wicken Fen, Cambridgeshire. Details from the IEEM office or the website www.ieem.org.uk.

3-4 July. Introduction to Phase 1 Habitat Survey Edinburgh. Details from the IEEM office or the website www.ieem.org.uk

7-10 July. BES Special Symposium: Biotic Interactions in the Tropics. University of Aberdeen. Details on the BES website www.britishecologicalsociety.org

4 June 2003. IEEM's First London Conference. The Water Framework Directive (POSTPONED FROM 8 APRIL). Euston, London. Details soon from the IEEM office or the website www.ieem.org.uk.

25-27 November 2003. 18th IEEM Conference: Upland Ecology. Palace Hotel, Buxton, Derbyshire. Details soon from the IEEM office or the website www.ieem.org.uk.