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Deptford Pink · Urban Mammal Study · History of Duck Decoys
Importance of Monitoring Wildlife Responses to Habitat Management

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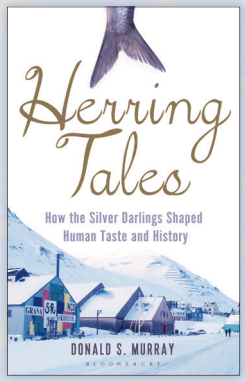

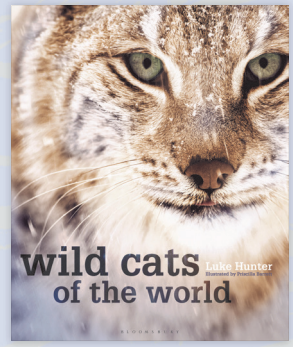

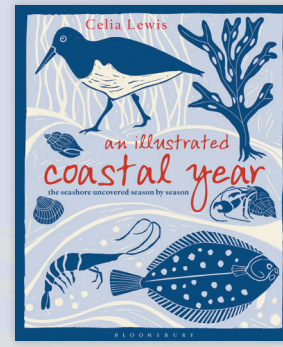

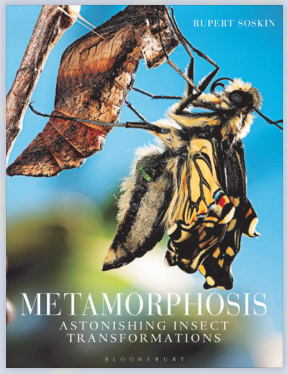

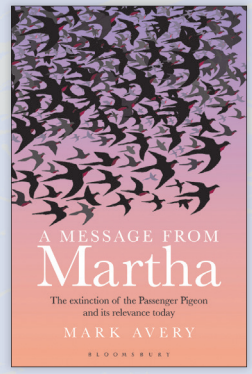

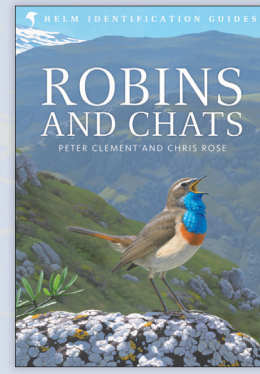

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Editorial
Keeping watch

Path through Selborne Common. John Morrison/Alamy

The study of the etymology of animal names is endlessly fascinating. Everything has been named for a reason, but many of those reasons have been lost in the mists of time, and peering through those mists in an attempt to get at the truth can become addictive. In this issue, regular columnist Robert Burton reveals his own 'dilettante interest in etymology' and his column is a fascinating read. One hopes that he will return to the subject again one day.

Elsewhere in this issue, there is something of a monitoring theme. Rob Fuller is the lead author on a paper that focuses on the increasing importance of monitoring wildlife responses to habitat management, while David Wembridge and Steve Langton reveal the results of a study of urban mammals that demonstrates the role that citizen science can play in monitoring.

There is an interesting link between these two themes. To monitor is to keep an eye on something over a period of time, but the etymology, or derivation, of the word implies potential danger. Its root lies in the Latin: 'monere' means 'to warn' or 'to alert'. Monitoring is not just about keeping a continuous count or measurement, but about doing so in order to become aware of any impending threat. (As a side-note, it is believed that the monitor lizards of Africa, Asia and Australasia get their name from a habit of standing on their hind legs to give themselves a better view of oncoming predators such as crocodiles.)

Monitoring in order to warn of danger lies at the hub of conservation, and surely there are few countries in the world better placed than ours to do a good job of it. After all, we have been keeping an eye on the wildlife around us for a very, very long time, and recording our findings. Today, there are courses and degrees and funding to encourage those with an interest to find out more and to contribute towards conservation, but that interest in the natural world was entrenched in the minds of many long before conservation was a considered concept. Those naturalists of the past were more often than not trained in another field – medicine, the church, the law – but they had a fascination with nature and, between them, built a sizeable body of knowledge.

That knowledge was based upon observation, which today lies at the root of monitoring. 'More real knowledge of natural history will be gained in a single summer spent in personal examination, than by years of book study', wrote the Reverend J. G. Wood in his *Common Objects of the Country* of 1858. He was echoing that much earlier writer Gilbert White of Selborne, who described himself as an 'outdoor naturalist, one that takes his observations from the subject itself, and not from the writings of others.' In fact, you could say that White, Cook and countless other clergymen, doctors and lawyers were early examples of loosely structured citizen science in action (you could, but they probably would have hated the phrase).

Protection of our natural world requires an ever-greater understanding of it, and the more people who can contribute to that understanding, in all its forms, the better. Monitoring schemes and ideas such as those discussed in this issue not only cast light upon the plight of wildlife, but also help to bring more people into even greater contact with nature. Surely we were born for that: after all, etymologically, nature *is* birth.

Malcolm Tait, Editor

A STUDY IN PINK

James Robertson

Flowering Deptford Pink. Bob Gibbons/FLPA

Not all plants sit easily at one end of the spectrum running from 'native' to 'alien'. The author considers the case of Deptford Pink, which leads him to take a sideways look at wild-plant conservation and the urge to garden.

This is the story of a delightful little pink which has been the subject of ardent conservation efforts in Britain, because it is thought to be a rare native plant in rapid decline. It illustrates the risk of concentrating conservation efforts on what are thought to be declining, native rare plants; of putting species before habitats. Whether or not Deptford Pink *Dianthus armeria* is pulling the wool over botanical eyes, as I argue, there are other reasons to go gently on the fashion for gardening rare, favoured native species.

Wild-plant conservation accords huge significance to native status, and to rarity. Deptford Pink ticks these boxes. But is it in fact native to the islands of Britain and Ireland? Does it occur naturally and without the involvement of human activity or intervention? A clue to its autecology, how it fits into its environment, comes from across the Atlantic.

On a website called 'Wildflowers of the United States' you will find the following: 'Deptford Pink, Mountain Pink. Some authorities consider this plant, a European native, to be weedy or invasive. This is supported by the fact that this introduced species is now found in the wild in all but three States (not known in Arizona, Alaska, or North Dakota) as well as much of Canada. Deptford is a town in the south of England where the plant grew in such abundance that it became the source of the common name.'

Deptford has long since been absorbed into London, and the sixteenth-century botanist John Gerard did not describe his pink as abundant. And this was not Deptford Pink, which has probably never grown in Deptford. The error which turned 'a little wild creeping Pink found in the great field next to Detford' into the upright *Dianthus armeria* was introduced by the apothecary Thomas Johnston in his greatly extended edition of *Gerard's Herbal* in 1633 (Mabey 1996). In 1958, in his classic *The Englishman's Flora*, Geoffrey Grigson pointed out that Gerard must have been referring to the Maiden Pink *Dianthus deltoides*. This is a species of dry grassland habitats, usually on sand. The land which stretched from Deptford to the Thames would have

suited it well – there is an exposure of the Thanet Sand Formation, surrounded by sands, gravels and small inliers of nodular chalk, about Deptford. The common name 'Deptford Pink' should have been given to Maiden Pink, whose more generic common name would have suited the pink blushes of *D. armeria* rather well.

This takes the shine off the pedigree which *Gerard's Herbal* appeared to bestow on Deptford Pink. So, what do we know about its status?

Native or adventurer?

Dianthus armeria is a species with the ability to colonise disturbed places. To get there it must be able to hitch lifts. It may have been hitchhiking for hundreds of years. The open, dry situations where it pops up include roadsides, railway lines, gardens and greenhouses, car parks and, sometimes, open grassland. Former sites included monasteries, so its seed may have been carried where the monks trod, in sandals and folds of clothing. To my astonishment I found the plant growing in a New Zealand car park miles from anywhere, and, as we have seen, it has spread across North America. Human agency is the most likely cause of its spread around the temperate world, including parts of northern Europe.

Anne Pratt (1889) noted that, while *D. armeria* is not generally a common plant in England, 'it grows in many places in Kent', and she once found it 'on a stem nearly a yard high'. I shall come back to this tall plant later.

The first convincing record which I can find in my collection of Floras is from a roadside in Buckinghamshire in 1737 (Druce 1926). Other early sites are also typically roadsides. In Hertfordshire it is recorded from gravel pits (Coleman & Webb 1849). In Oxfordshire there is a record from 1762, and, while it is described as a native, Killick *et al.* (1998) include a 'wild garden' among its locations, and note that the plant could not be refound at several old sites where it was recorded. In Surrey it was first recorded in 1746, but Lousley (1976) comments that for all current records, such as 'on made up soil by gates to Army Depot, Chobham Common', there are doubts about the plant's status.

Authors of early Floras do not accord a status to Deptford Pink, while later ones accept that the species may be a 'casual' or 'garden escape' today, but ascribe native status to it because there are *old* records. Authors of later Floras expect to refind the plant in old localities, and conclude that it is in decline when they fail to do so. Yet new sites do occur, where populations last for a number of years and then disappear. It seems likely that many nineteenth- and twentieth-century records have been short-lived. If you consider that Deptford Pink is a native wild flower, a rare, static component of a specialist plant community which has been around for millennia, this looks like catastrophic decline. If Deptford Pink is more of a long-term casual, an adventurer, hitchhiking around with humans and taking advantage of opportunities to flourish in disturbed places, the pattern of records becomes more understandable.

The Maiden Pink is thought to be the species identifed as Deptford Pink in the 1633 version of *Gerard's Herbal*. Roger Tidman/FLPA

Irish interlude

Let us head over the sea to Ireland. Not long after the last glaciation, the land bridge between Ireland and Scotland was severed, interrupting the spread of plants and animals northwards and westwards across Europe. This left Ireland with an impoverished but fascinating flora, which has been augmented in recent decades and past centuries by many plant arrivals from around the world, assisted by human agency.

In 1992, Deptford Pink was discovered on Horse Island, off the coast of County Cork, by a group of botanists based at Sherkin Island Marine Station. This was written up in *Watsonia* as a species new to Ireland (Akeroyd & Clarke 1993). One earlier

Deptford Pink (top row, second left) as it appears in the Collins Field Guide. Maiden Pink is in the middle of the bottom row. Collins Field Guides/Minden Pictures/FLPA

record has since surfaced; this was made by H. Jacob in Ovens, County Cork, in about 1900.

In *Wild Flowers of Cork City and County* (O'Mahony 2009), Tony O'Mahony commented: 'While the discovery of Deptford Pink on Horse Island is a remarkable addition to the Irish Flora, its status (native or naturalised) on the island is highly problematic and, perhaps, unresolvable. The fact that no other Pink *(Dianthus)* species is indigenous in Ireland, and that Deptford Pink is not recorded elsewhere in this country, even as a casual, casts doubt on its native status on Horse Island.'

John Akeroyd, who wrote up the discovery (1993) and compiled and edited a full Sherkin Island report (Akeroyd 1996), reviewed Tony O'Mahony's Flora in in 2010 (*Watsonia* 28: 98–100). While welcoming the book, he wrote: 'My only quibble is that O'Mahony, in company with some other Irish botanists, disputes the native status of *Dianthus armeria* on Horse Island.'

In 2012, our pink turned up on the Aran island of Inis Meáin (or Inish Maan), off the County Clare coast. The Aran Isles are extraordinary rockscapes. Their limestone strata have been turned by human hands into a bleached lattice of white walls, blinding the visitor in strong sunshine. On a visit two years ago (after the discovery, I hasten to add), I was struck more by the cultural than by the natural; the flora was wonderful, but the evidence of human ingenuity in squeezing livelihoods out of the rocks was awesome.

In 2013, in *Irish Botanical News*, Maria Long, BSBI's Irish officer reported: 'An interesting find this year was a population of *Dianthus armeria* (Deptford Pink) on the east side of Inis Meáin, the middle of the three Aran Islands. The species was found in a semi-natural grassland sward, in an area with small fields, stone walls and plenty of outcropping rock.' On the evidence provided by a photograph, though, the location is not wholly convincing as a long-overlooked native station.

A great many visitors, including botanists, take the boat to the island. Who knows what they may carry with them? Horse Island looks a more likely native site today, but its acres have been intensively farmed and mined in the past. I agree with O'Mahony that certainty about native status is not possible. Other authors have raised the difficulty of distinguishing native and alien populations in both Britain and Ireland (Preston *et al.* 2002).

Could this worked landscape at Inish Maan really be a native station for Deptford Pink? James Robertson

Of course, humans have played a part in the distribution of many plants considered native in Britain and Ireland. I am uncomfortable with the sharp distinction which botanists like to make between 'native' and 'alien'. For thousands of years people have provided plants with an effective means of spreading across the sea to Britain and Ireland. In this magazine (Robertson 2015) I have mused about the status of Early Sand-grass *Mibora minima*, a species which I first got to know in a nursery in Surrey. It was discovered for the first time in Ireland in 2005, Tony O'Mahony writing it up in *Irish Botanical News* (O'Mahony 2006). After careful consideration, he concluded that it should be taken as a native member of the Irish flora. I imagine that he stifled any doubts, knowing that they would not endear him to the botanical community.

Sparks of knowledge fly when subjects rub together. Archaeology can offer botany the dimension of people and boats in constant movement around these islands, plant material sometimes being used as packaging. It is now accepted that Welsh Mudwort *Limosella australis* came to Wales in the ballast tanks of ships returning from America. Might some American-Irish specialities tell a similar tale? Take the Slender Rush *Juncus tenuis*, known in its native North America as Path Rush for its ability to withstand compaction. A weedy colonist of disturbed places, it looks natural in some introduced locations in the west of Scotland. In *Cybele Hibernica*, Colgan and Scully (1898) note that this rush, first found in Ireland in 1889, 'has at least all the appearance of a native'. Another member of the American element

Spotted Rock-rose. James Robertson

of the Irish flora, Blue-eyed Grass *Sisyrinchium angustifolium* is also a good colonist. There is a possibility, however remote, that other rare plants have arrived through human intervention, and blended into their surroundings, confusing botanists. Even Anglesey's County Flower, the delightful Spotted Rock-rose *Tuberaria guttata*, could have spread through human agency to reach relatively virgin post-glacial landscapes along the north-west European seaboard.

Protection and conservation

In 1998, Deptford Pink was added to the ever-growing list of plants on Schedule 8 of the Wildlife and Countryside Act 1981. Such plants must not be picked, uprooted or destroyed (or sold), for which actions you may be prosecuted if it can be shown that you did so intentionally. There is, however, a loophole: the 'lawful operation that could not reasonably be avoided' defence. A farmer need not be unduly concerned if he lawfully ploughs up a field full of protected plants.

You may wonder why so many rare plants, including bryophytes and fungi which few people are able to identify, have been added to Schedule 8, knowing how minuscule is the possibility of prosecution or, indeed, any tangible benefit for the species. Perhaps the answer is that it costs nothing and pleases conservation organisations.

When I showed Deptford Pink to a friend recently I was committing an offence, because I had intentionally broken off a piece of a Section 8 plant. It is a weed in my garden, albeit a much-appreciated one, charming me with its raggedy pink petals flecked with white. Ten years ago I was thrilled to have it appear in a pot, and nurtured it; now it is widespread. In cultivation it can grow not far short of a yard tall, like the plant which Anne Pratt found, which was, I expect, an adventurer, too. I have watched it thrive in gravel beds; grow for a short while in flower beds, brought in with home-made compost; and appear in pots. This last talent is the most impressive. Seeds are able to spring from upright pods when animals or gardeners brush against them as they pass by. Occasionally one will land on sterile compost on the surface of a pot, to germinate and develop a shiny rosette of strap-like leaves. It is immediately recognisable even when very small, and I have not the heart to weed it out. Pinks and pelargoniums often cohabit in pots in my greenhouse. I know five other botanists, two on Anglesey, who have it in their gardens 'as a weed'. I suspect that it is in many gardens, and may now be more common in the UK than ever before.

Deptford Pink can thrive in gravel beds. James Robertson

Deptford Pink may be a colonist rather than a native, although I prefer the term 'adventurer'. I don't think that this detracts from its superlative qualities. It is a scarce plant, yet can establish itself in a wide range of soil types in different open situations. It may pass unnoticed because these places are usually of limited interest to botanists, but sometimes it grows in semi-natural open grasslands, where it may reward a plant-hunter with an exciting discovery. A population may fade as conditions become less suitable due to competition, but this is a natural part of its behaviour. This lifestyle may explain why the Deptford Pink is such a good candidate for species recovery programmes. You can work on sites with the expectation that it will pop up, to universal applause, without having to worry about the complexities of ecology and plant communities. A scatter of seed works wonders.

Rosy pink in the garden

Last year, the SITA trust awarded £10,000 to the Species Recovery Trust (SRT) to shrub-clear and disturb a handful of old Deptford Pink sites. The Trust has some well-respected botanists associated with it, and the case for the grant was based on the pink's rapid decline, its possible extinction in Dorset and Somerset, and the practicability of taking action to save the species. SRT's website identifies the cause of decline as the lack of management, which has led to the loss of the open conditions which Deptford Pink needs, combined with a decrease in animals likely to spread the seed. 'In 2014 we monitored a number of Deptford Pink sites and were sad to find that the species had disappeared from several of those.' Funding has therefore been procured to clear scrub and disturb soil at seven sites in southern England where the pink is considered in danger of local extinction, and to create new sites for Deptford Pink at its current stronghold of Buckfastleigh, in Devon.

Such activity may or may not benefit the Deptford Pink, but I wonder whether it has any lasting benefits for our flora. It is perhaps a consequence of the funding process, which prefers to award sums of money for *in situ* 'gardening' of wild plants, rather than to address the needs of habitats and their plant communities. The importance attributed to Species Action Plans as part of the Biodiversity Action Plan process has generated many local plans, management leaflets and practical tasks to improve the condition of sites and former sites for Deptford Pink. I applaud this so long as the volunteer effort and funding which charismatic plants like Deptford Pink generate help declining, plant-rich habitats.

There is a narrative about this delightful 'miniature Sweet William' that wild-plant conservationists have bought into, and will not let go without a fight. In this story, the heroes are the plant conservationists who are struggling valiantly to reverse the catastrophic decline of one of the gems of our native flora. The subject of their efforts is a fragile, petite little pink, a wild flower which has become rare and is threatened with extinction. The audience includes grant-giving bodies and the plant-loving public, whose contributions allow the conservationists to fulfil their mission.

Directing resources on to an individual species rather than on to plant communities and their associated invertebrates speaks more of gardening than of ecology. By the same token, I regret the amount of time spent listing and vilifying every possible invasive plant, even though there is no hope of doing anything about most of them. It is the other side of the 'good native, bad alien' coin. The Center for Invasive Species and Ecosystem Health in the USA describes Deptford Pink as an ecological threat. Apparently, 'this plant will take over roadsides, ditches and fields'.

Nature conservation should not be about the management, manipulation and control of wild plants and animals to suit our likes and wishes and sometimes our false assumptions. It should be about places, about complex communities of plants and animals and soils and hydrological systems and geology and land forms, worth conserving for all the things we do not know about them, all the ways in which they can surprise us. Nature should also be valued as an essential element in human history, in our culture and our relationships with the land. Humans have added layers of history and hard work to the places which we value for nature, and such places have their own authenticity built from the rocks upwards.

Nature conservation seems to be, on the one hand, drifting towards too controlling and prescriptive an approach, seeking to turn fragments of nature into botanical-cum-zoological gardens; in reaction to which, we have, on the other, the equally

The great 'adventurer', the Deptford Pink. Christian Hatter/Imagebroker/FLPA

anthropocentric idea of unleashing big animals to go feral in an urban dreamscape in which the living presence of nature is not comprehended.

Conclusion

Deptford Pink is attractive, and inoffensive to human interests. I like it, and I want it to thrive. It seems to me that it has done remarkably well in a world dominated by one species, and from which nature is being eliminated. I do wonder what all the legislation, action plans, time, money and activity invested in this one species have achieved.

I regret that some organisations have retreated from the challenges of saving, restoring and managing wildlife-rich habitats in favour of a softer option: manipulating sites to benefit particular rare species. This runs the risk of leaving nature out of conservation, with the latter poised to step through the garden gate. Ecology is about the relationships between living things, and nature conservation should seek to apply the lessons of ecology to the management of the environment. Wild plants are elements in a tableau which expresses climate, soil, topography and also community. It is the tableau with which nature conservation should concern itself. But I do not think that the authenticity of wild plants, their otherness from the human-engineered environment, depends on native status. This account of the Deptford Pink is one of human connection, and of mobility.

Barry Cunliffe's recent bestseller *By Steppe, Desert, and Ocean* (2015) is full of the influence of landscape on the story of human development. His definition of human history has an ecological ring to it. 'History…is the subtle interweaving of human actions spread over vast landscapes and through deep time creating a dense fabric, every thread of which has significance. The wonder of it all lies in how interconnected everything is.' Cunliffe's two big themes are connectivity and mobility. 'The steppe, the deserts and the oceans created the connective tissue through which people, commodities, and ideas flowed.'

This flow has extended beyond humanity. Plants have for centuries travelled over land and sea with people, to be absorbed into the nature of Britain and Ireland. This continues. The dense fabric of nature is bound up with human history, and what we perceive as natural has been woven into human history over millennia. Mobility and connectivity are as essential to an understanding of natural history as they are to human history, and both run together. The story of *Dianthus armeria* is a thread in the human story.

References

Akeroyd, J. [E.] (ed. and comp.) 1996. *The wild plants of Sherkin, Cape Clear and adjacent islands of West Cork*. Sherkin Island Marine Station, Sherkin Island.

Akeroyd, J. R., & Clarke, K. 1993. Dianthus armeria L. new to Ireland and other rare plants in West Cork. Watsonia 19: 185–193.Coleman, W. H., & Webb, R. H. 1849. Flora Hertfordiensis. London.

Colgan, N., & Scully, R. W. 1898. Cybele Hibernica. Edward Ponsonby, Dublin.

Cunliffe, B. 2015. By Steppe, Desert, and Ocean: The Birth of Eurasia. Oxford.

Druce, G. C. 1926. The Flora of Buckinghamshire. Arbroath.

Gerard, J. 1633. The Herbal or Generall Historie of Plantes. Enlarged and amended by Thomas Johnson.

Grigson, G. 1958. The Englishman's Flora. Phoenix House.

Killick, J., Perry, R., & Woodell, S. 1998. The Flora of Oxfordshire. Pisces.

Long, M. 2013. Dianthus armeria on Inis Meáin – Are there other populations out there? Irish Botanical News 23: 21–22.

Lousley, J. E. 1976. Flora of Surrey. David & Charles.

Mabey, R. 1996. Flora Britannica. Sinclair-Stevenson.

O'Mahony, T. 2006. Mibora minima (L.) Desv., Early Sand-grass (Poaceae) in West Cork (H3): an addition to the Irish Flora. Irish Botanical News 16: 5–13.

O'Mahony, T. 2009. Wildflowers of Cork City and County. The Collins Press, Cork.

Pratt, A. 1889. Flowering Plants of Great Britain. Warne, London.

Preston, C. D., Pearman, D. A., & Dines, T. D. (eds) 2002. New Atlas of the British and Irish Flora. Oxford University Press.

Robertson, J. 2015. Plants – Wales. British Wildlife 27(1): 61–62.

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Through a naturalist's eyes

Robert Burton

A snippet that, had there been more space, would have been included in my piece about dormice in the last issue concerned the origin of their name. I had always thought that 'dormouse' was derived from the Anglo-Norman *dormeus*, meaning 'sleepy one', but I found that there is a case for its coming from the Old Norse *dúsa* – doze, hence 'dozymouse' in the Viking north of England. The two mean much the same, but what did the Anglo-Saxons call it? 'Egle'. This would be much easier to type but would lead to confusion with very large raptors. I imagine that 'egle' is a basic word whose roots lie in antiquity and there is no more point in asking about its origin than that of 'table' or 'chair', but I do wonder how Devonians came to call the delightful rodent a 'chestlecrumb'.

I have always had a dilettante interest in etymology – the origin of words and changes in their use. I enjoy browsing maps to speculate on place-names and look for links with local history. With the names of animals and plants one can find some interesting stories of folklore and biology, but some names simply defy explanation. According to W. H. Hudson, the Hummingbird Hawkmoth was once called 'merrylee-dance-a-pole'. How on earth did that come about?

You have to be suspicious about derivations, because they can turn out to be false etymology. This is often guesswork based on what appears to be common sense but is merely speculative assumption. The guess is then accepted uncritically and passes into general knowledge. 'Foxglove' is often said to be 'folks glove', the 'folks' being fairies. 'Fairy gloves', 'fairy fingers' and similar names are known throughout the country, but the oldest recorded name for the plant is the Old English *foxes glofa*. The only puzzle is the connection between the flower and the fox.

So, natural history etymology is great fun but fraught with difficulty, and so littered with red herrings that it is often hard to tease out definitive derivations.

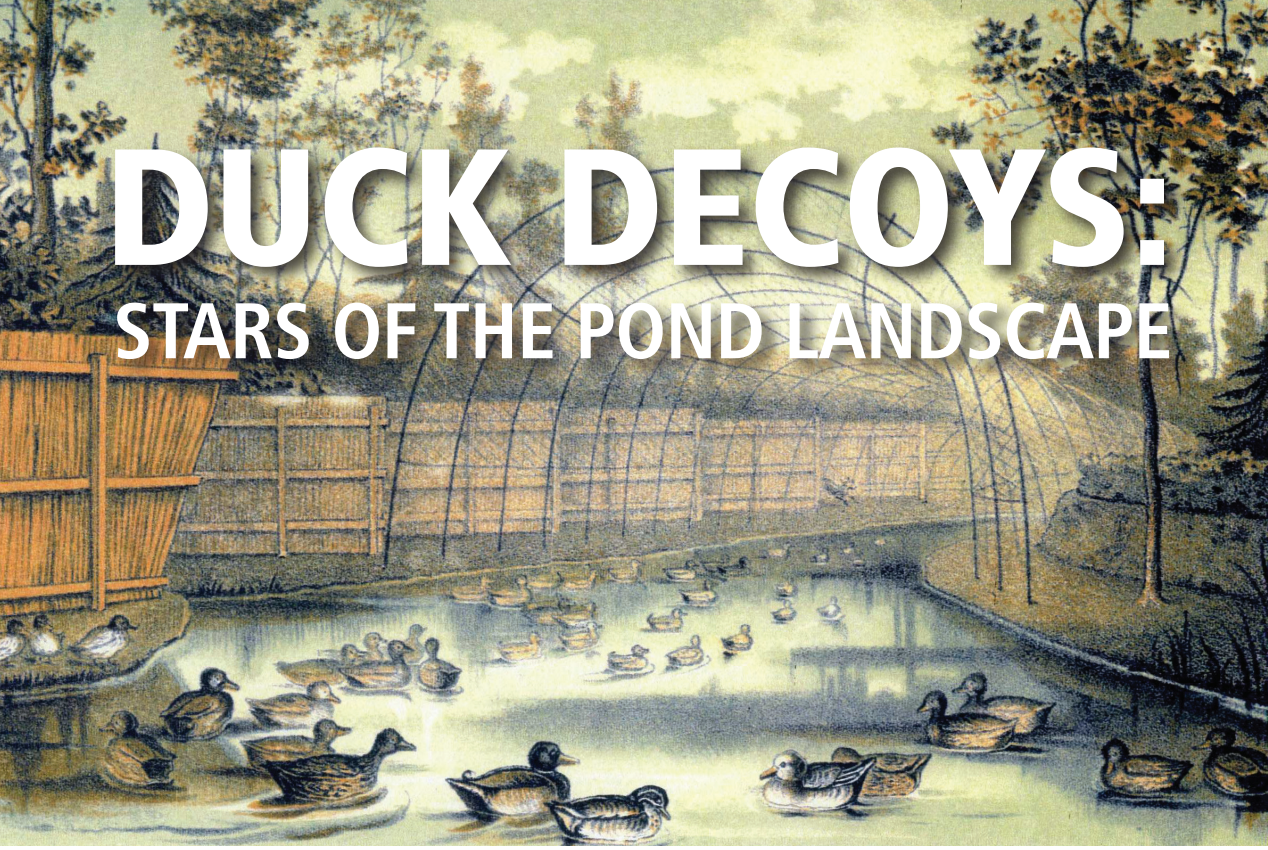
There is more interest if the name tells a story. 'Earwig' comes from the Old English *earwicga*, in which *wicga* means 'insect', and has nothing to do with 'wiggle'. People have been worried about earwigs crawling into their ears from time immemorial, a fear pooh-poohed by entomologists but verified in medical journals. Victims complain of a 'noise like thunder' and the treatment is to float the insect out with warm oil.

One problem has become acute in recent years. As interest in natural history grows, there is a need to concoct common names for previously overlooked species. I inherited Edward Step's (1932) *Bees, Wasps, Ants and Allied Insects of the British Isles* from my father. I suspect that Step invented many of the common names by anglicising the scientific names: Yellow-legged Mining Bee (*Andrena flavipes*), Thorny Sphecodes (*Sphecodes spinulus*) and so on. So, I was interested to see how Steven Falk's new book *Field Guide to the Bees of Great Britain and Ireland* deals with common names. I have made a quick comparison and was pleased to find that Falk largely follows Step. Some differences are due to changes in taxonomy, but Falk includes many more species for which he has coined names from distinctive attributes of appearance, habitat etc., which helps to make them memorable.

One of the few fungi that I can recognise is King Alfred's Cakes. It looks and feels like a very badly burnt bun, so it is memorable. Another one is Jew's Ear which also has its roots in folklore. According to legend, Judas Iscariot hanged himself from an Elder, a common host for the fungus. There was a move to change Jew's Ear to Jelly Ear in order to avoid possible offence, but will there be a similar change to *Auricularia auricula-judae*? The problem of names that might offend the sensitive was addressed in typical style by Twitcher in October 2007 (BW 19: 71).

Hummingbird Hawkmoth, or 'merrylee-dance-a-pole'. Bill Coster/FLPA

In a roundabout way this brings me to penguins, which can be considered in *British Wildlife* because they once nested on St Kilda. They are better known today as Great Auks, and the earlier name has been transferred to similar birds still extant in the southern hemisphere. The word 'penguin' is sometimes said to be derived from the Welsh *pen gwyn*, meaning 'white head'. The first account in English of southern hemisphere penguins comes from Francis Drake's circumnavigation in 1577–80. There is reference to a 'foule, which the Welsh men name Pengwin' that the crew saw, and ate, at the tip of South America. Why single out the Welsh? In many European languages the name is a variant of 'pinguin'. Only in English (and Welsh) is it spelled with an 'e'. It is said to be derived from the Latin *pinguis* – fat. As one who has eaten penguins, I can confirm the aptness of this idea but, although the etymology sounds reasonable, there is no proof. There is, however, another, more descriptive name for penguins. According to Oliver Goldsmith in *A Hstory of the Earth and Animated Nature* (1774), 'Our sailors…give these birds the very homely, but expressive, name *arse-feet*'. Or would that be too offensive?



DUCK DECOYS: STARS OF THE POND LANDSCAPE

Andrew M. Heaton

View inside a duck decoy. From Payne-Gallwey (1886)

Since the nineteenth century, disturbance, drainage and changing attitudes have seen a steady decline in active decoys. Three working decoys now remain, catching birds for ringing. Others form features of scheduled monuments, parks, country parks and SSSIs. The author sets out the results of a study of their present condition, revealing that two-thirds of the former decoys, with their distinctive star shape, still impact on the modern landscape.

It is 130 years since the publication of Sir Ralph Payne-Gallwey's definitive work on British duck decoys. As a means of trapping wild ducks for local consumption or for markets, decoys were a significant feature of the rural economy from the seventeenth to the nineteenth century, with about 200 examples in England and Wales. Ten years before Payne-Gallwey's study, Wilkie Collins's 1876 novel *The Two Destinies* opened with a scene detailing the capture of 'dozens on dozens' of ducks in a duck decoy. Collins's (accurate) description of the working of the decoy may have been informed by Daniel Defoe's narrative in *A Tour through the Whole Island of Great Britain* (1727). It says much that these two literary giants should have taken such an interest in a device for catching birds, demonstrating that, as sources of food for country house or urban market, duck decoys played a significant part in the rural economy for several centuries. There has been a steady decline in decoy numbers since Victorian times, and many decoys documented by Payne-Gallwey are no longer traceable. Nevertheless, a surprising number still remain as enigmatic features in the countryside, of both historical and natural-history interest.

The origins of duck decoys

Permanent structures for trapping wildfowl originated in the Netherlands, probably in the sixteenth century. A 'decoy' consisted of a central pond from which radiated a number of curved arms covered in netting, in which the birds would be trapped: a decoy pond typically displayed a star shape.

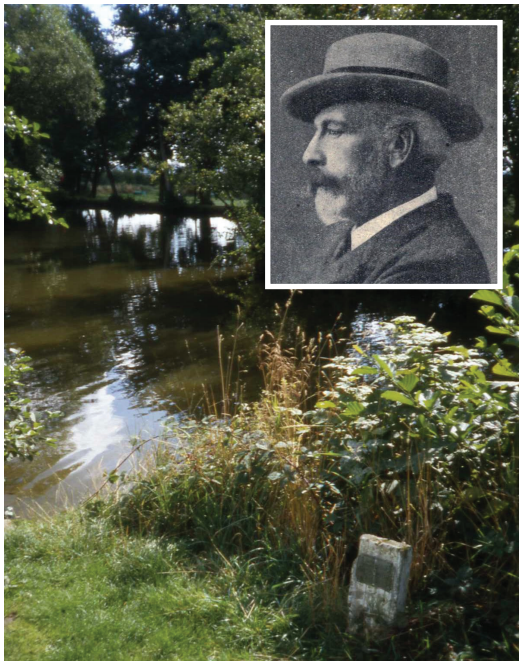
The first decoy in England was probably one built at Waxham, in Norfolk, around 1620, by Sir William Woodhouse (Kear 1990). Other early decoys are found at Acle and Hemsby, in Norfolk, and Sharpham, Westbury and Stoke, in Somerset. The best-documented early decoy is that completed at St James's Park, London, in 1665 for King Charles II. A Dutchman, Sydrach Hilcus, was brought over to construct the decoy; accounts and details of materials used are still in existence.

South Lincolnshire became the first stronghold of decoy construction (Roebuck 1934). As the success of decoys became apparent, they spread across the country, especially in extensive wetland areas of East Anglia and Somerset. The heyday of decoys was the early eighteenth to mid-nineteenth centuries, when they were catching wildfowl in huge numbers, many being sent to London markets – 200,000 birds each season (Cocker & Mabey 2005).

Much of our knowledge of decoys comes from Sir Ralph Payne-Gallwey's comprehensive *The Book of Duck Decoys, their construction, management and history*, published in 1886. Payne-Gallwey realised that the use of decoys was a dying practice and he determined to document the structures and working of decoys across the British Isles. He listed 188 decoys in England, five in Wales and 22 in Ireland. There has apparently never been a working decoy in Scotland.

Payne-Gallwey's published list was not totally comprehensive. He failed to document some notable decoys, including those at Porlock, Doncaster and Stoneleigh. Payne-Gallwey himself realised this: his own copy of *The Book of Duck Decoys*, held by the Harrison Zoological Museum, in Sevenoaks, is annotated with the author's handwritten notes detailing an additional dozen sites, including Onslow, in Shropshire, where he noted 'I superintended the formation of a Decoy Pipe here in 1889. It is the best made decoy pipe in England.' Recent research has increased the number of known decoy sites significantly: Shrubb (2013) lists additional sites.

At the time when Payne-Gallwey was writing, only 44 of his England and Wales total of nearly 200 were still working, the majority having fallen into disuse even then. Late decoys were constructed in 1885 – the triangular decoy at Aldwincle, in Northamptonshire, and that built by Payne-Gallwey himself at his Thirkleby Park estate, near Thirsk – while Onslow was completed in 1890. Payne-Gallwey's notes refer also to a 'fine new trap decoy' built at Solway Moss, Cumberland, and possibly both the last and the northernmost decoy in Britain. By this time, the era of the decoy was over and a steady decline in their use followed.

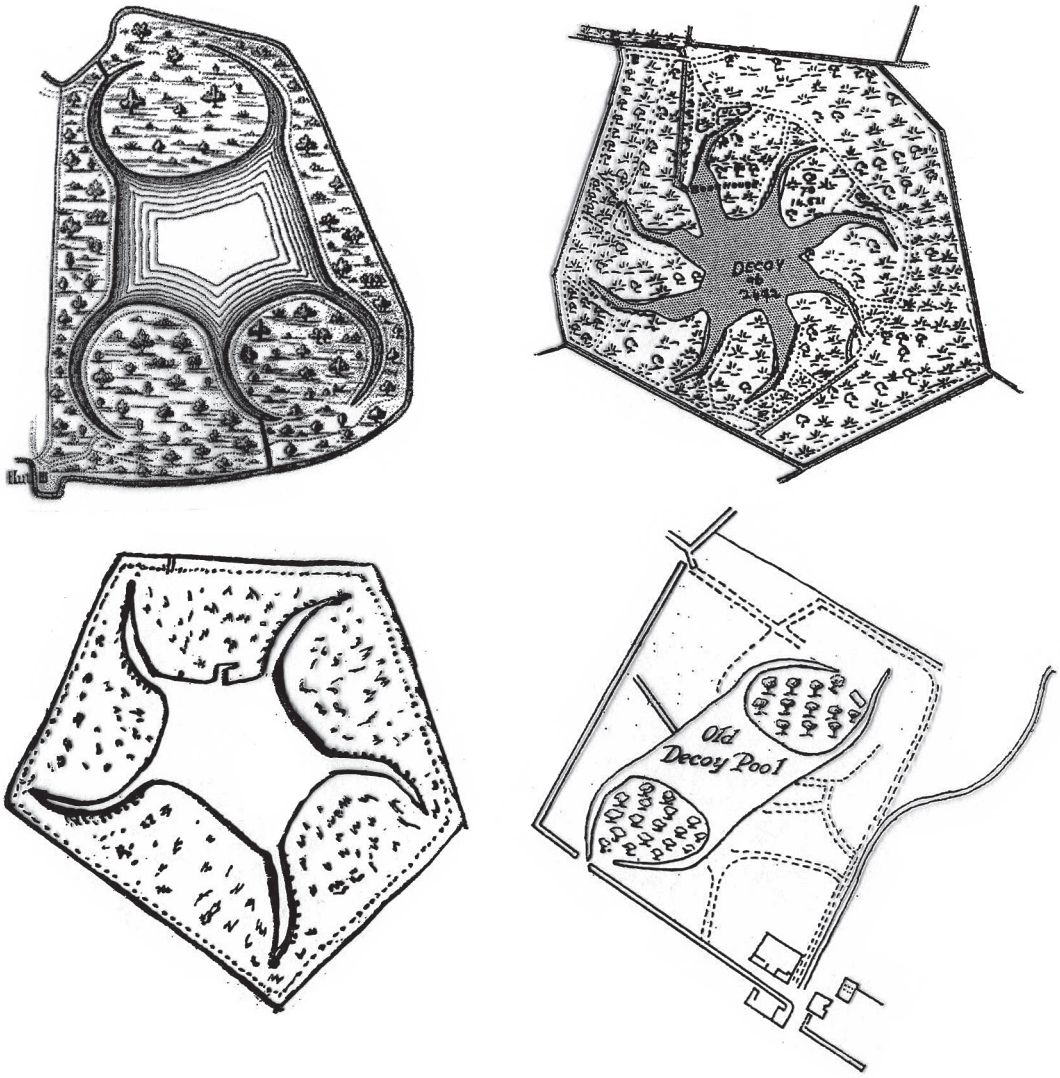


Sir Ralph Payne-Gallwey (inset), author of *The Book of Duck Decoys* (1886), and his own decoy at Thirkleby Park, North Yorkshire, which is now a fishing pond in a caravan site. The plaque gives the date of construction (1885). Andrew Heaton

The structure of a duck decoy

Decoy designs varied. Some were built on the edges of large lakes, others were adaptations of existing ponds, while many were newly constructed. Essentially, though, all consisted of a central area of open water on which ducks would land, and a number of netted arms (or 'pipes') leading off it where the birds would be enticed and trapped. Pipes generally numbered from two to eight (although Fritton Lake decoy had at least 21), leading from the central pond in different directions, so as to be usable under different wind conditions.

The majority of decoys were built around a central pond of 1–2 acres (0.5–1ha) in extent, with a depth of 2–3 feet (0.6–0.9m), shelving towards



Sketched plans of various named decoys, taken from Whitaker (1918), showing the variety of designs possible. Clockwise from top left they are at Morden, Borough Fen, Berkeley Castle and Hale. Whitaker

the edges. Around the edges would be 'landings', flat short grass where the birds could rest. The pipes consisted of curving ditches, 60–70 yards (55–64m) long, which tapered as they led away from the pond; at the pond edge the pipe width was 18–21 feet (5.5–6.4m), gradually narrowing down to 2 feet (0.6m) at the far end. The net structure was supported by a series of hoops straddling each pipe, spaced at 5-foot (1.5m) intervals. Durable hoops were made of round iron, but wooden poles also were used. The first hoop at the pond edge, with a spread of 21 feet (6.4m), stood 15 feet (4.6m) high above the water. Over the hoops was stretched diamond-mesh sisal or hemp netting. Beyond the fixed net, at the narrow end of the pipe, came the detachable tunnel net ('purse'), in which the birds were trapped.

Alongside the pipe ran a series of screens, consisting of post-and-rail frames with a covering of reeds (and peep-holes for the decoyman), with overlapping, low fences running between each adjacent pair as dog leaps. Around the decoy pond, woodland was planted to provide a buffer against disturbance. The far end of each pipe, however, was left open and unshaded so that it appeared to be a safe area into which to fly.

How the decoy operated

Decoys worked by encouraging ducks to enter a pipe and swim along it until they reached a point where their retreat to the safety of the pond could be cut off, and they would then be driven into the tunnel net.

Swimming ducks on open water react to a predator on the water's edge by moving towards it but maintaining a safe distance. If the predator moves along the edge, the ducks will follow it, remaining at the same safe distance. This activity is seen in reaction to Foxes, and to other possible predators, including dogs, and has been made use of in the practice of 'dogging' a decoy – training a dog to attract birds into a pipe. Various dog breeds have been used for this purpose, the Dutch Kooikerhondje being bred specifically to work decoys.

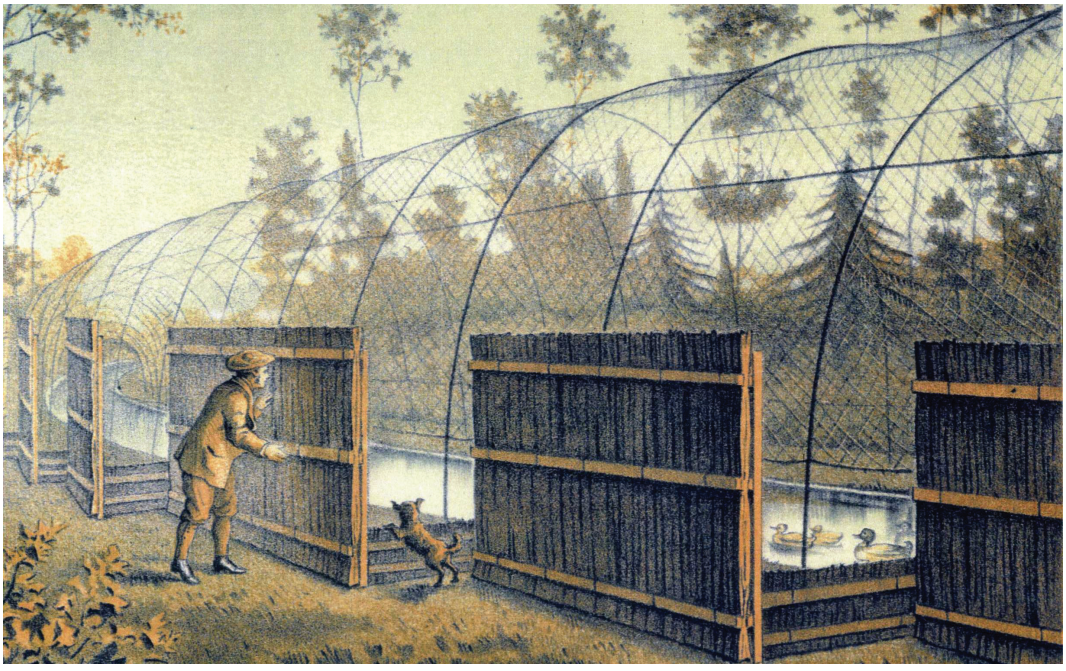
When the decoyman was sure that ducks were present close to a pipe entrance, he sent his dog to jump over the first leap and run along the first screen, then disappear behind it, this being repeated a couple of times. The sudden appearance and disappearance of the dog attracted the curiosity of the ducks, which swam towards it to investigate. The decoyman, out of sight behind the screens, then moved quietly forwards, sending the dog to run around the next screen. This was repeated screen by screen along the pipe, drawing the birds down under the net.

When the ducks had moved well into the pipe, the decoyman returned to the entrance, revealing his presence. This drove the birds down the pipe into the tunnel net; they were unable to detect the closed end because of the curve of the pipe. Trapped in the purse, the ducks were killed and extracted.

An alternative to dogging a decoy was that of feeding. A few tame ducks were kept on the decoy to attract wild ducks wary of a totally empty pond. Grain, hemp seed or potatoes were fed on to the pond during the day. When sufficient wild ducks were present, the decoyman, hidden behind the screens, walked away from the pond towards the pipe end, throwing grain over the top of each screen, drawing the tame and wild birds. Again, at the point where the retreat of the birds could be barred, he revealed his presence, frightening them into the purse.

Decoy records show a constant pattern of catches: the most frequent ducks caught were Mallard *Anas platyrhynchos* and Teal *A. crecca*, the most numerous species in winter, when trapping occurred. Only Mallard were seen as 'full ducks', other species being counted as 'half ducks'. Pintail

An illustration of a decoy, with the decoyman using a dog to entice the birds into the net. From Payne-Gallwey (1886)



A. acuta, Wigeon *A. penelope*, Shoveler *A. clypeata* and Gadwall *A. strepera* were much less frequent. The rapidly expanding eastern England Gadwall population in the nineteenth century apparently had its origins in a pair caught and bred at Dersingham Decoy, in Norfolk (Cocker & Mabey 2005).

These species are all dabbling ducks, feeding from the water surface, and easily enticed by fed grain. Diving ducks – Pochard *Aythya ferina* and Tufted Duck *A. fuligula* – were more difficult to catch, tending to dive to escape. In Essex and Suffolk, there were specialist 'pochard ponds', built with tall nets held up on long poles.

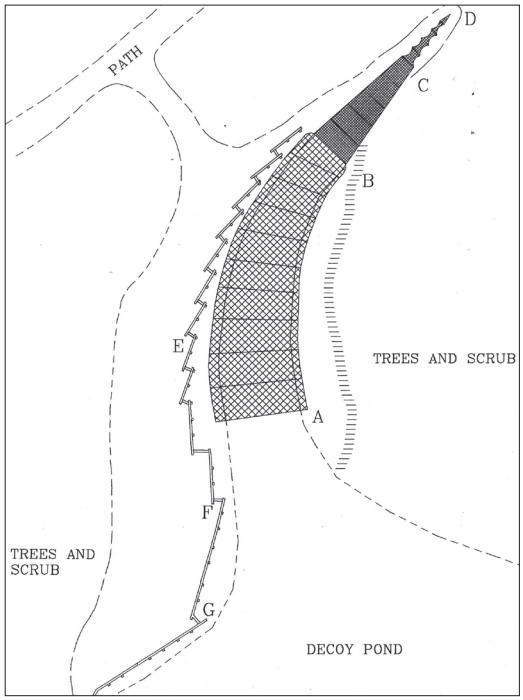
The distribution of decoys

Lincolnshire, 'truly…the home' of decoys, had at least 40 scattered across the county (Defoe 1727; Lorand & Atkin 1989), with a concentration in the southern fens. The most famous and successful, however, was Ashby Decoy, on the edge of Scunthorpe: from here detailed records are available, documenting an average catch of 3,000 ducks per season, with a record of 6,357 in 1834–35 (Roebuck 1934).

East Anglian counties, too, had many decoys. Those in Norfolk often took the form of pipes added to existing lakes, rather than purpose-built decoy ponds; for example, the shoreline of Mickle Mere, at Wretham, was totally remodelled to accommodate ten pipes. Suffolk and Essex each had many decoys constructed, mainly near the coast. When Payne-Gallwey was writing, Suffolk had more working decoys than any other county. In Essex, there were both 'pochard ponds', where the elusive diving ducks were captured, and dedicated 'teal ponds'. Bohuns Hall, in Essex, and Brantham, in Suffolk, functioned both as pipe decoys and as pochard ponds, having sets of removable poles and nets.

The other main area for decoys was Somerset (McDonnell 1984), particularly the Levels, where five, including a group of three on King's Sedgemoor, were still working in Payne-Gallwey's time. Westbury Decoy was a particularly early structure (or complex of two decoys), in existence before 1635.

Small numbers of decoys appeared across southern England and the Midlands. Many were pipe decoys (Oakley Park, in Shropshire, was the only place where pipes were called 'flues'), but



A plan of a decoy pipe. A, B and C show nets fixed to hoops of decreasing size. C and D mark the tunnel net. E is reed screens and dog leaps. F–G is a grassy resting area for birds. Andrew Heaton

Midlands estates in fact had a preference for a different type of duck trap, a cage trap, worked directly with sliding doors controlled by wires. The decoy at Virginia Water, Surrey, was unusual in featuring both pipes and a cage trap.

In the north of England, there were at least 14 decoys in Yorkshire, with a concentration in the extensive marshes of the Humberhead Levels (Limbert 1978, 1982, 1998). One Yorkshire site, Doncaster Decoy, was notable as a municipal rather than a private enterprise, with profits distributed to the poor of the town. The northernmost decoy recorded by Payne-Gallwey was at Lowther Castle, in Westmoreland, although a late structure at Solway Moss may have taken the record. No decoy exists in Scotland, where one begun near Findhorn Bay ('set out' by John Bradley Williams of the famed East Anglian decoy family) was never completed.

Payne-Gallwey noted five decoys in Wales. Two on the Gwent Levels have disappeared, one on the Gower (Park Wern) shows up as earthworks, and Lymore Park, in Montgomery, has a well-preserved five-pipe decoy. The best-known of the Welsh decoys, however, is at Orielton, south of Pembroke,

where four pipes were added to an artificial lake in 1868 (Lockley 1977; Stott and Mitchell 1991; Saunders 2008). The fourth pipe was constructed under the direction of Herbert Williams, one of the extensive Williams family of Borough Fen who took their decoy expertise around the country. There was a history of decoy families promoting the practice widely – the Skeltons of Friskney were another such family – working not on the estate staff, but essentially self-employed.

Decoys in decline

By the mid-nineteenth century, working decoys had declined drastically as unproductive ones were abandoned. This was due mainly to widespread drainage of wetlands brought about by the numerous Drainage Acts: there was no longer the extent of habitat to attract wintering wildfowl from the Continent, and numbers of British breeding ducks had also fallen.

Disturbance, too, played a part. The increasing availability and efficiency of firearms, especially with widespread availability of breech-loading pieces in the nineteenth century, meant that shooting was competing with and directly affecting decoys. The two decoys at Berkeley, in Gloucestershire, were said to have been ruined by operation of the Ground Game Act 1880, constant shooting scaring the wildfowl away.

Developments (often railways) close to decoys brought about the demise of others. The owner of two Monmouthshire decoys, at Wilcrick and Nash, was paid £500 compensation when the South Wales Railway (later a part of the GWR) was constructed within half a mile of each. It was the Great Eastern Railway which put paid to the Suffolk sites of Brantham and Lakenheath, while the South Coast Railway cut through the Tangmere Decoy, in Sussex. Coatham Decoy, on Tees-side, was also affected by a railway, and was finally closed by construction of nearby ironworks. Doncaster Decoy, abandoned in about 1778, was later obliterated by extensive railway sidings, and is commemorated by the naming of 'Decoy Marsh' in Potteric Carr nature reserve. Lincolnshire's Fleet Decoy was destroyed by the cutting of the South Holland Drain in 1793.

By the time of his survey, Joseph Whitaker, a naturalist from Rainworth, in Nottinghamshire, in undertaking a follow-up to Payne-Gallwey's work, was able to report only 21 decoys in use (Whitaker 1918). The decline continued through the twentieth century, and by 1936 just 11 remained working. The last decoy in commercial use was at Nacton (Orwell Park), in Suffolk. This operated very successfully (e.g. catching 9,303 birds in 1925–26) from 1830 to 1968, when the Wildfowl Trust took on a lease to catch birds for ringing, which continued until 1982 (Matthews 1969; Day 1981).

This change from catching ducks for food to ringing and releasing them occurred in all the remaining working decoys in the latter half of the twentieth century. The first decoy to go this way was Orielton (Saunders 2008): from refurbishment in 1934 until 1960, 11,000 ducks were ringed, providing some of the earliest insights into wildfowl migration. Ringing followed at Nacton and the other remaining decoys, peaking at over 8,000 birds ringed at six decoys in 1967, a significant contribution to migration and demographic studies of waterfowl.

The decoys today

An assessment of the fate of decoys, undertaken by the author in 2014–15, utilising Ordnance Survey maps, satellite imagery, Historic Environment Records (HER) data and other sources of information on specific decoys, gave the following results. Of the 193 decoys that Payne-Gallwey identified in England and Wales, about one third (61) appeared to have left no visible remains in the countryside today. The remaining two-thirds were still identifiable from their impact on the current landscape (note: totals are inflated, as one site can show several features):

- 16 sites (8% of the original total) showed up only as cropmarks;
- 28 decoys were represented by earthworks (this is a minimum figure);
- defined relict habitats (ponds, lakes, wet woodland, marsh) were identifiable in 148 instances, 76 surviving as ponds and 54 as wet woodland on the site of the former open water;
- six decoys were in working order, even if not being operated regularly.

Of the original total, at least 42 still had pipes visible, while 14 sites had other structures surviving (hoops in a surprising 11 sites, huts and edging stones).

Of all those which formerly existed, just three regularly operated decoys remain in Britain. The best-preserved is the eight-pipe decoy at Borough Fen, north of Peterborough (Cook & Pilcher 1982). The Wildfowl and Wetlands Trust (WWT) previously funded the site for ringing purposes; the decoy, which is a Scheduled Ancient Monument, is still used for ringing, though not by WWT. Numbers are lower now, but early ringing activity was very successful in helping to track wildfowl movements: between 1947 and 1977, birds ringed at Borough Fen totalled 31,000 Mallards, 10,500 Teals, 72 Pintails, 253 Shovelers, 67 Wigeons, four Gadwalls and three Garganeys *Anas querquedula*.

A decoy is operated by WWT at its headquarters at Slimbridge, Gloucestershire. This is the Berkeley New Decoy, a four-pipe structure in a 'skate's egg' formation, constructed in 1843 to replace the similar Old Decoy when this suffered disturbance caused by the nearby Gloucester–Sharpness Canal. The New Decoy had declined to disuse by 1929; partly restored in 1937, it is now maintained by WWT. Exhibitions have been set up in a hide overlooking the decoy and in the old decoyman's hut, and demonstrations are given, working the decoy and ringing any birds caught, on winter Saturdays, using a Toller (occasionally a Black Labrador) as the decoy dog. The nearby Berkeley Old Decoy is not operational, although its four pipes are still discernible.

The earliest decoy still in use, dating from 1655, is at Abbotsbury Swannery, in Dorset, where a four-pipe decoy was built, together with two pipes directly on to The Fleet (Prendergast 1987). Detailed records of catches since 1881 exist. Two pipes remain working, although at a low level, catching rather few birds. The decoy is a Scheduled Ancient Monument (SAM) and the whole site is a significant tourist attraction, including, as it does, the only managed swannery in Britain. The decoy is operated by the Deputy Swanherd.

Duck decoy at WWT Slimbridge Wetland Centre, Gloucestershire. David Hosking/FLPA

Three other decoys remain in working order, but they are not currently being used for catching. Although Boarstall Decoy, in Buckinghamshire, is known originally to have been a six-pipe decoy, the site's early history is otherwise unclear, its first record being on a map of 1697 (National Trust 1991). In 1980, the decoy was purchased by the National Trust, following which two pipes were fully restored. The decoy was, until recently, worked with a dog by the decoyman, the ducks caught being ringed. Although no catching is currently taking place, the National Trust maintains a visitor centre on the site. In addition to Boarstall, the National Trust has about a dozen sites which show evidence of decoy ponds (including Kedleston, Sudbury and Kingston Lacey).

Until a few years ago, Hale Decoy, on Merseyside, was managed by Cheshire Wildlife Trust. One of the five pipes was completely restored and used for ringing purposes. The Trust's tenancy ended, however, and the decoy – now leased by Halton Borough Council and managed by a volunteer group, The Friends of Pickering Pasture, which also organises guided walks and displays in the Gamekeeper's Cottage – appears no longer to be active as a ringing site.

The decoy at Nacton (Orwell Park), in Suffolk, also retains in place its structure, including nets and screens, but it is not used for catching; visiting educational groups are welcomed. The decoy is unique in having rustic (wooden, thatched) huts above each pipe, so that the owner could watch activities, and sunken walkways around the decoy, allowing hidden access by the decoyman.

Several other former decoys are given protection in some way, 32 being scheduled as Ancient Monuments by English Heritage. (Scheduling and 'Monument Class Descriptions' – definitions – are now undertaken by Historic England.) Thirteen of these SAMs, a seemingly high proportion, are in Somerset. Examples of scheduled monuments come

from all around the country, including Gore Decoy (Essex), Skellingthorpe (Lincolnshire), Haughton (Nottinghamshire), Meaux (Yorkshire), Ashwell (Hertfordshire), and the Welsh example at Lymore Park, in Montgomeryshire.

Several decoys remain on estates now accessible to the public. The National Trust's parkland around Hardwick Hall, in Derbyshire, includes the site of a cage-trap decoy, one of the stone sight-houses having been restored. Hardwick Decoy is currently the subject of an archaeological investigation, backed up by biological and hydrological surveys, which will guide future management of the feature. At Coombe Country Park, in Coventry, the decoy, built in 1880 to supply the Coombe Abbey estate, now provides a pond-dipping area and features on a guided trail. Thirkleby Decoy is a fishing lake in a caravan park, as is one on Mersea Island, in Essex, while Whittlesey Decoy has given its name to a complex of fishery lakes. Ashby Decoy provides irrigation water for a Scunthorpe golf course. At Ranworth Broad, the former decoy is a feature of the nature trail (boasting Royal Fern *Osmunda regalis* and Swallowtail *Papilio machaon*) around the Broads Visitor Centre, although the access path is currently requiring repair. Decoy Spinney, at Stoneleigh, Warwickshire, which is now largely an area of wet woodland, served as a point on a farm trail, but it has recently been closed to public access while remaining a Wildlife Trust reserve. Woollaton Park, enclosed in the suburbs of Nottingham, has a decoy display in outbuildings, and information on a nature trail.

Chillington Hall decoy, in Staffordshire, comprises two decoy pipes, named individually 'Rookery Decoy' and 'Grecian Decoy' (the latter situated near a temple folly), on a large lake created by Capability Brown. Several decoys now lie within sites featured on Historic England's Register of Historic Parks and Gardens (Attingham, The Hoo), while Lymore Park is covered by the Welsh equivalent.

Besides their historical value, relict decoys can retain significant wildlife value, supporting wetland habitats, notably open water, marsh/swamp or wet woodland. About 23 decoys rate protection as Sites of Special Scientific Interest. In some instances, the decoys fall within larger SSSIs; examples include Berkeley and Hale, on the Severn and Mersey Estuaries respectively, and Acle, in the Broads.

The working decoy at Abbotsbury Swannery, Dorset. Andrew Heaton

Elsewhere, the decoy itself, with its surrounding woodland, provides the wildlife interest. The three-pipe pond and mixed woodland of Aldwincle Decoy, built for Lord Lifford in 1885, now holds one of the largest heronries in Northamptonshire, forming part of Titchmarsh Local Nature Reserve, which in turn falls within both a SSSI and an SPA. Other SSSI decoys include Coatham, Coombe, New Forest and Hemsby.

Four National Nature Reserves, in Dorset (Morden Bog), Huntingdonshire (Holme Fen) and Norfolk (Holkham; Bure Marshes), include decoys. Ten decoys are features of National Parks (notably the Broads), and a similar number fall within AONBs such as the Suffolk Coast and Heaths. Four decoys sit in Country Parks.

Friskney Decoy Wood is a nature reserve of the Lincolnshire Wildlife Trust, supporting bird species such as Siskins *Carduelis spinus*, Reed Warblers *Acrocephalus scirpaceus* and Kingfishers *Alcedo atthis*. Another Wildlife Trust, that of Essex, has a decoy on its Abbotts Hall property, the site of a managed-retreat scheme, causing concern for archaeologists regarding erosive effects on the decoy. Yorkshire Wildlife Trust has a decoy site at Denaby Ings. There is Wildlife Trust involvement at half-a-dozen sites in total.

At several former decoys, plans for restoration are expected or already implemented. At Coombe

Abbey, the Country Park Management Plan states that two of the decoy pipes are to be restored as part of the aim to bring the decoy back into working condition. At Fritton Lake, on the Norfolk–Suffolk border, the Great Yarmouth Wildfowling and Conservation volunteers rebuilt one pipe of the former decoy as a tourist attraction within Fritton Lake Country Park, although it subsequently suffered damage from a wind-blown oak tree.

The term 'decoy' was later applied to flight-ponds, to which ducks were attracted to be shot rather than trapped. Thus, many 'decoy ponds' on maps never had any pipe structure associated with them, making it awkward to identify true former decoy sites. Nevertheless, there remain quite a few relict pipe decoys, surprisingly large numbers – rather more than Payne-Gallwey noted – being listed in county Historic Environment Records. Suffolk HER recognises 25 sites, all on the coast except for one inland (Lakenheath), and Essex lists nearly 40, including one actually in Greater London at Rainham Marshes.

The total of just three decoys still being used for their original bird-trapping purpose represents a decline even since the previous review (Heaton 2001), when four decoys were regularly catching. This decline needs to be stopped now, and reversed. With much interest in the historic environment, and funding available through agri-environment schemes, major projects such as 'Wet Fens for the Future', and various pond initiatives, it may be that more of these fascinating features could be brought back to something close to their original form.

A decoyman scares the ducks into the net. From Payne-Gallwey (1886)

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References

Cocker, M., & Mabey, R. 2005. *Birds Britannica*. Chatto & Windus, London.
Collins, W. 1876. *The Two Destinies*. Chatto & Windus, London.
Cook, A., & Pilcher, R. E. M. 1982. *The History of Borough Fen Decoy*. Providence Press, Ely.
Day, J. W. 1981. The Duck Decoys of Suffolk. *East Anglian Magazine* 40: 122–125.
Defoe, D. 1727. *A Tour Through the Whole Island of Great Britain 1724–25*.
Heaton, A. M. 2001. *Duck Decoys*. Shire Books, Princes Risborough.
Kear, J. 1990. *Man and Wildfowl*. Poyser, London.
Limbert , M. 1978. The Old Duck Decoys of South-East Yorkshire. *Naturalist* 103: 95–103.
Limbert, M. 1982. The Duck Decoys of South-East Yorkshire: an addendum. *Naturalist* 107: 69–71.
Limbert, M. 1998. The Natural Harvest of Thorne Moors. *Thorne and Hatfield Moors Papers* Vol 5: 22–35.
Lockley, R. 1977. *Orielton: the human and natural history of a Welsh manor*. Andre Deutsch, London.
Lorand, S., & Atkin, K. 1989. *The Birds of Lincolnshire and South Humberside*. Leading Edge Press, Hawes.
Matthews, G. V. T. 1969. Nacton Decoy and its catches. *Wildfowl 20:* 131–137.
McDonnell, R. R. J. 1984. Duck Decoys in Somerset, a gazetteer. *Proc. Somerset Arch. and Nat. Hist. Soc.* 128: 25–30.
National Trust. 1991. *Boarstall Duck Decoy*. National Trust. 16pp.
Payne-Gallwey, R. 1886. *The Book of Duck Decoys, their construction, management and history*. John van Voorst, London. Available at: https://archive.org/stream/bookofduckdecoys00paynega#page/n5/mode/2up
Prendergast, E. D. V. 1987. *Dorset Decoys: Abbotsbury and Morden*. Dorset Nat. Hist. and Arch. Soc.
Roebuck, A. 1934. Lincolnshire Duck Decoys. *Lincolnshire Magazine* 2: 134–138.
Saunders, D. 2008. "For Five Shillings this duck can be yours" – a history of the Orielton Decoy. *British Wildlife* 20(1): 37–43.
Shrubb, M. 2013. *Feasting, Fowling and Feathers: a history of the exploitation of wild birds*. Poyser, London.
Stott, T., & Mitchell, C. 1991. Orielton Duck Decoy: the story of its decline. *Field Studies* 7: 759–769.
Whitaker, J. 1918. *British Duck Decoys of Today, 1918*. Barlington Publishing, London. Available at: https://openlibrary.org/books/OL7081963M/British_duck_decoys_of_today_1918.

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HABITAT MANAGEMENT NEWS

Compiled by Conservation Management Advice, RSPB

Rejuvenation management to improve hedgerow habitats for wildlife

The role played by hedgerows is well known and documented. They make a significant contribution to the historic, cultural and landscape value of the countryside and provide habitat for a wide range of flora and fauna, several groups of which have been shown to have positive associations with hedges of dense woody structure and few gaps, a good width and many layers of vegetation.

In some European countries, hedges are protected by legislation and designated a priority habitat under the EU Biodiversity Strategy. Several European countries provide financial incentive for appropriate management under agri-environment schemes, while in the UK the 1997 Hedgerow Regulations limit their removal.

Despite the profile, however, in the UK there has been a decline in the length and structural condition of hedgerows over the ten years since the introduction of the Regulations. This has been attributed largely to a lack of rejuvenation management, neglect and over-frequent trimming with mechanised flails. A similar pattern of deterioration is being experienced across much of north-west Europe.

Rejuvenation management to promote vigorous basal growth is necessary in order for a hedge to maintain its dense structure and to prevent it from becoming leggy and gappy. Hedge-laying has for many centuries been the traditional form of management used in several European countries. Another traditional method is coppicing and the removal of most of the above-ground part of the hedge.

In the UK, the proportion of hedge-laying fell from around 50% in the mid-20th century to about 2% by 2007. Over a 40-year rotation this equates to 16–27% of hedges being rejuvenated. Similar reductions have been experienced elsewhere in Europe.

Research over the past 20 years has revealed how the method of rejuvenation can have an effect on the hedge's rates of regrowth and structure and subsequent habitat value for wildlife. Layed hedges have tended to show the greatest diversity and abundance of species ranging from plants and invertebrates to birds and mammals.

As a result of the continued deterioration in the structure and condition of hedgerows, it has been realised that there is a need to develop cost-effective methods of rejuvenation which are comparable to the rates of woody regrowth and dense basal structure achieved by traditional methods.

A recent paper published in *Biological Conservation* reports on testing conducted on the effects of three modern alternative methods of rejuvenation on hedge structure and provision of berries for wildlife, and compares them to traditional hedge-laying, coppicing and an unmanaged control, using a large-scale manipulative field experiment. The methods tested included two newly developed, faster alternatives to hedge-laying (conservation hedging and wildlife hedging), also reshaping with a circular saw, and coppicing to ground level.

The paper hypothesises that:
1. modern alternatives to traditional hedge-laying are cheaper to apply to typical hedgerows in intensively managed landscapes;
2. these alternative methods would have a similar beneficial effect on hedge regrowth and structure; and
3. provision of berries by hedgerows for overwintering wildlife would initially be most reduced by coppicing compared with other forms of rejuvenation, but any reduction would be relatively short-term.

While the results are directly relevant to agri-environment schemes in England, the study's conclusions have broader Europe-wide significance for countries implementing similar schemes or other forms of hedgerow-management regulation.

Five sites were chosen, four of which were dominated by mature Hawthorn *Crataegus monogyna*: at Monks Wood and Wimpole Hall, both in Cambridgeshire, Newbottle Estate, in Northamptonshire, and Utcoate Grange, in Buckinghamshire. The fifth site was at Crowmarsh Battle, in Oxfordshire. The hedge there was a younger mixed-species hedge, dominated by Hawthorn, with smaller amounts of Blackthorn *Prunus spinosa*, Field Maple *Acer campestre*, Spindle *Euonymus*

europaeus, Buckthorn *Rhamnus cathartica* and Wayfaring Tree *Viburnum lantana*.

As Hawthorn was the dominant species across all five trial sites and is the dominant hedgerow species across England, it was the focus of assessments for regrowth and berry provision following rejuvenation in the trials.

In November 2010, the hedgerow-rejuvenation treatments were applied at five sites to 24m-long contiguous hedgerow plots in a randomised-block experiment:

Traditional hedge-laying The Midlands-style hedge-laying involves the cutting and removal of about half of the hedge's woody volume. Main stems were partially severed at the base, leaving a small section of living cambium intact, laid over at approximately 35°, and woven into a dense, woody, linear feature. Remaining branches were then laid to one side of the hedge, leaving the other side bare with no branches. Frequent stakes and top binders were used to secure the stems and branches in place.

Conservation hedging This is a quicker alternative to traditional hedge-laying. Stems were cut at the base (as above) and laid over. Remaining stems and branches were laid along the line of the hedge, rather than to one side. Fewer branches were removed, stakes were used sparingly, and binders omitted.

Wildlife hedging A chainsaw was used to make rough basal cuts on every stem, and the hedge was pushed over along its length with a 360 digger bucket. No brash (woody stems and branches) was removed, and some stems were entirely severed when the hedge was pushed over.

Circular saw A tractor-mounted circular saw was used to cut the sides and top of the hedge, thereby reshaping it into a tall, box-like structure. Future management would consist of similar periodic reshaping every 8–10 years.

Coppicing Hedge stems were cut close to ground level with a chainsaw. Almost the entire volume of the hedge was removed.

Control No rejuvenation applied.

Each rejuvenation method was replicated two or three times at each of five sites (a total of 12 replicates). Contractors who specialised in each form of rejuvenation were employed to apply the treatments, to ensure that they realistically resemble hedgerow rejuvenation in the wider countryside. Wildlife hedging and circular-saw reshaping could not be applied at Crowmarsh Battle, as the hedge was not mature enough.

A total of seven variables was measured across the five plots. These were:

1. Contract cost for each rejuvenation method used.
2. Rates of regrowth following rejuvenation.
3. Regrowth from basal cut stools.
4. Regrowth in the hedgerow canopy.
5. Dead-foliage cover.
6. Hedgerow structure.
7. Berry provision for overwintering wildlife.

The methodology and results for each of the above assessments are discussed in relation to the impacts on wildlife and are illustrated in detail in the paper.

This study is the first quantitative test of new approaches to hedge-rejuvenation management. The use of a large-scale manipulative field experiment over three years provides robust evidence for the relative cost of five rejuvenation methods and their effects on the value of hedgerows for wildlife in terms of hedge structure, regrowth and berry provision. This evidence for the benefits of new, cost-effective methods of hedgerow rejuvenation is urgently needed if we are to halt the decline in hedgerow condition.

Three 'laying' methods and coppicing were effective at improving hedgerow condition by stimulating basal regrowth, increasing the density of woody material at the base and reducing gap size. When cost is not a driving factor, traditional hedge-laying has a recognised aesthetic and cultural appeal and a key role to play in hedgerow rejuvenation. The study demonstrated, however, that cheaper alternative methods of rejuvenation can increase the habitat value of hedgerows for a range of wildlife to a similar extent to that of traditional hedge-laying, through successfully stimulating regrowth to increase the density of woody material in the hedge base and reduce the size of gaps.

The paper recommends the widespread use of conservation hedging as an alternative to, or to complement, traditional hedge-laying. The lower cost of conservation hedging could result in double the length of hedgerow being rejuvenated. The use of coppicing should be restricted to areas with a low chance of deer browsing, and should be carried out on small lengths of hedgerow at any one time in order to minimise short-term impacts on wildlife such as small mammals. This new management approach realises a potential to double the length of hedgerow currently rejuvenated under agri-environment schemes.

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Reference

Staley, J. T., Amy, S. R., Adams, N. P., Chapman, R. E., Peyton, J. M., & Pywell, R. F. 2015. Re-structuring hedges: Rejuvenation management can improve the long term quality of hedgerow habitats for wildlife in the UK. Biological *Conservation* 186: 187–196. See also: www.hedgelink.org.uk

Managing for Scotland's mountain plants

Some of Scotland's most iconic habitats are found in the mountains. Caught between the warm and wet weather from the Atlantic and the cold, dry weather from Europe, these mountains are home to a unique community of plants – the arctic-alpines – with species characteristic of European alpine mountains growing alongside others from arctic Scandinavia. A significant number of these species, however, are in decline, faced with challenges such as climate change and unsuitable land management. On International Mountain Day (11th December 2015), Plantlife Scotland published some new management advice, aimed at ensuring that future generations can enjoy these special mountain plants.

Blaeberry and Crowberry heath with *Racomitrium* lichen, taken at Brown Cow Hill, Aberdeenshire. Deborah Long

From the upland mires and springs where such plants as Starry Saxifrage *Saxifraga stellaris* grow to the alpine plateaux of the Cairngorms where mosses and liverworts carpet the ground, these arctic-alpine communities have adapted to survive the harshest of living conditions. These plant communities have existed here for thousands of years, and owe their existence to the combined natural effects of climate, aspect and soil chemistry with minimal land management.

Many of the species living here, such as *Sibbaldia*, Moss Campion *Silene acaulis* and Mountain Azalea *Rhododendron canescens*, are rare, fragile and slow-growing. They are adapted to survive the harsh conditions of the mountain tops that quicker-growing plants from low altitudes cannot tolerate. But these slow-growing species are at risk from a number of factors related to climate and management.

Key threats facing Scottish arctic-alpine plant communities include:

Burning Muirburn is the traditional practice of burning off old growth on a heather moor to encourage new growth for grazing and Red Grouse *Lagopus lagopus*. At high altitudes, the severe climate restricts the growth of shrubs and fire destroys these plant communities. They should never be burnt.

Grazing These plant communities are adapted to grazing. The right level of grazing keeps down competition from shrubs and grasses and creates micro open habitats for mosses and lichens to colonise. Heavy grazing, however, creates too much bare ground, which these slow-growing species cannot fill. This leads to erosion, which at high altitudes can be severe and exacerbated by low temperatures and high rainfall.

Changing weather conditions As the climate changes and becomes less predictable, with drier spells and warmer winters, these plants have nowhere left to grow, as they are already at the tops of our mountains.

Atmospheric pollution Perhaps surprisingly, pollution can still reach our mountain tops. Nitrogen from car fumes drifts high above the glens and is a particular problem in spring, when the snow melts and allows an influx of nitrogen into mountain soils and water systems.

'These high-altitude Scottish specialist plants are part of our mountain heritage,' says Deborah Long, Head of Plantlife Scotland. 'With climate change, they need, more than ever, the sort of land management that creates and maintains a habitat where they can survive and thrive. What they actually need most is a kind of benign neglect, where there is no burning and a bit of grazing.

'The Scottish public can also help: we require more data on how these plant communities are doing. You can help by taking part in the National Plant Monitoring Survey this year and by visiting a mountain area every year to keep track of how mountain species like Blaeberry, Ling Cowberry and Mossy Saxifrage are doing.' **Contact: Katie Cameron. Email: katie.cameron@plantlife.org.uk. Tel: 01722 342759. Download Plantlife Scotland's management leaflet from http://www.plantlife.org.uk/publications/managing_for_scotlands_mountain_plants.**

Anyone with information on the success or failure of any management technique is invited to contact John Day, Land Management Adviser, RSPB Conservation Management Advice, The Lodge, Sandy, Beds SG19 2DL; tel: 01767 680551; fax: 01767 683640; e-mail: john.day.lodge@rspb.org.uk.

Letter from the far West Coast

Michael Viney

Last winter, Ireland suffered its own calamitous floods. The River Shannon, notably, swamped great reaches of the farming midlands, along with its bankside towns and floodplain bungalows. The island is a raggedy saucer, with central limestone hollow and mountainy, metamorphic rim. Safe, if stormswept, on my hill above the Atlantic, I watched the rains make their first landfall, a day or so ahead of the UK.

Flowing slowly down the middle of Ireland, the Shannon has flooded for millennia. 'Draining the Shannon' was an aspiration of Irish independence. In the 1950s, after another calamitous flood, the government borrowed Colonel Louis Rydell from the US Army Corps of Engineers, a notable tamer of the mighty Mississippi. He mapped channels to be dredged, warned of cost and complexity, and moved on to the flooding of the Indus, in Pakistan.

His advice inspired decades of Ireland's state drainage, its rough dredging leaving many lowland rivers as canals, their banks heaped with spoil. As in Britain, reform of river engineering had to wait on ecology and the impact of EU nature directives. Ireland had no crusaders like Jeremy Purseglove, but measures like those which he offered in his influential *Taming the Flood* (1988) began to take effect, and riverbeds and vegetation were allowed to heal.

The Shannon catchment is the Republic's wildlife heartland, its wetlands and seasonally flooded fields a major winter retreat for Europe's migrant waterfowl. Much of it is now parcelled out into SACs and SPAs for the EU Natura network. They conserve, for example, the 'callows', or water meadows, of the middle Shannon, both for wintering migrants and for nesting native waders, on grassland that has never been ploughed or reseeded. On the lower Shannon, an SAC protects nationally rare water flora and threatened riverbank bryophytes. Its tributaries hold all three of Ireland's lamprey species, and its lakes harbour the Arctic Pollan *Coregonus autumnalis* along with native salmonids.

Corncrake. Bill Coster/FLPA

Living and working in a landscape hedged about with restrictions – the few surviving raised bogs that must not be cut for fuel, farmland streams that may not be dredged or scalped of bushes, meadows that must not be 'improved' – the small farmers of the Shannon corridor have spent decades in uneasy, often resentful, thrall to conservation, with grants for mowing regimes designed to suit the dwindling Corncrake *Crex crex* population.

Farther west, the floods have deluged low-lying farmland in south Galway, on the northern flank of the Burren, where a karstic limestone landscape creates turloughs. These winter-filling lakes, distinctive to Ireland, also bring flocks of migrant wildfowl, their conservation competing with plans for river drainage.

Marooned once again, their livestock huddled on the last grassy atolls and swans, geese and ducks sailing out across their land, small farmers in half-a-dozen Irish counties have only one cure in mind – dredging and more dredging. They may wonder how the EU's nature directives can withstand the events of climate change.

Last spring, the European Commission announced a 'fitness check' on the workings of these directives. It wondered how far conservation might now safely be delegated to national governments. The very thought alarmed most European NGOs, familiar with the domestic political power of farming and other lobbies.

Meanwhile, the Commission is gathering national responses to its Floods Directive. At a consultation conference in Brussels in November last year, NGOs heard that 'the practical implementation of an integrated floods-nature management approach remains in the initial phase in many member states'.

If intensive study of historical flooding makes a good start, then Ireland has been doing its best. Its Catchment Flood Risk Assessment and Management (CFRAM) programme compiles studies of great detail and diligence. Even here on the Mayo coast, where our local, small trout river, the Bunowen, descends from a mountain pass, its occasional floods at Louisburgh village are chronicled attentively.

The production of flood-risk maps from such data, however hydrologically skilled, does seem problematic. Those for the Shannon may need revision, given the winter's remarkable chain of rainstorms. As the first landfall of such highly saturated clouds, the west of Ireland (which is everywhere beyond the Shannon) seems doomed to suffer not merely the predicted 25% increase in winter rainfall, but storm-blown deluges sucked up by each extra degree of ocean warming.

The calculations of CFRAM do allow for a scaling-up of flood flows of 30% in its 'high-end future scenario'. That seems more than enough for an island like a saucer. As human settlements take priority, and most money, in defensive engineering, ambitions for the Commission's 'integrated flood-nature management approach' could come under increasing strain.

References

Office of Public Works CFRAM studies. www.cfram.ie.
Purseglove, J. 1988. *Taming the Flood: a history and natural history of rivers and wetlands.* Oxford University Press.

THE INCREASING IMPORTANCE OF MONITORING WILDLIFE RESPONSES TO HABITAT MANAGEMENT

Rob Fuller, Matthew Marshall, Brian Eversham, Paul Wilkinson and Karen Wright

Tests of habitat restoration could be valuable in helping to reverse the decline of the Nightingale.
Edmund Fellowes/BTOImages

The authors argue for a more strategic approach to monitoring the consequences of conservation actions and for greater sharing of the results.

Habitat loss and habitat degradation are fundamental causes of wildlife impoverishment in Britain in recent decades. The large-scale creation, restoration and management of habitat have become a crucially important focus of conservation, with a rationale for action now provided by Lawton *et al.* (2010). A strategic landscape-scale approach is vital in working towards the recovery of nature, and this is recognised in the Government's 2011 Natural Environment White Paper. In our crowded island, where the pressures on land are exceedingly high and the resources available to conservation very limited, it is a huge challenge to establish the types of habitat networks essential for maintaining and expanding the populations of many species. Nonetheless, remarkable work is being carried out across the conservation movement. This magazine has highlighted achievements in creating or restoring large sites or landscapes, including Lakenheath Fen (Sills & Hirons 2011), Thorne and Hatfield Moors (Lunn *et al.* 2011), The Great Fen (Bowley 2013) and Wallasea (Ausden *et al.* 2015). A recent article on the Meres and Mosses (Jones 2015) illustrates the reality of implementing Lawton's four primary principles of creating landscapes with *more, bigger, better* and *joined* habitat (Lawton *et al.* 2010). There is no simple blueprint; each landscape needs to be considered individually in terms of the needs of key species and the opportunities that exist for habitat creation or restoration.

Given the constraints on land availability for conservation, it is increasingly important that those areas under conservation management are subject to the most effective interventions to achieve the greatest effect (Baker & Fuller 2013). The most certain way to ensure survival of populations of localised species and ones with specialised habitat needs is to increase the area of high-quality habitat (Hodgson *et al.* 2009, 2011). This must take account of the critical needs of these species in terms of features such as soil type, water chemistry, preferred foodplants, microtopography and vegetation microstructures. In contrast, many interventions focus on very generalised prescriptions for managing vegetation that do not necessarily create the diversity of structures required by many of the species, especially invertebrates, that should be

Box 1 *WildSurveys*: an online system for recording wildlife responses to conservation interventions within Wildlife Trust Living Landscape schemes and reserves

This new internet-based monitoring concept has been developed by the British Trust for Ornithology and The Wildlife Trusts as a means of tracking responses of selected wildlife taxa to habitat creation and restoration within Living Landscape schemes and Wildlife Trust reserves. It provides a flexible data-capture system that can be adapted to many different habitat contexts, types of intervention and species groups. The system is being trialled within The Wildlife Trusts. The development of suites of related case studies, focusing on similar habitat interventions, will be encouraged in order to maximise the gain in knowledge about wildlife responses. In the long term, it has the potential to provide a framework for addressing specific questions about management interventions and habitat creation at landscape scales if sufficient case studies can be maintained for selected species groups.

WildSurveys strongly encourages the use of structured designs with controls wherever possible and relevant. The emphasis is on monitoring changes in numbers of individuals over time at carefully selected locations, using simple field protocols specific to the target taxa.

Although any species groups could be monitored through *WildSurveys*, several priority species groups of invertebrates and vertebrates have been identified; it is hoped that higher plants would be recorded at all selected locations. Recommended field methodology is based so far as possible on established practice in order to allow integration with national recording schemes.

The system allows the definition of exact study-site boundaries and the selection of sample locations within these. Data can be gathered and recorded in several different ways, so that the scale of data-recording is appropriate for the species group, the habitat type and the question being addressed about the intervention. Counts can be made at sample points, along sample transects or for whole plots as appropriate for the species group and location. The nature of the intervention, broad habitat types and vegetation structure are all recorded within the system. Vegetation structure is recorded at the sampling locations by means of a novel and rapid approach in which observed structure is visually matched to diagrammatic structures.

characteristic of those environments (Dolman *et al*. 2011, 2012). Hence, we use the term 'habitat quality' in the context of the resources on which species depend, rather than in the sense of some broad notion of vegetation condition.

In an ideal world, all conservation interventions would be underpinned by a comprehensive management plan. This would incorporate not just the definition of objectives and the management actions intended to achieve those objectives, but also appropriate monitoring to determine whether satisfactory outcomes had been achieved (Ausden 2007). This would allow adaptive management whereby the plan is subject to review and then, if necessary, modified on the basis of clear evidence derived from the monitoring. In reality, the vast majority of conservation interventions are not systematically monitored. This often comes down to cost – understandably, resources are usually prioritised for purchase and management. In addition, apparently well-established techniques are frequently believed to deliver strong benefits for wildlife and it is thought that testing such assumptions is unnecessary. This is a worrying situation for several reasons. First, not all widely applied interventions have, in fact, been thoroughly assessed in terms of what they actually deliver, as pointed out by Denton (2013) in the case of grazing on heathland. Second, many interventions are aimed at one or a few species and the rest of the fauna and flora may be unknown. Third, funders and the public increasingly need assurance that conservation techniques really are successful. It is equally important to know when things work and when they do not, or when they have beneficial but completely unforeseen outcomes. Fourth, the environment is changing in many ways and it cannot be assumed that the established conservation techniques will be successful in the future. For example, many insects are thermally constrained in their choice of habitat, and climate warming may cause them to adopt new microhabitats (Davies *et al*. 2006). Future conservation management will need to consider how best to provide the optimum microclimates for these species (Suggitt *et al*. 2014).

If effective ecological networks are to be created, there is a need to improve understanding of how wildlife responds to the creation and restoration of all types of 'conservation habitat'. Robust monitoring can greatly help conservation decision-making by identifying which types of conservation intervention are likely to produce the best future outcomes for wildlife and over what timescale they are likely to materialise. This information

has huge potential value for understanding which conservation approaches will work best for different taxa and habitat types in the future. In Britain we are fortunate in having national monitoring programmes and atlases that allow us to track the general status of many taxa (Maclean 2010; Preston *et al*. 2012). These schemes generate invaluable data, but very few are designed to inform us about the performance of specific conservation interventions. We argue that the conservation movement needs to become far more strategic in monitoring the consequences of its actions and sharing the results of monitoring.

Some of the most exciting conservation schemes are being undertaken at very large spatial scales. For example, the Living Landscapes initiative of The Wildlife Trusts embraces more than 100 schemes throughout Britain. Individual schemes vary greatly in size – The Great Fen, in Cambridgeshire, is some 3,500ha, whereas Pumlumon, in west-central Wales, is 40,000ha. Monitoring of wildlife in any detail across an entire Living Landscape scheme would be impossible in most cases. We suggest that opportunities should be taken to establish long-term monitoring schemes in sample areas, including nature reserves, where a major effort is being made to create and improve habitat. The emphasis would be mainly on assessing whether habitat of high wildlife quality is being established. The quality of the evidence will be maximised by adopting structured, but straightforward, study designs, some of which we explore in this article. A recently developed online system has the potential to act as a basis for capturing such data and for sharing the resulting information (Box 1).

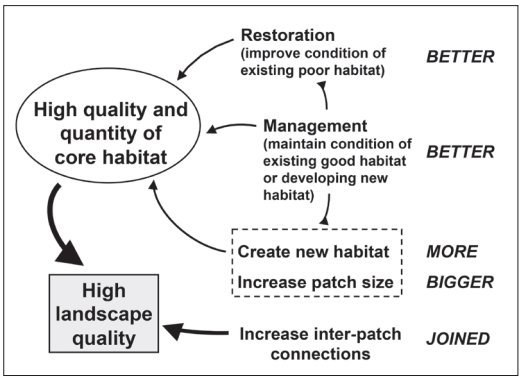

Figure 1 Relationships between major interventions likely to be used for increasing the quality of landscapes for wildlife (with reference to the Lawton Review headline conclusions: Lawton *et al*. 2010). The emphasis is on actions affecting the quality and quantity of core patches of semi-natural habitat and increasing the connections between them. Particular emphasis is given to the importance of establishing and maintaining core habitat, because this provides the critical resources that much wildlife, especially specialist species, requires.

The diversity of conservation interventions

Habitat-based conservation schemes are conducted in many types of landscapes differing greatly in habitats and wildlife. For example, some Living Landscape schemes aim to improve the general 'landscape quality' for wildlife across a defined area. Others have a vision of establishing an expanse of wildlife-rich habitat in a previously wildlife-poor environment (e.g. The Great Fen). Most schemes, however, probably focus on selected tracts of countryside which have high, or potentially high, wildlife value with the intention of enhancing their capacity to support sustainable wildlife populations. The emphasis could be either on meeting the requirements of particular species or on providing diverse habitat structures at micro and macro scales that will support a wide range of species. Given this diversity, it is essential that monitoring approaches are appropriate for local aims and circumstances. Just as there is no single best way of doing conservation, there is no single best way to monitor.

Conservation interventions are frequently targeted at 'desirable' species. These may be locally or nationally scarce, or ones that are especially distinctive of particular habitat types. Extra attention may be given to species that are poor dispersers, because only mobile species will reach new habitat quickly. In all cases, the provision of sufficient high-quality habitat containing the key resources is crucial, but for poor dispersers habitat connectivity becomes increasingly critical. Where there is a strong focus on one or more desirable species, it is obviously vital to understand the basic ecology in order to develop a sound management plan. Several general approaches to intervention can be recognised:

- Increasing structural and functional connectivity to improve movement of organisms between existing habitat patches, establish sustainable metapopulations and facilitate colonisation of potential habitat.
- Creating new habitat patches and extending the

Box 2 Intervention terms

Habitat patch: An area of semi-natural habitat, of any size, forming a unit for some intervention and usually perceived to be distinct from its surroundings in its habitat characteristics.

Core habitat: Habitat patches considered to be of high quality for wildlife. Patches of core habitat will typically be semi-natural and include, but not be confined to, all protected areas and County Wildlife Sites. Not all core habitat is long-established. New habitat and restoration habitat (see below) could, and should, become core habitat in time; in the case of early successional species, this could occur quite rapidly. Core habitat may change as a consequence of succession but nonetheless retain high wildlife importance, albeit for different species.

Restoration habitat: Habitat patches which have fallen into a low-quality state for wildlife and where restoration aims to return them to high quality and to add them to the pool of core habitat. This definition can include patches undergoing restoration and ones that have been apparently restored. Restoration does not necessarily imply the strict re-creation of some former state or condition. Restoration interventions will often be similar to those employed in ongoing habitat management.

New habitat: Entirely new habitat patches which are intended to support viable populations of some species, possibly as part of a wider network of sites. These may be extensions to existing core habitat or entirely separate. Unlike restoration habitat, new habitat involves a fundamental change in land cover, creating wildlife habitat where it did not previously exist, e.g. on former agricultural or industrial land. New habitat and restoration habitat have entirely different starting conditions; this is likely to have significant implications for the trajectory and speed of change in wildlife. The intensity and timing of management interventions are also likely to differ.

Managed habitat: Habitat management is crucial to maintaining habitat quality for target taxa in many contexts. Different management treatments may be employed within the same habitat types, either to benefit different taxa or because responses are uncertain. Management can be subtly different from restoration. Management may have been continuing over a long period with the aim of maintaining habitat suitability, frequently for early successional species, whereas restoration implies a period of neglect followed by intervention aimed at restoring some desired condition.

Connecting habitat: Habitat features within ecological networks that provide 'stepping stones' or that physically link habitat patches in ways that are assumed to facilitate movement of plants and animals through landscapes. The creation of new habitat is usually involved, but restoration may be relevant, for example where particular vegetation structures have been lost as a result of succession. What constitutes biologically meaningful 'connecting habitat' can be difficult to determine, because species differ so greatly in their dispersal ability and in the habitats that facilitate their movement. In reality, connectivity has functional meaning only in the context of the needs and behaviour of the focal species.

Habitat gradients: Frequently, habitat patches may contain various forms of gradient from one condition to another. There may be a transition from dry to wet conditions, from grassland to woodland, from grass to heather, and so on. In the context of wildlife-monitoring, gradients are important. Much wildlife interest may reside at the interface between distinctly different vegetation types. Consequently, these transition zones may need to be explicitly accounted for in monitoring designs. The existence of a habitat gradient can provide opportunities to assess how a species responds to interventions when these are implemented across a range of conditions.

Matrix habitat: The rest of the landscape/region not covered by the previous six categories. It is, therefore, broadly that part of the landscape where there is no particular focus on wildlife conservation within semi-natural habitat patches. Agri-environment measures, however, may occur within the matrix.

area of existing habitat patches. The expectation is that colonisation of new habitat by 'desirable' species will be more rapid when it is located adjacent to existing high-quality habitat.

- Restoring habitat quality through management interventions. 'Restoring' does not necessarily mean reverting to some previous state or condition; a new habitat structure or management system that has wildlife value could be introduced.
- Novel landscape-scale management to create new kinds of plant and animal assemblages. Where habitat patches are sufficiently large, or interconnected, 'natural processes' may form a major element of the conservation approach. It is most likely that this would involve extensive grazing. Outcomes may be entirely 'open-ended' (i.e. no expectation of a particular outcome) or the works be directed at the creation of desired habitat structures. They may allow for the development of shifting mosaics of vegetation which maintain early- and mid-successional habitats in perpetuity.

Relationships between the main types of interventions and approaches to landscape-scale conservation are illustrated in Fig. 1 (page 177). Various ways of testing wildlife responses to these interventions are possible. Given the variation in

objectives and contexts of landscape-scale conservation, a terminology for interventions is helpful (see Box 2). In practice, however, the distinctions are not always clear-cut and there will be grey areas. When does 'created habitat' cease to be thought of as 'new' habitat? When does deteriorating core habitat become potential restoration habitat? When does restoration habitat achieve core-habitat status?

Questions and issues that can be addressed by monitoring

Landscape ecology has established important principles concerning the interaction of species with habitat extent, spatial pattern and fragmentation (Southwood 1977; Lindenmayer & Fischer 2006; Lindenmayer *et al*. 2008). Much of the relevant research has been undertaken in North America or Australia, where the biological communities and, perhaps more importantly, the history and scale of landscape modification are very different from those in western Europe (Martin *et al*. 2012a, 2012b). It cannot be assumed that these findings always offer an optimum basis for developing habitat-based initiatives in Britain. At the simplest level, the existing principles are embodied in Fig. 1 and form the best basis that we have for action. There is, however, much scope for refining these for application in different cultural landscapes and socio-economic contexts. Furthermore, most of these principles have been developed by studying wildlife responses to habitat loss and fragmentation (i.e. existing spatial patterns of habitat), rather than responses to habitat creation and restoration. The latter is not a simple reversal of the former, because many processes and features of the environment will have irredeemably changed through a long history of human activity – for example, nutrient inputs, different assemblages of predators, the loss of former keystone species and the gain of new ones, possibly including some non-native species. Conservation is also operating in a situation in which many species are shifting their geographical range, and potentially their habitat use, in response to climate changes, rather than as a result of habitat interventions. Well-designed and conducted monitoring can help to distinguish these confounding factors and address many questions relevant to conservation in modern and future landscapes. To some extent the answers are likely to be specific to different contexts and taxa, but general principles may emerge that build on those which we already have.

Coppice under restoration in west Dorset. How quickly do species of young open woodland colonise woodland being brought back into a coppice rotation after a long period of neglect? Rob Fuller

Six generic questions about habitat creation and restoration are listed below. These and similar questions are frequently posed by conservationists; in addition, a profusion of specific questions could be asked with regard to how wildlife responds to different management treatments within core, restoration or new habitat. This list is not definitive; other types of question could be formulated, and regional priorities vary, as do the contexts in which the questions may apply.

1. How does wildlife in new habitat change over time and how does it come to compare with that in existing similar core habitat?
2. How does wildlife in restoration habitat compare with that in existing similar core habitat?
3. How does wildlife respond within restoration and new habitat when isolated from, or adjacent to, core habitat?
4. How does provision of connecting habitat between otherwise separate patches of core, restoration and new habitat affect wildlife?
5. Is close proximity of new or restored habitat adjacent to core habitat a better option for wildlife than provision of connecting features between core habitat patches?
6. How do habitat structure and composition within the matrix (the land between patches of conservation habitat) affect conservation success within core, restoration and new habitat (in the absence of provision of connecting habitat)?

As resources available for conservation are limited, decisions will frequently be needed about where to invest effort. One way to tackle this is to identify those opportunities that give the greatest information gains, for instance by answering several of the above questions. Questions 1 and 2 are relatively basic but critically important, especially when they are framed in the context of particular management approaches adopted in habitat creation or restoration. Questions 3 to 6 are somewhat more refined variants of the first two questions.

Some real-life examples of potential monitoring studies are given in Box 3 on page 182, together with the questions and general approaches that could be adopted.

Basic monitoring approaches and study designs

Decisions will usually be needed on how to maximise the quality and value of the information derived from monitoring for the resources that can be committed. Four points are of paramount importance.

1. The monitoring needs to be sustainable in terms of available resources and commitment. We advocate simple designs, rather than complex experiments. Resources will always limit what can be undertaken and, the more complicated the monitoring scheme, the less sustainable it is likely to be.
2. The data need to be gathered by using the same methods and intensity of sampling over time to ensure long-term comparability.
3. The treatment itself (i.e. the exact interventions) needs to be well documented and measures of habitat change recorded.
4. There is absolutely no point in embarking on monitoring if there is no chance that it will produce relevant and reliable information. The objectives need to be clear and the basic design must be appropriate. This requires consideration of controls, benchmarks, replicates, sample sizes and sampling frequency.

The inclusion of *control habitat* is often essential in order to determine whether the intervention is really making any difference to wildlife. It may be possible to strengthen the design further by gathering data before the intervention is made, allowing a 'before and after' comparison as well as a 'with and without intervention' comparison. *Benchmark or reference habitat* forms a complementary concept in representing a desirable state or condition that one may wish new or restored habitat to attain. Ideally, several examples (*replicates*) of the particular intervention of interest are needed in order to be reasonably sure that the observed response is constant and general. The countryside is hugely complex, and in practice these concepts can be difficult to apply, so they are discussed in more detail later in this article.

Large habitat-creation schemes present rather different monitoring challenges from those in which relatively small-scale interventions are spread more widely across the landscape. The former are 'landscapes in themselves' and the monitoring can be structured in such a way that replicates are internal to the initiative. Monitoring of smaller interventions, however, does not usually provide information about whether wildlife improvements are being realised at the wider landscape scale. 'Landscape' in this context does not, for example, have to mean an entire Living Landscape. It could be sensible to target monitoring on *focal areas* where there is an especially strong prospect of creating or restoring substantial amounts of wildlife-rich habitat. In the long term, conservation is more likely to have influence in the sphere of protecting and creating semi-natural habitat than it is in enhancing the quality of the agricultural and urbanised matrix. *Focal areas* may, therefore, be best located where quantities of semi-natural habitat are relatively high.

The emphasis here is on developing appropriate study designs, rather than on how to analyse the

Woodland glade at Swanton Novers NNR, Norfolk. Techniques for the creation of complex glade structures in woodland have been little studied.
Rob Fuller

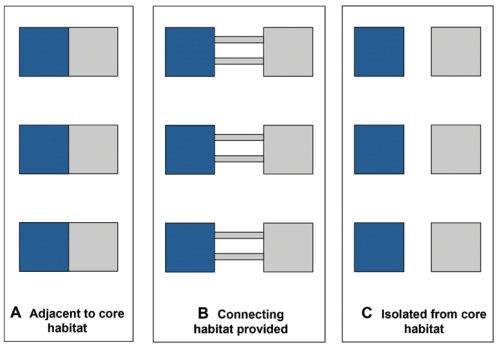

Figure 2 Three types of contrasts (A – C) for monitoring creation of new habitat, with three replicates in each case. Each block represents a site. Blue = core habitat; grey = new habitat. The core habitat provides a benchmark against which the effectiveness of the habitat creation can be assessed. If the goal of habitat creation is entirely open-ended, reference to core habitat is less important. Monitoring just A, B or C would be valuable, but it would be even better to monitor A & B or A & C as this would additionally give insights into the consequences of connectivity and isolation. Similar designs could be developed to account for the complexity of the matrix habitat. For instance, B could involve creating new habitat in a landscape with many existing potential connecting features.

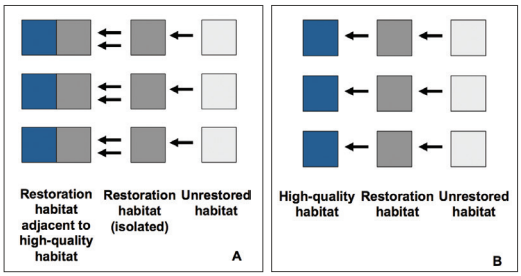

Figure 3 Simple contrasts of sites selected to monitor effects of habitat restoration. A is a study of the effects of restoring habitat in close proximity to existing high-quality (i.e. core) habitat. B examines wildlife trends in isolated sites. In each case three replicates are shown. The expected improvement and relative scale of improvement in wildlife is indicated by arrows. The core habitat provides a benchmark against which the effectiveness of the habitat restoration is assessed. The unrestored habitat provides a control for judging whether the restoration is making a difference to wildlife. The ideal would be to include both control and benchmark habitats. If a choice has to be made, however, it is probably best to invest effort in monitoring control habitat.

data that will accrue from the monitoring. Appropriate statistical analysis is important, but a monitoring study that is well designed at the outset will make the job of data analysis and interpretation far more straightforward. It is recommended, however, that some basic statistical advice is sought on the numbers of sample locations that may be appropriate when gathering data through point samples, either for species or for habitat.

Fixed-plot contrasts

It is suggested that, wherever possible, straightforward contrasts be adopted that allow the effect of a particular conservation intervention to be assessed. So far as possible, sites that are being compared should be similar in habitat type, soil type, elevation and surrounding-landscape composition and structure, but differ in the attribute of interest. This could involve contrasting wildlife responses under different restoration/management treatments, or one might compare treatment habitat with control or benchmark habitat. Contrasts are valid only if made between habitat patches or sites that have substantial features in common, though exact matching is rarely, if ever, possible in the real world.

Diagrammatic examples of site-selection designs for monitoring wildlife responses to creation of new habitat are shown in Fig. 2. These designs take into account the proximity of existing habitat and the creation of connecting habitat. Fig. 3, on the other hand, shows designs that focus on habitat restoration. In both instances, it would not be necessary to implement all the options shown to gather really worthwhile data. The taxa-specific sampling approaches would vary. In some cases this might involve taking many point samples within each habitat patch (this could be the case for surface-active or aquatic invertebrates and higher plants), whereas extensive transects or even whole-plot counts might be taken for other species groups (e.g. adult dragonflies, butterflies and birds). In practice, it would be necessary to adopt sampling that allowed for management or restoration that was implemented at different times in different locations.

In many circumstances it is by no means necessary to sample every year. The intervals between sampling, however, do need to be determined in

Box 3 Case studies: examples of monitoring wildlife responses to interventions in early successional habitats on Wildlife Trust reserves

Scrub-grass mosaic at Draycott Sleights, Somerset. Kiff Hancock

Mendips limestone grassland, Somerset

Draycott Sleights is a 65ha SSSI located on the southern scarp of the Mendip Hills, and is owned and managed by Somerset Wildlife Trust. The underlying geology of limestone and windblown loess, alongside historical management, has created complex mosaics of CG2, CG3 and MG5 grassland interspersed with scrub developing into secondary woodland. The site is important also for invertebrates, particularly butterflies (with 32 breeding species). Monitoring aims to assess the impacts of management to (i) restore degraded mesotrophic and scrubbed-over areas and (ii) maintain the botanical interest of high-quality calcareous grassland. Key questions are, first, how best to retain a dynamic habitat mosaic beneficial to the target species and, second, what the responses of grassland species are to scrub clearance, focusing on recovery times and impact of mulch depth on recovery. A variety of techniques is used, including point samples in grids or transects to identify changes in vegetation communities and to monitor recovery of grassland after scrub clearance.

Ash regeneration at Arger Fen & Spouse's Vale, Suffolk. Rob Fuller

Former arable farmland, Suffolk

This site consists of several formerly arable fields owned by Suffolk Wildlife Trust at its Arger Fen & Spouse's Vale reserve. One of the fields was taken out of production some 10 years ago and an area adjacent to an ancient wood was rapidly colonised by Ash *Fraxinus excelsior*, while mixed scrub is developing in other areas. The Ash has subsequently suffered heavily from ash dieback. The other fields were more recently arable and are not yet showing large-scale scrub development. The fields are being left to natural succession for the indefinite future. The long-term vision is for an extensively grazed mosaic of scrub and grassland, rather than dense woodland. Monitoring aims to assess how plant, bird and invertebrate communities gradually change as a result of the policy of non-intervention and light grazing by deer. An understanding of how wildlife responds to the developing vegetation mosaics will inform long-term vegetation management at this and other sites. In total, 96 plots (5m radius) are located throughout the dying Ash and the mixed scrub. Tree, shrub and ground vegetation cover will be estimated at each of these plots on an annual basis. The plots will also form sample units for plants and selected invertebrate groups. Birds will be counted at points along line transects running through all the habitat types.

Magnesian limestone grassland, South Yorkshire

The Yorkshire Wildlife Trust's Sprotbrough Flash reserve contains small areas of limestone grassland that are rich in plant species. This grassland type is localised along a thin belt running north–south between Nottinghamshire and Durham. The site is a former quarry that was landfill, with the original topsoil restored. Birch *Betula* woodland subsequently regenerated over part of the site, while other areas were kept free of trees by grazing. Over the past decade, Hebridean sheep have been used to graze within fenced plots on the open grassland and the woodland has been partially cleared, resulting in a species-rich diverse sward structure with low patchy scrub. Grazing may not be sustainable in the future owing to ongoing antisocial problems. The management question is whether the interest of the site can be maintained through periodic scrub management. Specifically, how do the ground flora and sward invertebrates change with increasing scrub development, and can 'tipping points' be identified beyond which scrub growth becomes detrimental to the conservation interest? Potentially, monitoring of plants and invertebrates following scrub removal could help to identify the optimal successional stages that provide the maximum conservation benefits and, in turn, these could inform adaptive management of the site.

Grassland at Sprotbrough Flash reserve, South Yorkshire. Rob Fuller

Chalk grassland, Kent

The Medway Smile Living Landscape contains several fine examples of unimproved calcareous grassland, such as those along the Wouldham to Detling Escarpment and Queendown Warren SSSIs. These sites are botanically rich and support many plant and invertebrate species of elevated conservation priority, such as Early Spider-orchid *Ophrys sphegodes* and Adonis Blue butterfly *Polyommatus bellargus*. The project run by the Kent Wildlife Trust aims both to restore and to create areas of species-rich grassland on calcareous soils, and to maintain the existing quality of established sites. Management is through grazing with cattle and sheep, restoration through scrub control, and creation on former agricultural land through reseeding and conservation grazing of former pasture. Monitoring aims to answer the questions of (i) whether restoration by scrub removal and creation by agricultural reversion produce species-rich grassland that can support key plant and invertebrate species, (ii) how rapidly changes in plant and invertebrate communities occur, and (iii) how restored and created habitats compare with established grassland. Plant communities, butterflies and ground beetles will be monitored by means of, respectively, 2×2m quadrats, line transects, and pitfall traps and direct searching, in replicates of core, restoration and new habitat, and of current and historical management. Established sites will be used as benchmarks against which changes are assessed.

Recent scrub removal on chalk grassland near Detling, Kent. Rob Fuller

Grazing and turf-stripping on lowland heathland, West Sussex

The Sussex Wildlife Trust's Iping and Stedham Commons reserve (125ha) consists of large areas of heathland, Purple Moor-grass *Molinia caerulea* mire, birch–pine *Betula–Pinus* woodland and small areas of wet heath. Stedham has been 'pulse'-grazed for more than 10 years with cattle. Iping is currently not fenced and, because of the lack of grazing, is losing key species such as the reintroduced Field Cricket *Gryllus campestris*. Heath Tiger Beetles *Cicindela sylvatica* have been reintroduced on Iping on purpose-made 'scrapes' (the stripped turfs used to create more heathland on nearby golf courses). Invertebrate-monitoring has examined the effects of grazing in three areas similar in vegetation and aspect. These were: (i) grazed for 10 years; (ii) summer-grazed, with temporary electric fencing used; and (iii) a control plot with no livestock grazing. All invertebrates were recorded within a one-hour period by several observers, using a range of methods. Records were bulked over multiple visits from April to September. Comparisons between plots were made in terms of the guild composition of the invertebrate assemblages. On the scrapes, Heath Tiger Beetles and other invertebrates were counted by observers walking each scrape at a steady pace per unit area. These data were used to show which scrapes produced the most beetles and the greatest diversity of bare-ground invertebrates.

accordance with the speed with which vegetation and other habitat conditions change in relation to the habitat needs of the target organisms. The rapidity of successional change tends to be far greater in the early stages of habitat development than in later stages. The niches for many early successional species are available for only short periods, so that, if sampling intervals are too wide, these may be missed. It may be possible to adopt mixed sampling intervals, whereby either (i) certain taxa are monitored at shorter intervals than others or (ii) a small sample of sites is monitored at short intervals but a much larger sample is then monitored at longer intervals.

Rotational management, gradients and shifting mosaics

Conservation management frequently involves rotational cutting or mowing, this being the case in many habitat-restoration projects. The conservation interest may reside in the overall diversity created by the resulting vegetation gradients, or may be more focused on particular developmental stages (usually the earlier stages) or the transitions between patch types. Monitoring may be relevant when comparing different rotational treatments or simply in assessing whether ongoing management is providing suitable habitat for target species. It may be necessary to stratify the samples that are taken so that particular stages of vegetation development or transitions are sampled over periods of time.

Monitoring wildlife responses to rotational management or shifting mosaics does not necessarily involve the use of strict controls or reference plots, because the comparisons are essentially those made between the different stages of development. There may, however, be instances when controls would be desirable, especially when a comparison is needed

between managed and unmanaged treatments. Furthermore, one may wish to test responses to different kinds of management by matching samples under different treatments, where 'conventional' or 'traditional' treatments may be regarded as a control against which a 'novel' treatment is compared.

Replicates, controls and benchmarks in the real world

Conservation is frequently dealing with sites that are highly individual, distinctive and sometimes unique. This can make it difficult to find valid and suitable controls, benchmarks or replicates. It is worth bearing in mind that the real world operates by drawing on many kinds of information; not all monitoring has to reach the highest standards of a rigorous experiment. Even though the design might not match the requirements of a peer-reviewed paper in the scientific literature, results from very simple monitoring can be enormously informative.

Wherever possible, it is highly desirable to adopt replicates to measure the effects of specific habitat changes on wildlife; one needs to know whether observed changes are constant. Even two replicates are better than none. The adoption of replicates may, however, prove impractical in some instances. So, are replicates absolutely essential?

An alternative approach is to focus on monitoring case studies, i.e. single examples of habitat creation or restoration. Case studies are definitely worthwhile, especially if the types of contrast discussed above can be included within them. They can act as good-practice demonstration sites, especially where the benefits can be illustrated by using the data from monitoring. Even if no replication is possible at the time, a later case study, following the same interventions and using the same monitoring protocols, may provide an effective replicate some years after. It is strongly suggested that the value of case studies could be greatly increased by forming monitoring partnerships to establish sets of related case studies, each set addressing some intervention matter in common. For example, these partnerships could be among different Wildlife Trusts, with interventions spread across several Living Landscapes. Hence, the 'replicates' might be spread over a wide geographical area. If these case studies were designed and monitored in comparable ways, some of the benefits of replicates within a single scheme could be derived.

Studies of wet-grassland management have determined the conditions that benefit breeding waders such as Lapwing and Redshank. Howard Stockdale/BTOImages

The concepts of controls and benchmarks are clearly closely linked and complementary, the former effectively looking backwards (how far have we travelled?), the latter forwards (how much farther do we have to go?). It is often questionable whether both are needed, and careful consideration should be given on a case-by-case basis. The wider value of controls and benchmarks is context-dependent and depends on the nature of the intervention. Conservationists may feel that neither a control nor a benchmark is justifiable, because both of these merely waste resources and areas of land that could be directed towards priority conservation action on the ground. An argument can sometimes be made that it is self-evident whether or not habitat creation has succeeded – have lots of 'interesting species' colonised or not? This viewpoint is understandable where there is a wholesale transformation of the landscape from one that is demonstrably poor in wildlife, for example where arable farmland is converted to wetland. In such cases, a simple benchmarking process might involve identifying the target species and then establishing systematic monitoring to track whether these species (as well as other 'interesting species') do colonise and, if so, on what scale. Even in such extreme cases, controls are not entirely without value; quantitative evidence that large-scale habitat transformation makes a big difference for wildlife is valuable in policy and educational terms.

In situations of new habitat creation, there may be value in rapidly shifting the emphasis from control to benchmark. In the early stages of habitat creation, one may wish to know how quickly the wildlife in the new habitat is diverging from the starting habitat and which species are benefiting. Very soon, however, the interest may switch to knowing whether the plants and animals are converging on a desired target state. At this point, the monitoring of the starting habitat may cease and effort be redirected on to benchmark habitat. In situations where habitat creation is given the freedom to develop in an open-ended way without any target end point, monitoring of the new habitat without reference to a benchmark would be entirely reasonable. In such cases, it would be interesting to assess how the wildlife compared with that of managed or long-established core habitat at a similar successional stage, although this may be best undertaken as a one-off exercise rather than as part of an ongoing monitoring programme.

In general, benchmark habitat may be more useful than controls in monitoring wildlife responses to habitat creation if the starting point is almost devoid of wildlife, such as arable farmland. When monitoring habitat restoration and management, however, it is often best to choose controls rather than benchmarks. Scientifically, the use of clearly defined controls is best practice because it can produce the most convincing evidence of the effects of an intervention. In the absence of controls, one cannot be sure that changes in wildlife are attributable to the treatment or intervention rather than to some other factor, e.g. changing climate, predator pressure or pollution. In the worst case, monitoring without controls may lead to false conclusions being drawn regarding the effects of conservation interventions. Benchmark habitat may itself be subject to substantial conservation intervention, resulting in 'shifting goalposts'. Furthermore, valid control habitat (poor quality, unmanaged, etc.) is generally easier to find than valid benchmark habitat. There are, in any case, other ways of establishing benchmarks or references than through the monitoring of core habitat. For example, target species may be identified that are known to be present in nearby core habitat and that have the necessary dispersal ability to colonise. The use of atlas data and other biological records can be helpful in setting targets against which outcomes can be measured. The fundamental message is that serious attention should always be given to the rigorous sampling of controls wherever possible.

Final thoughts

The exchange of information to improve the effectiveness of conservation will be increasingly important in the future. Evidence-based conservation is not a new concept; it has been strongly advocated for years (Sutherland *et al.* 2004). A growing repository of information is available at www.conservationevidence.com. This website offers '…a free authoritative information resource designed to support decisions about how to maintain and restore global biodiversity.' Evidence is periodically summarised from the established scientific literature on what conservation actions work (e.g. Sutherland *et al.* 2015), and new original observations are published in its online journal *Conservation Evidence*. Findings from the types of monitoring studies advocated in this article would make valuable contributions to the growing body of evidence – there are many gaps in knowledge, and the environment is constantly changing. In developing the concepts behind *WildSurveys*, we discovered that some practitioners seem to be unaware of the *Conservation Evidence* resource, suggesting that communication between conservation practitioners and ecologists could improve further. While much monitoring activity is happening on conservation land throughout Britain, very little of this is coordinated, or in any sense strategic, so that lessons are rarely extended beyond the site in question. Moreover, some of this monitoring is not designed in ways that can generate robust evidence. Establishing several series of case studies focusing on similar habitat interventions would be a huge step forward.

There are no 'off the shelf' monitoring solutions, because the real world is complex, irregular and messy. The development of habitat-creation initiatives and habitat networks is an ongoing process which creates challenges for monitoring in that opportunities may gradually develop and change over time. It is hoped that the thoughts presented here may help in decisions on how best to tailor monitoring to local needs, while recognising that there is much to be gained from adopting common

Redgrave and Lopham Fen NNR, Suffolk. An example of large-scale wetland-habitat restoration, undertaken in the 1990s by Suffolk Wildlife Trust, which has created a mosaic of reedswamp, sedge fen, lagoons, wet scrub and woodland. Rob Fuller

approaches to information exchange on shared problems and opportunities.

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References

Ausden, M. 2007. *Habitat Management for Conservation – a Handbook of Techniques*. Oxford University Press, Oxford.

Ausden, M., Dixon, M., Fancy, R., Hirons, G., Kew, J., McLoughlin, P., Scott, C., Sharpe, J., & Tyas, C. 2015. Wallasea: a wetland designed for the future. *British Wildlife* 26: 382–389.

Baker, D. J., & Fuller, R. J. 2013. *How can Research help Deliver a 'Coherent & Resilient Ecological Network'?* BTO Research Report No. 628. British Trust for Ornithology, Thetford.

Bowley, A. 2013. The Great Fen – the challenges of creating a wild landscape in lowland England. *British Wildlife* 25: 95–102.

Davies, Z. G., Wilson, R. J., Coles, S., & Thomas, C. D. 2006. Changing habitat associations of a thermally constrained species, the silver-spotted skipper butterfly, in response to climate warming. *Journal of Animal Ecology* 75: 247–256.

Denton, J. 2013. Conservation grazing of heathland – where is the evidence? *British Wildlife* 24: 339–346.

Dolman, P., Mossman, H., Panter, C., Armour-Chelu, N., Nichols, B., & Pankhurst, T. 2011. The importance of Breckland for biodiversity. *British Wildlife* 22: 229–239.

Dolman, P. M., Panter, C. J., & Mossman, H. L. 2012. The biodiversity audit approach challenges regional priorities and identifies a mismatch in conservation. *Journal of Applied Ecology* 49: 986–997.

Hodgson, J. A., Thomas, C. D., Wintle, B. A., & Moilanen, A. 2009. Climate change, connectivity and conservation decision making: back to basics. *Journal of Applied Ecology* 46: 964–969.

Hodgson, J. A., Moilanen, A., Wintle, B. A., & Thomas, C. D. 2011. Habitat area, quality and connectivity: striking the balance for efficient conservation. *Journal of Applied Ecology* 48: 148–152.

Jones, M. 2015. Landscape-scale conservation in the Meres and Mosses. *British Wildlife* 26: 337–344.

Lawton, J. H., Brotherton, P. N. M., Brown, V. K., *et al*. 2010. *Making Space for Nature: a Review of England's Wildlife Sites and Ecological Network*. Report to Department for Environment, Food & Rural Affairs, UK Government.

Lindenmayer, D., Hobbs, R. J., Montague-Drake, R., *et al*. 2008. A checklist for ecological management of landscapes for conservation. *Ecology Letters* 11: 78–91.

Lindenmayer, D. B., & Fischer, J. 2006. *Habitat Fragmentation and Landscape Change: an Ecological and Conservation Synthesis*. Island Press, Washington.

Lunn, J., Middleton, P., & Bull, K. 2011. The restoration of Thorne and Hatfield Moors. *British Wildlife* 22: 322–332.

Maclean, N. (ed.) 2010. *Silent Summer – The State of Wildlife in Britain and Ireland*. Cambridge University Press, Cambridge.

Martin, J.-L., Drapeau, P., Fahrig, L., Lindsay, K. F., Kirk, D. A., & Smith, A. C. 2012a. Birds in cultural landscapes: actual and perceived differences between northeastern North America and western Europe. In *Birds and Habitat: Relationships in Changing Landscapes* (ed. R. J. Fuller), pp. 481–515. Cambridge University Press, Cambridge.

Martin, T. G., Catterall, C. P., Manning, A. D., & Szabo, J. K. 2012b. Australian birds in a changing landscape: 220 years of European colonisation. In *Birds and Habitat: Relationships in Changing Landscapes* (ed. R. J. Fuller), pp. 453–480. Cambridge University Press, Cambridge.

Preston, C. D., Roy, D. B., & Roy, H. E. 2012. What have we learnt from 50 years of biological recording? *British Wildlife* 24: 97–106.

Sills, N., & Hirons, G. 2011. From carrots to cranes: the creation of RSPB Lakenheath Fen, Suffolk. *British Wildlife* 22: 381–390.

Southwood, T. R. E. 1977. Habitat, the templet for ecological strategies? *Journal of Animal Ecology* 46: 337–365.

Suggitt, A., Hodgson, J., Maclean, I., Macgregor, N., Bennie, J., & Hopkins, J. 2014. Microclimate, climate change and wildlife conservation. *British Wildlife* 25: 162–168.

Sutherland, W. J., Dicks, L. V., Ockendon, N., & Smith, R. K. (eds) 2015. *What Works in Conservation?* Cambridge, UK: Open Book Publishers. http://dx.doi.org/10.11647/OBP.0060

Sutherland, W. J., Pullin, A. S., Dolman, P. M., & Knight, T. M. 2004. The need for evidence-based conservation. *Trends in Ecology and Evolution* 19: 305–308.

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How to be wild

Simon Barnes

Marsh Harrier hunting over snow-covered marsh. Paul Sawer/FLPA

Tony Juniper has just been made president of The Wildlife Trusts. Good choice. His books *What Has Nature Ever Done for Us?* and *What Nature Has Done for Britain* should be required reading for all politicians and, for that matter, all voters. His calm, confident explanation of the value of ecosystem services will give the most nature-blind person cause to think again. I applaud every syllable of those two excellent and increasingly relevant works.

All the same, Juniperism is not for me. The essential argument of these two books is that we must look after the wild world because we need it. Because it is useful to us. Because without it we should all be worse off, in many different and, above all, quantifiable ways. And in that word lies the entire strength and weakness of the Juniperist position.

Here is a Juniperist justification for the music of J. S. Bach: It has been a great boon to the tobacco industry and allowed a lot of people to stay employed and to make money. (Readers of a certain age will recall that a chunkette of Bach was used in the advertising campaign with the slogan 'Happiness is a cigar called Hamlet'.)

And here is a Juniperist justification for the National Gallery: It gets people out of the rain. It brings in tourists and that helps the economy. It also adds to British prestige, and that's helpful when it comes to exports and international negotiations.

All that is all very fine and good and true, but it's not exactly the whole story. It ignores the possibility that *The Goldberg Variations* is what angels listen to on their tea-break and it ignores the suggestion that van Gogh's *Wheatfield with Cypresses* is a fragile fragment of heaven.

There's no point in explaining such things to the philistines, to the Widmerpools who run our world: if you don't understand it, I can't explain it. But although most public people – at least in public – hesitate to line up with the philistines of art, they are dismayingly eager to line up with the philistines of nature. Which is why we need Juniperism.

The trouble is that Juniperism falls down if you can replace nature with something better. If you could, say, invent a transpiration machine powered by the wind, we wouldn't need rainforest, would we? If the only argument for nature is financial, the argument fails as soon as you get a cheaper alternative.

Let me stress here that I have not the slightest doubt that Juniper is aware of this, and that he shares with most of us a wider view of nature. I'm sure that we are all agreed that there is more to nature than Juniperism, just as there is more to Gauguin than the fact that someone paid US$300 million for one of his paintings last year.

Sit down for a few moments in the rainforest. Or on the banks of the Luangwa River in Zambia. Or in a butterfly meadow or a wet wood full of bryophytes, or my back garden – choose your own favourite place, choose your own favourite group of species, you can even choose your own weather. We all think the same thing in such circumstances, do we not? We think: this is *good* for humanity. People really *need* this. This stuff really matters in terms of the survival of my species.

Do we hell! Not even for a second. We think: God almighty, isn't this absolutely bloody wonderful?

We may be collecting data, studying for some qualification, doing a job, be committed to science and to reason and to logic – and still we are smitten by this shaft of holy joy: the sheer glory of being alive and breathing the same air as these wonderful living things.

And that, too, is relevant. It's as relevant as any bit of financial calculation and we need to remember that. Those who work professionally in conservation need to walk away from the flickering screen more often and remind themselves why they got there in the first place.

Juniperism is for the unfortunates, for those who lost the love of nature they were born with. Juniperism has its purposes, and I applaud it from the bottom of my brain.

But for me and, I suspect, for most of us, the real response to the wild world comes from the bottom of another vital organ. We need to establish this joy as part of mainstream thinking: so that public people will become as reluctant to admit their philistinism about the wild world as they are to admit their philistinism about the arts.

The marsh I can see from my window as I write is important because it sequesters carbon and holds water and breeds pollinating insects. But sod that! – I've just seen a Marsh Harrier flying across it.

LIVING WITH MAMMALS: AN URBAN STUDY

David Wembridge and Steve Langton

A Hedgehog exploring an urban garden.
Paul Hobson/FLPA

A 12-year study has cast new light upon mammal population trends in urban areas, demonstrating the important role that citizen-science monitoring can play.

Most of us live in urban landscapes. The word 'urban' is variously defined in different countries, but typically it refers to population centres with more than 2,000 inhabitants (UN 2014). Globally, more than half of the human population (about 52%) lives in urban areas (UN 2012); in the UK – where, in England and Wales, the Office of National Statistics (ONS) uses 'urban' to describe settlements with more than 10,000 inhabitants – four-fifths of us are urban-dwellers (Defra 2012), occupying about a tenth of the land area (Davies *et al*. 2011). Within these urban regions, domestic gardens, recreational grounds, cemeteries, allotments, brownfield sites and other areas provide a mosaic of habitats with environmental benefits for local communities. The importance of this 'green infrastructure' in providing what are sometimes called 'ecosystem services' and in wildlife conservation is increasingly recognised (e.g. Alcock *et al*. 2014; Goddard *et al*. 2010; Pugh *et al*. 2012), but the extent of green space is largely unquantified (CABE 2010) and it is not systematically monitored (UNEP 2011). Notwithstanding this, obligations exist under domestic and European law to monitor the protected species such as Hedgehog *Erinaceus europaeus*, bats, shrews and Badger *Meles meles* that make use of these spaces.

The value of interactions between people and the wildlife alongside which they live is difficult to quantify (Soulsbury & White 2015), but there is some evidence to suggest that the health and well-being benefits of green space increase with greater biodiversity (Fuller *et al*. 2007). Increased urbanisation, however, generally reduces species richness across taxa (McKinney 2008). In Melbourne, Australia, a study of indigenous mammals found that, of 54 species present prior to European settlement, fewer than half had a 95% chance or more of surviving to the turn of the current century, and the effect of urbanisation was most marked for small, ground-dwelling species, with only two of 15 species likely to be extant in 2000 (van der Ree & McCarthy 2005). In the UK, changes in the urban environment continue to put pressure on populations: the recent *State of Nature report* (Burns *et al*. 2013) found that 59% of the 658 urban species assessed had declined in the previous

40 years and that 35% had declined strongly (i.e. the population had at least halved over the period monitored or would do so at the current rate over 25 years).

The significance to wildlife of domestic gardens and brownfield sites has received considerable attention (Gaston *et al*. 2007; Gibson 1998; Head 2011; Macadam & Bairner 2012; Owen 2010; Woodward *et al*. 2003), and the potential of volunteer-based surveys to monitor this wildlife has been demonstrated (Toms & Newson 2006), but few surveys have recorded mammal species in the built environment and few data on population trends exist.

Citizen science and wild mammals

Identifying such trends in monitoring projects is necessary in order to assess the success or otherwise of conservation efforts and to inform conservation decisions (Danielsen *et al*. 2005), but professional monitoring is often costly and, as such, unlikely to be sustained over time. Moreover, it can fail to engage stakeholders, which, in urban areas, include the many people who live or work there. Natural-history recording in Britain has a long history, and large-scale, public surveys date back to those organised by the British Trust for Ornithology (BTO) in the first half of the last century, collecting records of paper-tearing and pecking of foil milkbottle-tops by birds. More recently, the potential for 'citizen science' has become apparent with the growth of the internet and mobile devices with GPS, large displays, cameras and the ability to run specialised applications (Jones 2013).

The survey described here started before such 'apps' were commonplace, but the advantages of volunteer-based, citizen-science monitoring extend beyond its particular format, not least that it is generally cost-effective. Taking the National Bat Monitoring Programme as a case study, Battersby (2005) estimated the annual running cost to be less than a fifth of what it would have cost had a similar level of data collection been carried out by professional surveyors. The built environment is a patchwork of separately owned and managed sites, which presents challenges for professional surveys. Residential areas, however, are naturally suited to citizen-science approaches.

Mammals are usually discreet neighbours. Occasionally, activities such as howling, digging or gnawing can raise the hackles of some human residents, but, for the most part, mammals are unobtrusive (typically active at twilight or at night) and only infrequently encountered by people. Surveys therefore require a degree of commitment; moreover, to identify how populations are changing, repeated surveys over time are necessary,

A Fox foraging in a London park at night. Jamie Hall/FLPA

demanding a long-term commitment from volunteers. A lot is asked of survey participants and much can be gained.

Up to 43 mammal species have been recorded in a questionnaire-based survey of gardens (Ansell *et al.* 2001) but, more typically, around two dozen (Baker & Harris 2007; Toms & Newson 2006) are recorded, including seven of the 11 non-bat species formerly designated priority terrestrial-mammal species in the UK Biodiversity Action Plan (Hedgehog, Brown Hare *Lepus timidus*, Red Squirrel *Sciurus vulgaris*, Water Vole *Arvicola amphibius*, Otter *Lutra lutra*, Pine Marten *Martes martes* and Hazel Dormouse *Muscardinus avellanarius*). Only six species or species groups, however (bats, Red Fox *Vulpes vulpes*, Grey Squirrel *Sciurus carolinensis*, Hedgehog, mice and voles), are recorded in a fifth or more of gardens (Baker & Harris 2007).

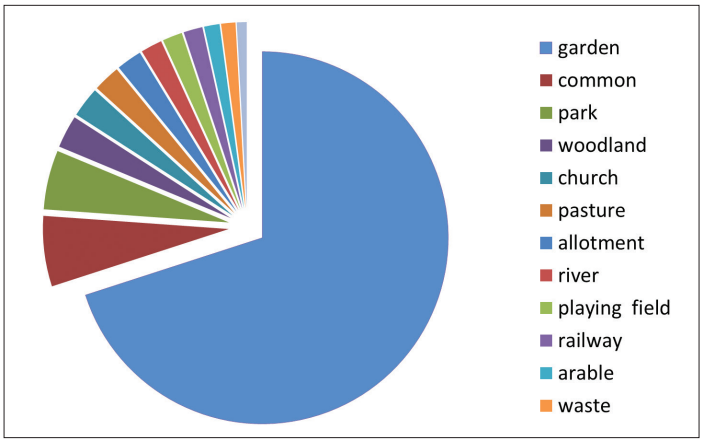


Figure 1 Composition of site types in the survey. The site type of 2,895 sites was identified, gardens comprising 70.0%.

Two surveys, the BTO's *Garden BirdWatch*, described by Toms & Newson (2006), and the People's Trust for Endangered Species' (PTES) *Living with Mammals*, described here, have produced long-term datasets of mammal records in gardens and, in the latter case, other urban green spaces.

For some mammals, urban green space is an important resource. Species that have shown declines in the wider countryside (notably in farmland), such as the Song Thrush *Turdus philomelos* and the Hedgehog, are found in significant numbers in urban areas (Hubert *et al.* 2011; Mason 2000). A better understanding of these relationships and of how species are faring in the built environment will be important in the provision and development of green infrastructure in towns and cities, to improve the lot not only of our wild neighbours but of ourselves as well.

Living with Mammals

The *Living with Mammals* survey started in 2003, with the aim of producing effort-based indices of mammal abundance across the built environment, and has run annually ever since. It was developed by Paul Bright, at Royal Holloway, University of London, and its ongoing management is undertaken by PTES.

Weekly records of sightings and field-signs of mammals are collected by volunteers during a 13-week period each year between the end of March and the start of July, recording the largest group of animals seen at one time. Sites are chosen by participants and identified as one of 13 types, described either by use (e.g. 'allotment' or 'churchyard') or by predominant habitat type (e.g. 'riverbank' or 'woodland'). Information about the site, as well as species records, are recorded in a 'tick-box' format and captured by optically scanning survey forms.

Sites can be any green space within 200m of buildings or wholly within a town or city (for example, within a large civic park). Nature reserves or urban farms are excluded. The pattern of distribution of sites closely mirrors that of built land, indicating that the survey's coverage is predominantly 'urban' in the sense used by the ONS.

In total, 7,500 surveys of wild mammals were collected over the 12-year period, providing data from more than 3,000 sites. Domestic gardens make up the majority of sites in the survey (Fig. 1) and are the largest single category of urban land use, typically making up about a quarter of the area of cities (Loram *et al.* 2007; Smith 2010). The extent of the resource represented by gardens has been characterised in Sheffield University's *Biodiversity in Urban Gardens in Sheffield* (BUGS) and BUGS II projects. Gardens in the eponymous

city were estimated to be home to 360,000 trees, 50,750 compost heaps and 25,200 ponds (Gaston *et al.* 2005b), far more than in other forms of suburban and urban green spaces such as parks and recreational areas.

Species correlation across sites

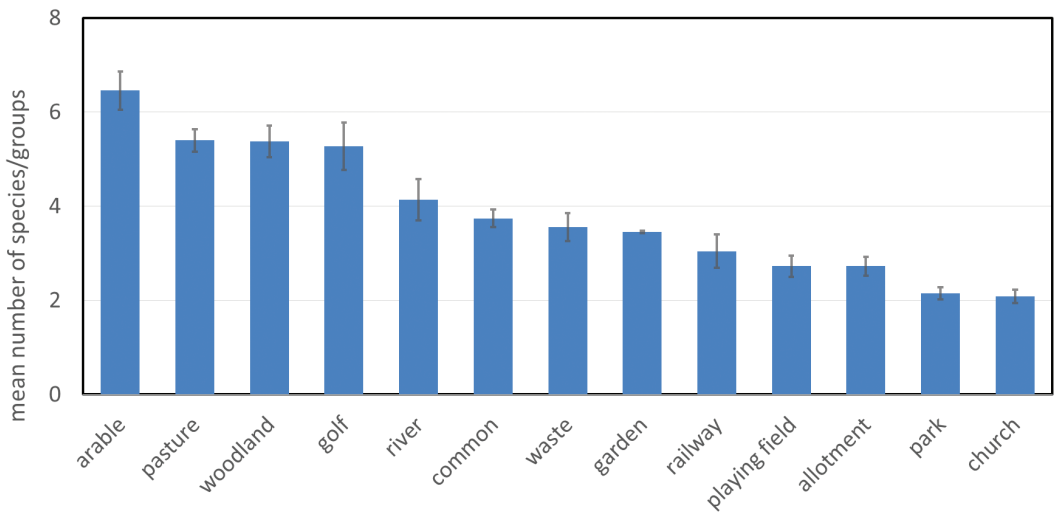
The value of individual efforts to enhance biodiversity in gardens ('wildlife gardening') is generally seen as real, but there is limited evidence for the effectiveness of particular measures to increase diversity. Gaston *et al.* (2005a) found that artificial nest sites for solitary bees and wasps were readily used by the target species, while nettle patches and bumblebee nest sites had a low probability of success (nettles supported few Nymphalid butterfly larvae, but did encourage other nettle-feeding invertebrates). There is evidence that the providing of food sources – berry- and fruit-bearing plants, birdfeeders, ponds, compost heaps, etc. – or features offering shelter – flowerbeds, trees, woodpiles, hedgehog boxes, etc. – in gardens increases the number of mammal species using the site (Ansell *et al.* 2001). Meanwhile, Baker & Harris (2007) found that Hedgehogs and mice were recorded more frequently in gardens with greater numbers of habitats and food-bearing plants; Hedgehogs appeared to respond to increasing food availability more than to increasing habitat diversity.

One aim of the *Living with Mammals* survey, similarly, is to identify features associated with a greater species richness of mammals at sites in the built environment, and participants record 40 characteristics of a site, including its size and age, the type of boundary, and whether features such as trees, compost heaps and nocturnal lighting are present, along with the type of habitats close to the site.

Teasing apart the separate contributions to biodiversity of the different microhabitats that characterise green spaces is difficult, but it is apparent that types of site differ in the mean number of species (or species groups) recorded. After allowing for differences in recording effort and other explanatory variables, significantly more species were recorded on average in gardens than in churchyards or cemeteries, allotments, parks and road or railway verges (Fig. 2). Grey Squirrels and mice were relatively frequent in gardens and, together with bats, Red Fox and Hedgehog, were the most commonly recorded garden species. Derelict or wasteland sites recorded a similar number of mammal species to that in gardens, but Red Fox and deer (Muntjac *Muntiacus reevesi* and Roe Deer *Capreolus capreolus*) were more common at these sites.

The more bucolic sites, those identified as woodland, pasture or arable sites, showed the greatest number of species, and significantly more than gardens did. This was due to higher recording rates of Red Fox and Rabbit *Oryctolagus cuniculus*, and, in the case of arable sites, Brown Hare *Lepus europaeus*.

Figure 2 Mean number of mammal species (+/- SE) at each type of site over the 12-year dataset.



A young Brown Long-eared Bat clinging to a brick wall. Hugh Clark/FLPA

The most ubiquitous species – those for which 'site type' was not a significant factor in explaining their presence – included Hedgehog and Badger, although the latter was only rarely recorded at wasteland or allotment sites. The current fortunes of these two species, discussed below, differ markedly, and an understanding of how each uses and moves about an urban environment may be important in preserving both.

Older sites, particularly those established before 1900, were significantly more species-rich than more recent ones. Grey Squirrel and bats were proportionately more common on older sites, whereas Hedgehog was more likely to be found on sites established in 1950 or later.

Several other site characteristics also had a significant impact on the number of species found, supporting the findings of earlier surveys. One characteristic, the proportion of the site covered by trees or shrubs, is interesting because it follows a finding of the BUGS project, namely that the single feature of gardens most strongly linked to a rich invertebrate fauna is the abundance of trees more than 2m tall (Smith *et al*. 2006). Hedgehog, Grey Squirrel, Red Fox, bats and shrews were all less likely to be recorded at sites with low levels of trees and shrubs. Bats and shrews feed almost exclusively on invertebrate prey; insects and earthworms make up a half or more of the diet of Hedgehogs, and a fifth of that of urban foxes. While it is not surprising that trees are a good habitat for squirrels, this suggests that their impact on biodiversity may extend through the brushwood and leaf-litter habitats which they create, and the invertebrate fauna which these support, to increase mammal abundance.

The patchwork of different sites that make up the built environment, and the diversity of microhabitats within them, collectively can support a rich mammal fauna – so long as sites are accessible and connected. The single factor that was significant for most species, however, was the extent of built land in the 1km grid-square of the site. Those sites with the greatest amount of built land (those in the highest quartile) had on average only 60% of the number of species at sites in grid-squares with the lowest amount of built land (those in the lowest quartile).

Population trends

Each year between 1998 and 2008, London lost on average an area of domestic-garden land (consisting of lawn, tree canopy or other vegetation) equal to two-and-a-half times that of Hyde Park (Smith 2010). Brownfield sites are prioritised for development, and redevelopment of residential

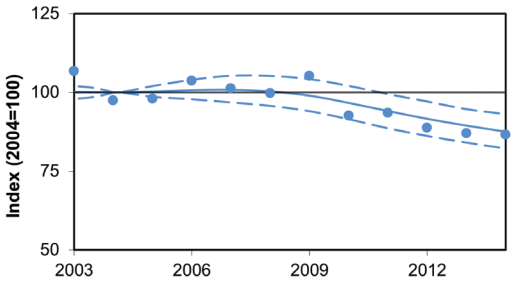


Figure 3 Proportion of sites recording bats. A smoothed curve (solid blue line), for sites surveyed in two or more years, was fitted by using a Generalised Additive Model, and 95% confidence limits (broken lines) estimated by bootstrapping at the site level. Results are based on 400 bootstrap samples.

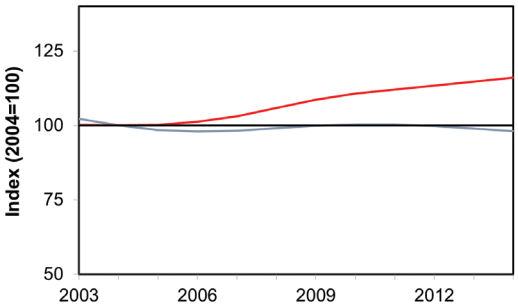


Figure 4 Records of Red Fox. The blue line shows the proportion of sites recording Red Fox; the red line shows the proportion of weeks in the survey period in which Red Fox was reported. For the sake of clarity, annual estimates and confidence limits are not shown.

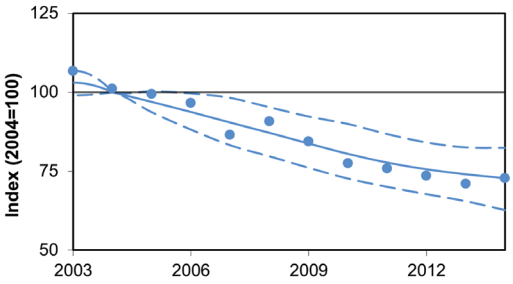


Figure 5 Proportion of sites recording Hedgehog.

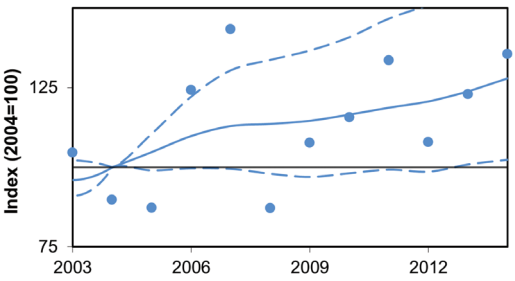


Figure 6 Proportion of sites recording Badger.

housing tends to decrease the area of garden land and increase that of hard features. Given the changing land use in urban areas, how are wildlife populations faring?

Four species or species groups showed a significant change in the proportion of sites occupied between 2003 and 2014: Hedgehog, Badger, bats and mice. Nominally, the trend for Grey Squirrel was also significant, the upper confidence limit for 2014 dipping below the baseline, but this should be treated as provisional until further years' data are available.

The proportion of sites recording bats (Fig. 3) remained constant until 2008, but has declined markedly since then. The likelihood of observing bats was greater if the site was within 100m of a river. Most records are likely to be of pipistrelles, but Daubenton's Bat *Myotis daubentonii*, Brown Long-eared Bat *Plecotus auritus* and Serotine *Eptesicus serotinus* are also frequently encountered in built environments, and most of the 17 breeding bat species in Britain will make seasonal use of buildings for maternity roosts. In the National Bat Monitoring Programme, field surveys of Common *Pipistrellus pipistrellus* and Soprano Pipistrelles *P. pygmaeus* at rural as well as urban sites level off or (in the case of the latter) decline slightly after 2009–10 (BCT 2015), which may underlie the decrease found here.

Records of mice showed a similar pattern to those of bats, but the decline levels off from 2009–10.

The proportion of sites recording Red Fox has changed little since the first year of the survey (Fig. 4, blue line), but the frequency of sightings during the 13-week survey period has changed (red line), the proportion of positive weeks increasing by an average of 1.49% each year. There is some evidence, from an analysis of weekly counts of animals, to suggest that this is due to an increase in abundance (rather than in activity, for example) but, as yet, the current level of site occupation appears sufficient to support the population.

Evidence that the Hedgehog population in Britain is declining has been growing over the past

ten years or so. At the time of the first report of the Tracking Mammals Partnership (Battersby 2005), limited data were suggestive of a decline. A better picture came in a report by Roos *et al*. (2012), commissioned by PTES and British Hedgehog Preservation Society (BHPS), which analysed data from five surveys between 1996 and 2010, including *Living with Mammals*. All the surveys showed declines: a conservative estimate suggests that a quarter of the population had been lost in the first decade of this century (Wembridge 2011). In urban areas at least, this trend appears to be continuing. Fig. 5 shows the proportion of sites recording Hedgehogs in *Living with Mammals*; the average decrease of the smoothed curve per year is 3.12%, exceeding the IUCN Red List criteria identifying species at greatest conservation risk.

Hedgehogs can be locally abundant in built environments. In suburban gardens or on amenity grassland, densities are typically greater than those in rural landscapes (e.g. Young *et al*. 2006), and it is likely that this is a result (at least in part) of the protection which such areas provide from Badger predation (Young *et al*. 2006; Hubert *et al*. 2011). Ansell *et al*. (2001) found that Hedgehogs were 2.5 times less likely to be present in gardens visited by Badgers than in those where Badgers were absent; and Hof & Bright (2009) showed a negative (but non-significant) correlation between Badger presence and Hedgehog presence at sites in the first four years of *Living with Mammals*. The current analysis of the survey shows that Badgers are becoming more common; the proportion of sites recording this species shows a significant increase of 2.49% each year on average (Fig. 6).

Badgers will eat Hedgehogs, but the relationship between the two is an example of asymmetric intraguild predation, in which predator and prey also compete for a shared food source, and the impact on Hedgehogs is more complex than predation and competition alone (Polis *et al*. 1989). The two species coexist in the built environment, and Badgers have a significant negative impact on Hedgehogs in the *Living with Mammals* survey: taking into account site characteristics and survey effort, sites recording Badger are less likely to record Hedgehog. The question is, however: how directly is an increasing Badger population the cause of declining Hedgehog numbers? At sites where Badgers are absent, the downward trend in Hedgehog records is as marked as that at sites where Badgers are present, suggesting that other factors are important. In an urban setting, multiple factors are likely to play a role in shaping the dynamics: the distribution of green spaces and the connectivity between them, the abundance of soil invertebrates and supplementary feeding may be as significant (food availability is balanced against predation risk in intraguild-predation theory). At sites where Badgers are absent, for example, their presence at neighbouring sites may have an effect by limiting the movement of Hedgehogs between areas (Young *et al*. 2006).

Conclusions

The potential of gardens and urban green spaces to support biodiversity is substantial (Head 2011), and their importance in environmental education and engagement is paramount: they are where most of us experience nature day to day. Collectively, these spaces are home to most of our terrestrial mammal species and, as our countryside changes, they may be increasingly important to some. The pressure on wildlife – the loss, fragmentation and degradation of habitat – is, however, common to the built environment as well, and *Living with Mammals* shows that some species are faring better than others. The fall in Hedgehog records, a decrease of 30% since the survey began, is of particular concern as suburban areas are thought to represent refugia for this species.

Monitoring of urban wildlife is important if biodiversity in these environments is to be maintained and improved. Citizen-science surveys and projects such as PTES/BHPS' *Hedgehog Street*, which encourages neighbourhood-scale efforts to improve urban habitats, can be effective conservation tools and provide another level of engagement – an active connection – between human residents and our wild neighbours.

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References

Alcock, I., White, M. P.,Wheeler, B. W., Fleming, L. E., & Depledge, M. H. 2014. Longitudinal effects on mental health of moving to greener and less green urban areas. *Environmental Science and Technology* 48: 1247–1255.

Ansell, R., Baker, P., & Harris, S. 2001. The value of gardens for wildlife – lessons from mammals and herpetofauna. *British Wildlife* 13: 77–84.

Baker, P. J., & Harris, S. 2007. Urban mammals: what does the future hold? An analysis of the factors affecting patterns of use of residential gardens in Great Britain. *Mammal Review* 37: 297–315.

Battersby, J. 2005. *UK Mammals: Species Status and Population Trends*. Joint Nature Conservation Committee/Tracking Mammals Partnership.

BCT. 2015. National Bat Monitoring Programme Annual Report 2014. Bat Conservation Trust. http://www.bats.org.uk/pages/nbmp_annual_report.html.

Burns, F., Eaton, M. A., Gregory, R. D., *et al*. 2013. *The State of Nature report*. The State of Nature partnership.

CABE. 2010. *Urban green area: Building the evidence base*. CABE Space, London, UK.

Danielsen, F., Burgess, N. D., & Balmford, A. 2005. Monitoring matters: examining the potential of locally-based approaches. *Biodiversity and Conservation* 14: 2507–2542.

Davies, L., Kwiatkowski, L., Gaston, K. J., *et al*. 2011. Urban. In: *The UK National Ecosystem Assessment Technical Report*. UNEP–WCMC, Cambridge, UK.

Defra. 2012. *Statistical Digest of Rural England 2012*. Department for Environment, Food and Rural Affairs. http://www.defra.gov.uk/publications/files/pb13642-rural-digest-2012.pdf.

Fuller, R. A., Irvine, K. N., Devine-Wright, P., Warren, P., & Gaston, K. J. 2007. Psychological benefits of greenspace increase with biodiversity. *Biology Letters* 3: 390–394.

Gaston, K. J., Cush, P., Ferguson, S., Frost, P., Gaston, S., Knight, D., Loram, A., Smith, R. M., Thompson, K., & Warren, P. H. 2007. Improving the contribution of urban gardens for wildlife: some guiding propositions. *British Wildlife* 18: 171–177.

Gaston, K. J., Smith, R. M., Thompson, K., & Warren, P. H. 2005a. Urban domestic gardens (II): experimental tests of methods for increasing biodiversity. *Biodiversity and Conservation* 14: 395–413.

Gaston, K. J., Warren, P. H., Thompson, K., & Smith, R. M. 2005b. Urban domestic gardens (IV): the extent of the resource and its associated features. *Biodiversity and Conservation* 14: 3327–3349.

Gibson, C. W. D. 1998. *Brownfield: Red data – the values artificial habitats have for uncommon invertebrates*. English Nature Resource Report No. 273. English Nature, Peterborough.

Goddard, M. A., Dougill, A. J., & Benton, T. G. 2010. Scaling up from gardens: biodiversity conservation in urban environments. *Trends in Ecology and Evolution* 25: 90–98.

Head, S. 2011. What is the role of British gardens in biodiversity conservation? *ECOS* 32: 45–52.

Hof, A. R., & Bright, P. W. 2009. The value of green-spaces in built-up areas for western hedgehogs. *Lutra* 52: 69–82.

Hubert, P., Julliard, R., Biagianti, S., & Poulle, M. L. 2011. Ecological factors driving the higher hedgehog (*Erinaceus europeaus*) density in an urban area compared to the adjacent rural area. *Landscape and Urban Planning* 103: 34–43.

Jones, K. 2013. I think that's a… *New Scientist*, issue 2936 (28 September 2013).

Loram, A., Tratalos, J., Warren, P. H., & Gaston, K. J. 2007. Urban domestic gardens (X): the extent and structure of the resource in five major cities. *Landscape Ecology*. 22: 601–615.

Macadam, C. R., & Bairner, S. Z. 2012. Urban biodiversity: successes and challenges: brownfields: oases of urban biodiversity. *The Glasgow Naturalist* 25 part 4.

Mason, C. F. 2000. Thrushes now largely restricted to the built environment in eastern England. *Diversity and distributions* 6**:** 189–194.

McKinney, M. L. 2008. Effects of urbanization on species richness: a review of plants and animals. *Urban Ecosystems* 11: 161–176.

Owen, J. 2010. *Wildlife of a garden: a thirty year study*. Royal Horticultural Society, London.

Polis, G. A., Myers, C. A., & Holt, R. D. 1989. The ecology and evolution of intraguild predation: potential competitors that eat each other. *Annual Review of Ecology and Systematics* 20: 297–330.

A Badger comes to the window of one of the survey participants. S. Paterson

Pugh, T. A. M., MacKenzie, A. R., Whyatt, J. D., & Hewitt, C. N. 2012. The effectiveness of green infrastructure for improvement of air quality in urban street canyons. *Environmental Science and Technology* 46: 7692–7699.

Roos, S., Johnston, A., & Noble, D. 2012. *UK Hedgehog datasets and their potential for long-term monitoring*. BTO Research Report 598. BTO, Thetford.

Smith, C. 2010. *London: Garden City?* London Wildlife Trust/Greenspace Information for Greater London/Greater London Authority. http://www.lbp.org.uk/downloads/Publications/HabitatInfo/LondonGardenCity.pdf.

Smith, R. M., Warren, P. H., Thompson, K., & Gaston, K. J. 2006. Urban domestic gardens (VI): environmental correlates of invertebrate species richness. *Biodiversity and Conservation* 15: 2415–2438.

Soulsbury, C. D., & White, P. C. L. 2015. Human-wildlife interactions in urban areas: a review of conflicts, benefits and opportunities. *Wildlife Research* http://dx.doi.org/10.1071/WR14229.

Toms, M. P., & Newson, S. E. 2006. Volunteer surveys as a means of inferring trends in garden mammal populations. *Mammal Review* 36: 309–317.

UN. 2012. *World Urbanization Prospects, the 2011 Revision*. United Nations, Department of Economic and Social Affairs, Population Division, New York. http://esa.un.org/unup/.

UN. 2014. *Demographic Yearbook* 2005, Table 6. United Nations Statistics Division, New York. http://unstats.un.org/unsd/demographic/products/dyb/dyb2005/notestab06.pdf.

UNEP. 2011. *The UK National Ecosystem Assessment: Synthesis of the Key Findings*. UNEP–WCMC, Cambridge, UK.

van der Ree, R., & McCarthy, M. A. 2005. Inferring persistence of indigenous mammals in response to urbanisation. *Animal Conservation* 8: 309–319.

Wembridge, D. E. 2011. The state of Britain's hedgehogs 2011. PTES/BHPS. http://ptes.org/wp-content/uploads/2014/06/SOBH2011low-res.pdf.

Woodward, J. C., Eyre, M. D., & Luff, M. L. 2003. Beetles (Coleoptera) on brownfield sites in England: an important conservation resource? *Journal of Insect* Conservation 7: 223–231.

Young, R. P., Davison, J., Trewby, I. D., Wilson, G. J., Delahay, R. J., & Doncaster, C. P. 2006. Abundance of hedgehogs (*Erinaceus europaeus*) in relation to the density and distribution of badgers (*Meles meles*). *Journal of Zoology* 269: 349–356.

David Wembridge manages the People's Trust for Endangered Species' ongoing public-participation surveys of mammal populations in the built environment and wider landscape. **Steve Langton** is a freelance statistician who has analysed many long-term mammal-monitoring datasets for organisations including PTES, the Bat Conservation Trust and Bat Conservation Ireland.

Wildlife reports

compiled by

Malcolm Tait

Weather for November and December 2015

A generally mild month, November got off to a dry, warm start but was affected by autumn storms towards the end. The UK mean temperature was 8.2ºC, which is 2.0ºC above the average. The highest recorded temperature was at Trawsgoed (Ceredigion) on 1st, which is a new UK record for November, although, with just 64% of average sunshine, it was the dullest November since 1929. Rainfall was heavy in parts of Scotland, north-west England and north Wales, all of which had more than 200% of the month's average, while other areas experienced normal rainfall. Much more was soon to come.

December was a record-breaking month. With a mean temperature of 7.9ºC it was the warmest December since records began in 1910. A warm and moist tropical air mass contributed to the mildness, but frequent deep depressions and frontal systems, including storms Desmond, Eva and Frank, resulted in 191% of average rainfall, making this the wettest of any calendar month since records began. At Honister Pass (Cumbria) 341.4mm of rain fell in the 24-hour period to 6pm on 5th, yet another UK record. With just 73% of average hours of bright sunshine, this was also the dullest December since 1989.

Malcolm Tait

Mammals

Following my piece on **Red Squirrels** *Sciurus vulgaris* in the June 2015 issue (*BW* 26: 354–355), I received some interesting comments from Derek Bunn. It appears that Red Squirrels disappeared from Blackburn and nearby rural woodlands almost 20 years before the **Grey Squirrels** *S. carolinensis* were recorded. Accordingly, he argues that the squirrel poxvirus could not have been responsible for their extinction in the area. Derek points out that those Red Squirrels were certainly present when he was a boy, adding that Monica Shorten, in her New Naturalist monograph, also mentions Red Squirrels as disappearing from areas where there were no records of Greys being present. Interestingly, those from Merseyside, although spoken of as 'our red squirrels', are not from native stock. They were either introduced or escaped in the early 1930s. Derek also claims that those people familiar with the Red Squirrels in the South Lakes before their extinction saw a recognisable difference in their pelage from the Merseyside squirrels, some of which had a dark morph.

In the light of concerns about the future of the **Hedgehog** *Erinaceus europaeus*, a paper by Paul Bright *et al.* (*Animal Behaviour*, April 2012) is particularly relevant. As the authors emphasise, an insight into how and why species use the space available to them may help in their conservation. The West European Hedgehog is relatively mobile and adapted to a wide variety of habitats. It is, however, frequently associated with edge habitats. This edge-ranging behaviour is not fully understood and may be the result of fear of predators, food availability or other factors. The researchers used radio-telemetry to investigate the movement of Hedgehogs in comparable landscapes with high and low predator (**Badgers** *Meles meles*) abundance. Food availability was also assessed in both these areas. Their results suggested that agricultural habitats may be 'landscapes of fear' for Hedgehogs in the presence of a high number of predators. On agricultural fields Hedgehogs were, on average, situated closer to edge cover in areas with predators present. It was considered likely to be beneficial for Hedgehog conservation in areas with a high number of

predators to increase the complexity of the habitat structure by, among other measures, establishing more and denser hedgerows in rural areas. Thus, enhancing the complexity of the habitat structure may reduce the effects of fear. In addition, the results underline the importance of integrating data on predator abundance and food availability in studies that focus on habitat-selection behaviour and species conservation. In a bid to halt the decline, the British Hedgehog Preservation Society (BHPS) is working with many Hedgehog-carers and is helping them to improve record-keeping, including the careful use of tags to monitor the animals which they release. It has also developed more general Hedgehog courses for interested volunteers. Furthermore, studies have been undertaken to evaluate the differing effects of physical barriers, such as major roads, on fragmented Hedgehog populations. Research was also concentrated on assessing the impact of different farming practices and an assessment of the effect of agro-chemicals. Other topics included the best ways in which to manage hedgerows as nesting areas, dispersal routes and food sources for Hedgehogs (*Wildlife World*, People's Trust for Endangered Species).

Eurasian Otters *Lutra lutra* may conflict with humans using fish stocks for food, income or recreation. Consequently, an understanding of fish selection by Otters is important for predicting and managing potential conflicts. Kathryn R. Grant and Lauren A. Harrington studied this by using spraint (faeces) analysis to describe the diet of Otters in rivers in the Upper Thames Valley, in lowland England, in summer and winter. They focused specifically on the species and size of fish consumed, while the proportion of fish consumed that were of commercial or sporting value (the 'Potential Value' category) was also assessed. Within this group, they assessed the relative selection for family and length by comparing fish found in the Otters' diet and their local availability, the latter being estimated from UK Environment Agency electrofishing survey data. Fish represented 46% (relative frequency of occurrence, RFO) of total Otter diet, fish of Potential Value accounting for 19% (RFO). In the Potential Value category, cyprinids were relatively avoided and esocids were relatively preferred. Approximately 80% of fish prey items originated from fish 4–13cm in length, 3% from fish >20cm. Smaller (0–10cm) percids and cyprinids, together with with larger (16–20cm) esocids, were chosen. In summer, the Otters' diet was broader, comprising 31% (RFO) fish, 24% birds and 14% crayfish. During the winter, the diet was predominantly of fish (68% RFO), with crayfish and birds each accounting for about 5%. In the summer, most of the fish consumed were the relatively slow-swimming Common Bullhead *Cottus gobio*. In my studies on the rivers in Ryedale, North Yorkshire, I, too, found that bullheads made up a large proportion of Otter diet. In winter, however, more of the faster-swimming cyprinids were eaten, because they were considered to be easier to catch when the water is colder.

Gordon L. Woodroffe,
The Mammal Society

Hedgehog in garden. Richard Revels

Birds

A **Crag Martin** *Ptyonoprogne rupestris* in Chesterfield proved popular during 8th–19th November, spending time around the crooked spire of the Church of St Mary and All Saints and the Chesterfield Town FC stadium. There was a run of late swift records, of either **Common Swift** *Apus apus* or **Pallid Swift** *A. pallidus*, though the two are not always easy to separate in brief views. A Common Swift was at Bearsted, Kent, as late as 29th December. Incredibly, there was a **Little Swift** *A. affinis* at Fort le Crocq, Guernsey, on 30th December and one at Thorntonloch, Lothian, on the following day. An unseasonal **Red-rumped Swallow** *Cecropis daurica* was in Norfolk during 17th–31st December, at various locations between Cley and Titchwell; in addition, there have been a few records of **Swallow** *Hirundo rustica* throughout December. Other unusually late records include **Wheatear** *Oenanthe oenanthe* in Cornwall, Dorset and Durham in December and a **Whitethroat** *Sylvia communis* on St Mary's, Isles of Scilly, on 4th January.

A **Rufous Turtle Dove** *Streptopelia orientalis* was at Scalloway, Shetland, from 25th November to 17th December, and what appears to have been the same bird was found on the Faroe Islands on 5th January. Another rare dove, a **Mourning Dove** *Zenaida macroura* from America, was at Lerwick, Shetland, from 26th December to at least 5th January.

The corpse of an adult **Brown Booby** *Sula leucogaster* was found on the tideline at Owenahincha beach, Co Cork, on 2nd January; the bird had been dead for about five days, though its origin is unknown. Also in Ireland, an adult-type **Glaucous-winged Gull** *Larus glaucescens*, the first for Ireland, was at Castletown Bearhaven, Co Cork, during 3rd–6th January at least. Still on the seabird front, there was an impressive passage of **Little Auks** *Alle alle* in eastern Scotland in early January, with 1,100 moving west in 90 minutes at Hound Point, Lothian, and 1,016 in one hour at Girdle Ness, Aberdeenshire, both on 4th January, while at the latter site 1,163 flew north in 1.5 hours on 3rd.

The mild winter weather has encouraged some of our resident species to start singing. Many observers have noticed **Song Thrushes** *Turdus philomelos*, **Mistle Thrushes** *T. viscivorus*, **Blackbirds** *T. merula* and **Robins** *Erithacus rubecula* singing during December and into January. There have been signs of **Magpies** *Pica pica* and **Grey Herons** *Ardea cinerea* nest-building, too. The most extraordinary record, however, is of a pair of **Great Crested Grebes** *Podiceps cristatus* with four young at Blackwell Basin, Greater London, on 25th December.

Mild it may be, but nothing like the extreme heat of sub-Saharan Africa, where so many British breeding birds are now – many of them species in decline. The causes of the decline of a suite of long-distance Afro-Palearctic migrants remain largely unknown, but changing conditions on their wintering grounds, particularly in the Sahel and Guinea savanna regions, may well be a contributing factor. One huge challenge is the Saharan crossing, for which birds employ a number of different 'fuelling' strategies, the quality of 'fattening' sites being particularly important in influencing their chances of making it. A study of individually marked **Whinchats** *Saxicola rubetra* in central Nigeria has been attempting to determine whether these birds fattened there, 400km south of the Sahara (an 11-hour flight for a small passerine), or farther north on the edge of the Sahara itself. Crossing the entire Sahara desert from this site would involve a minimum distance of 2,500km and require an estimated weight gain of about 7g (to 24g). In fact, birds departed from the sites with an average weight of only 16.8g, suggesting that they must fatten up elsewhere. Comparing departure dates with arrival dates in Europe also indicates pre-migratory fattening after the birds leave these winter sites, as they arrive much later than would be expected if they left directly from central Nigeria. The scientists suggest that Whinchats move farther north in order to fatten up as close as possible to the desert barrier. This may enable them to minimise predation risks associated with intense foraging and the reduced agility caused by high fuel loads. Thus, the quality of these staging sites may be critical in determining timing of migration and subsequent survival of birds. Assessing any changes in their quality will require researchers to brave the harsh conditions of these northern Guinea savanna and Sahel zones. (*Ibis* 157: 808–822)

The latest details on population status of our common breeding birds in the wider countryside has been published in BirdTrends (www.bto.org/birdtrends). This fantastic resource pulls together data from surveys, bird-ringing and nest-recording to give us information on population trends, survival rates and nesting success. The steepest long-term population declines are for **Turtle Dove** *Streptopelia turtur*, **Tree Sparrow** *Passer montanus*, **Willow Tit** *Poecile montana*, **Snipe** *Gallinago gallinago* and **Grey Partridge** *Perdix perdix*, all of which have declined by more than 90% since 1967, as almost certainly has **Lesser Spotted Woodpecker** *Dendrocopos minor*. Turtle Dove shows the biggest decline of any species in this report. On the bright side, the steepest long-term increases we have measured have been for **Buzzard** *Buteo buteo*, **Great Spotted Woodpecker** *Dendrocopos major*, **Greylag Goose** *Anser anser* and **Collared Dove** *Streptopelia decaocto*, all of which have increased by more than 300% since 1967.

The annual monitoring of species through BTO and RSPB surveys plays an important role in the periodic reviews of status carried out as part of the 'Birds of Conservation

Whinchat. Richard Revels

Woodcocks need open rides for display and courtship. Derek Middleton/FLPA

Concern' process that produces the Red, Amber and Green lists. The latest review, BoCC4, was published in December and is available for download from the British Birds website (http://britishbirds.co.uk/birding-resources/key-refs/). The review reveals that 20 species moved on to the Red List, while only three leave it and move to the Amber List (**Bittern** *Botaurus stellaris*, **Dunlin** *Calidris alpina*, **Nightjar** *Caprimulgus europaeus*). Nineteen species have been Red-listed for the first time, and one, **Merlin** *Falco columbarius*, returns to the Red List. Among the new Red-listed species are **Shag** *Phalacrocorax aristotelis*, **Ringed Plover** *Charadrius hiaticula*, **Curlew** *Numenius arquata*, **Woodcock** *Scolopax rusticola*, **Puffin** *Fratercula arctica*, Mistle Thrush, Whinchat and **Grey Wagtail** *Motacilla cinerea*.

Unfortunately, the cryptic nature of some species renders them almost impossible to survey through standard schemes such as those underpinning BoCC4. Two such species are Woodcock and **Corncrake** *Crex crex*, both surveyed by using calling males as the basis for counts, and the populations of which are the subject of two recently published papers. Woodcock, although considered a woodland bird, has unusual and complex requirements compared with many other declining woodland species; it needs open rides and clearings for display and courtship, woodland with open ground-layer vegetation and patches of overhead cover for nesting, and areas of small trees and a dense shrub layer for feeding. The species has experienced moderate recent declines in mainland Europe, including in its Russian strongholds, but data are often sparse owing to the challenges of surveying a nocturnal, cryptic species that usually occurs at low densities, even in the strongholds. In the UK, a 2003 national survey and then another in 2013 were based on observations of the birds' crepuscular 'roding' display, when calling males fly large circuits over woodland habitats. The results of these two breeding Woodcock surveys, as well as three atlases, indicate a 31–37% decline in site occupancy and a 28–29% decline in abundance to an estimated breeding population of around 55,000 males.

Historically, the species has always exhibited a bias towards the north and east, an uneven distribution that appears to be becoming more marked, with greatest losses (between 2003 and 2013) in the west and south, probably linked to the availability of large woodland patches. Local extinctions between 2003 and 2013 were more likely in sites with smaller woodlands, which are considered less likely to support the diversity of habitats required for feeding and breeding Woodcock. Declines are probably linked to the 'usual suspects', such as rising deer numbers impacting on understorey vegetation, recreational disturbance and/or changes in woodland management. (*Bird Study* (2015) 62: 535–551)

The Corncrake, a summer visitor to the UK that winters in sub-Saharan Africa, has undergone long-term, large population decline and range contraction in the UK and been the subject of an intensive species-recovery programme. A range of initiatives deployed in Scotland based on detailed knowledge of habitat requirements and factors affecting breeding productivity, and including agri-environment schemes and reserve acquisition, has stemmed and reversed the decline in this core area. Male Corncrakes produce a characteristic loud rasping song, 'crek-crek', and unpaired males sing almost continuously on most nights in the breeding season. Surveys based on this behaviour have been used to conduct annual counts in core areas of Scotland since 1993. Results show that numbers increased in 16 of the 20 years between 1994 and 2014. Overall, the population recovery was most rapid between 2003 and 2008, numbers rising most rapidly, from 596 to 1,036 singing males, between 2001 and 2004. Since then, the increase has slowed and appears to be levelling off, numbers perhaps approaching a carrying capacity set by the area of habitat with suitable vegetation structure and composition. There was, however, a steep decline between 2012 and 2013, possibly linked to the unusually cold spring in 2013. The latter inhibited vegetation growth, reducing suitable cover for singing males and hence also reducing concealment from predators such as **Hen Harrier** *Circus cyaneus*, Buzzard and Otter *Lutra lutra.* This may, in turn, have resulted in Corncrakes being preyed on, moving to more suitable areas, or singing less frequently owing to perceived increased predation risk. The large decline in the core population between 2012 and 2013 highlights the sensitivity of the population to external factors, but the subsequent increase in 2014 shows a capacity for rapid recovery. (*Bird Study* (2015) 62: 486–497)

Dawn Balmer (BTO) and Juliet Vickery (RSPB)

Reptiles and amphibians

Many observers have ventured out during this winter's mild weather to check ponds for early amphibian activity. All through December newts have been easy to observe. In my own garden pond in Surrey, good numbers of adult **Smooth Newts** *Lissotriton vulgaris* have been present, alongside well-grown larvae from last year's breeding. Other observers have reported **Great Crested Newts** *Triturus cristatus* in early January already in full breeding condition. At this stage of the year, it is difficult to assess the impact that the exceptionally mild weather will have on amphibian breeding success.

While it is encouraging that native amphibians are populating garden ponds, 2015 saw an increase in the number of reports received by Amphibian and Reptile Conservation of non-native snakes being discovered in gardens. The keeping of snakes has undoubtedly become more popular, less expensive and more accessible in recent years and, while we may hope that this reflects a genuine interest in reptiles, escapes are an inevitable consequence. The most popular captive snakes are North American **Corn Snakes** *Pantherophis guttatus*, and **Milk Snakes** *Lampropeltis triangulum* frequently turn up in gardens, although it is hard to assess just how many escaped snakes there are in the wild and how they fare. The North American snakes, particularly Corn Snakes, are rodent predators but will also take birds and reptiles, and it is possible that they could survive quite well in our climate. More tropical species, generally pythons and boas, are also quite frequently reported, their prospects of long-term survival in our climate being more questionable. Introduced snakes have caused significant problems in certain parts of the world, notably Florida, where they have become established as breeding populations and pose a genuine threat to native species. Although there is no specifically identified threat to our native UK species, the challenge of dealing with escaped animals can be quite distracting as there is an expectation that somebody will come out to deal with the problem, which, thanks to the voluntary efforts of some of the local Amphibian and Reptile Groups, does sometimes happen.

Set against this increase in non-native snakes being found in gardens, it is heartening to report the results of a long-term study of **Grass Snakes** *Natrix natrix* between 2004 and 2012 which has been undertaken at the site in Norfolk where the northern race of the **Pool Frog** *Pelophylax lessonae* was first reintroduced. The study indicates a large population of Grass Snakes which increased over the nine-year study period, one measure of this increase being the number of snakes seen per visit rising from 1.25 to 3.83. Individual snakes were photographed so that they could be recognised, and analysis of the recapture data collected gave an annual survival rate of 0.66 and an individual detection rate of 0.17. These figures are quite high, and

Young Grass Snakes. Richard Revels

they were also found to correlate with Pool Frog observation data and increasing counts of **Common Frog** *Rana temporaria* spawn clumps. Analysis of the Grass Snake data also indicates high density, and in comparison with other studies in excess of the site's likely carrying capacity. The results of the study could be explained by the fact that the study area has been subject to management specifically for the Pool Frog to open up the habitat to create warm sunny breeding pools. This also favours Grass Snakes and other amphibian species upon which they feed. It is known that the Grass Snake is a wide-ranging species, and it could be that the snakes recorded are using the site temporarily in the course of annual movements through much larger home ranges that include all or part of the site.

Studies of this nature are vitally important in helping us to understand more about our most impressive snake species, and it is gratifying to note the population increase in this area at a time when anecdotal evidence from elsewhere in Britain suggests that the Grass Snake is becoming less common.

Reference

Sewell, D., Baker, J. M. R., & Griffiths, R. M. 2015. Population dynamics of grass snakes *(Natrix natrix)* at a site restored for amphibian reintroduction. *Journal of Herpetology* 25: 155–161.

Howard Inns, Amphibian and Reptile Conservation

Last year there were sightings of Common Darter beyond Christmas. Richard Revels

Dragonflies

In the last column, written in early November, my colleague Adrian Parr was predicting a possible close to the main dragonfly season. The record-breaking mild weather throughout all of December, however, has brought a similar record-breaking extension to the flight period of several dragonfly species, especially **Common Darter** *Sympetrum striolatum*, the traditional latest species on the wing, with sightings of adults beyond Christmas. This is quite unprecedented.

Back in November, two **Migrant Hawkers** *Aeshna mixta* and many Common Darters were out on 3rd at Minsmere and Dunwich, in Suffolk, and there were several other notable records on this day from elsewhere. On the River Yare at Cringleford, Norwich, an observer located three male **Willow Emerald Damselflies** *Chalcolestes viridis* in mild, sunny conditions, beating previous late dates at this site by four days. Migrant Hawkers and Common Darters were seen also at Sutton Fen, Norfolk, and one female Migrant Hawker was seen to oviposit both above and below the water in a floating branch. Two days later the weather had turned more inclement, but a **Vagrant Emperor** *Anax ephippiger* was found and photographed at Coypool, Plymouth, Devon, the third such record in the county in less than a month. Another was reported from Northney, on Hayling Island, Hampshire, on 11th November. Lone **Common Hawkers** *Aeshna juncea* were flying in front of a hide at Saltholme RSPB, Cleveland, on 5th November and at a site in Warwickshire on the following day.

Good numbers of Common Darters were still present at various sites through November: nine (plus two **Ruddy Darters** *Sympetrum sanguineum*) at Whisby Nature Park, Lincolnshire, on 7th, 14 (including three ovipositing pairs) at Badminston gravel pits, Hampshire, on 9th, plus numerous individuals at Strumpshaw Fen RSPB, Norfolk, on 10th November. Elsewhere in Norfolk, reasonable numbers, including ovipositing pairs, were observed at Roydon Common and at Horsey on 11th November, and a Migrant Hawker was also at Lound, in the same county, on this day. Numbers of Common Darters then dwindled, three being seen at WWT Steart Marshes, Somerset, on 13th, two (together with a male **Southern Hawker** *Aeshna cyanea*) at Camon Valley, Cornwall, on 15th, and two at Western Approach ponds, Gloucestershire, on 16th November. One Common Darter was also present at Farcet Fen, Cambridgeshire, on 26th November (Steve Dudley).

In Scotland, a single Common Hawker was still flying at Broddick Castel, north Ayrshire, on 14th November, in settled weather and a temperature of 10°C, following storm Abigail. Southern Hawkers also continued to be reported: from Reading University campus on 17th November, plus another probable individual of this species at Wildmoor, Berkshire, on 27th November, then another at Frith Common, Worcestershire, on 5th December. Four days later, however, people on a Bath Natural History Society field trip found and photographed a rather moribund, but still living Southern

The status and distribution of the Emperor have increased significantly in recent decades. Richard Revels

Hawker at Danks Down SSSI, near Castle Combe, Wiltshire. This was the first county record of any Odonata in December, and very late for the UK as a whole (the flight period usually finishing in October).

Fast fowarding to 22nd December, another Migrant Hawker was in a garden, and briefly entered the house, at Leyland, Lancashire, at dusk. Christmas came and went, but a Common Darter was seen on Boxing Day in a very sheltered part of Dawlish Warren, Devon, and another was basking in a reclaimed gravel pit at Idle Valley, in Nottinghamshire, on 27th December, when the air temperature was 14°C. At the time of writing (6th January) no further dragonfly sightings had been reported to the BDS, but, with the weather continuing mild and damp into the New Year, anything is possible and I would not be surprised to learn of further sightings of the migrant Vagrant Emperor, or even a **Winter Damselfly** *Sympecma fusca*.

A recently published paper has examined the trends in dragonfly distribution and status for the UK and Ireland, using a newer species' trait-correlating analysis applied to more than half a million records of 36 native species in the British Dragonfly Society (BDS) database (Powney *et al*. 2015). The authors showed that, between 1980 and 2012, the dragonfly fauna had undergone considerable change, 22% of species declining and 53% increasing. The key traits associated with these trends proved to be habitat specialism, distribution region and range size. The results showed that Odonata habitat generalists occupying southern Britain have tended to increase in comparison with the declining narrow-range specialists. Species that showed the greatest declines included Common Hawker and **Black Darter** *Sympetrum danae*, while **Emperor** *Anax imperator* and Migrant Hawker showed the greatest increases. The large number of species with positive trends is thought to be due to improving water quality, as well as climate-driven change in environmental conditions. Although other studies have found that southern species showed greater poleward shifts and expansions compared with northern species, there was little evidence for this in the present study, although this could be due to the low number of northern species (four) included in the datasets analysed. Not all southern species showed positive trends (e.g. **Scarce Blue-tailed Damselfly** *Ischnura pumilio* and **Common Club-tail** *Gomphus vulgatissimus*). The limited expansion of these species is probably the result of a lack of suitable habitat. It is of conservation concern that the narrow-range habitat specialists may be in the process of being replaced by the warm-adapted dragonfly generalists, leading to a biotic homogenisation of the Odonate fauna of Britain in the future.

Finally, dragonfly-recording in this country has taken a new turn, to make this easier for more people in the field, with the launch of the iRecord Dragonfly app, developed in partnership by the BDS, Centre for Ecology and Hydrology (CEH), Biological Records Centre (BRC) and the Joint Nature Conservation Committee (JNCC). This now enables recorders to input and upload dragonfly data on their smartphones or tablets. It has excellent identification information and is very easy to use for everyone. It is available as a free download; more information can be found at http://www.brc.ac.uk/app/irecord-dragonflies.

Reference

Powney, G. D., Cham, S. A., Smallshire, D., & Isaac, N. J. B. 2015. Trait correlates of distribution trends in the Odonata of Britain and Ireland. *PeerJ.* 3:e1410; doi 10.7717/peerj.1410.

Val Perrin,
British Dragonfly Society

Butterflies

We learned of 15 species in November 2015, a considerable drop from the 26 species recorded in October, but still a reasonable number for this time of year, when about a dozen species are frequently flying. This total of 15 does not include the **Geranium Bronze** *Cacyreus marshalli* that was found in a kitchen (on 19th November, in Suffolk) and assumed to have been artificially introduced with some *Pelargonium* cuttings brought home from Italy. Of November's species, the most notable, by a considerable margin, was **Long-tailed Blue** *Lampides boeticus*, with two individuals on 1st November and another on 11th, all in Sussex.

These are not the first ever UK records of Long-tailed Blue in November (e.g. 20th November 1961, Devon), but they certainly are a rare occurrence. The Sussex records all came from sites where immigrant butterflies are thought to have bred after their arrival in late summer, and where 'home-grown' Long-tailed Blues had already emerged during the autumn. With the breeding this year, a repeat of similar (though even more widespread) breeding in 2013, perhaps the appearance and breeding of this butterfly might ultimately become an annual event in southern England.

None of the other species flying in November 2015 was unexpected, as all have been seen on several occasions in previous Novembers. There were, however, some absentees this year, e.g. **Common Blue** *Polyommatus icarus*.

December's weather was extraordinarily warm (more than 4°C above the long-term average December temperature for the UK) and, in some parts, disastrously wet. Despite this being the warmest December on record, the almost ever-present thick cloud, often accompanied by strong winds, severely suppressed butterfly sightings. We learned of eight species seen on the wing during the month, a total that seems somewhat meagre given the remarkable temperatures. An indoor sighting of Long-tailed Blue (16th December, Highlands) is not included in the total, as it was thought to have been brought home among items by a traveller from Spain.

Unsurprisingly, those species seen outdoors comprised the four butterflies that hibernate as adults in the UK, along with the regular overwintering **Red Admiral** *Vanessa atalanta* and – slightly more unusual at this time of year – **Painted Lady** *V. cardui*. December 2015 was a month of exceptional moth immigration into southern Britain on strong, warm southerly winds, and it was not surprising that Painted Lady butterflies arrived at the same time. The main influx seemed to start on the night of 20th, when a Painted Lady was attracted to a moth trap in Dorset at 21.00 hours. This was followed by 15 further reports over the next 10 days. We learned of Painted Lady sightings in Devon (one on 24th, three on 29th), Dorset (one on 24th, one on 28th, two on 29th, one on 31st), Essex (one on 23rd), Hampshire (one on 28th, one on 29th), Somerset (one on 29th), Sussex (one on 23rd) and Wiltshire (one on 29th).

Possibly more unusual were the five sightings of **Speckled Wood** *Pararge aegeria* during December. The first was on the Isles of Scilly on 20th, followed by reports from Sussex and Devon (both on 23rd), and the last of the year were in Hertfordshire and Kent (both on 29th). Recent warm winters have occasionally provided December sightings of this species. Initially, we suspected that such individuals might have pupated in artificially warm situations, e.g. greenhouses, provoking emergence at such an unusual time of year. Repeated sightings over several years, however, suggest that a few pupae are tempted to end diapause and emerge by our currently warmer 'natural' mid-winter conditions.

Also emerging unseasonably, just before Christmas, were half-a-dozen **Large White** *Pieris brassicae* in a garden in Fulham, London, while elsewhere recorders spotted the now familiar winter sight of Large White caterpillars continuing to feed on brassicas. A rarer sight, however, was that of three-quarter-grown **Small White** *P. rapae* caterpillars on cabbages in Hampshire on 30th December.

The day of 29th December was an exceptionally warm and (against the general trend) also a sunny one. Except for Large White, all of the species seen repeatedly through the month were reported on that day. Finally, on the last day of the year, we had reports of **Peacock** *Aglais io* (Essex), Painted Lady (Dorset) and Red Admiral (Bedfordshire, Surrey and Sussex) roused to flight by the continuing mild temperatures and occasional bursts of watery sunshine.

No butterfly species was able to claim a spectacularly successful year in 2015, although most appeared to fare reasonably well in a year with seasons that seemed almost indistinguishable. Disappointing summer conditions were balanced by more favourable conditions in the early spring and again in the autumn. The **Holly Blue** *Celastrina argiolus* boomed and the **Silver-washed Fritillary** *Argynnis paphia* continued its spread across the woods of East Anglia and the Midlands. On the other hand, the decline of the **Wall** *Lasiommata megera* showed no sign of abating. Northern Ireland

A very late Grayling was seen on 16th October. Richard Revels

became another region in which the Wall was evidently in real trouble, with only two reports in the entire year. Similar falls in abundance have been reported from the near Continent, too. In addition, after a couple of very good years, and a promising spring, numbers of **Small Tortoiseshells** *Aglais urticae* and Peacocks seemed to drop away alarmingly during the summer.

The beneficent weather conditions late in the year led to many 'latest ever' county/country butterfly sightings. One particularly noteworthy one was that of a **Grayling** *Hipparchia semele* on Barra, in the Western Isles, on 16th October 2015. This is almost a month later than any other Scottish Grayling record in the Butterflies for the New Millennium recording scheme database. Unfortunately, it is too early to know if the winter's exceptional warmth (to date) has been a benefit, a peril, or a matter of little consequence. This winter warmth may cause problems, either by disrupting the normal developmental phenology of butterfly species or through increased mortality due to predation and disease, or both, but the evidence is thin. Widespread flooding may also take its toll.

We should like to express our gratitude to all of the butterfly-recorders and colleagues at many organisations who contributed sightings and information to this column during 2015. If you would like to hear more about how 2015 was for the UK's butterflies, come along to the National Butterfly Recorders' Meeting in Birmingham on Saturday 19th March. The programme for the day, which includes some excellent speakers, and advance booking details are on the Butterfly Conservation website (at http://butrfli.es/recordersmeeting2016).

For a longer-term view on how our butterflies have been faring, Butterfly Conservation and the Centre for Ecology & Hydrology have recently published *The State of the UK's Butterflies 2015*. This report provides new analyses of changes to the distribution and abundance of UK butterflies since the 1970s and over the past decade. The long-term situation remains dire, 76% of species having decreased in either distribution or abundance, or in both, since 1976. The severe declines of habitat specialists such as the **High Brown Fritillary** *Argynnis adippe* and **Wood White** *Leptidea sinapis* will be familiar to *British Wildlife* readers, but the report also reveals worrying declines among wider-countryside butterflies. The total abundance of all wider-countryside species combined decreased by a quarter over the period 1976–2014. For example, **Small Heath** *Coenonympha pamphilus* has lost 57% of its UK distribution (at 1km-square resolution) and 54% of its abundance at UK Butterfly Monitoring Scheme sites. **Essex Skipper** *Thymelicus lineola*, **Small Skipper** *T. sylvestris*, Wall and **White-letter Hairstreak** *Satyrium w-album* all show severe declines in abundance over the same period. Another key finding of the new report, however, is more optimistic. Some threatened butterflies seem to have responded to intensive conservation efforts over the past decade (2005–2014); for example, **Duke of Burgundy** *Hamearis lucina* and **Pearl-bordered Fritillary** *Boloria euphrosyne* abundance increased substantially, while **Dingy Skipper** *Erynnis tages* and **Silver-studded Blue** *Plebejus argus* increased in distribution, providing evidence that long-term declines can be halted given sufficient effort and resources. The full report is available online at http://butrfli.es/StateofButterflies.

Looking forward, keep an eye on the first-sightings page of the Butterfly Conservation website for all the news as butterfly species emerge in 2016. If you have any observations concerning butterflies, please contact Butterfly Conservation on 01929 400209 or via www.butterfly-conservation.org, or e-mail nick.bowles@ntlworld.com. You can follow and contribute butterfly and moth information on Butterfly Conservation's Facebook page and via Twitter (@RichardFoxBC).

Nick Bowles and Richard Fox, Butterfly Conservation

Moths

The tail end of 2015 will be remembered as mild and very wet, with flooding in many places. Apparently, December 2015 was the wettest month on record for Scotland since meteorological records began. In terms of moth activity and news, this period seems to have been the liveliest for this time of year that I can recall in all the 27 years I have been writing this column. Warm southerly airstreams tracked back to locations such as the Azores kept the weather exceptionally mild and continued to bring immigrant moths to our southern shores right through November and December and up to the time of writing (early January 2016), although these moths were in considerably smaller numbers than those recorded in September and October. Meanwhile, small numbers of adults of species usually associated with the early spring were reported in December, in a pattern which has become increasingly familiar in recent years.

To deal with the immigrations first, and this is a partial account: November started off with a **Golden Twin-spot** *Chrysodeixis chalcites* on 1st at Cocklake, Somerset (per Atropos), and several **Flame Brocades** *Lacanobia* and **Clifden Nonpareil/Blue Underwings** *Catocala fraxini* on 1st and 2nd. A Blue Underwing which was found in good condition on 31st October by Stuart Morling in a garden at Fivehead, near Taunton, Somerset (per John Bebbington), adds to one found at Taunton reported in the last issue (*BW* 27: 131), and local breeding is a strong possibility. One of the last of the **Hummingbird Hawkmoths**

Macroglossum stellatarum for the year was seen nectaring on lavender *Lavandula* sp. on 5th November at Skidby, East Yorkshire (Andy Nunn), and on the same day a **Silver-striped Hawkmoth** *Hippotion celerio* was found resting on a conservatory blind at Castleford (per Atropos). Late November and early December were quieter, but with the more frequent immigrant species continuing. Then, in mid-December, with those warm southerlies came a **Crimson-speckled** *Utetheisia pulchella* on 16th near Weymouth, Dorset (Jack Oughton), a **Purple Marbled** *Eublemma ostrina* with six **Small Mottled Willow** *Spodoptera exigua* on 17th, at Lizard, Cornwall (Mark Tunmore), several **Striped Hawkmoths** *Hyles livornica*, including one on 19th December at Dungeness, Kent (Max Hellicar), and a probable **Spalding's Dart** *Agrotis herzogi* at the B&Q warehouse in Poole, Dorset (per Atropos), which will be the second UK record if confirmed. The first Spalding's Dart was also captured very late in the year, on 22nd November 1995. That was light-trapped by Adrian Spalding at Praze-an-Beeble, near Camborne, Cornwall.

The generally mild weather, and the news of the immigrants, kept lots of moth-trappers trapping probably more intensively than usual, and the early appearances of resident spring species kept things interesting. In autumn 2015, a new group forum site called Recording Moths was launched by Dave Grundy, who is well known to moth-recorders as the instigator of the Garden Moth Recording Scheme. As soon as the forum started, it was buzzing with posts on moths such as the **Spring Usher** *Agriopis leucophaearia*, **Pale Brindled Beauty** *Phigalia pilosaria*, **Common Quaker** *Orthosia cerasi* and **Hebrew Character** *O. gothica*, odd individuals of these being recorded in many places several months before their main flight seasons of February, March and April.

There was also the expected crop of sightings of species flying months after their main flight period was over, probably representing individuals which had failed to be triggered into the dormant phase of their life-cycle and had continued their development. An example in this category is a **Willow Beauty** *Peribatodes rhomboidaria*, taken at light at Durlston, Dorset, on 2nd December by Steve Nash, who comments that his previous latest record from past years occurred in the middle of October. Even more surprising was a **Poplar Hawkmoth** *Laothoe populi* on 18th December at Swindon, Wiltshire (Steve Covey). A **Large Yellow Underwing** *Noctua pronuba* on 1st December at Bawdsey Hall, Suffolk (Matthew Deans), was in the company of two **Dark Swordgrass** *Agrotis ipsilon* and was probably an immigrant. Large numbers of immigrants of this species are recorded in some years, though not this late in the year. In *Atropos* 44: 57–58, it is reported that in recent years adult **Winter Moths** *Operophtera brumata* in western Scotland have been persisting on the wing into March, rather than completing their flight season in January.

Paul Black recently sent me a list of the unusually late appearances of probably second-generation individuals of a number of species which he recorded in 2014 in various places in Berkshire. These include **Poplar Grey** *Subacronicta megacephala* on 4th and 6th September, **Round-winged Muslin** *Thumatha senex* and **Dingy Footman** *Eilema griseola* on 6th September, a **Large Elephant Hawkmoth** *Deilephila elpenor* on 10th October, and several **Rosy Footmen** *Miltochrista miniata* from 16th to 31st October. An **Engrailed** *Ectropis crepuscularia* on 27th September follows a long-established precedent. I recall publishing a note on a late one like this which I captured back in 1988 because I considered it noteworthy at that time (*Ent. Rec.* 100: 213–214).

There is particularly interesting news concerning the newly established resident **Black-spotted Chestnut** *Conistra rubiginosa*. Two males in very good condition were reported in Bedfordshire in December (per county moth recorder Andy Banthorpe); the first, on 17th, was taken at Biggleswade by Lionel Burgess and the second, nearby on 18th, by his son, Matt Burgess. Apart from being the first county records for Bedfordshire, these are probably the first to be recorded outside Kent with the exception of one at Felixstowe, Suffolk, in November 2014.

In 2015, the only obviously immigrant species in my garden light-trap catches for September, October and early November was the **Silver Y** *Autographa gamma* and I had only ten of those, all except one between 3rd and 15th September, with a later individual on 9th October. In some years I have been able to count ten Silver Y nectaring at flowers in the garden on a single night. In 2006, which is generally regarded as having

Rosy Footman. Paul Waring

Large Elephant Hawkmoth. Paul Waring

been an exceptionally good year for immigrant moths, I trapped the only **Convolvulus Hawkmoth** *Agrius convolvuli* I have ever had in the garden trap during the period from 1991 to 2015, along with one of only a couple of **Bordered Straw** *Heliothis peltigera* seen here in that quarter of a century of recording. So, in my garden at least, 2006 wins out as being better than 2015 for migrants. Furthermore, during September 2006, I was encountering **Scarce Bordered Straw** *Helicoverpa armigera* at seemingly every inland site that I visited in southern England, and of course seeing various of the more frequent immigrant species, as well. So, in terms of the numbers of immigrants recorded away from the coasts, I would say that 2015 has not been so exceptional as 2006.

Clearly, a year can be exceptional on the basis of total numbers of immigrant species, the length of the species list, the number of really noteworthy species, the number of additions to the British list, and so on. The year 2003 was a particularly good one for additions to the British list, which I shall always remember because British Wildlife Publishing had published the first edition of our *Field Guide to the Moths of Great Britain and Ireland* in the August in time for a launch at the Rutland Bird Fair. The record number of additions in the late summer and autumn of that year quickly rendered the guide incomplete! Fortunately, we were able to add the new species into the second edition.

But let's put these impressions aside until Sean Clancy has prepared the immigration report for 2015, so that the complete picture can be compared with previous years. The most recent immigration report so far published is for 2011, and that appeared in 2015 (*Ent. Rec.* 127: 45–79). Sean also reviews the more noteworthy immigrants in *Atropos*, with a faster turn-around time, and this will show how the rarest immigrants have fared. That report should be published during this new year.

Issue 88 of the newsletter from the Norfolk Moth Survey reports that three new species were added to the county list during 2015: the **Speckled Footman** *Coscinia cribraria* was recorded as a single immigrant of the Continental subspecies *arenaria* at Ridlington, east Norfolk, on 3rd July (A. Mansfield); a **Splendid Brocade** *Lacanobia splendens*, first recorded as an immigrant in mainland Britain in 2003, turned up at Strumpshaw Fen on 10th July (Ben Lewis), followed by others at Eccles on 11th and 12th July (N. Bowman) and new for VC 28, west Norfolk, on 14th July (N. Tuck); and a **Passenger** *Dysgonia algira* was trapped at Taverham, near Norwich, on 8th August (Mike McCarthy). The Passenger is an immigrant for which the annual peak total so far is 12, in 2006. This Norfolk individual appears to be the 27th UK record (as per *Atropos* website).

On another Facebook group, Caterpillars UK, members report caterpillars which they find, often with requests for help with identification. Formed in April 2014, this group now has 636 members at the time of writing. That's a lot of eyes out there to spot caterpillars, and I find the reports and photos quite fascinating and informative as to the state of the season.

Also on the subject of caterpillars, a recent paper by Paul Brooks and Roy Leverton (*Ent. Rec.* 127: 267–270) confirms that Common Rest Harrow *Ononis repens* is a larval foodplant of the **Bordered Grey** *Selidosema brunnearia* in the British Isles. What is also very interesting is to hear of the quite large numbers of caterpillars which they found, once armed with this knowledge, in comparison with the paucity of adult records for the site.

On the subject of definitive round-ups of moth news, it seems that we must mourn the passing of the annual *Lepidoptera Conservation Bulletin*, produced by Butterfly Conservation in recent years up to and including the volume for 2013. The issues covering 2009 to 2013 can be found as downloadable pdfs on the Moths Count website. When the issue for 2014 failed to appear last year, I made some enquiries and found that it had to be discontinued owing to insufficient resources. It had become a huge job to compile and, with staff cutbacks, it was no longer feasible. I shall miss it as a hugely valuable summary and directory of the news and advances made in moth conservation in the British Isles during the year, and of the relevant publications. The *Lepidoptera Conservation Bulletin* started life as the *Moth Conservation Bulletin*, which I produced from 1987 to 1992 while Moth Specialist in the Terrestrial Invertebrate Branch of the Nature Conservancy Council, and then JNCC, with some subsequent issues. The original aim was to report back to the recording network for the rarer

British macro-moths on the results of the conservation projects which I was conducting and coordinating, and to compile a list of the publications which contained further details. As the numbers of projects and people involved increased, and Butterfly Conservation became the lead organisation for moth conservation, as well as for butterflies, the remit of the Bulletin was extended to include all the Lepidoptera, and the Bulletin was renamed, expanded and produced in house. From a photocopied booklet with circulation limited largely to the County Moth Recorders, the Bulletin was eventually produced online in 2009, available for anyone with internet access. By this time it had grown into a very large document, produced by a team of authors, and its scope had widened to listing any publications particularly relevant to the study of moths in the British Isles. In addition to a summary of the conservation work during the year for each of a list of priority moths (largely those included in the Action For Threatened Moths Project), and a list of resulting reports and publications (as in the old *Moth Conservation Bulletin*), it included an ever longer list of the publications which appeared during the year on other moth-related subjects, such as the effects of climate change, light pollution, and even species added to the British list, as well as new foodplant records and other observations relevant to conserving moths – and, of course, butterflies, too.

As partial compensation, BC has instigated the rather quirkily titled 'Mothy Mutterings' on the Moths Count website. Do not be put off by the 'oldie worldy' title! These are up-to-date monthly news reports on the progress of some of the moth projects underway in the month in question. Generally, these cannot be definitive accounts, because the data-gathering may not have been completed, let alone compiled and analysed, when the report is prepared, much as with some of the items in these moth reports for *BW*, but I have found these 'mutterings' most helpful for keeping aware of or tracking current fieldwork.

I learned from Mothy Mutterings that the fence which was erected to help to protect the breeding grounds of the single British population of the endangered **New Forest Burnet** *Zygaena viciae* had been breached by sheep this summer. Other than this unfortunate occurrence, the project to conserve the New Forest Burnet is a real success story. In July 1990, I stood with David Barbour on a single small ledge inaccessible to sheep on a steep rock face. This ledge was the only place where we could find any New Forest Burnets. We studied these carefully and estimated that the entire surviving population was down to 15 or fewer individuals and that this ledge was quite probably the only place where they were breeding. We measured, photographed and documented the sward on the ledge and noted that it was much longer than in the tightly sheep-grazed grassy slope below where the moth had formerly occurred but could no longer be found. We recommended that a fence be installed so that the sward on the slope could grow more like that on the ledge. There are more details and photographs from that day in *Ent. Gaz.* 42: 231–238 (1991). To make a long story short, that fence was installed, the moth was monitored and studied by David and others in the following years, and a recolonisation of the slope occurred. Once this happened, the population soon built up to number in the thousands. It is important that the fence is maintained, because we know that, if the slope is heavily grazed by sheep again, the population will be greatly reduced and may become confined to those ledges inaccessible to the sheep.

Moth Night 2016, coordinated by *Atropos* and BC, will take place from 9th to 11th June. The main theme will be hawkmoths. This event will be well timed for the Large Elephant Hawkmoth, illustrated opposite. For more details see www.mothnight.info.

As always, I thank all the above-named individuals, organisations and websites, and others involved in the above-mentioned projects, and all other correspondents.

Dr Paul Waring

Bees, wasps and ants

I thought that I would start the New Year with something of a voyage of joint discovery as we travel into the world of the 'DEBs'. These three families, Dryinidae, Embolemidae and Bethylidae, are grouped within the superfamily Chrysidoidea and, to be quite frank, are species to which I have not given a great deal of attention over the years. I suspect that I am not alone. They are somewhat on the periphery of the 'aculeates' (stinging bees, wasps and ants), since some species retain the original use of the ovipositor as an egg-laying device, rather than its being a weapon of attack/defence.

Many of the species are less than 3mm long, the larger species attaining a length of only 8mm, so they are rather more challenging to get a proper look at, let alone put a name to. There is a lot that we still do not know about these insects, and there is therefore much to reward the careful observer in advancing our knowledge of the group. As this is a taxonomically difficult group, with numerous synonyms for some species, accurately totalling the number of species present within the UK is difficult, so the numbers which I give below should be taken with a pinch of salt.

The species are generally encountered by those entomologists with a tendency to sweep vegetation or beat trees and shrubs, rather than by the visual hunting that most hymenopterists employ. Nevertheless, chance encounters are also possible and exciting discoveries await us all. In the latest edition of the BWARS newsletter (Autumn 2015), Jeremy Early describes finding a specimen of *Dryinus collaris* on the inside of his

Female *Nomada ferruginata*. Steven Falk

kitchen window. This is one of the largest species within the Dryinidae, females reaching 8mm in length. It is also one of the rarest, with Jeremy's specimen only the eighth confirmed record for Britain, where most records have been made in this century. Its main host here is thought to be the planthopper *Issus coleoptratus*. There are roughly 35 species of dryinids within the UK, but only two of them within the genus *Dryinus*. Dryinids are largely both predators and parasitoids on a range of homopteran-bug nymphs and, in order to manipulate the nymphs, most female dryinids possess enormous 'forceps' (chelae) on their front legs.

The Embolemidae is a small group in north-west Europe, with only one species present, but the family has a worldwide distribution, although only 10–15 species account for this distribution. *Embolemus ruddii* is mid-sized at 2–5mm for the wingless females, which again attack nymphs of homopteran bugs. The precise biology of this species, however, is largely unknown.

This leaves the Bethylidae, of which there are roughly 20 species in nine genera in the UK. This tally does, however, include a number of introduced species that might thrive only in granaries, storehouses and other artificial locations. The larvae of most of these species parasitise larvae of beetles and various Lepidoptera.

In 1976, this collective group of insects was covered by Royal Entomological Society *Handbooks for the Identification of British Insects* Volume 6, Part 3(a). While taxonomy, nomenclature and the number of species have inevitably moved on since that year, this remains a useful starting point for anyone wishing to further his or her interest. Since this Part of the *Handbook* is now long out of print, it has become one of the series now available as a free download from the RES website. Further information on how to capture and study these insects is also available via the BWARS *Members' Handbook*.

The Norfolk and Norwich Naturalists' Society has been conducting a detailed survey of the extensive dune system and associated habitats at Winterton, on the east Norfolk coast. Its invertebrate catches have included a number of DEBs, identified by John Burn, our leading expert on the group. The catch included the dryinid *Anteon jurineanum*, which has been found right across Britain, albeit very sparingly. It has been found in a very wide variety of habitats, from acid to alkaline and from wet to dry soil types. It has often been swept from birch trees. The society's work has also yielded a record of the bethylid *Goniozus claripennis*, which appears to be rather scarcer, modern records coming from the south-east of England. This species attacks the caterpillars of a small number of tortricid moths. This being the case, a knowledge of its hosts and the action of teaming up with your 'mothing' friends to track down the parasitised hosts may be the best chance of finding these wasps, if you can then successfully rear the adult wasp from the hapless caterpillar.

Turning to more familiar territory, Nick Owens reports the discovery of the cuckoo-bee *Nomada ferruginata* at Wymondham Cemetery in May of 2015. This was formerly thought to be a very rare insect and was placed in the highest threat category (RDB1) in the UK Red Data Book. It seems, however, to be undergoing something of a revival in recent years, with records from Hampshire, Kent, Wiltshire, Berkshire, Middlesex, Gloucestershire, Warwickshire, Essex and Suffolk. Indeed, a Suffolk specimen was recently shown to me by Hawk Honey, having been caught at Purdis Heath, near Ipswich, in 2014. This species is a cleptoparasite of the spring-flying mining bee *Andrena praecox*, which forages at willow catkins.

Another species that may be seeing an upturn in its fortunes is the digger wasp *Gorytes laticinctus*. This has always been thought of as a rare and threatened species (RDB3 in the current published status references), but George Else reports that it has been seen by several people this summer, occasionally in significant numbers. This includes a record from Chris O'Toole's garden in Loughborough, a very significant record for the East Midlands.

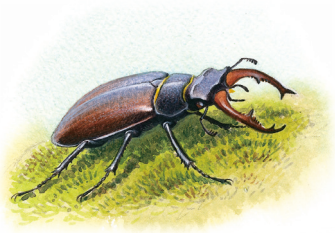
As ever, BWARS is collecting records of winter activity by bumblebees, so please submit your records to this national project via its website (www.bwars.com). With the unusually mild weather each side of Christmas, it is likely that winter-active nests will have fared well this season. I saw a worker of the **Buff-tailed Bumblebee** *Bombus terrestris* carrying full pollen loads on its hind tibiae on 20th December 2015, indicating an active nest nearby, although this was the sole observation that I made before Christmas festivities distracted me.

As advertised elsewhere in this issue, the country's hymenopterists now have a new tool at their disposal to enable them to get to grips with species identification, namely Steven Falk's recently produced *Field Guide* (but beware, this still requires extensive microscopy),

from British Wildlife Publishing. This provides identification keys to all species found in Britain, Ireland and the Channel Islands. As well as extensive illustrations by Richard Lewington, Steven's associated photo library on the Flickr website aids the identification process. I understand that Steven's webpages will also support any errata and identification updates, to keep apace with new developments.

Things to look out for in the coming months: While many hymenopterists are still just stirring by early June, the spring months offer several specialist bees that are doubtless under-recorded because of the relative lack of early recording activity. This includes the distinctive *Nomada ferruginata* referred to above. It might be found where flowering willows provide forage for its main host, so long as suitable host nesting habitat is also available. Will 2016 be the year in which the huge, distinctive iridescent purple/black carpenter bee *Xylocopa violacea* re-establishes a foothold in the UK? In recent years there has been an increased number of sightings and tentative evidence of attempted nesting, so surely it is only a matter of time before it establishes itself here on a more permanent basis.

Adrian Knowles, BWARS



Beetles

As usual, I begin with more of the apparently never ending additions to the British list. Three of these are rove beetles, Staphylinidae. *Lordithon speciosus* is the fifth member of its genus to be recorded in Britain, following its discovery in the Aviemore area of Scotland (Schülke 2015). All members of the genus develop in the fruiting bodies of fungi, and the single specimen of *L. speciosus* was found with many examples of three other members of the genus. This is a generally scarce species in Europe, with a primarily boreo-montane distribution, and it may therefore be confined in Britain to the Scottish highlands. The author gives a key to distinguish *L. speciosus* from closely related species.

The second new staphylinid species is *Stenus intermedius*, recorded from a post-industrial site near the River Wye in Monmouthshire (Bantock *et al*. 2015). *Stenus* is the largest genus of beetles in Britain, with 74 species prior to the new discovery, and many of these closely resemble one another. *Stenus intermedius* is no exception, being best distinguished from similar species by examination of the male genitalia. It seems probable that it will be found elsewhere in the country now that its presence has been noted.

If *Stenus* is a fairly difficult genus of rather small beetles, *Carpelimus* is more so. The 21 British species vary in length from 1.5mm to 4mm, and many closely resemble one another. To these can be added *C. nitidus*, which is yet another 'new to Britain' species from Dungeness, Kent (Telfer 2015). A single specimen was found in 2010, but its identity has only recently been confirmed. The majority of *Carpelimus* are found in wetland areas, usually at the edge of waterbodies, and the specimen was recorded at bare, wet, silty margins of flooded sand pits. The author suggests that this is probably a natural colonisation from across the Channel, the likely source for most of the other recently discovered species in the area.

Another rather large genus of beetles is *Epuraea* (Nitidulidae), with 19 British species prior to the recent addition of *E. ocularis* (Booth & Galsworthy 2015a). Most species are rather similar in appearance and can be difficult to identify, but *E. ocularis* is normally quite distinctive, with two dark spots on each elytron (as shown on an excellent photograph by the authors). This is originally a tropical species but has been spreading quite widely in Europe in recent years, and its discovery in Britain is perhaps not unexpected. It was discovered in numbers in Morden Hall Park, a National Trust property in south-west London. In view of its origin, one wonders if it is another beetle that requires the warmer microclimate of a city.

Enedreytes hilaris belongs to the Anthribidae, a family which has many members in warmer parts of the world, but with only nine species previously recorded in Britain. The larvae of this species develop in the stems of broom, and a single specimen of the species was swept from grassland among an extensive stand of the plant at Wanstead Flats, south Essex, in 2014 (Bantock & Flanagan 2015). As the site had been extensively surveyed for several years, it seems likely that the species is a recent arrival there. It would be worth checking broom anywhere within the Thames Estuary area for this species.

Species sometimes appear in unlikely places. Roger Booth found a weevil which he could not identify on the roof of his car in Merton Park, London (Booth & Galsworthy 2015b). Although rather similar to *Anthonomus*, which has 13 British species, it was later identified as *Bradybatus fallax* and therefore both a genus and a species new to Britain. More specimens were later found on the roof of another car, and a specimen was then beaten from a large adjacent Sycamore tree, a known foodplant. Apparently, the species has been recorded from other sites within London but details are unknown.

The large longhorn beetles of the genus *Cerambyx*, commonly known as capricorn beetles, have been recorded more commonly in Britain recently, and confirmed occurrences are summarised in a recent paper (Salisbury *et al.* 2015). The authors conclude that no species has been resident here for many years, virtually all records being subfossil. It is almost certain that recent records are all of species which have emerged from imported timber. While three species have been confirmed, the majority have been *C. cerdo*. It is possible that this species could become established and is worth looking out for. My observation is that many longhorn beetles are most likely to turn up in

the light-traps of lepidopterists, who should look out for any very large examples.

A similar review of recent and historical records of the distinctive chafer *Oxythyrea funesta* has also been published (Barclay & Notton 2015). This is another distinctive species that is illustrated in many popular insect guides. Not generally considered a native, it has been recorded more frequently in recent years, probably mainly imported with horticultural material, and could well become established and even abundant in the future.

In my last report (*BW* 26: 435–437), I noted that I was returning to survey a site on the Isle of Grain, Kent, where I found the small scarabaeid beetle *Rhyssemus germanus* in 2012. At the time, this appeared to be the first report of the species in the country since before 1830. I was subsequently informed, however, that it had been found on Dungeness NNR in 2011 and has now been recorded also from another site in southern England. General opinion is that these populations represent recent introductions, although, with such a small and inconspicuous species, it is difficult to be certain that they have not been previously overlooked. The weevil *Otiorhynchus dieckmanni*, another presumed introduction, is also present on the site. I am pleased to report that this year I found the population of *Rhyssemus germanus* to be well established and I recorded more than 50 individuals, many more than in the previous survey. The habitat here is interesting, with the main population of the beetle confined to areas of very fine loose flue ash from a coal-fired power station. Mounds of this substrate are the subject of a good deal of Rabbit activity, including numerous small scrapes which have filled with decaying leaves, and it is mainly in these scrapes that the beetle was found. It was, however. absent from similar scrapes on gravel substrate nearby, a good example of a very specific man-made habitat being apparently essential. While the majority of the wider site is now being developed, the substantial areas of good post-industrial land which have been set aside in mitigation continue to support this beetle and numerous other invertebrate species. In total, 330 beetle species, including 35 considered to be nationally scarce, have been found within a total of over 700 invertebrate species. This includes 81 ground beetles, almost a quarter of all British species. Sites such as this in the Thames Gateway area are under intense pressure, but here is a demonstration that development on brownfield sites does not always have to mean the total loss of habitat and species, provided that a thorough ecological survey is undertaken and an appropriate plan is put in place and adhered to.

In the previous report, I also mentioned a survey to assess the status of the **Bloody-nosed Beetle** *Timarcha tenebricosa* here in Warwickshire, where its population is largely restricted to a single area of very ordinary countryside. The population here appears to be still very strong, though not all translocations seem to have been successful. As a result of the previous report, several people contacted me to say that they had similar experience of the beetle in their parts of the country, with only isolated populations present, in areas which appeared to have no particular habitat features to distinguish them from the surrounding countryside.

Finally, as this report will be published in winter, a reminder that this is a good time for recording beetles. Unlike most insect groups, many species of beetle are adult in winter and can best be found then. Some of these are winter-active, particularly many of the ground and rove beetles, while others become inactive and hide away in places such as leaf litter, thick moss and grass tussocks. The equipment for finding these is easily found in any hardware store: a large garden sieve, a round plastic washing-up bowl to fit the sieve, and a folding pruning saw. Put the sieve on top of the bowl, fill it with moss or litter and shake vigorously: the beetles will fall through into the bowl. More productive, however, are large grass tussocks, particularly those of Tufted Hair-grass *Deschampsia cespitosa*. These are best examined by cutting the tussock off at the base with the pruning saw, which is much more effective than a knife or hacksaw, and then breaking it up in the sieve over the bowl. Wearing gloves is a good idea, so as to avoid injury if the saw slips and to prevent cuts from the grass leaves. Personally, I prefer to put the resultant samples into plastic bags and bring them home to sort at leisure. Not only is this far more comfortable for the coleopterist, but species which are inactive and easily missed in the field soon begin to run about and are much easier to spot after they have warmed up.

The number of species and individuals that can be found in this way can be remarkable. I am planning a winter of tussocking this year and hope to summarise the results in the next report.

References

Bantock, T., & Flanagan, J. 2015. *Enedreytes hilaris* Fåhraeus, 1839 (Anthribidae, Anthribinae) new to Britain. *The Coleopterist* 24(1): 18–21.

Bantock, T., Ashby, M., & Plant, C. 2015. *Stenus (Tesnus) intermedius* Rey, 1884 (Staphylinidae, Steninae) new to Britain. *The Coleopterist* 24(1): 22–24.

Barclay, M. V. L., & Notton, D. G. 2015. *Oxythyrea funesta* (Poda) (Scarabaeidae) in London and a summary of recent and historical British records of this species. *The Coleopterist* 24 (2): 113–115.

Booth, R. G., & Galsworthy, A. C. 2015a. *Epuraea ocularis* Fairmaire, 1849 (Nitidulidae) new to the UK. *The Coleopterist* 24(2): 69–71.

Booth, R. G., & Galsworthy, A. C. 2015b. *Bradybatus fallax* Gerstaeker, 1860 (Curculionidae) new to Britain. *The Coleopterist* 24(2): 131–132.

Salisbury, A., Malumphy, C., & Barclay, M. V. L. 2015. Recent records of capricorn beetles *Cerambyx* spp. in England and Wales (Cerambycidae). *The Coleopterist* 24(2): 40–44.

Schülke, M. 2015. *Lordithon speciosus* (Erichson, 1839) (Staphylinidae) new for the British fauna. 88th contribution to the knowledge of Tachyporinae. *The Coleopterist* 24(1): 58–62.

Telfer, M. G. 2015. *Carpelimus nitidus* (Baudi di Selva, 1848 (Staphylinidae)) new to Britain. *The Coleopterist* 24(2): 100–105.

Turner, C. R., & Beaver, R. A. 2015. *Hypothenemus eruditus* Westwood and *Hypothenemus seriatus* (Eichhoff) (Curculionidae: Scolytinae: Cryphalini) in Britain. The Coleopterist 24(1): 12–15

Richard Wright

Spiders

In this column in April 2015 (*BW* 26: 287–288), we reported on the discovery of *Hypsosinga heri*, a species presumed extinct until Allan Neilsen, Sara Cookson and Jacquie Rayner found one at Radipole Lake, Dorset, in May 2014. In the Summer 2015 issue of the Spider Recording Scheme Newsletter, Allan provides a detailed account of further investigations to elucidate the spider's status in the area; a further 11 *H. heri* have been found at various locations around this RSPB reserve. In addition, Allan found 18 on a single day at the nearby Lodmoor reserve. The species appears to be well established across these two sites, although its potential presence in the wider area is worth investigating – readers are encouraged to keep an eye open in May and June if in the area (see SRS website and Newsletter). These discoveries are just an example of how much non-specialists and volunteers can add to our knowledge of the British spider fauna.

The same issue of SRS News reports the discovery of a new species for the UK in 2014, with a further discovery of the species in 2015 reported in the Autumn SRS News. At the request of Natural England, Pip Collyer, along with other members of the Norfolk and Norwich Naturalists Society, carried out a survey of Winterton Dunes National Nature Reserve. Together with the county beetle recorder, Pip set pitfall traps to capture species not sampled by other methods. One of these pitfall traps yielded a small male linyphiid ('money spider') that Pip could not identify. It was sent to Peter Merrett, a global expert on this group, via the National Spider Recorder, Peter Harvey. Peter identified it as *Syedra myrmicarum*, a spider not previously recorded in the UK. It is known from central Europe, but rarely found. The survey also recorded a number of new species for the site. In October 2015, in a churchyard in Bedfordshire, Ian Dawson found a small pale linyphiid in some leaf litter collected from between the branches of a conifer. This, too, turned out to be *Syedra myrmicarum*. This situation is rather far from that known for the species in Continental Europe, where it is found in heathland and on xerothermic slopes, in ant nests and under stones.

Many non-arachnologists are surprised at our continued activity into October, November, and even December. These months can be a good time to search the autumn fall of leaf litter for linyphiids in particular, which may not be found at other times of the year, and, as demonstrated by these discoveries, other habitats are worth sampling, too.

Peter Harvey continues to find new sites for *Philodromus rufus* (*sensu stricto*) in Essex (see *BW* 26: 287–288), and the species has now been found also in Hampshire by Alan Wilkinson. This spider is likely to be discovered increasingly in southern England, but Peter stresses that, although the species is generally markedly more rufous on the whole body and legs, separation from *P. albidus* is still difficult (females requiring dissection), and confirmation of both male and female is best achieved by comparison with reliably identified reference material.

In the previous spider column, in August 2015 (see *BW* 26: 437–439), we reported on the discovery of *Anyphaena sabina* on a green roof in London by Richard Wilson, Andy Godfrey and Mark Telfer in 2014. This species was first found in Britain by Edward Milner, also in London (Milner 2012). In June of 2015, T. J. Thomas found another *A. sabina* in the garden at the Natural History Museum, as well as *Cryptachaea blattea*, a theridiid ('comb-footed spider') first found in the UK on the Isle of Wight in 2011.

We have another new species record for the country with Jonty Denton's discovery in Guildford, Surrey, in May 2015 of *Clubiona leucaspis*, beaten from amenity planting while he searched for 'exotic' bugs. As the spider had a distinctive but unfamiliar pattern, Jonty used the Spiders of Europe website (www.araneae.unibe.ch) – an extremely useful resource for the arachnologist – to compare the palps (in adult males, these include structures necessary for identification). On a return visit on the following day he found three adult females, and reasonably hypothesised that this is a breeding population accidentally imported with the amenity planting.

***Hypsosinga heri*, once thought extinct, has been found in Dorset.**
Allan Neilson

If there is anything that these spider reports indicate, it is that there is still plenty that we do not know, and, in the words of Donald Rumsfeld, 'there are things we don't know we don't know'. Amateurs and non-specialists can help to answer (and ask!) these questions, and we encourage you to visit the new British Arachnological Society website, which is imminent as we write this.

References

Milner, E. 2012. New *Anyphaena* species recorded in London, a second species new to Britain from Mile End Park, Tower Hamlets. *SRS News* 72. In *Newsletter of the British Arachnological Society* 123: 23–24.

SRS News No. 82. In *Newsletter of the British Arachnological Society*; also download available from http://srs.britishspiders.org.uk/portal.php/p/Spider+Recording+Scheme+News

Greg Hitchcock,
British Arachnological Society;
www.britishspiders.org.uk

Plants – Ireland

The Botanical Society of Britain and Ireland (BSBI) held a very successful recording week in early August, in Co Mayo, to contribute to the next atlas on which the BSBI is working (for 2020). A total of 42 members of the BSBI joined over the eight days and 11,000 records were collected. The highlight of the week was the finding of **Broad-leaved Rush** *Juncus planifolius* in abundance on a cut-over peat bog. This rush has leaves that are flat, rather than round as you would expect on a rush. It is otherwise known only from Connemara.

Co Mayo is a rather wild county with little agriculture compared with much of Ireland, and the fields that are used for grazing are still unimproved and wonderful for

Betony. Richard Revels

orchids. **Lesser Butterfly-orchids** *Platanthera bifolia* still turn many pastures white in June, a very rare sight these days. Marsh-orchids colour road verges, pastures and shores of loughs red, and it is not uncommon to have five or six species at any one location. **Marsh Helleborines** *Epipactis palustris*, too, are frequent in places.

Another project with which people have been helping over the whole of Ireland is the collecting of *Gunnera*. A leaf sample was collected from each plant and placed in a bag of silica gel, and photos of each site were taken. These were sent to the Royal Horticultural Society at Wisley, where the DNA will be analysed. *Gunnera* can be a very invasive species in the west of Ireland. The aim of the project is to determine whether naturalised in the wild is, besides **Giant-rhubarb** *G. tinctoria* and **Brazilian Giant-rhubarb** *G. manicata*, the hybrid between those two species. Indeed, some plants found in the wild almost give the impression that the two species have been grafted onto each other, as they have flowering and fruiting spikes of each species on the same plant.

From Kinish Harbour and Cow Strand on Sherkin Island, off the south-west coast of Cork, has been found the hybrid between two native species, the **Spear-leaved Orache** *Atriplex prostrata* and **Babington's Orache** *A. glabriuscula*, growing on the gravelly shore. These sightings add to the only previous known Irish record, which was made back in 1950. Another hybrid that is hard to distinguish is that between **One-flowered Glasswort** *Salicornia pusilla*, which has single flowers, and **Purple Glasswort** *S. ramosissima*, which has flowers in groups of three. The hybrid can have, on the same plant, single flowers or groups of two or three. This hybrid is known only from saltmarshes at Ballyteige, in Co Wexford, where it was found new for Ireland in 2015.

Lesser Canary-grass *Phalaris minor*, a rare non-native grass in

Ireland, has been found new for Cos Carlow, Cork and Waterford as a weed of arable fields. This species had already been recorded as a rare casual in several counties on the east side of Ireland. Another rare non-native grass, **Black-grass** *Alopecurus myosuroides*, has turned up in arable fields in Cos Antrim and Derry. That grass had been reported from only a handful of sites around Ireland before.

There have been a few non-native species recorded for the first time in Ireland. These include **Beggarticks** *Bidens frondosa*, found on the side of a wall at Grand Canal Docks, Dublin, and **Woody Fleabane** *Dittrichia viscosa*, which appeared at a lorry park at Rosslare Harbour, Co Wexford (it is likely that the seeds were dislodged from the parked vehicles which had come in on the ferries from Europe mainland). Another species that has arrived at Rosslare Harbour via ferry traffic is **Yellow Wall Bedstraw** *Galium murale*, which came on traffic via Fishguard Ferry Port, where it is well established since 2012.

A few non-native species which had been recorded previously from only a handful of sites around Ireland have turned up as new county records. These include: **Fig-leaved Goosefoot** *Chenopodium ficifolium* on the edge of a cultivated field at Castlebar, Co Mayo; **Peach-leaved Bellflower** *Campanula persicifolia* on a roadside at Stewartstown, Co Tyrone; **Oak-leaved Goosefoot** *Chenopodium glaucum* at Stokestown Port, Co Wexford; and **Atlas Poppy** *Papaver atlanticum* at the north end of Bray Promenade, Co Wicklow.

One of the biggest surprises of 2015 was the refinding of **Betony** *Betonica officinalis* on Bilberry Rock, on the edge of Waterford City. The Betony was thought to have been destroyed by quarrying more than 100 years ago. It was first found here in 1746 and last reported in 1886, many searches over the years having failed to refind it. There are two populations of the Betony on Bilberry Rock. What is even more of a surprise is that the owner of the site had known for at least 20 years that the Betony was there, but did not realise that it was a very rare species until his son told him to report it. The worrying thing is that there is a planning permission for the area and the Betony may soon disappear again. **Paul Green**

Bryophytes

Orthotrichum – a highly mobile genus of epiphytic mosses – continues to provide the lion's share of new British bryophytes. This is partly because of a genuine increase in many epiphytes, partly because of increased interest in the genus by British bryologists, and partly because European experts are clarifying the identification characters of the genus. Both **Alpine Bristle-moss** *Orthotrichum alpestre* and **Roger's Bristle-moss** *O. rogeri* were reported new to Britain in 2015 issues of *Journal of Bryology*, albeit under very different circumstances.

Orthotrichum alpestre is not a recent arrival. It was collected by Martin Corley by the Water of Ailnack near Tomintoul, in the northern Cairngorms, in 1983, but was considered to be an atypical form of *O. pallens* until it was redetermined as *O. alpestre* by Francisco Lara. The climate of this part of north-eastern Scotland is more or less ideal for *O. alpestre*, which has a European distribution that extends from northern Scandinavia to the high mountains of Spain, Italy and the Balkans. In most of its range it grows on rocks, with occasional epiphytic records; the Ailnack collection was from a Wych Elm. It is possible that British bryologists would overlook a saxicolous colony as **Anomalous Bristle-moss** *O. anomalum*, **Hooded Bristle-moss** *O. cupulatum* or **Rock Bristle-moss** *O. rupestre*, thinking those to be the only members of the genus that grow on rock, but it seems unlikely that *O. alpestre* would be anything other than very rare in Scotland, as otherwise it would have been found before.

Orthotrichum rogeri seems almost certainly to be a new arrival. I found a single tuft of an unfamiliar *Orthotrichum* on a young oak in Ashdown Forest in spring 2014, collected part of it, and failed to work out what it was despite several hours' scrutiny. Francisco Lara identified it as *O. rogeri* on the BBS *Orthotrichum* workshop a few months later. This species was thought to be an exceedingly rare European endemic until a few years ago, and is listed on Annex 2 of the Habitats Directive. Subsequent research has shown it to be relatively frequent in several areas of Europe, and it is increasing in the Netherlands. The Ashdown Forest tuft was almost certainly the result of a spore being blown across from the Continent, and as yet there have been no more records from there or elsewhere in England. It seems likely that further records will follow, as has been the case with other recent arrivals such as *O. acuminatum* and *O. scanicum*.

Following on from the summer's discovery of **Alpine Jagged Notchwort** *Lophozia opacifolia* new for Wales in Eryri (*BW* 27: 63–64), Des Callaghan has discovered this species new for the Southern Uplands of Scotland. It was growing at 810m altitude on Broad Law, and the same area also supported **Starke's Fork-moss** *Kiaeria starkei* new for southern Scotland. Both of these boreal species have been found in the Lake District in the past, and their Southern Upland colonies bridge a gap between their headquarters in the Highlands and isolated populations farther south.

Further Scottish excitement came from the other end of the biogeographical range with November's discovery by Nick Hodgetts of a second Scottish colony of the Mediterranean–

Atlantic liverwort the **Petalwort** *Petalophyllum ralfsii* on Baleshare, in the Outer Hebrides. Nick's survey was commissioned by SNH, and resulted from a feeling that the north-western Scottish dune systems had seldom been visited by bryologists in seasons when *Petalophyllum* is visible and this globally threatened species may therefore have been overlooked somewhere. Although machair is excellent for a wide range of taxa, it is generally unsuitable for *Petalophyllum* because of high nutrient levels; the Baleshare site had skeletal dune turf and was reminiscent of some Irish sites for the species. Armed with this new information, SNH will be working with the site-managers to ensure continued grazing management at the Petalwort site so as to maintain open dune-slack habitat there. Nick also recorded other notable bryophytes in the Uist dunes – including **Gillman's Notchwort** *Leiocolea gillmanii*, **Down-looking Moss** *Catoscopium nigritum*, **Inclined Distichium** *Distichium inclinatum* and **Ribbed Extinguisher-moss** *Encalypta rhaptocarpa* – and it is clear that these dunes are as important bryologically as they are for so much other biodiversity.

Much less welcome news comes from the dunes of Wales, where David Holyoak was commissioned by NRW to revisit the colonies of rare dune *Bryum* species that he documented in 2001. Floristic succession has led to losses or declines at all sites, and the trend for dune *Bryum* appears depressingly downward. Of most concern is a reduction in suitably open, damp habitat for **Blunt Bryum** *B. calophyllum* and **Warne's Thread-moss** *B. warneum* at Tywyn Aberffraw, and the former seems to have gone extinct in Wales along with **Broad-nerved Hump-moss** *Meesia uliginosa* and Down-looking Moss, both of which had their sole Welsh site there. *Bryum warneum* clings on in a single slack, and the rapid loss of rare species from what was Wales' premier site for dune bryophytes highlights the need for local 'gardening' to secure vulnerable populations, while also pushing for a sustainable, long-term 'rejuvenation' solution for our dunes. Slightly more welcome was the confirmation of a reasonable population of *B. warneum*, along with some **Baltic Bryum** *B. marratii*, in a newly developed slack at Whiteford Burrows. David also discovered *B. marratii* new for Morfa Harlech during his survey, but as this is a moss of the dune-saltmarsh transition, rather than of pioneer dune slacks, it does appear fractionally less vulnerable than some of its relatives.

In an interesting collaboration of biology and physics, Wolfgang Hofbauer from the Fraunhofer Institute of Building Physics investigated the diversity of wall pioneer mosses in the genus *Schistidium*, using DNA-barcoding techniques developed by the Royal Botanic Garden in Edinburgh. **Thickpoint Grimmia** *Schistidium crassipilum* was found to dominate, but another taxon was identified by means of the ITS (internal transcribed spacer) region, and additional genetic diversity was visible among the samples. British bryologists initially struggled when *Schistidium apocarpum* was split into several species, but have now come to understand the genus relatively well. The prospect of *S. crassipilum* holding further cryptic species is not a welcome one.

Sam Bosanquet

Fungi

As the winter rain pours steadily down, it is hard to recall that the autumn of 2015 was comparatively dry and not so good for larger fungi. It was not until very late in the season that some interesting species turned up locally, one of which is, I believe, a new record for the British Isles.

Plums and Custard

Tricholomopsis rutilans is a familiar agaric with large and handsome fruitbodies that are custard-yellow throughout, with fine, plum-red scales on the cap and stem. It is common throughout the country on rotting conifer wood, often fruiting in spectacular clusters. For some years, however, I have occasionally noticed the species growing among Bracken in upland grassland and made the rather lazy assumption that there must have been some conifer wood – perhaps an old fence post – buried at the spot. I thought no more about it until last year, when I came across a paper by Ibai Olariaga and colleagues (2015, *Mycol. Progress* 14(4): 21) that used both DNA-sequencing and traditional morphological examination to explore variations within *Tricholomopsis rutilans*. Those authors discovered that it was a complex of at least five closely related taxa, one of which was sufficiently distinct to be described as a new species, the Bracken-inhabiting *Tricholomopsis pteridicola*, collected extensively by the authors in the Basque Country of north-western Spain and south-western France. This new species differs from *T. rutilans* not only in its habitat and substrate, but also in the smaller size and paler colours of its fruitbodies. The background colour in particular is not bright custard-yellow, but always 'pale yellowish cream'. This fits specimens which Shelley Evans and I have come across in Wales – and I managed to find some still fruiting locally in late November (see photo). The specimens in the photograph have fewer red scales than usual (possibly thanks to heavy rainfall), but do show that the gills are creamy rather than deep yellow. In Wales, we have come across it in at least two upland grassland sites in vice-county Radnorshire and at least one in Brecknockshire. Olariaga *et al.* suggest that *T. pteridicola* 'is likely to have a broader distribution in Europe, although it might be restricted to temperate and oceanic areas', so it is clearly a fungus to look

***Tricholomopsis pteridicola* in Radnorshire – a newly described species.** Peter Roberts

out for in the south-west of England, western Scotland, and Ireland. The current *Checklist of the British & Irish Basidiomycota* does mention *T. rutilans* as sometimes growing with Bracken, seemingly with reference to a number of Scottish-woodland collections, and it may well turn out to be quite widespread, even if previously overlooked.

Also from Wales, Peter Sturgess identified and forwarded a specimen of an interesting black club fungus collected in unimproved grassland in vice-county Glamorganshire in late October last year. Although it may superficially resemble ascomycetous earthtongue *Geoglossum* species, frequently found in the same biotype, the **Dark Club** *Clavaria greletii* is a basidiomycete and is a relative of the white and yellow clavarioid species which are commonly encountered in old grassland. Small black fruitbodies are easy to overlook, of course, but, even so, *C. greletii* is undoubtedly rare and Peter's collection (as shown here) appears to be the first record of the species in Wales. Four black or dark brown clavarioid species have been recorded from the British Isles, all equally rare, and several years ago (2009) I published descriptions and a key to them in *Field Mycology* (8(2): 59–62). This is now freely available online at www.britmycolsoc.org.uk/files/3412/8298/3167/Clavaria_Brown_and_black.pdf.

One of the four species included in the paper was referred to the American *Clavaria atroumbrina*, but a subsequent study by Kautmanova *et al.* (2012, *Persoonia* 29: 133–145) sequenced a representative British collection and found that it was close to but not conspecific with the American type. So, our British '*Clavaria atroumbrina*' appears to be a new species, though one that remains as yet unnamed.

In a previous column (2015, *BW* 26(3): 216), I noted that Carol Hobart had collected an unfamiliar hart's truffle during the British Mycological Society's foray at Gregynog Hall, in Montgomeryshire. Carol has now published an account of this, with photographs and description, in *Field Mycology* (2015, 16(4): 121–125). The species – new to the British Isles – is *Elaphomyces decipiens*, and several specimens were found under an old oak at a depth of 5–15cm. Like other hart's truffles, the fruitbodies are more or less globose; but *E. decipiens* is unusual in that the fruitbodies are densely encrusted with a mixture of earth and mycelium that needs to be patiently and carefully removed before the warted outer surface of the hart's truffle is revealed. This discovery brings the number of British species to six, two of them (*E. decipiens* and *E. cyanosporus*) first unearthed by Carol.

The invasion of *Favolaschia calocera*, a bright orange, poroid, tropical agaric now dubbed 'Orange Ping-Pong Bats', was noted in the last column. Since then, a comprehensive account of its worldwide spread and its recent appearance in Cornwall and Devon has been published by Martyn Ainsworth and others in *Field Mycology* (2015, 16(4): 113–120). The paper includes details of further finds in the south-west, together with results of a DNA study that indicate that British material is identical to specimens from Kenya, New Zealand and Australia. This is another interesting new fungus to look out for. Like it or not, it will be heading your way soon.

Peter Roberts

***Clavaria greletii* in Glamorganshire – a new Welsh record.** Peter Sturgess

Conservation news

Flooded pasture. John Eveson/FLPA

compiled by

Sue Everett

FLOODING

Northern deluges

Unsurprisingly, the wettest December on record in northern Britain did not leave people's front rooms unscathed. An estimated 16,000 homes were flooded in December, as storms 'Desmond', 'Eva' and 'Frank' swept off the Atlantic in rapid succession. Coupled with temperatures 4.1°C above average, unprecedented amounts of rain were recorded for north Wales and much of northern Britain, with 341mm of rain falling at Honister Pass, Cumbria, in the 24 hours to 18:00 GMT on 5th December, while at Thirlmere 405mm also set a new record for two consecutive rain-days. For details and analysis, see the CEH *Briefing Note: Severity of the December 2015 floods* (http://bit.ly/1OTfDDT). This reports that the three peak flows recorded from the Eden, Tyne and Lune during Desmond (1,700m^3/second) are the highest on record and are equivalent to more than 41 Olympic swimming pools every minute. This would fill the auditorium of the Royal Albert Hall in less than a minute.

Flooding rethink

In a deluge of media coverage of the flooding, there was a significant degree of *déja vu* and a repeat of previous bleats and rants (especially a repeat of calls to dredge rivers and for more money to be spent on defences) that have followed every major flooding episode experienced this century (during which floods have become worryingly numerous). This time, however, more of the talk is of climate change and the expectation that extreme weather events are going to become the new norm, one for which a range of measures will need to be considered to address the impacts of flooding on people and property. It is not surprising, then, that the Environment Agency and, subsequently, Natural Capital Committee Chair, Dieter Helm, are calling for a complete and radical rethink of flood-defence policy. This time there has also been more talk of upstream, catchment- and land-based measures, and the role that land management (especially farming) and land drainage play in speeding up the flow of water downstream.

In *Flood defence: time for a radical rethink* (http://bit.ly/1JyRiCG), Dieter Helm describes the conventional approach to flood defence as 'at best inefficient and… sometimes even counterproductive, encouraging the sorts of land use and land management decisions that can actually make flooding worse in the medium term'. Helm says that rivers should be treated as a core natural capital, responsibility for flood defence should be removed from the EA, and new flood-defence companies should be created on a catchment basis. Referring to the 2014 floods in the Somerset Levels, he cites that the changing farming practices 'directly contributed to the silting of the two main rivers' while 'upstream farming practices... contributed to the more recent flood events'.

Dredging

This winter's flooding further exposed the current government's irrational actions (or lack of action) designed to placate the Conservative heartlands and free-market mantras (especially its constituency of developers, farmers and landowners). In January, this included a decision by Defra Secretary Liz Truss to give farmers more or less *carte blanche* to dredge ditches on their land. No doubt some individuals given these powers will use them sensibly. The majority of land-controllers, however, see wet bits of land as conflicting with their use of it, so the outcome of Ms Truss's decision is likely to be of benefit to destructive types of intensive farming (such as maize-growing) rather than to places where people actually live. Objectives to reduce the impacts of farming on rivers will also be more difficult to achieve. Unfortunately, many people still seem to consider that the one-trick-pony measure called dredging is the answer to flooding, as evidenced by the report from Miles King (see http://bit.ly/1mQZKCN) describing new drainage proposals put forward in the Somerset Levels.

These proposals are likely to affect part of the Levels and Moors European Special Protection Area, where two major drains will be widened and deepened and flood banks raised further.

Flooding, farming and land use

Miles also covers other debates on flooding, including the Parliamentary debate that took place in January (see http://bit.ly/1ZY1NU8). Unsurprisingly, the recent floods did not escape the wrath of George Monbiot, who accuses the government of doing little, hiding the evidence and 'official neglect' (see http://bit.ly/1R5tKaF). In his blog of 6th January (http://bit.ly/1OOqccY), he also accuses Liz Truss of choosing 'to protect farmers over flood victims' and in December (http://bit.ly/1NHSJdJ) he described a 'storm of ignorance' when saying that 'censoring official advice, stripping the hills and rivers, the government ensures that disasters like the Cumbria floods will keep recurring'. George also reached out to *Daily Mail* readers (http://dailym.ai/1mxf9YR), pointing out the perversity of EU farm subsidies: 'To claim your money, you don't need to produce a single lamb chop…you merely need to ensure that your land is in "agricultural condition" – and this means bare.' Criticising dredging and flood-management policies, he said that dredging is 'the stupidest and most counter-productive policy you could devise', while concluding that 'Flood management is more or less where medicine was in the seventeenth century: unscientific and irrational.' In 2014, he said some similar things: 'How we ended up paying government to flood our homes' (http://bit.ly/1m26MPJ). In January, the European Union also waded in with a comment: 'Suggesting that the EU is to blame for floods is completely without foundation' (see http://bit.ly/1VPH4j8).

Mark Avery and others were not reticent in highlighting the damaging role of grouse-moor management that significantly reduces the capacity of moorland to retain water. Mark also has a useful set of links on his 3rd January blog (http://bit.ly/1SLLnfH), while his blog of 4th January ('Implausible deniability' – http://bit.ly/1SfF5pr) graphically shows the madness of current grouse-moor management. The role of farming and land use in floodplains and uplands was also, once more, highlighted by the Committee on Climate Change Adaptation Sub-committee Chair, John Krebs, in a letter to Defra floods minister Rory Stewart on 17th January (http://bit.ly/1Q2dbvs). A precedent for compensating farmers whose land floods has also been set, and ideas are being discussed for rolling out payments for allowing the flooding of floodplains. So, give taxpayer grants to drain wetland and floodplains, enabling cultivation and agricultural improvement, then pay farmers when their land floods because their crop has been destroyed. See Miles King (http://bit.ly/1S1CWw6) on that one.

Restoration killer facts

There are a number of river and wetland restoration projects completed (some still underway) from which figures on ecosystem services, including soil carbon, water retention and storm-flow reduction, have been collected. These data are being collated as 'Killer facts' by Alistair Driver, National Biodiversity Manager for the Environment Agency (see latest version at http://bit.ly/1SfV8n0). The statistics in this document are real benefits measured against actions completed on the ground, not modelled or predicted benefits. One example comes from Exmoor, where moorland rewetting by blocking drainage ditches has reduced storm flows to 32% of the pre-restoration level, equating to approximately 8,000 cubic metres per hectare per year across the 46ha of the project area. There is also some quantification of European Beaver *Castor fiber* impacts from the monitored introduction site at Boldventure, in Devon, where the animals have constructed 13 dams, holding up to 650,000 litres of additional water within ponds on the site. This equates to 21.6 litres of surface-water storage per square metre of land. The Beavers also had a positive impact on the quality of water leaving the site. Further data contributions are invited. Please e-mail your examples or links to documented evidence to alastair.driver@environment-agency.gov.uk. Alistair also tweets about relevant projects @AliDriverEA. In addition, the JBA Trust is compiling a catalogue of nature-based flood-management projects – see http://bit.ly/1PCTFkP.

On the other hand, land-use and catchment-restoration measures, although helpful, may not always be the great panacea if deluges similar to the December 2015 events are experienced. This was a conclusion of a review of flooding of my former home town in 2007 (Thatcham, West Berkshire, 84mm of rain in a few hours), and it is also the initial conclusion of the Water Friendly Farming Project carried out on lowland farmland by the Freshwater Habitats Trust and partners (see 'Floods and land management: myths and reality' at http://bit.ly/22X6IHs). This review also looked at other evidence and considered tree-planting, rewetting of bogs and other wetlands, creating of interception ponds, floodplain retention, and river rewilding; floodplain retention was considered the measure most likely to succeed at times of exceptionally high rainfall. The analysis by Alan Jenkins of the Centre for Ecology and Hydrology is also relevant (see http://bit.ly/1N4OWXh).

EA Chair vacancy

Shortly after his return from Barbados (following the Christmas floods), the former Chair of the Environment Agency, Sir Phillip Dilley, was exposed by Miles King as holding a Directorship of the Abbeystead Estate, an intensively managed grouse moor in the Forest of Bowland where 'Hen Harriers do not have a good time' (see http://bit.ly/1l2D816). Sir Phillip resigned as Chair of the EA on 11th January. There is more about him and other appointees on the Defra Board in Miles King's blog of 16th November.

Development and flooding

Penultimately in this section, I shall remind readers about more of the current madness that is embedded within the present planning system and government policy. As background, there was an independent review of flooding published in 2008 (The Pitt Review) and out of this came the detailed *Planning Policy Statement 25: Development and flood risk practice guide on flooding* – a document that was to be regularly updated. In 2012, however, it was scrapped by the Coalition Government and replaced by four pages in the National Planning Policy Framework.

Second, advice to Government from the Adaptation Sub-committee (ASc) of the Climate Change Committee about the risks of building on land liable to flooding has been consistently ignored by ministers. In 2012, it revealed that 200,000 homes were built on floodplains between 2001 and 2011 (see http://bit.ly/1iWSq1O). The ASc says that since then the coalition has made it easier for councils to approve planning applications in risky areas; housing stock in areas where flooding is likely at least once every 30 years has grown at a rate of 1.2% per year since 2011, nearly twice the rate as that outside floodplains. Currently, according to figures from a Greenpeace UK FOI investigation (see http://bit.ly/21RqFPs), some 9,000 new homes are planned in areas identified as being partially or fully at risk from flooding. There has also been, according to Sir John Krebs, ASc Chair, 'lamentable' uptake of measures designed to reduce runoff from urban areas in the form of Sustainable Drainage Systems (SuDS).

Sustainable drainage

The revised SuDs manual is now available as a free download (from http://bit.ly/1niCT42). Published by CIRIA, this covers all aspects in the design of SuDs, including biodiversity. For information, SuDs refers to 'sustainable drainage systems' designed to reduce the potential impact of surface water from new and existing developments and so reduce the risk of flooding.

Pasture-fed sheep and cattle. Wayne Hutchinson/FLPA

LAND AND NATURE

Land reform: England

The document *Equality in the Countryside: A Rural Manifesto for the Parliamentary Opposition* sets out some steps needed to progress a land-reform agenda in England. Among the stated objectives are to reconnect young people with nature and include sustainable land management in the National Curriculum. The Manifesto also calls for workers, not landowners, to be rewarded for managing land 'ecologically and productively'. While it is unlikely that any debate on land reform will take place under the current government, this document kicks off the debate in England – which has been long overdue. The Manifesto is published by The Landworkers' Alliance and *The Land* magazine and is supported by The Family Farmers' Association. It can be read online at http://landworkersalliance.org.uk or www.thelandmagazine.org.uk. Meanwhile, Access to Land (www.accesstoland.eu) is a European network of grassroots organisations aiming to secure land for agro-ecological farming.

Pasture-fed livestock

The Pasture-Fed Livestock Association was founded just a few years ago to promote the finishing of ruminant livestock on grassland and open semi-natural vegetation and to show other farmers that meat and milk do not have to come from animals fed with cereals and manufactured feed. Over the past three years, eight PFLA farmers have provided information on their costs, income and experiences. These data have now been collated and are presented in a new publication, *Pasture for life: it can be done – The farm business case for feeding ruminants just on pasture*. The results show that producing beef and lamb on 100% pasture and forage can be profitable. See the report at www.pastureforlife.org and sign up on Facebook (Pasture-Fed Livestock Association) or follow on Twitter @PastureForLife. Although not concerned specifically with biodiverse pasture, the PFLA initiative is one of a number of recent initiatives that are attempting to promote less intensive livestock systems; among their members are farmers who have put into reverse intensive systems on their own farms, demonstrating benefits for biodiversity and farming.

Real farming

Funding Enlightened Agriculture (www.feanetwork.org) is a network of organisations and individuals who wish to support agricultural and food-production practices that are economically sound, are socially just and promote long-term protection of natural resources. Within the UK this is the beginning

of a growing momentum of farmers, land managers, advisers, academics, 'foodies' and others wishing to see a sea change in current food-farming policy and practice. It was recently showcased at the sixth and, to date, the biggest Oxford Real Farming Conference and is part of the 'Real' farming movement (see www.campaignforrealfarming.org).

Wildlife yields

A recent study of a 900ha arable farm found that wildlife-friendly farming increased crop yield, thus giving evidence for 'ecological intensification' of farming. The study, by Pywell *et al*., is published by The Royal Society at http://bit.ly/1U9747Z.

New research published by Rothamsted Research (see http://bit.ly/1T1J2NX) shows that emissions from the UK farming industry could be largely offset by 2050 by expanding the increase in woodland cover from 12% to 30% and restoring 700,000ha of wet peatland. Crop production on remaining farmland would, however, need to be increased.

SOILS AND THE BLACK STUFF

Soil Health Inquiry

The Parliamentary Environmental Audit Committee is currently considering evidence submitted to its Inquiry into Soil Health. Evidence submitted to date is available for viewing at http://bit.ly/1LNKxaw. One of the documents referred to on the Inquiry webpage is Defra's 2009 Soil Strategy – another document that has been put in a dark cupboard and ignored while soil has continued to wash into our rivers.

Peat use up

Updated figures about growing-media use in garden centres and professional nurseries show that these used more peat in 2014 than in the previous year. The survey, commissioned by Defra (see http://bit.ly/1Q2sltv), found that retail peat use in 2014 rose by nearly 10%, while professional peat use was up by 3%. Alternatives used in garden centres did increase, however, by 3%. Under the Coalition Government, an ambition for the horticultural sector to end its use of peat by 2030 was set out in 2011's The Natural Environment White Paper. Former Biodiversity Minister Richard Benyon also confirmed a desire to see peat eliminated from the amateur gardener market by 2020. A report and draft roadmap setting out how these might be achieved through voluntary measures was subsequently published in July 2012 and a government response issued in 2013 (http://bit.ly/1OuQonv). A policy review was due to take place towards the end of 2015. Defra's Press Office has confirmed that 'a review is currently underway and the outcomes are expected to be published alongside our 25-year plan for action on the environment, which will set out a comprehensive, long-term vision to protect and enhance our natural environment.'

Restoring peatland

Following a successful two-year trial, a new Government-backed Peatland Code was launched in November. The Code is a mechanism by which businesses can help to fund peatland restoration projects. It is also a voluntary standard that quantifies carbon emission reductions of restored peatlands, so that businesses can invest in preselected projects with confidence that their funds will return clear carbon benefits, enabling them to meet corporate social-responsibility targets. In the UK, the aim is to target the restoration of one million hectares of peatlands over the next five years; these restored sites alone could save 220 million tonnes of carbon dioxide by 2050. The Peatland Code, which was produced by the International Union for Conservation of Nature's (IUCN) UK Peatland Programme, can be downloaded from http://bit.ly/1QlODxF.

Scottish Natural Heritage reports that a further 3,000ha of Scottish peatland will see physical restoration work this winter. This is in addition to the 5,580ha of peatland across more than 100 sites which have received physical restoration funded by Peatland ACTION since the project began, in 2013. Further information on progress, including videos, is available via http://bit.ly/1lrQW5y.

Moor-burning review

The Scottish Government has commissioned a review of the Muirburn Code. The review will be undertaken by Scotland's Moorland Forum. Further details are available at http://bit.ly/1PvljGi.

Peatland restoration

Restoration of degraded peatlands in Scotland can generally be justified in economic terms on the basis of GHG emission savings alone, according to recent research. See http://bit.ly/1ORBliD for details.

SPECIES NEWS

Hunt for sharks and rays

Now in its 13th year, the Great Eggcase Hunt has become one of the UK's most popular and long-standing citizen-science marine-recording projects. There is now also a smartphone app (ST Eggcase)

Nursehound eggcase. Steve Trewhella/FLPA

and identification key for eggcases of 11 species that may be washed up on beaches or seen by divers around the coast. For details, go to http://bit.ly/LE39lE.

The Shark Trust also runs the Angler Recording Project, which encourages sea-anglers, skippers and sea-angling clubs to record and submit records of any shark, skate or ray which they catch. In addition, the project promotes catch-and-release, providing advice on best practice when handling this group of fishes. The free shark, skate and ray angling app is ST Angler.

Fungi code

The British Mycological Society has published a *Code of Conduct for responsible collecting of fungi for research and educational purposes* (available at http://bit.ly/1QaHboZ).

Fungi: Lost and Found

The five-year Lost and Found Fungi Project (see http://bit.ly/1zy1eVl), which started in July 2014, aims to establish the beginnings of a robust, data-led approach and mechanism for fungal conservation assessment. It includes compiling a list of 100 target species, coordinating field surveys, monitoring at-risk species, and preparing conservation assessments.

Hen Harrier plan

Defra has published The Hen Harrier Action Plan, alternatively labelled the Hen Harrier Inaction Plan by Mark Avery. The Action Plan has six principal measures: law enforcement, diversionary feeding, satellite tracking, nest and winter roost site protection, reintroduction to southern England, and a brood-management scheme trial. A critique of the plan, and a link to it, is given at http://bit.ly/1P3dZzF on the Raptor Persecution Scotland blog.

Neonics and butts

The use of neonicotinoid pesticides may be contributing to the decline of butterflies in the UK, a new study has revealed. The chemicals remain in the environment and can be absorbed by wild flowers growing in field margins, many of which provide a nectar source for butterflies and foodplants for their caterpillars. Researchers found that population trends of 15 species, among them Small Tortoiseshell *Aglais urticae*, Small Skipper *Thymelicus sylvestris* and Wall *Lasiommata megera*, showed declines associated with neonicotinoid use. A summary is available via *Science Daily* – see http://bit.ly/23cAJ6k.

Tree seed

The UK National Tree Seed Project began in 2013. It aims to establish, over a five-year period, a national tree-seed collection for long-term conservation and to facilitate research so as better to understand and manage the native trees in the UK Landscape. This project will build a national *ex situ* collection of UK tree seed that is genetically comprehensive and comprises sufficient seeds to support research and conservation. Collections may be used also to study resistance and susceptibility to pests and diseases and other environmental stresses, and methods to combat these. The project is led by the Millennium Seed Bank Partnership (MSBP). A manual for collecting tree seed, with other information, is available: see http://bit.ly/1xPrhoZ for details.

Scottish Pollinator Strategy

There is an open consultation (closing date 14th March) concerning a strategy to protect Scotland's pollinators and to safeguard the ecosystem services which they provide. The Scottish Pollinator Strategy (http://bit.ly/1VEV4w3) sets out the current situation for pollinators, the reasons why action is needed, and the steps proposed for their conservation.

Priority species decline

UK Biodiversity Indicators 2015, published by Defra online at http://bit.ly/1JfUHq4, shows the abundance of priority species at the lowest level to date. There is also a further decline in the status of UK habitats of European importance.

A major new study has found that the ongoing decline in Britain's wildlife associated with climate change and habitat loss is also threatening vital ecosystem function. Researchers analysed trends in the frequency of species that provide key ecosystem functions – decomposition, carbon sequestration, pollination, pest control and cultural values. For 4,424 species over four decades, there have been significant net declines among animal species that provide pollination, pest control and cultural values. These species include bees, moths and hoverflies (28% are in decline), while 16% of those that act as natural pest-controllers, such as ants and ground beetles, have also experienced significant losses. The research, by Oliver *et al*., is published in *Nature Communications* at http://bit.ly/1jNFQXF.

One priority species, the Freshwater Pearl Mussel *Margaritifera margaritifera*, continues to be in trouble. Recent surveys in Scotland have revealed that the species is absent in 11 Scottish rivers where it was previously recorded, and that pearl mussels appear to be declining nationwide. Scottish Natural Heritage reports that the prime culprits are illegal pearl-fishing, low numbers of host fish, climate change, poor water quality, and river alterations. Conservation efforts are now focused on the 114 rivers where pearl mussels are still breeding. See http://bit.ly/1khanxp for further information.

ODDS AND SODS

Oily words for a warming world

Will the world be saved from dangerous climate change? This seems unlikely, even though the December 2015 Paris climate talks culminated in agreeing *The Paris Protocol: a blueprint for tackling global climate change beyond 2020*. This agreement is due to come into force in 2020 and only after

55 countries that account for at least 55% of global emissions have ratified it. The Protocol sets out a plan for limiting global warming to 'well below' 2°C. There are many analyses of the details. For instance, climate scientist and blogger Kevin Anderson (see http://bit.ly/1SRJYV1) considers the reliance on 'negative emissions technology' that will require capturing and storing of CO_2, instead of the drastic emissions reductions needed, as plain wrong. This would, among other things, include a massive scaling-up of biomass crops. Professor Anderson concludes that vested interests 'won out' and says that the five-year review timeframe 'eliminates any serious chance of keeping below 2°C'. The other person the world should be listening to is James Hansen, former NASA scientist, who has similar views. He said, in an interview given to *The Independent* (http://ind.pn/21Zps8E), that the climate deal (then still in draft) was 'worthless words...no action, just promises' and 'as long as fossil fuels appear to be the cheapest fuels out there, they will be continued to be burned.' A summary of what is in the agreement is available at http://bit.ly/1ExouUt. Just in case you don't know, the price of oil is plummeting, now at less than $30 a barrel (from a high of $105 just over a year ago); the sinister reasons behind this, and the role which oil plays in current and recent Middle East conflict, are aptly analysed by Steve Austin (see http://bit.ly/1Q2E00H). No chance, then, of keeping it in the ground.

Marine Protected Areas

A second phase of 23 new Marine Conservation Zones (MCZs) has been designated in England. For details see www.wildlifetrusts.org/mcz.

Trends

A briefing POSTnote *Trends in the environment* has been published by the Parliamentary Office of Science and Technology. See http://bit.ly/1PIA8C1.

Sewage, what sewage?

A significant source of nutrients in fresh and coastal waters remains sewage effluent, so it is shocking to hear that The Environment Agency is unable to regulate discharges from nearly 2,000 sewage-treatment work outfalls. This is because data on the discharges from these outfalls are being withheld by water companies. History is relevant as, when the water industry was privatised in 1989, thousands of discharges were given temporary deemed consent (TDC) because no legal permits for these discharges existed. In 2009, according to Fish Legal and the Angling Trust, the EA tried to apply for these to be regulated, but water companies appealed against the action (on the grounds that they preferred voluntary disclosure) and the appeal was upheld by the Planning Inspectorate. The water companies were given a deadline by the Environment Agency of the end of January 2016 to provide full information about these discharges. If they failed to meet it, the Angling Trust and Fish Legal plan to use their newly secured right to request environmental information directly from the water companies to find out exactly how much raw sewage is being discharged from the remaining 1,968 sewage outfalls and how regularly. Coupled with ongoing and chronic pollution from agriculture, it is therefore unsurprising that most of England's rivers, lakes and coastal and ground waters will fail to meet EU targets for good ecological and chemical status by 2021 – six years after the initial deadline set under the Water Framework Directive. See http://bit.ly/1J6OixF for an analysis.

Scalloping at Cardigan Bay

The Welsh Government's controversial consultation on scallop-dredging in Cardigan Bay was withdrawn in November, following complaints by environmental groups.

Nature's good for you

Contact with nature has positive implications for social cohesion and crime reduction, according to conclusions reached by researchers from Cardiff University. The authors suggest that findings such as theirs could justify policies aimed at reducing crime by improving people's contact with nature. See http://bit.ly/20braCa for details.

New law for nature

Lawsuits for nature protection are gaining ground, with the world's first 'Ecocide' case prosecuted in Guatemala's new Environmental Crimes Court. The defendant, a palm oil corporation, has been charged with criminal ecocide that has resulted in significant die-offs of fish and other wildlife in and around the La Pasión River (see http://bit.ly/1KoS3t3).

Build for biodiversity

The Big Biodiversity Challenge (www.bigchallenge.info) is in its second year. It challenges construction companies and developers to add a new biodiversity enhancement to a site, development or existing building. Details of entries submitted in 2015 are now available. The initiative is led by the CIRIA Biodiversity Interest Group.

Natural Capital

The Natural Capital Planning Tool (see http://bit.ly/1PoaZtn) was published by RICS in January. This was developed to allow planners and developers to assess the impact of proposed developments and plans on the provision of ecosystem services.

The Government's response to the Natural Capital Committee's third State of Natural Capital report was published last September (see http://bit.ly/1ODKaBS). The Government says that it agrees that, if economic growth is to be sustained, natural capital must be safeguarded. It also agrees with the proposal to develop a 25-year plan for a healthy natural economy and commits to extend the life of the Natural Capital Committee to the full term of the current Parliament. Other commitments are made but, given the ever-shrinking cash available for nature, what will happen in reality is questionable.

'Charter Champions' are being sought for trees and woodlands. Richard Becker/FLPA

Circuit of Wales

Final approval was given in November by The Welsh Government to de-register common land at Rassau, Ebbw Vale, and so give the final green light to building the 320ha Circuit of Wales motor-racing circuit with a business park and hotels. The site is currently a mixture of acid grassland, heathland, bog and streams. The Gwent Wildlife Trust states that more than 200ha of wildlife-rich habitat will be destroyed. The Trust says that compensation land put forward is not equivalent to the value of the wildlife that will be lost; it has serious doubts as to the success of proposals for enhancing and creating new habitats.

Scottish sites database

Information on trends affecting more than 2,000 species and 3,000 habitat features in Scotland is available on a 'Protected Nature Sites' interactive database (http://bit.ly/1QlQsLa) which was launched by Scottish Natural Heritage last October. Searches can be done according to habitat type, species or site name, or geographically. Special features, associated pressures, and underlying trends within Scotland's protected nature sites can be identified.

Charter for trees

Important trees and woodlands need greater protection, so says a coalition of conservation bodies. In January, these bodies, led by the Woodland Trust, launched a new initiative which will culminate in a 'Charter for trees'. 'Charter Champions' are currently being sought, as are stories of trees and woods in communities. You can contribute via https://treecharter.uk.

European nature laws

Last December, Environment Ministers of the EU member countries, including UK Environment Minister Rory Stewart, called for more money for protected areas and agreed to safeguard and improve implementation of the Birds and Habitats Directives. This decision followed a Europe-wide campaign, related to the 'fitness' check of the Directives, to safeguard these important wildlife laws. Ministers also recognised the role of agriculture as a main driver of biodiversity loss. A report of the Environment Ministers' meeting is on the BirdLife website at http://bit.ly/1Wrv9IE.

Top man for nature

Wildlife campaigner Tony Juniper has been appointed as The Wildlife Trusts' President.

Woodland info online

The Forestry Commission has released a new online archive of forestry documents (at http://bit.ly/1SuhRMi) which holds out-of-print technical publications, handbooks and other documents.

Sue Everett is an independent ecologist and sustainability consultant and can be contacted on conservation.news@gmail.com. She occasionally blogs and increasingly tweets at http://warmerandwilder.blogspot.com and @suesustainable.

Over-excited

As incessant, globally warmed rain lashes the panes, Twitcher turns to his new copy of the National Trust's magazine, called *MAGAZINE*. It comes with a sunshine welcome from someone called Sharon who writes in the gushy, 'oh-mi-god' style in which teenagers like to talk things over. Sharon has seen the countless treats the Trust has in store for us, most of which, I notice, seem to cost money. 'As the first snowdrops appear, I can't help but get excited about all the special places and activities there are for you to enjoy during the year ahead.'

Never mind that the 'special places' are just Trust properties, much the same as last year and the one before that. They still fill Sharon with what an earlier, more dignified generation might have called 'an ebullition'. She wants all three million Trust members to feel the same, to bubble over with emotional incontinence as though each of us has the mental age of 12.

Quite how we are supposed to show our passion Sharon does not say. Windmill one's arms wildly and shout 'awesome'? Turn a cartwheel among the snowdrops? Has Sharon considered the dangers of encouraging her mostly elderly members to perform cartwheels?

Poor Sharon. She is just a victim of a synthetic informality that insists that we must call complete strangers by their Christian name and pretend to be carried away by dumbed-down pap. Perhaps she is only 17 and has only learned to communicate in twitter-speak. What Twitcher fears, though, is that she is really an old lady in a tweed skirt and sensible shoes, and she writes like this because she thinks that it is what we have come to expect.

Rothschild revisited

The Wildlife Trusts has published an 'e-book' about the work of the pioneer conservationist Charles Rothschild. It is by my fellow columnist and erstwhile *Times* journalist Simon Barnes, and is called *Prophet and Loss*. That's a much better title, I must admit, than the one I dreamed up with Charles Rothschild's daughter, Miriam, 20 years ago for our book on the exact same subject, *Rothschild's Reserves*, though I note that Barnes's subtitle, *Time and the Rothschild List*, bears an uncanny similarity to ours, which was *Time and Fragile Nature*.

To write it, Barnes went on a journey, which he describes as 'intense and powerful', during which he visited seven out of the 284 special places which Rothschild considered 'worthy of preservation'. All of these places are well-known: Kynance Cove, Kenfig Burrows, Woodwalton Fen, Bass Rock. Miriam, I recall, wanted me to visit all 284. Goodness knows how intense and powerful that might have been, but in the event my approach was the opposite of Barnes's. I went to see a selection of Rothschild sites that have been ruined beyond hope of restoration. I stood on bare, windswept fields, pig farms, festering rubbish dumps, conifer plantations where you need a torch to find your way, even suburban streets. No, there Rothschild's dream had very much *not* been fulfilled.

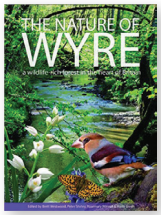
Perhaps I should have written a book about it called 'Profit and Loss'. If so, I might have made two points that I suspect The Wildlife Trusts will have played down. First, Rothschild set up the Trusts' forerunner, the Society for the Promotion of Nature Reserves, as a last, not a first, resort. His great hope was that the National Trust would take nature under its wing, but it didn't.

Second, Rothschild was a keen collector of butterflies and moths, beetles and, latterly, fleas, and a great stuffer of birds and other animals. He wasn't an advocate of the look-don't-touch philosophy of today's wildlife protectors. If you want to tread in Rothschild's footsteps, I suggest you bring a butterfly net with you to Woodwalton Fen or climbing irons to Bass Rock. Then you might indeed feel a 'piercing empathy' shortly before being arrested.

I can tell from Simon Barnes's writing that he is like many writers in that we have retained a little piece of childhood in our hearts. Many naturalists are like that too, because otherwise we would be far too mature and responsible to take delight in such worthless things as dolphins, tadpoles or butterflies. Childhood is about enjoying the moment. Adults don't do that, because they are thinking all the time about the future and its terrible problems. Never again will they do as a child does: 'Today was good. Today was fun. Tomorrow is another one'.

The great joke is that we seldom think about our childhoods until the autumn of our lives, when memories of those distant times have grown hazy. At any rate, I decided to write about mine while I still remembered anything. One day I hope to rework my chronicle into something more commercial, a kind of cut-price *Last Child in the Woods*. But in the meantime I am publishing it privately in a non-profit-making limited edition for Friends of Twitcher. More about that in the next *British Wildlife*. All I can say at present is that, if you enjoy this column, I think that you would enjoy my memoir.

BOOK REVIEWS



The Nature of Wyre: a Wildlife-rich Forest in the Heart of Britain

Edited by Brett Westwood, Peter Shirley, Rosemary Winnall and Harry Green
Pisces Publications, Newbury 2015
312pp, colour-illustrated
ISBN 978-1-874357-69-8 £37.50 hbk

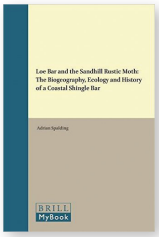
'Colour-illustrated' can mean many things, from a few old-fashioned plates in the middle to a picture book in which only the words are in black. This book is unusual in that it has the colour and design of a coffee-table production but with a serious text worthy of *British Wildlife*. Sharp and well-composed portraits of the Wyre Forest and its denizens abound on every page, often taking up a full page, with nicely designed double-page spreads opening each new chapter. The only lapse is that red is sometimes too bright. Otherwise the printing is well-nigh perfect. This book is a thing of beauty.

The Nature of Wyre is a remarkably detailed account of the wildlife of an English forest. The fungi alone get 25 pages; the flora another 40 (plus separate chapters for mosses and liverworts and for lichens); and, for a change, insects receive more space than birds and mammals combined (although at 34 and 24 pages, respectively, the last two are hardly neglected). The specialities of the forest all have their moment under the spotlight – Land Caddis, Narrow-leaved Helleborine, Whitty Pear (or 'true service tree'), Snow Flea, Lemon Slug, Slave-making Ant, Noble Chafer, and many more. This is a forest tour with a magnifying lens as well as binoculars, giving the reader an almost overwhelming sense of the diversity to be found in a single large wood. I have not, I think, seen anything quite like it. I hope that this glittering survey of the inhabitants of a large (by English standards) forest in the West Midlands will become a standard-setter for similar in-depth studies elsewhere.

That is if anywhere else can compete. Wyre is a particularly well-studied forest. It began with the naturalist Norman Hickin, who lived at Bewdley, on the edge of the forest. His work was continued by the 20-year-old Wyre Forest Study Group, which produces an annual review of forest studies and seems to include experts on pretty well everything. Perhaps the forest's location helps to explain its attraction. It sits right on the upland/lowland divide; it has the diversity of a southern wood but also has Dippers in the river and Wood Cranesbill in the meadows. Once it was even home to Black Grouse, and it was the last English stronghold of the Kentish Glory moth (there are plans to reintroduce it). As with all the best forests, there is far more to Wyre than the trees. It is also a place of fast-flowing brooks, orchards of apple, cherry and pear, old mills and disused railway tracks, even patches of heathland and bog. The relative openness of the forest is one of the keys to its diversity, the other being its great age and, on the whole, good state of preservation. Today, most of it is a Site of Special Scientific Interest and 650ha also form a National Nature Reserve. The public have access to all the forest apart from a few private enclaves.

If any book was devised to appeal to the readers of *British Wildlife*, this is it.

Peter Marren



Loe Bar and the Sandhill Rustic Moth: the Biogeography, Ecology and History of a Coastal Shingle Bar

Adrian Spalding
Brill, Leiden 2015
246pp, colour, maps and diagrams
ISBN 978-90-04-27029-9 £54 hbk
(Available also as an e-book)

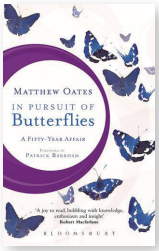
The Sandhill Rustic *Luperina nickerlii* is a medium-sized, silvery-brown moth that lives by the sea. It occurs in four widely scattered places in Britain and Ireland, each represented by a separate subspecies, the four differing in small details of colouring and habits. The rarest is subspecies *leechi*, which lives on Loe Bar, a line of shingle and sand in Mount's Bay, Cornwall, that separates a freshwater lake from the sea. The Sandhill Rustic's caterpillar feeds on Sand Couch *Elytrigia juncea*, first on the leaves and later under the surface, where it chews the grass's roots and rhizomes. The moth emerges in August and September and seems to spend much of its brief life in sitting still, 'silvery wings against silvery shingle'. It can survive occasional inundation by the sea, and one of the suggested titles for this book was 'The Moth That Swims'.

Adrian Spalding has been gripped by this rare little moth for the past 30 years. To find out how it survives in this pretty but harsh environment he has roamed the shingle by day and by moonlight, searching for the elusive moth, monitoring its population, elucidating its life-cycle and describing it and its early stages in the minutest detail. At the same time, and by way of context, this well-written book is also a study of the history and ecology of Loe Bar and the specialised insects, plants and animals that live there.

Why bother, and why should we read a whole book about a little moth of zero economic value? First, I suppose, is a natural curiosity about a species that ekes out its entire existence in a patch of grass no more than 300m by 25m (about two football pitches). Secondly, the story of the Sandhill Rustic is nature in microcosm. Without people like Spalding, so dedicated to minute

particularities, we shall never have enough information to conserve anything (in conservation, generalities can kill). Even so, a boring, badly written book would be useless because no one would read it. The pleasant surprise is that this study, despite its detail, is actually a pleasure to read, partly because he does not use technicalities or jargon, and also because Spalding takes as much delight in the Bar's story, its shipwrecks, its storms and shifting sands, and its well-adapted denizens, as he does in the fortunes of *L.nickerlii leechi*. His study of a small, rare moth and its habitat has the makings of a grass-blade classic.

Peter Marren



In Pursuit of Butterflies: A Fifty-Year Affair

Matthew Oates
Bloomsbury, London 2015
480pp, colour-illustrated
ISBN 578-1-4729-2450-6 £18.99 hbk

This is a very special book with many different qualities that will enthral anyone interested in the natural world. It follows the 50-year personal journey of Matthew Oates, a superb naturalist, who has spent his life in searching for a greater understanding of butterflies in Great Britain.

Oates claims to have the mind of a poet rather than a scientist, yet his minutely detailed observations, acquired through patience and persistence, set incredibly high standards that any researcher would be proud to match. Using his considerable literary skills, Oates celebrates the beauty and wonder of butterflies and their habitats with lyrical writing and some of his own poems. The whole book is punctuated with wit and many amusing anecdotes that add to the reader's pleasure. Its conclusion, 'Towards some meaning', offers a stimulating assessment of the philosophy behind nature conservation and the special place of butterflies in the natural world.

The story begins with Oates's childhood. His interest in Lepidoptera was inspired by a formidable prep-school housemaster who ran a butterfly-and-moth-collecting group. (The same teacher fired up my passion for wildlife, despite his regular beatings.) In Oates's youth, natural history was a normal childhood pastime, and he laments the dramatic reduction in opportunities for the children of today to explore the countryside. A brilliant English teacher introduced him to the writings of H. D. Thoreau. Oates had already discovered W. H. Hudson and Richard Jefferies, and he developed a passion for the works of Edward Thomas. His discovery of I. R. P. Heslop's book *Notes and Views of the Purple Emperor* was hugely influential. This work includes a descriptive anthology and is full of meticulous observations that led to Oates's life-long obsession with our most exotic and elusive butterfly.

Freed at last from the constraints of school and reading English at university, Oates made his base in Selborne, in Hampshire, surrounded by special butterfly habitats and the heartland of his beloved Edward Thomas. He survived as a self-employed ecologist and cut his teeth on studies of the Duke of Burgundy and the High Brown Fritillary.

The core of the book is a series of chapters reviewing each calendar year, based on Oates's detailed diaries since 1971 and sketchy accounts going back to 1968. (He regularly wrote 2,000-word accounts of a single day's butterflying.) In lesser hands such a structure could quickly become monotonous, but Oates delivers his reports on the ups and downs of our butterflies enveloped in evocative descriptions of the varying seasons. Wry observations on the vicissitudes of his own life and the people whom he encountered on his field trips (including three times stumbling upon couples 'beyond the stage of courtship') enliven the tale. There are several absorbing chapters focused on specific places, including Alice Holt Forest, Noar Hill, the New Forest and Savernake Forest.

With growing family responsibilities, Oates's head took over from his heart and he left the freedom of Selborne to join the National Trust as a special advisor. He laments that nature conservationists are now embroiled in money matters, politics and targets, not to mention interminable meetings in 'anaerobic offices' from which he always sought to escape. Despite such mutterings, his former Director General, Dame Fiona Reynolds, found the book magical and she could not put it down.

Oates travelled the length and breadth of the UK in examining all the key sites and species, ranging from Chequered Skippers in Scotland to Glanville Fritillaries on the Isle of Wight. In Northern Ireland he presciently discerned that the local Wood Whites were different from the English species. He struggled to view Mountain Ringlets in challenging weather and risked life and limb in pursuit of Swallowtails. From his 50-year study it is clear that individual species can be micro-managed only in the short term. Nature changes over the long term and most butterflies are extraordinarily adaptable, especially to the seasonal changes in our unstable climate.

Purple Emperor. Derek Middleton/FLPA

Matthew Oates modestly plays down the major contributions which he has undoubtedly made to our knowledge of butterflies and their conservation in the UK. On top of his lifetime achievements in the world of Lepidoptera, he has now applied his talents to produce an unforgettable book. His name should surely be added to the canon of Britain's finest nature writers.

Robin Crane

LETTERS

High Brown Fritillary

High Brown Fritillary.
Peter Entwistle/FLPA

With reference to my article with others on the conservation of the High Brown Fritillary *Argynnis adippe* in the December 2015 issue (27: 111–122), I write to correct an error on page 118. We refer to the fact that High Brown Fritillary was recorded 'in only 6% of 254 [managed clearings and rides] in 2014' on the Morecambe Bay Limestones. These data refer to 254 surveys completed, rather than to the number of clearings/rides, with many surveyed more than once. In fact, the butterfly was recorded in 10% of a total of 164 clearings/rides. While not a significant increase, double figures somehow feel better than single figures!

Of course, in reality it is only a marginal difference, one which simply re-emphasises that, despite intensive conservation management, this remains a highly threatened butterfly.

Occupancy and abundance data are vital for assessing our conservation progress. While we have a good network of recorders undertaking weekly transects, we are always on the lookout for new recorders who can help with surveys of other sites and the clearings/rides which we manage. If you live near Morecambe Bay and want to get involved in butterfly-monitoring or to participate in conservation work parties, please contact either Dr Dave Wainwright, Northern England Senior Regional Officer (dwainwright@butterfly-conservation.org), or Martin Wain, Morecambe Bay Limestones Project Officer (mwain@butterfly-conservation.org).
Dr Sam Ellis, Director of Conservation and Regions, Butterfly Conservation

Floods and burns

Following the recent disastrous floods, and the subsequent article in *The Independent* (2 January, widely disseminated on social media) describing the excellent measures taken to prevent flooding in Pickering, North Yorkshire, I was reminded of when I was in Deeside last year. It seemed to me that the incidence of muirburn had increased considerably, with patches of recent burns covering a greater proportion of the hillsides visible from the A93 than patches with reasonably mature heather. Yes, there was an unusual amount of rain in December and, yes, the oscillation of the jet stream and an unusually strong El Niño were no doubt contributory factors, but I cannot help wondering if the flooding in Ballater and Aboyne, in Aberdeenshire, might have been much less serious if the grouse moors upstream were managed more responsibly.

Maybe the main thrust of the conservation argument should not be so much about Hen Harriers, wonderful as they are, but to point out the very direct consequences of environmental abuse on people's lives. I think that the residents of such places as Ballater may well be receptive.
Nick Hodgetts

Ornate-tailed Digger Wasp

I was interested to read recent observations on the habits of the Ornate-tailed Digger Wasp *Cerceris rybyensis* (*BW* 27: 76). I spent some time among these insects this year and noticed something which might – just possibly – be an explanation for Stephen Plant's specimen which appeared to be hunting before establishing a burrow.

The area which I have been watching for a few years lies on a gentle south-facing slope just above scrub woodland. Some years ago, the topsoil over an area roughly 5m across was washed away by rainfall acting on the scarring where horses were led daily to and from a riding centre. The horses have been gone for a few years now, and the exposed shallow basin of greensand has softened and greened over. It is kept in trim by Rabbits and the diggings of many species of bees and wasps through the year, which culminates in a large township of Ivy Bees *Colletes hedera*.

The *rybyensis* burrows were sited sporadically throughout the area, with a convenient concentration of four burrows at one edge of the site. I settled here regularly. On one day in August, I noticed that the spoil pile of one burrow had been squashed and the entrance occluded inadvertently by a slipping specimen of *Charismatic megafauna* (the undersigned).

Wasps were actively hunting and returning with (unidentified) medium-sized solitary bees. Quite soon, one wasp arrived at what used to be her front door, guided presumably by remembered landmarks. She put the bee down and proceeded to dig out the entrance anew, in time disappearing from view while the paralysed prey rocked fitfully on the burgeoning spoil heap.

I predicted that, quite soon, she would reach up and drag the prey down without emerging herself. So, this time advertently, I brushed the bee a couple of inches away from the newly worked entrance and awaited a display of hymenopterous bafflement. She was quite a few minutes in completing repairs, then resurfaced and, with only the briefest moment of confusion, located the bee and dragged it under ground.

Could Stephen Plant's wasp have been redigging a previously occluded burrow? It is hard to imagine that the instinct – dig, then stock and lay – would vary, or

that experience would play a part in the ordering of the sequence. It's just a thought – I could be way off.

Many specimens of the Field Digger *Mellinus arvensis* share the site. An old Rabbit hole is particularly attractive to them, with many burrows in the side walls. One year, I noticed a cone of fine spoil on the floor of the hole; closer examination revealed a burrow dug vertically up into the roof among many hanging grass roots. I was lucky enough to spot the owner returning with prey, and to witness the struggle as the wasp wriggled awkwardly backwards, upside down, through the roots, all the while dipping its rear end to feel for the entrance hole.

In August 2015, I was watching while they were hunting vigorously, raining in with greenbottles from nearby suntrap brambles. Often they used me as a regional air base for rejigging their grip before taking the flies under. It was a strange and oddly comforting thought, all those hundreds of greenbottles removed from circulation and quietly interred within this small, anonymous patch of earth.

Steve Smailes

Wildlife garden

Peter Marren's article on the threat to the Natural History Museum's Wildlife Garden (*BW* 27: 100–102) is perceptive and fair, but omits an important fact which will concern *British Wildlife* readers.

Marren mentions that some 3,000 species have been recorded in the garden, but fails to say that these records represent work by museum staff and many volunteers over a period of more than 20 years. The garden has probably been more intensively studied, and its inhabitants of all groups more carefully recorded, than is the case for any other site in the UK. If the proposed plan goes ahead, this invaluable series of records will come to an end. Supporters of the proposed changes try to enthuse people by talking about new monitoring opportunities which will arise once the new layout is in place. Apparently, this monitoring will be far more rigorous than any previous recording. But why does the museum need to wreck its garden before this monitoring takes place? It can start immediately in the existing garden, building on what has already been recorded. The present records may not be ideal (are any?), but surely it is better to continue what was started over two decades ago than to destroy the garden and start again.

Roy Vickery, Author *Wildlife Garden – At the Natural History Museum* (2004)

Bioabundance and biodiversity

I would agree with Julian Greenwood (*BW* 27: 151) concerning the importance of including the numbers of individuals of a species in any assessment of biodiversity. Back in 1967, I joined a section of the Nature Conservancy which had been set up to advise on matters relating to land-use planning. I had previously been employed in woodland management and in town-and-country planning, so I had a slightly different background from that of the majority of employees of the Nature Conservancy at that time. I was encouraged by some of my colleagues, in both the Conservation and the Research Branches, to try to develop a logical approach to the assessment of wildlife resources. The approach which I eventually suggested was founded on a postulated or hypothesised relationship between value and the numbers of individuals; this was expressed in a paper which was published in the *Journal of Environmental Management* (Helliwell 1973), some time after the section to which I had originally been recruited had been disbanded.

This approach was seen by some of my colleagues in the Nature Conservancy as being too crude and/or not sufficiently 'ecological'; and some other government bodies were opposed to the Nature Conservancy taking an interest in any land with no statutory conservation designation, so the section of which I was a member was seen as being politically incorrect. My approach, however, was not, in itself, intended to be ecological. It was intended to be used in conjunction with ecological knowledge, in order to achieve some sort of logical basis for land-use planning purposes. In other words, it provided a more logical approach than simply classing any fragment of ancient woodland as being more valuable than a cathedral, or saying that the presence of an uncommon snail should necessarily prevent the building of a motorway or power station, while elsewhere the widespread diminution of fauna and flora proceeded unabated.

I am aware that, although my 1973 paper received some acknowledgement and support (e.g. Ratcliffe 1977, Sinden & Windsor 1981), it has been largely ignored or dismissed. I was informed by a mathematically minded friend that the mathematics did not stack up, although he was not able to explain to me why that might be so. No-one, however, appears to have come up with any alternative approach; and I am still awaiting an alternative, or for someone to develop and use my approach. I used this methodology in a number of instances in the 1970s and 1980s, although, in the absence of any substantial support from others, it seemed a bit like whistling in the wind. 'Ecosystem services' now seem to be in vogue, but they are something different. They might include a heading for the value of 'biodiversity', but without providing any fundamental system for assessing this. There remains, therefore, a need for an acceptable basic methodology.

References

Helliwell, D. R. 1973. Priorities and values in nature conservation. *Journal of Environmental Management* 1: 85–127.

Ratcliffe, D. A. 1977. *A Nature Conservation Review*. Cambridge University Press. (see p.11)

Sinden, J. A., & Windsor, G. K. 1981. Estimating the value of wildlife for preservation: a comparison of approaches. *Journal of Environmental Management* 12: 111–125.

Rodney Helliwell

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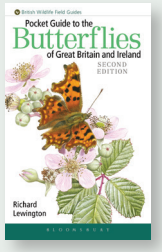

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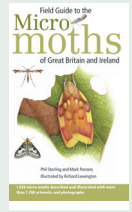

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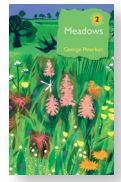

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