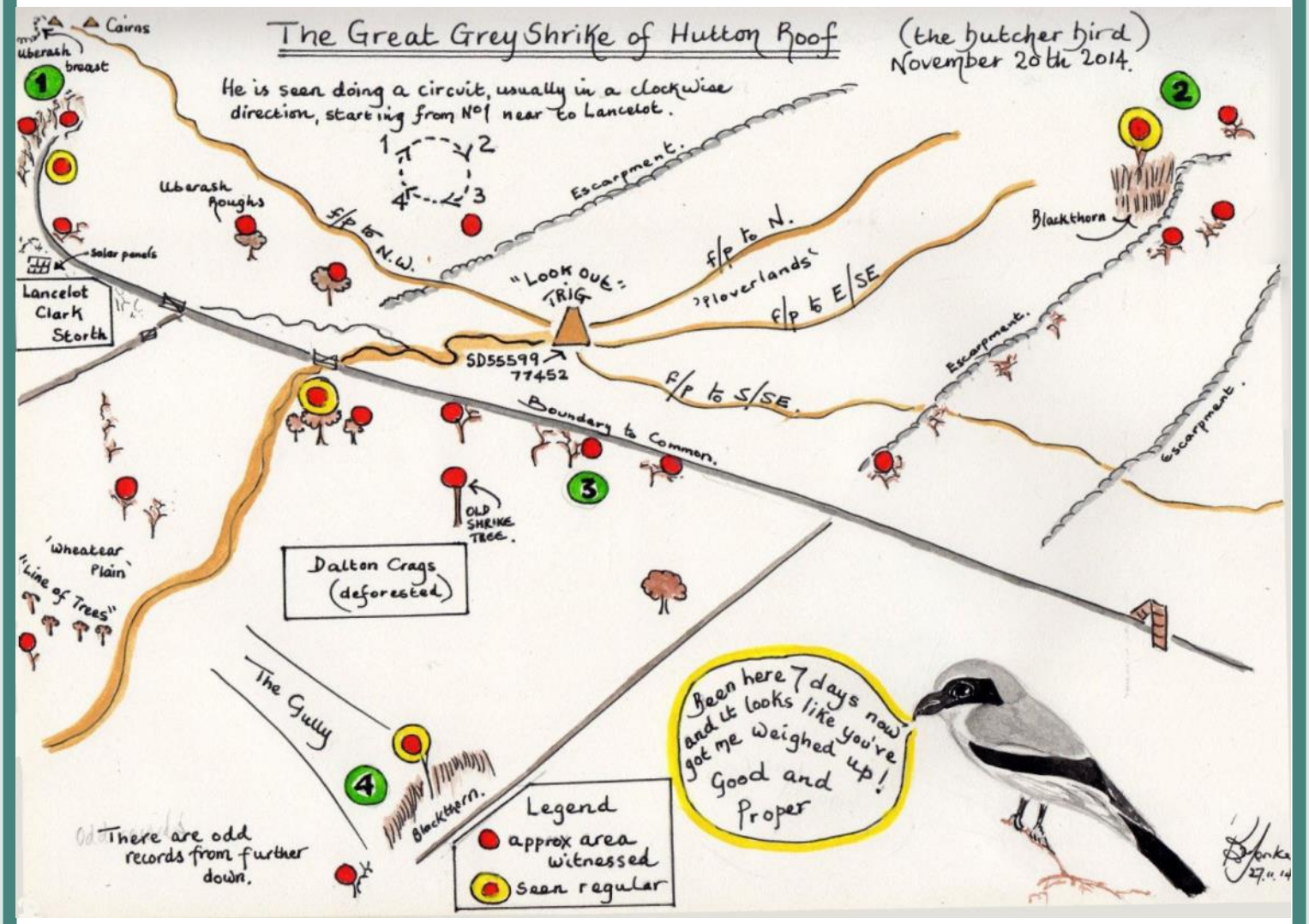
NFBR

National Forum for Biological Recording

Newsletter 49 – February 2015



The art of biological recording! Illustration by Bryan Yorke. More of Bryan's unique illustrations can be seen at arnsidesilverdale.blogspot.co.uk

Don't miss the NFBR/BES conference! Inspiring speakers, important topics, lively debate and a splendid field trip. See overleaf for full details.

This year's NFBR conference is organised jointly with the British Ecological Society, and promises a wealth of information and debate on the links between biological recording and ecological research. Extras include optional conference dinner and field trip.

Full details and the conference programme are on the NFBR website at:
www.nfbr.org.uk/wiki/index.php?title=Conference_2015

A booking form can be downloaded from the above link, or book online at:
onlineshop.shef.ac.uk/browse/extra_info.asp?compid=1&modid=2&deptid=6&catid=101&prodid=357

Conference costs:

Day	NFBR or BES	Non-Members	Students++
Thursday	£35	£45 (£40 early bird)	£20
Friday	£45	£55 (£50 early bird)	£25
Thursday and Friday	£65	£75 (£70 early bird)	£40

The deadline for early bird bookings is the 9th March 2015
+ Individual membership of NFBR costs just £10. Click here to join NFBR. Institutional members of NFBR are eligible for one discount-rate ticket per institution.
++ Undergraduate or post-graduate students or trainees enrolled on a full-time programme of study.
For full booking conditions see NFBR website.

Contents

Cover illustration: The Great Grey Shrike of Hutton Roof, by Bryan Yorke – see Editorial.

Editorial

Welcome to the 49th NFBR Newsletter, with apologies for it being slightly delayed. Before we go any further: have you booked your place at the 2015 conference? The programme is full of exciting topics and enthusiastic speakers, and it would be great to see as many NFBR members as possible in Sheffield in April. See inside cover for all the details, and please spread the word to anyone who will be interested - a flyer about the conference can be downloaded from the NFBR website, please print and display!

The conference focuses in part on the latest round of new technological developments and their implications for how we record and monitor biodiversity. The high-tech theme is also picked up in two articles in this issue: Alison Fairbrass and our conference keynote speaker Kate Jones provide some examples of positive outcomes from applying technology to recording on the page opposite, and further on Tom August explains how he has persuaded Twitter to interrogate data via NBN to help you find out the species that might be round the corner from where you are standing.

But it's worth remembering that biological recording is a broad church, and there is still much value to be gained from other ways of looking at and thinking about wildlife. Our cover illustration by Bryan Yorke is a particularly artistic way of recording and communicating a wealth of information about a single bird on his local patch. Databases and computers are essential tools for biological recording, but they are not the only way to communicate a love of natural history.

Elsewhere in this issue Bex Cartwright describes the life of an RSPB trainee on the very successful "Nature Counts" project, which is providing fantastic opportunities for some very talented people. We also help the NBN partnership celebrate the 100 millionth record, and an update on the new NBN strategy is one of the items on our news page. Some exciting new research is summarise, and our book reviews cover local and national wildlife studies. A 'beginner's guide' to sending in wildlife records completes the mix.

Thanks to all who have contributed words and images for this issue. Our next one is due in July, so please get in touch if you have news, reports, articles or photos to share. Contact me, or share your views more widely via our email discussion forum, our Twitter feed, or on our Facebook page. And don't forget to check in to the NFBR website.

Martin Harvey, July 2014

The **deadline for sending in articles for newsletter 50** is
1 June 2015

Latest News: NFBR joins the State of Nature partnership

In 2013 a group of 25 wildlife organisations worked together to produce a pioneering "State of Nature" report. Based on data from a range of biological recording sources, the headline statistics were alarming: "60 per cent of the species studied have declined over recent decades. More than one in ten of all the species assessed are under threat of disappearing from our shores altogether."

NFBR has now joined the ongoing partnership and looks forward to helping promote the use of biodiversity data to inform conservation and policy.

We're delighted that Professor Kate Jones of University College London is able to give the keynote speech at the NFBR conference in April. By way of introduction to her topic of "Technology for nature?", Alison Fairbrass and Kate provide a review here of some recent technological developments.

New technology for monitoring biodiversity

Alison Fairbrass
(Research Engineer, University College London, Alison.fairbrass.10@ucl.ac.uk)
Professor Kate Jones
(University College London, kate.e.jones@ucl.ac.uk)

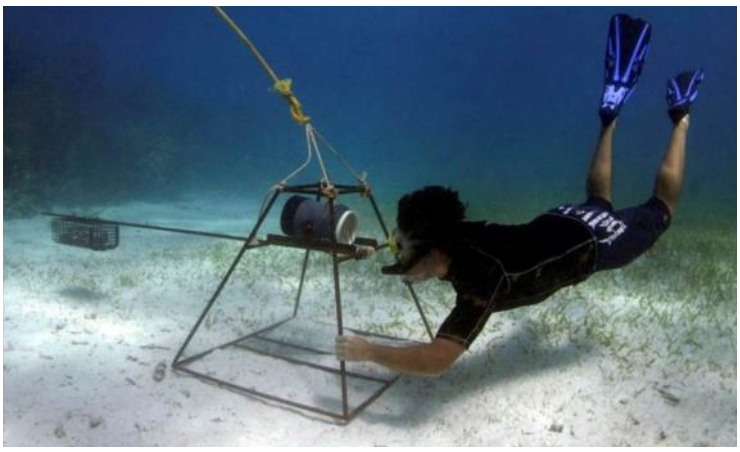
Technological advances in fields such as resource extraction and agricultural intensification have contributed to the over-exploitation of natural resources and declines of wild nature. However, new technologies can help understand the natural world and to further engage people with nature.

For hundreds of years, we have been observing and recording nature manually, documenting species – we have a lot to thank those old Victorian naturalists for. Even more recently we have been tracking changes in populations with visual counts of species such as birds and bats, thanks to networks of dedicated volunteers from organisations such as British Trust for Ornithology and Bat Conservation Trust. However, with the majority of nature still unknown, we need to dramatically up-shift the number of species documented and monitored in order to predict the impacts of anthropogenic change.

Now rapid technological development, improved social connectedness and an expanding interest in citizen science has the potential to make how we monitor our planet's biodiversity finally a little bit smarter, helping us to understand the consequences of biodiversity loss and mitigate these impacts.

Sensor technology

Some of the technological development in monitoring is in the form of new sensors such as camera traps. Although camera traps have been around for a number of years (originally developed for commercial hunters), they are now becoming more widely used in both terrestrial and marine biodiversity monitoring. Traps are usually set out in grids and the cameras inspected for wildlife periodically. One picture taken in Liberia in a joint Flora & Fauna International (FFI) and Zoological Society of London (ZSL) project was the first sighting of a pygmy hippo in the country and made the headlines. The HabCam project at The Woods Hole Oceanographic Institute takes pictures of the sea floor to monitor biodiversity and impacts of fisheries.



A marine camera-trap in action.

Sensors or 'tags' which can be attached to animals have also seen a rapid recent development and many projects are utilising tags that collect GPS and accelerometer data creating 'daily diaries' of the movement and behaviour of animals. This prospect of smaller and smaller tags is getting closer –one project uses RFID tags (the ones in oyster

cards) to understand wasp behaviour. Tags that are less than 5g (and perhaps 1g) that can provide GPS and accelerometer data are currently in development.

Small-scale tagging.

Sound is increasingly used to monitor biodiversity with more and more projects using networks of citizens to monitor sounds from birds, marine mammals, frogs and even bat ultrasonic calls. The iBats monitoring programme, run jointly with the Bat Conservation Trust and ZSL (also see the Case Study opposite), engages over 1,000 local people in surveys across Eurasia to collect acoustic transect data to monitor bat populations.

Monitoring for the iBats project.

Smartphones are being increasingly used as sensors and to further engage people with nature, opening up nature to a wider audience. For example, many identification guides now have a smartphone app. Some of these apps provide only species information such as images, biological information, distribution and sometimes sounds, but some newer apps also provide interactive keys designed to be used when the species is in front of you in the field.

Analytical Technology

The speed and innovation of these sensor technologies in biodiversity science and wildlife monitoring is generating more and more data. This brings its own challenges – how to identify the species or behaviours of animals within these data. These are complex problems that require collaboration between ecologists, computer scientists and statisticians to solve.

ZSL's Instant Wild project. uses crowd-sourcing to identify mammals caught on camera-trap.

One approach to the problem is to 'crowd-source' the answer. This is an approach taken by iSpot where an image is taken in the field (say from a smartphone or ordinary camera) and uploaded onto their website where it is identified by networks of experts and enthusiasts. However, you don't have to be an expert to help – there is a huge growth in online citizen scientists using human identifying skills to train computers to develop recognition algorithms. The Zooniverse set of projects is a great example – although many of their projects are astronomical there are a growing number of nature projects. For example, one called Bat Detective develops algorithms to find calls automatically from huge sequences of recordings. Their other projects include Snapshot Serengeti, Plankton Web, Notes from Nature. You can take part – it's easy, just log onto the website!

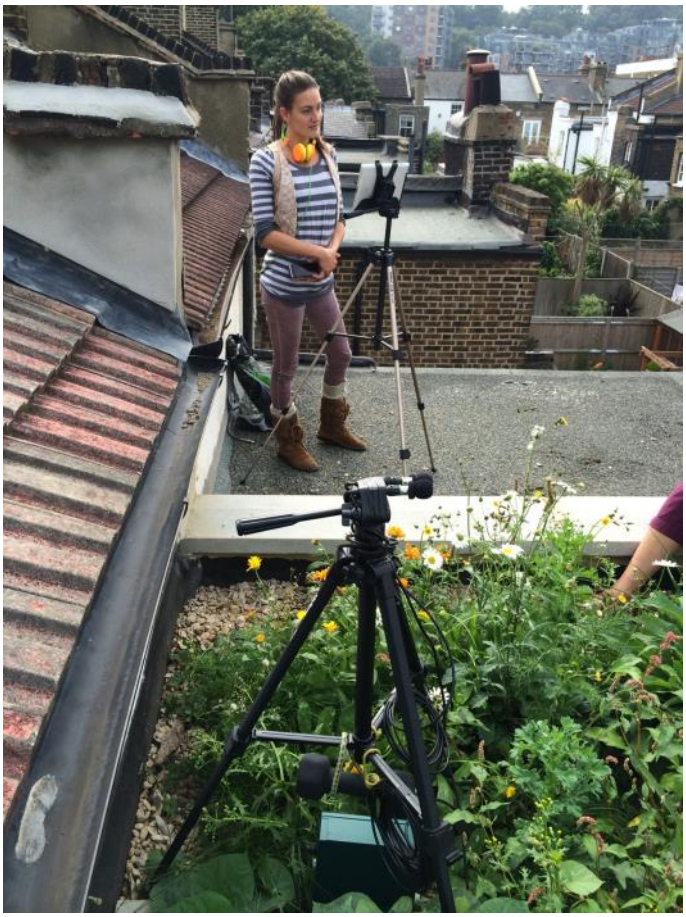
These types of projects open up science and the natural world to anyone interested. However, what if identification could happen automatically in the field? It has already

begun with apps on the smartphone. Leafsnap app is one example, where images of unknown leaves are submitted and identified using algorithms created by training visual recognition software to recognise known specimens. Then there is Cicada Hunt app which uses a smartphone microphone to record samples of sound and identifies a particular species of endangered cicada. Better species identification increases the impact of citizen science projects as the data collected by volunteers becomes more reliable. Additionally, the increased accessibility of information about nature also helps to engage more people. For example, imagine holding your phone or wearing a Google Glass on your nature hike that could interpret what animals and plants you are hearing and seeing, link to its conservation status, and tell you how much carbon it is sequestering, or pollination it is responsible for. Technology is creating a new and exciting way to interpret and engage with nature.

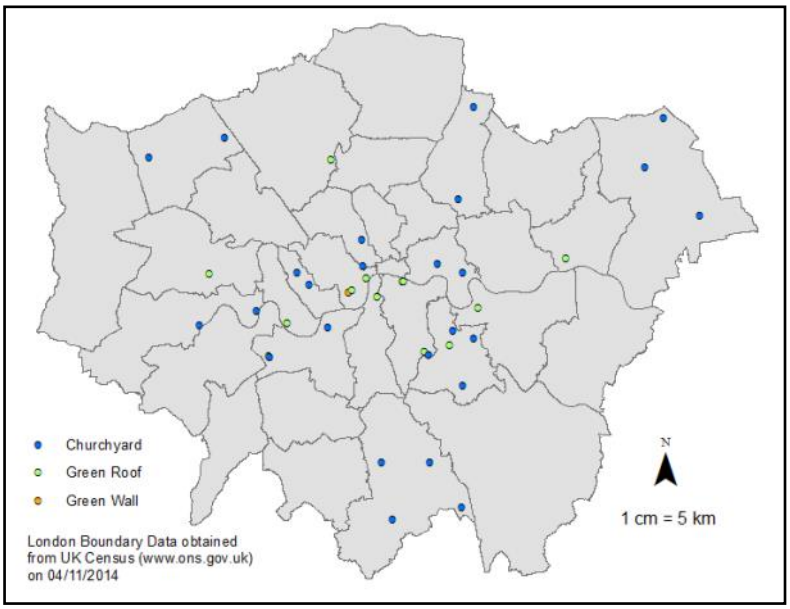
Case Study: Developing new soundscape technology to monitor the ecological impact of urban development

Mitigating the negative ecological impacts of development is a legal requirement in the UK, and biodiversity-enhancing design has become a popular choice to improve the environmental quality of new developments. However ecological expertise in the industries responsible for development – such as architecture, construction, and facilities management – is rare, meaning the benefits of these investments in biodiversity-enhancement are very often not fully realised. We see flowering verges mown in the middle of summer, green roofs lain with sedum mats because they are easy to cost into a budget, green walls that wilt and die because their watering regime was inappropriate for the plant species used. Such a shame that the money invested in enhancing biodiversity in developments goes to waste when natural habitat in the built environment is so valuable.

To improve the design and management of biodiversity-enhancing spaces, we are making biodiversity monitoring more accessible to those architects, construction professionals and facilitates managers, who wouldn't normally have the skills to identify the species using these spaces. To do this, we are developing new technology, based on recording and identifying sounds in the landscape (the soundscape), to automate the monitoring of biodiversity on developments. A weatherproof acoustic recorder is used to passively record the soundscape, recording all organisms emitting noise, such as birds, invertebrates, and bats. Multiple recorders can be deployed to cover a large development. These recorders, with periodic maintenance, can be deployed for days, weeks, months, even years at a time, allowing us to overcome one of biodiversity monitoring's major issues – data collection over large spatial and temporal periods with a high and regular repetition rate.



Setting up monitoring equipment for recording the soundscape.



Soundscape monitoring locations across London.

To do this we have been monitoring the urban soundscape of London over the past two years. By deploying our recorders in urban green spaces from the centre of the city to the outskirts of London we have compiled an acoustic library of 6,552 hours of soundscape data from 39 sites in London. Our initial analysis has revealed the diversity of taxonomic groups that can be monitored in this way in the built environment, including bats, birds, invertebrates and terrestrial mammals. The key to this technology however is getting information from the recordings about the sounds captured and the species that produced them. By applying techniques from computer science, similar to the pattern-recognition used to turn handwriting into computer text, we are developing the technology to automatically identify the sounds emitted by urban biodiversity.

For more information about some of the research that Kate and Alison are working on see the UCL/ZSL Biodiversity Modelling Research Group.

NBN Gateway becomes one of the largest wildlife databases in the world

The NFBR is one of the founder members of the National Biodiversity Network which runs the NBN Gateway. In early September 2014, the 100 millionth species record was uploaded to the NBN Gateway, making it one of the largest wildlife databases in the world.

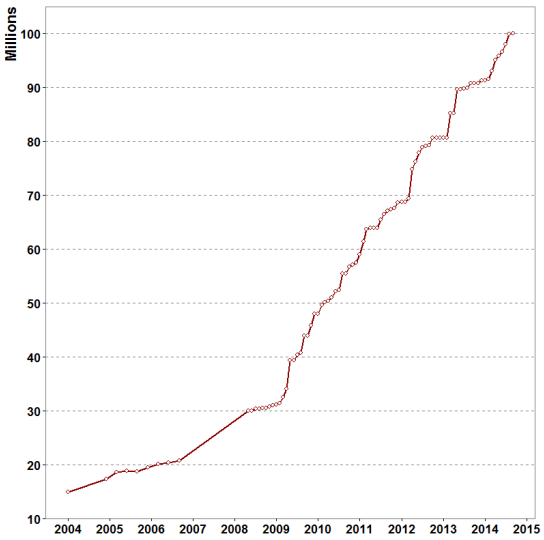
The NBN Gateway has grown rapidly from its prototype beginnings when 100,000 records were available in the late 1990s, to 20 million records in 2006, 50 million in 2010 and now to a staggering 100 million species records from across the United Kingdom. Data comes from the dedication and commitment of amateur and professional experts across the UK and allows anyone to view species distributions and download information. The NBN recognises the significant contribution that all the data providers have made to make this fantastic milestone possible.

The 100 millionth species record was of Two-spot ladybird (*Adalia bipunctata*), which was part of a dataset of more than

100 million record fact-file

- There are c. 44,000 species with records on the NBN Gateway
- The most observations are for the butterfly Meadow Brown (*Maniola jurtina*) with 839,866 records
- One of the oldest records on the NBN Gateway is of Red Deer (*Cervus elaphus*) in 1512 from Cumbria Biodiversity Data Centre (vertebrate species observations for Cumbria for the period 1512 to 2011)
- Two-spot Ladybird (*Adalia bipunctata*) has been adversely affected by the arrival of the invasive Harlequin ladybird (*Harmonia axyridis*) and has declined by around 40%, since the latter's arrival in Britain in 2004.

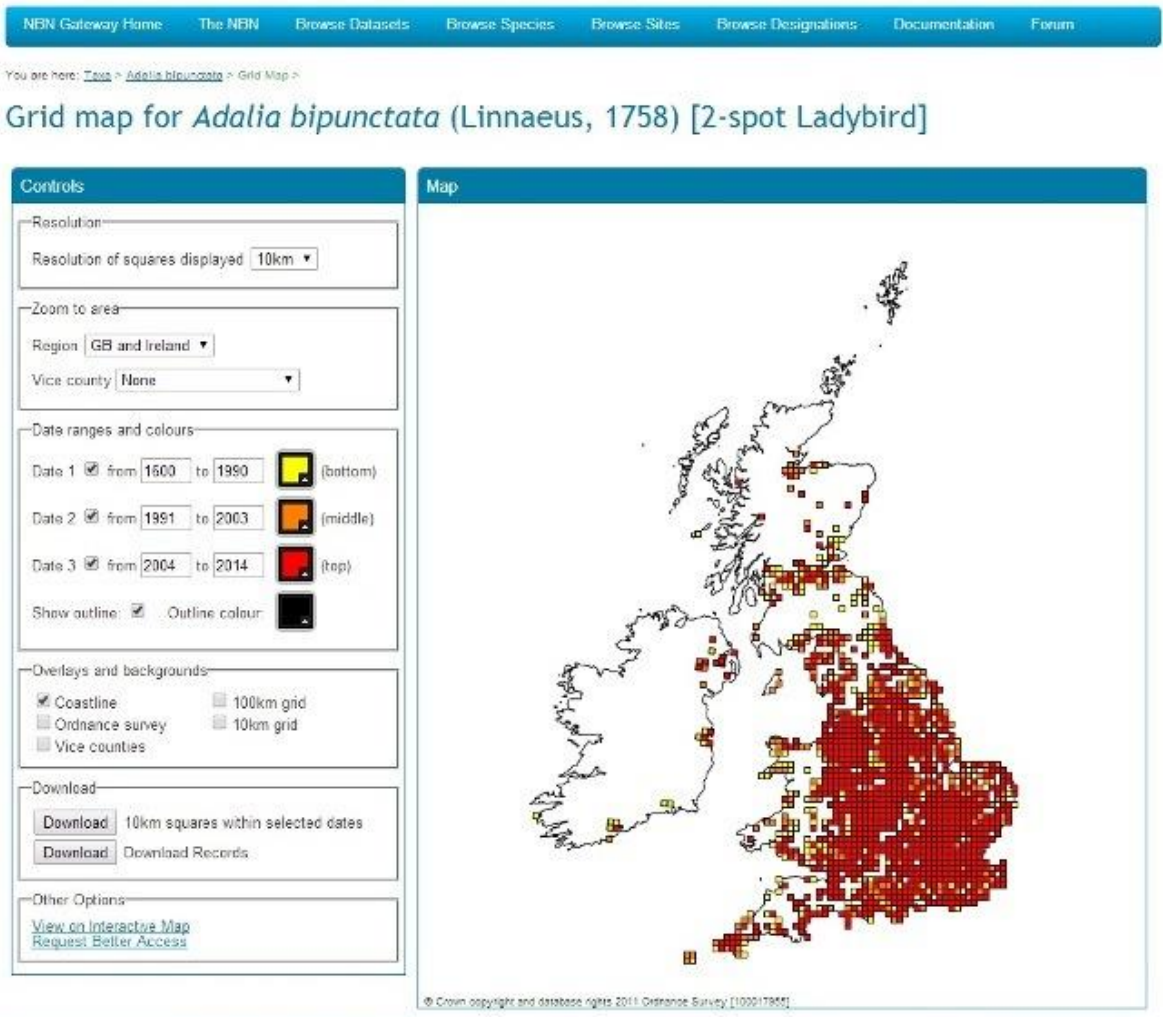
17,000 records from the National Trust's Wimpole Estate in Cambridgeshire. The species was recorded by Dr Peter Kirby, who has had a career working in nature conservation with special expertise in invertebrates. This summer, he re-discovered the very scarce Tansy Beetle (*Chrysolina graminis*) at Woodwalton Fen, Cambridgeshire (after a 40 year absence).



There is an increasing diversity of users of the NBN Gateway, who now range from naturalists interested in the distribution of particular species, government agencies monitoring changes in populations of threatened or non-native species, researchers using data for analysis and, increasingly, the general public interested in the wildlife in their local area. The map at the end of this article shows a simple way in which a search can be carried out.

Mapping the records

The above graph shows how the number of records available through the NBN Gateway has increased over the last 10 years. Below is the distribution of the Two-spot ladybird on the NBN Gateway grid map. Here you can also enter different dates to see how its range has changed since the arrival of the Harlequin ladybird.



Using Twitter to access wildlife information

Tom August, CEH Biological Records Centre (@TomAugust85 on Twitter)

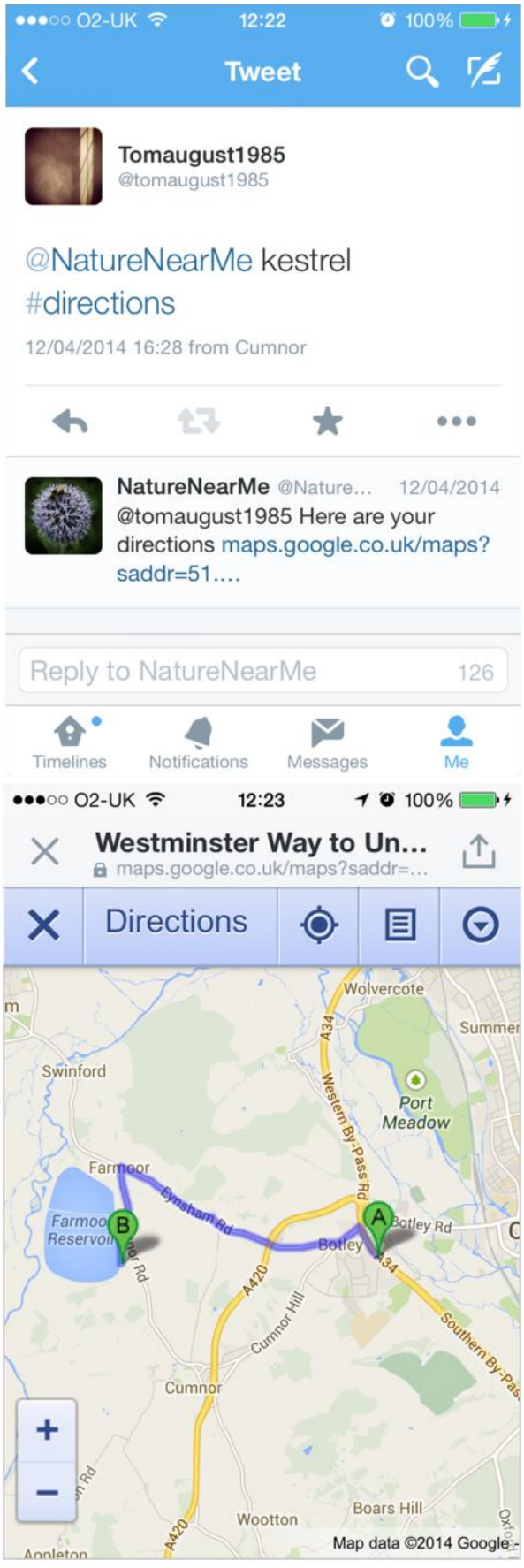
If someone asked you, "Where is the nearest record of a hedgehog to where you stand?" how would you find the answer? Perhaps you would send an email to your county recorder, pick up a copy of the mammal atlas, or use the interactive tool on the NBN Gateway?

The aim of "NatureNearMe" was to consider how we might be able to use technology to make this question as easily to answer as possible. The problem is two-fold. Firstly, how does a member of the public want to access this information? Secondly how would our technology go about finding the answer?

Twitter is an online social media platform which allows users to communicate with one another in 140 character tweets (messages). Twitter seemed like a good platform to work on, for a number of reasons. Twitter has a huge reach with over 280 million active users and is used by approximately 20% of adults. It is easy to develop computer code for Twitter since there are ways to allow computers to talk to it directly and automatically. Twitter can provide location information for people who use it on their smartphone. Finally, compared to other social media networks, it is skewed towards a younger demographic, who might be more receptive to engagement through technology and social media.

Having chosen Twitter as the forum in which people could ask questions about wildlife in their area the technical challenge was to work out how a computer could answer them. Just as Twitter has tools that allow it to talk directly with other computers, so too does the NBN Gateway. Linking these two tools together with a bit of computer code it is then possible for a computer to automatically read tweets from Twitter and fetch data from the NBN Gateway.

To make it easier for our system we use the '#' symbol in tweets to indicate the sort of data you are after. For example you may tweet, 'Hedgehog #directions', meaning 'Can you give me directions to the nearest record of a hedgehog'. Our system reads this, takes note of your location provided by Twitter, and



then asks the NBN Gateway for all publicly available records for your area. With this data in hand our system will find the closest record of a hedgehog to your location and tweet you back directions to get there, a process that takes ~30 seconds.

The NatureNearMe project was always intended to be a proof of concept (the computer it runs on cost £35), highlighting the potential of wildlife data when linked to other powerful tools such as social media. Data is becoming ever more connected, more accessible, and more valued. There is great potential to engage the wider public with data, just as we already engage the public out in the field. This requires us to foster relations between programmers, naturalists, and creative thinkers, and to keep a watchful eye on the potentials of new technologies.

You can find out more about @NatureNearMe and see a demonstration video here: naturenearme.weebly.com or scan the QR code with your mobile:

The code behind this project is available on Github: github.com/AugustT/NatureNearMe

NFBR updates: biodiversity information strategies, bilaterals, business plans and beyond

Steve Whitbread

It's been an interesting year for NFBR. What turned out to be John Newbould and Trevor James's swansong as conference organisers in Derbyshire last year was up to their usual high standard – and hugely enjoyable.

Disappointment over a bid to the Big Lottery Fund (in support of promotional efforts) was succeeded by frustration over the initial welcoming of a proposal to the Heritage Lottery Fund, who then changed their minds. The plan was to fund a project officer to support some organisational and audience development work and, in particular, to undertake the vital pre-consultation work. Another route will now need to be found.

Changes at the National Biodiversity Network Trust, with the appointment of new CEO John Sawyer, prompted a refresh bilateral meeting. With this and the consultations and other work the NBNT has carried out since his arrival, things look very positive. It was great to see the response to the workshops that preceded this year's very well-attended NBN conference with many NFBR members and Council members at both.

2015 is the final year of NFBR's 2011-15 Strategic Plan. If you've not already read it, it's worth a look. If you have, you'll probably remember that it proposed the idea of a UK Biodiversity Information Strategy. Although, there has been little obvious progress towards its goals, the time taken to reconstitute the former Federation as the Forum – so that we could become a charity – has given NFBR legal status. We can now apply directly for grants, bid for contracts or even employ staff.

The year ended with a sequence of bilateral meetings with the Society of Biology and the British Ecological Society, NatSCA (all down in London) and representatives of some of the member organisations of the State of Nature partnership travelling across to join us for a meeting in Northampton. All very different groups and very different meetings but each of them resulting in positive support for NFBR's plans. It'll be interesting to see how much we're able to capitalise on that support and how far we'll be able to take out plans in 2015.

Throughout these discussions about our shared interests and how we might support each other's projects and collaborate in future, there has been strong support for a more integrated approach to biological recording and agreement about the likely steps along the way. Despite various happenings since 2011 – from the Natural White Paper through to the Field Studies Council's exciting Tomorrow's Biodiversity project – it is clearly still needed. How to achieve it is another matter of course.

A first step will be to invite all of the 'bilateral bodies' to contribute to a concise 'Biological Recording – Challenges and Opportunities' document, taking in their very different perspectives. This will benefit from the information various groups have collected in the past but the intention is more that it highlight where there is most need to act or where appropriate action could have greatest benefit.

The second will be a preparatory exercise, seeking the views of these groups on exactly what form a major consultation exercise should take in order to engage the interest and capture the views of their different audiences, and how we might collaborate on it to best effect. The third would then be to undertake and report on the findings of that consultation exercise. In some ways that would be a modern-era counterpart to the work of the Coordinating Commission for Biological Recording, whose report led on to the creation of the National Biodiversity Network, although it will necessarily have a wider scope. What we should end up with are a report and outcomes that have as much impact for biological recording and biodiversity information use, as were achieved by Making Space for Nature, and even more directly relevant the State of Nature report. Just as important will be the establishment of partnerships to develop and take forward the initiatives that are identified in the course of the consultation, that takes account of those other initiatives and what other groups have already done, are doing or have planned, in a suitably joined up way. What might result by 2020, will be well worth supporting.

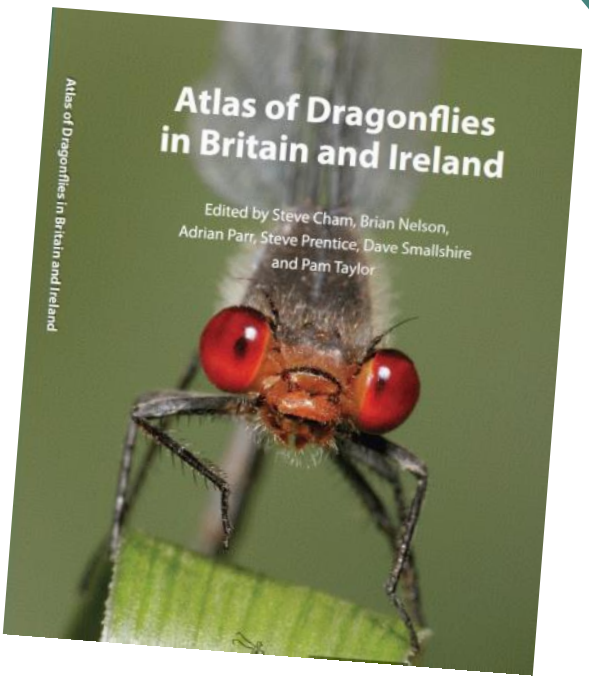
In the meantime, we are refining our business plan (which reflects the above), and with the opportunities to promote NFBR via the conference, the planned new website and social media outlets as well as via our newsletter audience and the partnerships we've built over the last three years, it should be possible to publicise the actions the Forum will be taking over this year and beyond. I think that 'watch this space' is traditional at this point but we are very keen that as we create opportunities for engagement we can involve the Forum's membership much more than in previous years. So 'get involved' is perhaps more apt as a closing statement. The more of us who help to influence how things evolve, the brighter the future for biological recording and the positive impacts it can have, whether for individuals, society or the environment.

Book reviews

- Cham, S., Nelson, B., Parr, A., Prentice, S., Smallshire, D., and Taylor, P. (eds) 2014. ***Atlas of Dragonflies in Britain and Ireland***. British Dragonfly Society. ISBN 9781906698492. Hbk £32.00

This fantastic book on the Dragonflies in Britain and Ireland is the long awaited follow-up to the 1996 Atlas produced by the then Institute of Terrestrial Ecology (which was itself a great advance on the previous Atlas that was produced as appendices to Cyril Hammond's *The Dragonflies of Great Britain and Ireland* of the late 1970s). The amount of work that has gone into this book in terms of recording days and then the writing and editing is amazing. This Atlas is a joint venture between the Biological Records Centre

and the British Dragonfly Society (BDS). The word Dragonflies in the title is used as the collective term for all Odonata (dragonflies and damselflies, note the lower case d) – confusing yes but that is the English language at times.

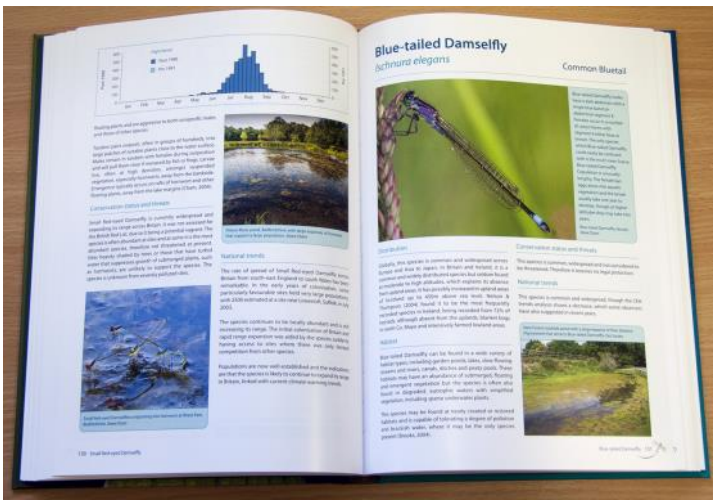


The recorder effort (just about all voluntary) is staggering. There were 67,378 site visits leading to 357,654 species records. Of all the 10km squares (hectads) in the UK 93% were visited, and of those 65% were so well recorded that all the likely species were found. Even Scotland, which has areas that are remote and not that many recorders, had very few hectads that weren't visited. This massive effort added up to 1.1 million records on the BDS database, a million of these dating from after 1990. We now have exceptionally good data behind the maps and for the first time we can confidently say we have an accurate baseline of Dragonfly distribution in Britain and Ireland.

There are seven introductory chapters setting the scene, looking at the data, the habitats that are used by Dragonflies and trends. The bulk of the book, 188 pages, is devoted to species accounts. They were written by various authors who know that particular species well. There are 60 species accounts (seven are short accounts for very rare visitors).

The species accounts are well-written and concise, illustrated with very good pictures of the species and also their habitat. You will be pleased to hear that the distribution maps cover three quarters of the page and are much easier to decipher than the recent BTO Bird Atlas, in addition the font is a good size too. No magnifying glass required! There is a good glossary, reference section and an index and 12 pages of acknowledgements to individual recorders.

There is some fascinating information in the introductory chapters. The change in average winter temperature from 1969–1990 to 1991–2012 is quite noticeable in Scotland. But the change in the summer average is huge in southern and central England and more subtle in Scotland. The rainfall data over the same period of time shows that Scotland is a bit wetter in winter and drier in summer, and again in summer there is a major trend to less rainfall in the southeast of England.



In the species accounts there are lots of dark blue upward pointing triangles indicating species expansion. Without a bit of background knowledge you might think that just about all species are expanding. In many cases the increase in distribution is down to increased recording effort. In Scotland we do know that species such as the Common Darter have expanded in range as have species moving north

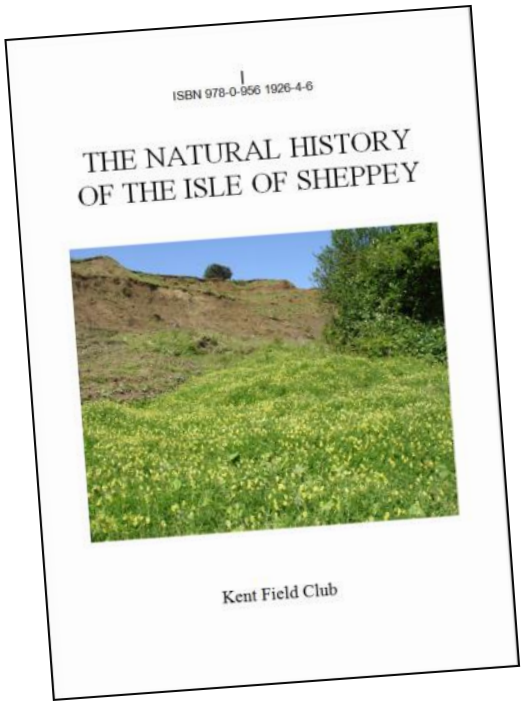
like the Southern Hawker and Emperor Dragonfly. Not to mention the new species colonising England from the continent, such as the Willow Emerald Damselfly and the Small Red Damselfly. But as I said that the beginning of this article this Atlas is a baseline and out of date even before publication. In the future we will be able to spot distribution changes better.

The status of dragonfly populations in the UK as a whole is very hard to determine due to the previous low levels of recording, but overall looking at the Atlas they seem to be in a good state as most species are not particularly specialist and the continuing overall improvements in water quality in rivers and standing water benefits them. There are obviously exceptions to this improvement in water quality, but I like to be mainly optimistic. It is worth bearing in mind that in the lowlands of Great Britain we do not have anything like number of dragonflies (and other insects) that we did have before the massive habitat loss to the agricultural revolution when huge areas of bog and wetland were drained. But there is a slow trend to dig more ponds in rural areas and create them in urban areas, mainly through Sustainable Urban Drainage Systems, and this is a move in the right direction.

This is a excellent book and if you are interested in Dragonflies do get one. Even if you aren't, try to get a copy from you local library and you will enjoy dipping into it.

Review by Jonathan Willet

- Badmin, J. (ed.) 2014. ***The Natural History of the Isle of Sheppey*** Transactions of the Kent Field Club Volume 18. 272pp. ISBN 9780956192646. Softback £12.00 p&p £2.00.



This is the first book published about the wildlife of Sheppey, a medium-sized island located just off the north coast of Kent. Despite boasting two National Nature Reserves famous for their avifauna, fine coastal stretches of sand and shingle and tumbling cliffs famous for fossils, the island (technically three) remains relatively under-recorded biologically compared with the south-east in general. We learn that Thomas Johnson, a London apothecary, was the first botanist to visit, in 1629, but that he and his colleagues were promptly arrested as 'foreigners', imprisoned in the now lost Queenborough Castle, only to be released and later entertained by the local mayor, once it was known they were 'men of science and medicine'. Their time was not entirely wasted though, as being good field workers, they compiled a reasonable list of plant species from the castle's ramparts.

Johann Dillenius visited Sheppey in the early 1720s and among the many specimens collected he described several seaweeds new to science from the surrounding waters. Entomologists were seemingly less adventurous, and although brief accounts were made by Messrs Douglas, Haward and Champion (a resident) in 1840s-1900s it was not until Walker's 1931 classic publication on Coleoptera that the richness of the island's insect fauna was truly recognised.

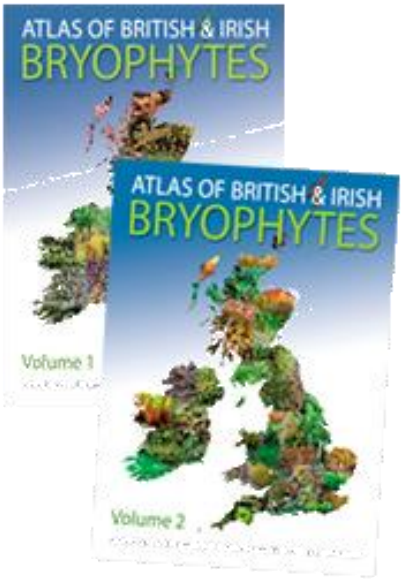
Subjects covered include: geology and landscape (Chris Young), he vascular plant of Sheppey, birds on Sheppey – 50 years of change, the islands mammals, marine algae (seaweeds) and the native and non-native marine fauna of natural and man-made habitats around Sheppey. Entomological subjects include: a provisional atlas of the Orthoptera (Richard Moyse), aquatic Coleoptera (Ron Carr) and Sheppey's moths (David Gardner). Entomologically, the island is best known for being the last locality in Britain where the Essex Emerald moth *Thetidia smaragdaria* ssp. *maritima* used to occur, and for the presence of the Pride of Kent rove beetle *Emus hirtus*.

The flora and fauna of the tumbling soft cliffs are described in detail for the first time by John Badmin who highlights the need for more study in this area. Many stretches of cliff are covered by the rare legume Dragon's Teeth *Tetragonolobus maritimus* and yet no insect species specifically associated with this plant have come to light. Sheppey's extensive saltmarshes are reviewed by the same author.

Sheppey it seems is a key but under-recognised wildlife site, acting as a stepping stone for wildlife moving east–west along the north Kent corridor and for those migrating across the Thames to breeding sites further north in the UK.

Review by John Stewart (adapted from a review first published in the British Journal of Entomology and Natural History)

Book notice



- Blockeel, T.L., Bosanquet, S.D.S., Hill, M.O., and Preston, C.D. (eds) 2014. ***Atlas of British & Irish Bryophytes***. Two volumes. Pisces Publications, Newbury. ISBN (vol 1) 9781874357612, (vol 2) 9781874357629. Hbk £75.00

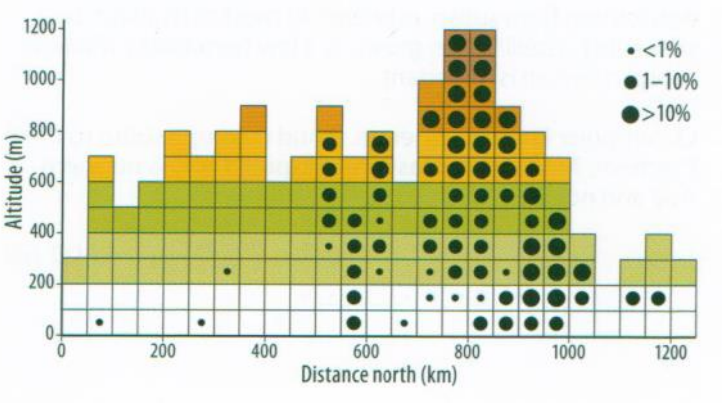
Britain and Ireland support a rich and geographically diverse flora of bryophytes with over 1,000 native species (four hornworts, 298 liverworts and 767 mosses) currently known. in the last 20 years 59 new species have been discovered.

The British Bryological Society (BBS) started recording bryophyte occurrences in 1960. The new two-volume atlas replaces an earlier, three volume Atlas (1991–1994), updating it with the results of two decades of further fieldwork. The number of records on which the maps are based has increased from a total of 770,000 in 1994 to 2.83 million in 2014.

Wall Screw-moss (*Tortula muralis*) by Ryan Clark

Records have been largely contributed by amateur recorders – 404 recorders contributed 97% of the records and of these a 'hard core' of 45 recorders each contributed over 10,000 records.
The maps in the atlas reveal dramatic

changes in the distribution of some species since 1990. The most striking change has been the increase of many species which grow on the bark of trees, a response to cleaner air following reductions in sulphur dioxide pollution in recent decades. Many species, such as the moss *Cryphaea heteromalla* and the liverwort *Frullania dilatata*, have spread from the relatively unpolluted areas and now occur throughout Britain and Ireland.



A novel feature of the atlas is the presentation of altitude and latitude data as a diagram, with dark dots showing the proportion of records from each category – this example is for *Sphagnum fuscum*, a species of northern uplands

By contrast, some species such as *Pohlia nutans* which grow in acidic areas and thus benefit from pollution, have decreased in the areas which were once heavily polluted.

Because both air quality and land use have changes so markedly since 1960, it is difficult to measure the extent to which climate change has affected bryophyte distributions. However, the small liverwort *Cololejeunea minutissima*, formerly a coastal species, has spread inland in recent years, perhaps in part because of milder winters.

In the Foreword, Professor John Birks from the University of Bergen describes the new Atlas as "a truly magnificent achievement" and "a major contribution not only to British and Irish botanical literature but also to international botanical literature".

Co-editor Chris Preston, from the Biological Records Centre, said, “The Atlas highlights the contribution that volunteer naturalists can make to the study of our biodiversity. Although we are often told that naturalists are a threatened species, the publication of this Atlas shows that this is far from the case. Dedicated observers are devoting years to systematically recording our species, and by use of computer technology are able to contribute their records to a national database. We hope that this atlas will stimulate bryologists in Britain and Ireland to continue to record these fascinating plants.”

Intermediate Screw-moss (*Syntrichia intermedia*) by Ryan Clark

Professor Birks added, “This two-volume Atlas is a truly magnificent achievement by all field bryologists, young and old, amateur and professional, who have meticulously surveyed the bryophytes in all parts of Britain and Ireland, including rain-soaked ultra-oceanic areas; remote cold and windy mountain tops; or unpromising derelict industrial areas in. The publication is a tribute to the British Bryological Society and to all its enthusiastic and energetic members.”

As the BBS says on its website “it is difficult to know why anyone would not be anxious to secure a copy”.

News updates

National Biodiversity Network Strategy 2015–2020

Update from Rachel Stroud

You are hopefully aware of the refresh of the NBN Strategy which has been taking place over the last six months. Indeed, some of you will undoubtedly have been involved in workshops and consultations which have been part of this process. We therefore wanted to update you on the current status of this project and the next steps.

By the time you read this you may well have already received the draft of the new Strategy, which was sent to everyone on the NBN database in early February. We are encouraging everyone to give their feedback on the contents of the Strategy by responding to a series of questions contained within it. These responses will help to us to agree a final document which will be published in April 2015. In conjunction with the Strategy, an Action Plan is also being developed. This will outline the objectives and priority actions for each Strategic Aim and will be published in Spring 2015.

The strategy seeks change in how biological data in the UK are collected, verified, managed, analysed, disseminated and used. The strategy sets out five strategic aims and 20 objectives to achieve the vision that: "*Wildlife data collected and shared openly by the Network is central to the UK's learning and understanding of its biodiversity and is critical to all decision-making about nature and the environment.*"

For those of you who are unaware of this work, and by way of background, the development of a new Strategy actually started two years ago, when two (annually) consecutive Extraordinary General Meetings brought about a draft skeleton structure. Wider consultation and input was sought via a Strategy Refresh Questionnaire, and a series of workshops in Wales, England, Scotland and Northern Ireland gathered country focussed perspectives. A needs analysis questionnaire of the NBN Gateway was completed by 150 Network members and a critique was undertaken by an external consultancy. Individual discussions with staff in the NBN Trust, coupled with this wide engagement process resulted in over 450 Network members and associates, data providers and potential collaborators and NBN Gateway users throughout the UK engaging with the development of the new five year strategy. The collaborative nature of the Network is truly reflected in the Strategy and we hope that everyone involved feels that they are part of a very exciting stage in the further development of the NBN.

Tomorrow's Biodiversity: QGIS tools and insect identification with TaxonAid

QGIS is a free, open-source Geographical Information System. It is a powerful piece of software, and like all GIS takes some time to become familiar with. Rich Burkmar has developed a brilliant suite of extra tools that can be added to QGIS for working with biological records. They provide some very useful functions, including viewing NBN maps and data (via the NBN WMS), displaying records derived from CSV files, working with OS grid references and registering raster map images from the internet.

Rich has made the tools available, along with a set of tutorial videos, via the FSC's "Tomorrow's Biodiversity" project pages: tombio.myspecies.info/QGISTools. Rich is also running workshops on QGIS later this year, details also on the tombio website.

The Tomorrow's Biodiversity project is also working with Leeds University on an innovative approach to insect identification, using scanned images of insect specimens (hoverflies to start with) that can be rotated through 360 degrees and annotated with key features. A website has been set up to try out the initial results, and feedback from people using the site would be welcomed. Go to www.taxonaid.com and give a hoverfly a whirl!

All-party Parliamentary Group on Biodiversity

This group exists to "provide a forum for cross-party parliamentarians, senior policy makers, academics, leading industry figures and other interested parties to have an informed discussion on all aspects of protecting biodiversity in the UK and abroad." NFBR attends the meetings when possible, and provided input last autumn to a meeting aimed at investigating the capacity of Local Planning Authorities to carry out their responsibilities for biodiversity and ecology. The meeting heard presentations from, among others, Mike Oxford for the Association of Local Government Ecologists, who highlighted a recent survey of LPA planners and ecologists that confirmed that more than 70% of Planning Officers were unable to adequately understand research methodologies for assessing biodiversity. Neither did they have a significant understanding of the legal duties and policies around biodiversity protection. They were not able to understand whether actions set out in environmental assessments would deliver stated outcomes through the proposed measures for management, avoidance, mitigation or offsetting were capable of being secured through appropriate planning conditions, statutory obligations or licenses.

The report from the meeting concluded that:

> Biodiversity is in serious decline, with inappropriate development being one of the main drivers. The planning system should prevent this, but to do so, LPAs must have the necessary expertise to deal with necessarily complex ecological issues. The Biodiversity APPG urges the Government and relevant departments to ensure that a lack of LPA ecological expertise does not continue to prevent the planning system from delivering net-gains of biodiversity, in line with the requirements of the National Planning Policy Framework.

It went on to draw six conclusions and make five requests to government, finishing with:

> Continued reduction in ecological capacity in LPAs may reflect short-term expediency, but this reduction reduces efficiency and often slows the planning process. Moreover, by creating uncertainty within the process, longer-term investment is likely reduced. Government should mandate all LPAs to deliver robustly on their biodiversity duties rather than to treat the environment and biodiversity as a luxury, ignored because staffing its assessment is too expensive.

The full conclusions and requests can be seen on the CIEEM website, and a report of the meeting is on Dr Robert Bloomfield's bioDiverse.org website.

UK Biodiversity Indicators Forum

This group exists to "to facilitate exchange of experience in the development and use of biodiversity indicators", and to help ensure that the biodiversity indicators reported to government are as robust and up-to-date as possible. The latest meeting was last June, and the report includes a useful summary of presentations and workshops sessions from Defra, Natural England, JNCC, NBN Trust, BTO, RSPB, Butterfly Conservation and Bat Conservation Trust.

The full report contains detailed summaries of the discussions and can be downloaded from jncc.defra.gov.uk/page-6723. Its overall conclusions include recommendations for short-term improvements to the indicator data (ensuring that confidence levels are given on graphs, and the data quality is clearly documented), and a number of longer-term issues, finishing with:

> We need an overall strategic approach to monitoring and surveillance to develop the data we require and to make the process more stream-lined and collaborative. This should bring together the statutory bodies, NGOs, and research and academic sectors.

News snippets

- **The value of long-term research**

"2014 saw the fiftieth anniversary of the Rothamsted Insect Survey (RIS) that has collected and catalogued more than 30M insects across the UK – information that informs farmers of when pest species might hit their crops, what animal disease vectors are flying, and is used by ecologists detecting the patterns that underpin the structure of biological communities." More details and a great video at: www.bbsrc.ac.uk/news/food-security/2014/140910-f-big-science-from-small-insects.aspx

- **Of nests and nets: why we still count eggs and ring birds**

Great blog post by Dave Leech on what can be achieved through the hard work of volunteers with the BTO's Nest Record and Ringing schemes: markavery.info/2014/12/03/guest-blog-nests-nets-dave-leech-bto

Along similar lines, but this time focusing on the role of the county bird recorder, is a blog by Hugh Pulsford via "A Focus on Nature" (which is an innovative an energetic network aiming to "to encourage young people aged 16 to 30 to get involved in, enthused and passionate about the natural world"): www.afocusonnature.org/issues-in-conservation/can-county-bird-recorder-hugh-pulsford

- **Biological records via field voice recordings**

The indefatigable Rich Burkmar has developed a new app to work in conjunction with his (free) "Gilbert 21" biological recording database package. The (Android) app allows you to make voice recordings in the field, that can be downloaded and turned into databased records when you're back at base: www.gilbert21.org.uk/G21App.aspx

- **105 years of Cumbrian natural history**

The Carlisle Natural History Society, with help from Cumbria Biodiversity Records Centre, has digitised its run of Transactions, containing longer articles on the natural history of Cumbria and dating back to 1909. All available at: www.carlislenats.org.uk/forum-gallery/transactions-of-cnhs-contents

Where should records go? – a beginner's guide

Martin Harvey

If you're new to biological recording it can be confusing navigating between all the recording schemes and records centres, and understanding how (and if!) they link up. Bioblitz organisers were keen to make records available but unsure as to the best way of doing this, and this text was written for the 2014 bioblitz conference. The original can be downloaded (along with many other useful resources) from the Bristol Natural History Consortium website: www.bnhc.org.uk/bioblitz/free-downloadable-resources

There are two principal routes by which biological records are collated and verified: via Local Environmental Records Centres (LRCs), and via National Recording Schemes and Societies (NSS), some of which operate via networks of local (often county) recorders.

LRCs are interested in obtaining records of any species from within their area (which is usually a county or other local government region). They typically use this data for many purposes, including: to inform the local planning process, provide information for local conservation projects (e.g. Biodiversity Action Plans), provide information to local conservation managers, and support and train volunteer wildlife enthusiasts in the area. LRCs are professional organisations but their staffing levels and resources vary quite a lot from county to county. Most work with volunteers (e.g. to help with verification of records) but again the capacity varies from county to county.

NSS are interested in obtaining records of their particular species group from all locations across the country. They typically use this data for many purposes, including: to monitor the distribution of species, produce atlases and assess conservation statuses (Red Data lists etc.), provide information for conservation projects, and support and train volunteer wildlife enthusiasts with an interest in their species group. NSS are very varied in their structure, from schemes run or hosted by professional organisations (e.g. British Trust for Ornithology, Butterfly Conservation) who usually work with networks of volunteers (e.g. via a volunteer county recorder network), through to schemes run entirely by an individual volunteer.

Many (but not all) NSS and LRCs exchange data with each other on a regular basis. Most data from both LRCs and NSS is passed on to the National Biodiversity Network (NBN), who make it available in one place via the NBN Gateway, which is used by government agencies, members of the public, researchers and many others to find out what data is available for all species everywhere.

Further complexity comes from the multiplicity of different online systems and apps that have been developed in recent years. These offer exciting possibilities for encouraging more people to get involved with biological recording, but unless the systems work well with existing data flows they can end up adding complications and delays to the sharing and verification of the data that results from them.

An ideal solution might be to have one place where a biological record could be sent so that it then became available to LRCs, NSS and NBN simultaneously. Technological developments are making it easier for data to be shared in this way, and are likely to become a bigger part of the picture in future, but for now many biological recorders still send their data to an LRC in the first instance, or to an NSS, or to both.

What should happen to my wildlife records?

There are a number of questions to think about, depending on whether you are thinking about your own records, or organising recording as part of a project:

- Will your project generate fully identified records of species (e.g. via recording by local experts)? Or is the emphasis more on outreach to novice wildlife enthusiasts, which may produce a higher proportion of records of "spider" or "yellow flower" etc., rather than fully identified species?
- Are you working with an LRC or NSS, or drawing on experts from one or the other?
- Is your project responsible for keeping records of species, or is that role being carried out by LRC or NSS people?
- What is the process for verifying records, will that be done by the project, or are you seeking help from an LRC or NSS to check the records at a later stage? Or maybe if your main aim is outreach the records can't be or won't be verified, in which case their main purpose may be to provide informal feedback to participants and they should not be sent in to a formal recording scheme?

What is the role of technology in this?

Most LRCs and NSS use a database of some sort to provide long-term storage of records, but a number of different systems are in use, and there is increasing use of online technology (both websites and apps). All LRCs and NSS will accept records via spreadsheets, and for short term projects a simple spreadsheet may still be the easiest way of collating records, but using online systems can provide additional opportunities and benefits.

If your project is emphasising outreach and learning then you may want to use an online approach to getting help with species identifications. If you are going to be generating species records, then online recording systems can be very useful. Some have data-sharing built in to the system, others are more stand-alone (so you'll need to pass data on via another route). Questions to consider when looking at software or online systems:

- Cost, user-friendliness: stating the obvious, but the cost of any software and how easy it is for you to use are important factors.
- Data fields: all biological recording systems should store the basic "four Ws": what, where, when, who. But what else do you need? E.g. abundance, habitat, micro-habitat, weather etc. Can you store photos as part of your record? Do you need to store verification decisions as part of your record?
- Species dictionaries: does the system use a recognised species dictionary? If so, is it the UK Species Inventory (the national standard maintained by the Natural History Museum)? If not, will that cause problems?
- Data reporting and analysis: having put your data into a system, can you get it back out again? Does the system help you produce reports and run analysis queries?
- Download formats: what download formats does the system provide? Most will at least offer a text file download (which can be opened in a spreadsheet and passed on to a recording scheme, or loaded into a database), but what other formats might you need: a specific database format such as Recorder 6 or MapMate; Google Earth (.kml/.kmz); GIS (ARC shapefiles, MapInfo) etc.
- Data sharing: how will your data get from your system to the relevant LRC and NSS, and then on to the NBN? Are there any other organisations or individuals that you want to make it available to? Can you make it open access?
- Validation and verification: does the system validate the records entered (e.g. preventing the entry of incorrectly formatted dates or grid references, ensuring species names match a recognised dictionary)? Does the system include verification checking (e.g. via the NBN Record Cleaner rules)?

Main messages: if your project is generating species records, please ensure they are sent to at least one of: the relevant LRC; the relevant NSS; or an online system that makes the data available to them. Ask your LRC or NSS how they prefer to receive data.

Recording and research

Biological recording contributes to wider research outcomes, and ultimately to better understanding of ecology and conservation. Here are some recent research papers that draw on data from recording schemes, or are relevant to biological recording in general.

- Fox, R., Oliver, T. H., Harrower, C., Parsons, M. S., Thomas, C. D., Roy, D. B. (2014), **Long-term changes to the frequency of occurrence of British moths are consistent with opposing and synergistic effects of climate and land-use changes.** *Journal of Applied Ecology*, 51: 949–957. doi: 10.1111/1365-2664.12256

Making use of 11 million species occurrence records over the period 1970–2010, from the National Moth Recording Scheme database, this open-access paper assesses changes in the frequency of occurrence of 673 macro-moth species in Great Britain.

A diversity of responses was revealed: 260 moth species declined significantly, whereas 160 increased significantly. Geographically widespread species, which were predicted to be more sensitive to land use than to climate change, declined significantly in southern Britain, where the cover of urban and arable land has increased. Moths associated with low nitrogen and open environments (based on their larval host plant characteristics) declined most strongly, which is also consistent with a land-use change explanation.

Some moths that reach their northern range limit in southern Britain increased, whereas species restricted to northern Britain declined significantly, consistent with a climate change explanation. Not all species of a given type behaved similarly, suggesting that complex interactions between species' attributes and combinations of environmental drivers determine frequency of occurrence changes.

The authors suggest that habitat protection, management and ecological restoration can mitigate combined impacts of land-use change and climate change by providing environments that are suitable for existing populations and also enable species to shift their ranges.

- Johnston, A., Thaxter, C. B., Austin, G. E., Cook, A. S.C.P., Humphreys, E. M., Still, D. A., Mackay, A., Irvine, R., Webb, A., Burton, N. H.K. (2015), **Modelling the abundance and distribution of marine birds accounting for uncertain species identification**. *Journal of Applied Ecology*, 52: 150–160. doi: 10.1111/1365-2664.12364

Many emerging methods for ecological monitoring use passive monitoring techniques, which cannot always be used to identify the observed species with certainty. Digital aerial surveys of birds in marine areas are one such example and they are increasingly being used to quantify the abundance and distribution of marine birds to inform impact assessments. However, the uncertainty in species identification presents a major hurdle to determining the abundance and distribution of individual species.

This paper combines data from two surveys in the same area: aerial digital imagery that identified only 23% of individuals to species level, and boat survey records that identified 95% of individuals to species level. This method shows it is possible to construct maps of species density in situations in which ecological observations cannot be identified to species level with certainty. The advantages of this approach for estimating the abundance and distribution of birds in marine areas are discussed.

- Silvertown J, Harvey M, Greenwood R, Dodd M, Rosewell J, Rebelo T, Ansine J, McConway K (2015) **Crowdsourcing the identification of organisms: A case-study of iSpot**. *ZooKeys* 480: 125-146. doi: 10.3897/zookeys.480.8803

Accurate species identification is fundamental to biodiversity science, but the natural history skills required for this are neglected in formal education at all levels. The paper describes how the web application ispotnature.org is helping to solve this problem by combining learning technology with crowdsourcing. Over 94% of observations submitted to iSpot receive a

determination. External checking of a sample of 3,287 iSpot records verified > 92% of them. To mid 2014, iSpot crowdsourced the identification of 30,000 taxa (>80% at species level) in > 390,000 observations with a global community numbering > 42,000 registered participants.

iSpot uses a unique, 9-dimensional reputation system to motivate and reward participants and to verify determinations. Taxon-specific reputation points are earned when a participant proposes an identification that achieves agreement from other participants, weighted by the agreers' own reputation scores for the taxon. In 57% of such cases the reputation system improved the accuracy of the determination, while in the remainder it either improved precision (e.g. by adding a species name to a genus) or revealed false precision, for example where a determination to species level was not supported by the available evidence. We propose that the success of iSpot arises from the structure of its social network that efficiently connects beginners and experts, overcoming the social as well as geographic barriers that normally separate the two.

- Roy, H. E., Peyton, J., Aldridge, D. C., Bantock, T., Blackburn, T. M., Britton, R., Clark, P., Cook, E., Dehnen-Schmutz, K., Dines, T., Dobson, M., Edwards, F., Harrower, C., Harvey, M. C., Minchin, D., Noble, D. G., Parrott, D., Pocock, M. J. O., Preston, C. D., Roy, S., Salisbury, A., Schönrogge, K., Sewell, J., Shaw, R. H., Stebbing, P., Stewart, A. J. A. and Walker, K. J. (2014), **Horizon scanning for invasive alien species with the potential to threaten biodiversity in Great Britain**. *Global Change Biology*, 20: 3859–3871. doi: 10.1111/gcb.12603

Invasive alien species (IAS) are considered one of the greatest threats to biodiversity. The paper considers IAS that were likely to impact on native biodiversity but were not yet established in the wild in Great Britain. The process involved two distinct phases:
- Preliminary consultation with experts within five groups (plants, terrestrial invertebrates, freshwater invertebrates, vertebrates and marine species) to derive ranked lists of potential IAS.
- Consensus-building across expert groups to compile and rank the entire list of potential IAS.

Of 591 species considered, 93 were agreed to constitute at least a medium risk with respect to them arriving, establishing and posing a threat to native biodiversity. The quagga mussel, *Dreissena rostriformis bugensis*, received maximum scores for risk of arrival, establishment and impact; following discussions the unanimous consensus was to rank it in the top position. A further 29 species were considered to constitute a high risk and were grouped according to their ranked risk.

In January 2015 a European Union (EU) Regulation on Invasive Non-Native Species (INNS) came into force. The Regulation should ensure harmonisation and prioritization at the EU-level recognizing the importance of prevention, early warning and rapid response. Risk analysis is essential for underpinning many components of INNS policy, including prevention (informing legislation and justification of restrictions), early warning and rapid response (prioritizing action and guiding surveillance) and long-term control (prioritizing species for control). A core component of the Regulation is a list of 'IAS of EU concern' that will be drawn up together with European Member States, based on scientifically robust risk assessments as laid down in the Regulation (Roy, Schonrogge et al. 2014).

The GB Non-Native Species Information Portal (GB-NNSIP) is an on-line information system, involving a network of people including the volunteer recording schemes and societies alongside the Biological Records Centre and other organisations engaged in sharing information on non-native species. The GB-NNSIP is being updated at least annually and is dynamically linked to the National Biodiversity Network Gateway. The role of volunteers, primarily through the recording schemes and societies, in providing information on species and occurrence data, has been invaluable. Indeed compiling the information within the GB-NNSIP would not have been possible without the contributions of volunteer experts from across Britain.

Thanks to Helen Roy, Biological Records Centre (CEH)

RSPB Nature Counts trainee programme

Bex Cartwright (@Bex_Cartwright on Twitter)

At RSPB Arne learning about Lowland Heathland management with RSPB Ecologists

Since April 2014 six trainees have formed the final cohort of participants in the RSPB's "Nature Counts" project. Nature Counts is part of the "Skills for the Future" programme funded by the Heritage Lottery Fund. Participants are offered a practical work-based traineeship which aims to address skills gaps in the cultural heritage and nature conservation sectors. The RSPB project has 2 strands; ecology and visitor services. Over the four years of the scheme 27 individuals have benefited from the expertise and support of RSPB staff as well as numerous organisations and individuals from the wider conservation and training community. Demand for these positions and this type of experience is clearly very high with nearly 300 applications for the ecology roles in 2014 (not including applications for the posts based in Ireland) and over 500 in 2013.

Although all of the trainees have been given broad ecological training across a range of taxa and habitats we were encouraged to choose a specialist group on which to focus our identification skills. All six trainees share a passion for studying under-recorded groups which are perhaps considered more difficult. Between us we cover freshwater invertebrates, bryophytes, fungi, aculeate Hymenoptera, Coleoptera and Diptera. Although these groups are by no means easy, I think the difficulty in beginning identification can come from not having access to appropriate resources: specialist equipment, books, keys, microscopes and reference collections – also, and just as important, a mentor and a network of contacts you can call upon for help. We have all been able to access these resources and increase our network of contacts through the opportunities offered to us. During this traineeship we have also had access to a range of quality habitats present across RSPB reserves.

I had a huge head start in my specialist group ID training as I have also been participating in the Field Studies Council's "Invertebrate Challenge" and "Biodiversity Fellows" programmes. My current employer encouraged me to continue my attendance and involvement in these excellent projects as part of my traineeship. My identification and survey skills have also benefited this year with the opportunity to visit and survey RSPB sites with some of our most respected and experienced hymenopterists. I am immensely grateful to them for their time and continued encouragement.

Part of a reference collection of Caddisflies curated by Genevieve Dalley

In addition to our specialist groups our broad ecological training has included courses on Vegetative Grasses, NVC Survey, Invertebrate Habitat Management,

Identification of Aquatic Plants and *Sphagnum* Identification.

Sphagnum mosses course at RSPB Abernethy

In July all of the ecology trainees took part in the Botanical Society of Britain and Ireland (BSBI) Field Identification Skills Certificate (FISC) assessment. I think we all found that having this test on the horizon was a huge additional incentive to work hard on our botanical identification and survey skills right from the start of our traineeships. The ecologists in my department are very good botanists and had the enthusiasm, patience and time to help me improve. Although I was very pleased with my FISC result this time around I am planning on retaking the test in 2016 in order to keep up the momentum of my learning. Even before receiving my result just taking the test gave me a better understanding of my abilities as a botanist and I would thoroughly recommend it.

We have already been using our new skills to contribute to biological recording and conservation, generating records and discovering important species. Anne Guichard, one of the Belfast-based trainees, spotted the rare Irish Lady's-tresses (*Spiranthes romanzoffiana*), a UK priority species, at RSPB Portmore Lough in July, the first time it had been recorded at this reserve. The find encouraged site staff that their management techniques were benefiting a range of

Irish Lady's-tresses *Spiranthes romanzoffiana*)
(photo by A.Guichard)

Short-necked Oil Beetle *Meloe brevicollis*
(photo by Kirsty Godsman)

wildlife. Genevieve Dalley got a caddisfly into the media spotlight with BBC Scotland news reporting her exciting discovery of *Molanna angustata* at RSPB Insh Marshes. This was the first confirmed record of the species for Scotland!

In May the Scottish based trainees were part of a team sent on a mission to the Isle of Coll to assess the population of the rare Short-necked Oil Beetle *Meloe brevicollis*, a species that was thought extinct in the UK until as recently as 2008. It was rediscovered at a site in Devon and then on Coll in 2009. Results were dramatic with over 150 Short-necked Oil Beetles counted during the three day survey.

Brown-banded carder bee *Bombus humilis* at RSPB Wallasea Island Coast Project

Other firsts and highlights for me this year have included seeing Fen Orchids, Swallowtail Butterflies and Norfolk Hawkers at RSPB Sutton Fen, Brown-banded and Shrill Carder Bees at the RSPB Wallasea Island Coast Project, moth trapping and the short-haired bumblebee release at RSPB Dungeness and of course surveying aculeate Hymenoptera at some great sites including RSPB Pulborough Brooks, Fen Drayton and The Lodge itself. Although I still have a lifetime of learning ahead, with the training I have received so far I will be able to use my skills and knowledge to offer management advice for invertebrates across a range of habitats and carry out surveys and habitat assessments.

Swallowtail Butterfly *Papilio machaon* at RSPB Sutton Fen

The future is looking very positive; most previous trainees have remained employed within the RSPB, gone on to further academic study or found positions with other conservation organisations. Of this year's cohort, James has just embarked on a PhD studying conservation management for invertebrates with the University of East London and Buglife (look out for him on a 'brownfield' site near you!) and Laura is the newly appointed reserve warden at RSPB Portmore Lough. Anne and I have found further employment within the RSPB reserves ecology department and Kirsty and I are completing our MSc Invertebrate Ecology and Conservation courses.

The RSBP and HLF are to be congratulated on supporting such an important and effective project. Let's hope that resources can be found to develop more such projects, essential if we are to ensure that high-quality training is available for future ecologists.