Country-Side

The Magazine of the British Naturalists' Association
Volume 36 No. 1 Winter 2022

Mystery Gall – Elephant Hawk Moth – Pishiobury LNR – Scottish Birds – Brightlingsea Biodiversity – Knettishall Heath – Forgotten Pollinators – Recording Wildlife – Rare Inverts in the Cairngorms

Country-*Side*

WINTER 2022
Vol. 36 No 1
ISSN No. 0011-023X

Founded by E. Kay Robinson in 1905
Editor: Pauline Rutherford
Type Setting: Pauline Rutherford
Printing: Hot Metal Press, Barnsley

Country-Side is published by:
British Naturalists' Association ©2021
Registered Charity No. 296551
A Company Limited by Guarantee.
Registered No: (02119195) in England & Wales
Registered Office: 27 Old Gloucester Street, London WC1N 3AX

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Front cover: European Robin
Photo: K. Hinchcliffe
Back cover: Mourning Bee
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Picture Index

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Deadline for next issue: March 15th 2023

Editorial

Pauline Rutherford

Here we are on the brink of winter again, after some extremely hot weather in June, July and August it may be a welcome relief to experience cooler weather! Of course, some may argue these extremes in temperatures aren't climate change, that we have always had hot weather "occasionally". However, this "occasional" is becoming prolonged and frequent; and affects not just us as humans, but the wildlife – the flora and fauna who struggle to deal with these changes. The dry, hot weather means flowers don't grow therefore don't get pollinated; this affects the insect numbers; and those that feed on insects – the birds and bats – who will in turn struggle to produce enough offspring to continue the chain, and so, whole life cycles are disrupted. I could go on in more depth but this is perhaps better kept for an article on climate change if anyone wants to write it!

I have to say a big thank you for all the articles and observations submitted for this issue, the variation in subjects is very interesting. From a chance observation of seeing a hawk moth laying eggs on brassicas, to two community projects; and not forgetting our guest writers – Samantha Norris - Warden for Knettishall Heath WLT Nature Reserve in Suffolk, and Chris Raper - Manager of the UK Species Inventory, at the Angela Marmont Centre for Biodiversity at the NHM.

Natural History Observations

Mystery Galls in Elsecar, South Yorkshire

David Swales MBNA

A little while back at the start of June (2022) myself and my other half Esther were out for a walk around our local patch, ending up on a woodland path that takes you into the park at Elsecar. This tiny scrap of woodland, hemmed in between a busy road and a well-worn footpath, really is a favourite spot of mine as the ground flora contains an excellent mix of ancient woodland indicator species such as Woodruff (*Galium odoratum*), Yellow Archangel (*Lamiastrum galeobdolon*), Pignut (*Conopodium majus*), Wood Millet (*Milium effusum*) and Wood Melick (*Melica uniflora*), suggesting this little patch may be part of a much older landscape now much changed.

As I was scrabbling around on the floor with a hand lens getting nose to leaf with a Pignut, Esther was enjoying standing in a pool of sunlight on the path which came down through a hole in the canopy above. As she gazed up, I heard her say, "that looks odd, any idea what it is?" Straightening,

Front and back of the leaf

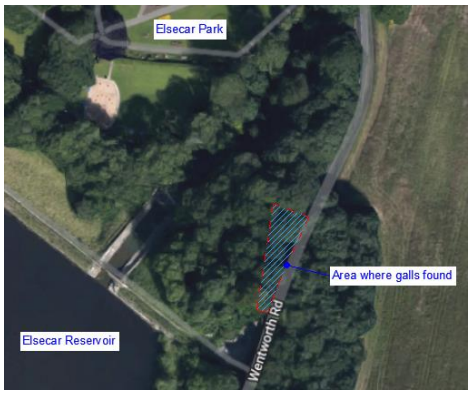
I found myself looking at some leaves on the low hanging branch of a Beech tree (*Fagus sylvatica*), covered in strange ovoid shaped objects, about 10mm long with pointed tips. It was clearly a gall, but it was one I had never seen before, and I was soon engrossed.

This patch of woodland has a few large, mature Oak (*Quercus* sp) and Ash (*Fraxinus exelsior*) in it, but there are also some large Beech which I guess must have been planted for timber at some point in the past and never harvested. The Beech trees have done their usual trick of grabbing so much light it is more or less clear underfoot beneath them,

Woodland path to Elsecar park.

with any open space in front now being slowly dominated by a

swathe of self-set Beech seedings, ranging in size from a few feet to 10 feet tall. The ground plants and grasses I was initially interested in are being pushed further down a banking as these trees grow and will eventually only find refuge under the spreading branches of a large Oak which dominates part of the area. I love to observe these dramas that are played out in all habitats; the push and pull for resources, the rise and fall of dominant species, the dynamic way the landscape changes. Though I have to admit, when observing plants, a certain amount of patience is required.

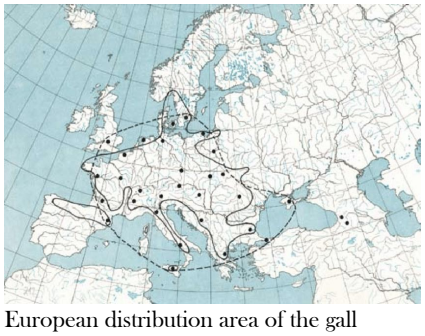


Woodland area where the galls were found

After the initial find we started to look around the woodland patch more closely and discovered this leaf full of galls was no isolated incident with all the Beech trees in the immediate area being covered in them. The galls were present on Beech of all ages, from the smallest sapling to the largest mature tree, and all levels in the canopy from young branches almost on the ground to as high as we could see up into the large trees. Some leaves only had a single gall while others were so covered you could barely see the leaf. The galls in deep shade all seemed to be a pale green colour, while those in the sun seemed to have a red blush on them. Leaves with few galls seemed to retain their shape while leaves with many galls seemed to be contorted, though all still seemed healthy with leaves not dying and falling. The other thing of note we observed was that the galls seemed to be isolated in this one area. We walked 30m further down the path where some other small Beech were growing and could not see a single gall, nor could I find galls in any other areas local to the park where Beech trees are present.

Once back home I set to in trying to identify what we had found, and a bit of internet searching later turned up a few references for the Beech gall midge (*Mikiola fagi*) along with a few gall pictures. All this seemed to match what we had seen in the field but as I am no gall aficionado, I sent it off to Steven Rutherford (Honorary Chairman BNA), who in turn sent it to Margaret Redfern (author of New Naturalist "Plant Galls" and many other titles) and Tom Higginbottom (Honorary Secretary of the British Plant Gall Society) for verification. To my great delight they all came back with the same answer, it was indeed *Mikiola fagi* which had caused the galls we had seen. This also turned out to be an interesting find as Steve informed me that the NBN (National Biodiversity Network) Atlas only shows 12 national records, with Margaret adding that this gall had been rare for several years, but this species seems to be making a comeback and is becoming common again. Tom was also really interested as other gall enthusiasts had recorded *Mikiola fagi* further south, and that he along with Doncaster Nat's, had recently seen this gall on a Beech tree at the far end of Finningley churchyard in Doncaster. To get feedback like this is brilliant for the amateur naturalist, not only do you get a verified identification to boost your confidence, but you also see your records being of use and interest to others.

Theodor Hartig was a German forestry biologist and botanist, who in 1839 first identified and described *Mikiola fagi*. He also went on to describe what is now known as fungal hyphae networks, showing the mutualistic symbioses between fungi and plant roots. UK records of *Mikiola fagi* are patchy with E. W. Swanton noting in his 1912 book 'British Plant Galls' that 'they are of rare occurrence in Britain', while Rex Hancy, author of 'The Study of Plant Galls in Norfolk' (2000), was given a photograph of a *Mikiola fagi* gall taken in 1989. The FSC (Field Studies Council) were not convinced by the species presence either, stating in their key 'British Plant Galls' (2011) 'not found in Britain for many years and possibly extinct here'. However, in more recent years the *Mikiola fagi* gall has been recorded in the southwest and around Manchester, along with sightings from York University campus in 2018, Woodhouse Ridge, Leeds in 2019 and as far north as Braid Wood, Edinburgh in 2021. Now both Doncaster and Elsecar can be added to the map, charting the march of the Beech gall midge. The distribution map shows where *Mikiola fagi* was in 2008, though we now know it is found much further north here in the UK thanks to the more recent records.


European distribution area of the gall midge *Mikiola fagi* (interrupted line) by Marcela Skuhravá et al. (2008) https://www.researchgate.net/publication/280236458_Gall_midges_Cecidomyiidae_Diptera_of_Poland

The Beech gall midge (*Mikiola fagi*) is a gall-causing fly in the family Cecidomyiidae where the larvae of the midge feeds within plant tissue, creating the abnormal plant growths we see as galls. The gall is usually induced by chemicals injected into the plant tissue by the larvae thus creating their own little safe haven away from the elements and predators, where they can feed and grow within the gall, acting as both microhabitat and food source for the gall maker. The *Mikiola fagi* gall becomes conspicuous in May, growing more quickly than the tiny larvae it contains, allowing plenty of room for it to develop. The galls we observed varied in size, but they were on average 10mm long, being smooth, hard and woody to the touch. When the larvae are fully grown, usually in the summer or autumn, the galls drop to the ground and the larvae seals the end with silk. The larvae will then hibernate in the gall until it pupates in spring, where it emerges as an adult to start the whole cycle again.

Galls are fascinatingly curious objects and fun to hunt for, each with its own life story to tell. So do keep an eye out for (and record) *Mikiola fagi*, along with any other galls you come across, as the ebb and flow of these species are an important part of the bigger picture when it comes to the ever-changing face of UK biodiversity.

Additional thanks to Tom Higginbottom from the British Plant Gall Society for supplying me with information about the historic and current spread of this gall species in the UK.

Elephant Hawk Moth Eggs

Keeley Porter

In June, I was watering at the little community garden I run for a local foodbank and I came across this lovely visitor. An Elephant Hawk-moth *Deilephila elpenor*. She was depositing her eggs on a Brussels sprout plant. I looked up the Hawk-moth's preferred food source for the caterpillars and apparently, they love Fuchsia spp leaves and Rose-bay Willowherb *Chamerion angustifolium*.

Although I have a big pot of Fuchsias in the community garden, the moth chose the brassica's instead. With closer inspection, I noticed she had not only deposited eggs on the Brussels sprouts leaves, but also on the netting over the plants.

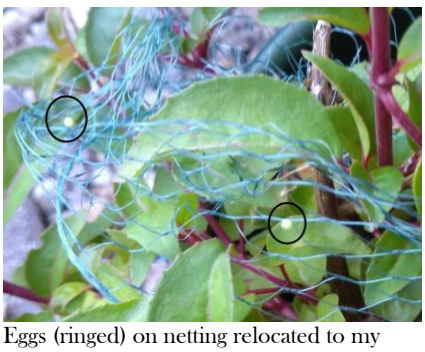
Elephant hawkmoth laying eggs

I sought advice from Steve Rutherford who suggested I carefully move the netting with the eggs over the Fuchsia plants. I transferred two larvae and one egg that looked ready to emerge (pale white at one end) to the Fuchsia in the little community garden.

After some discussion, and taking into account the rather small size of the Fuchsia plant, I decided they had a better chance of surviving if I took the net home to fix to a much larger potted Fuchsia. The eggs on the underside of the Brussels leaf were still intact – it had been quite hot recently, so maybe the eggs on the netting got enough heat to encourage them to emerge before the eggs in a shaded, cool spot.

A few days later the eggs had hatched into tiny white larvae with the trademark spike on the tail-end. I kept watching for them turning green as they grew, then the darker grey colour resembling an elephant's trunk but sadly I never saw them after that. I assume as they continued to grow they ventured further afield for food and eventually to pupate.

Egg laying moth



Eggs (ringed) on netting relocated to my garden

Newly hatched larvae

Pishiobury Local Nature Reserve
- taking natural history out to the community.

Bob Reed

Speaking as the Chairman of our local Natural History Society, I am sure it will come as no surprise to you to hear that we are experiencing all the problems associated with traditional societies today. We are having problems not only getting people to sit on the committee, but particularly to take on Officer roles. Many of our remaining members are now largely inactive due to their age or medical conditions and it is all very disheartening and depressing. We are having an increasing problem in finding people to address our Winter Programme meetings. Our society was founded in 1935 by the eminent entomologist and author P.B.M. Allan of 'Moths and Memories, Moth Hunters Gossip' etc. I became a member in 1968 and over the years have witnessed a steady decline until we arrive at a time today when we have lost almost all our specialists, 'experts' and even our eccentrics! Is there anything that can be done for natural history or is it just going to fade away and become history itself?

The Oak Walk, Pishiobury Park

In 1980, East Herts District Council purchased Pishiobury Park in Sawbridgeworth, Herts as a local green space. Pishiobury Park is an 18th-century landscape park in the style of Capability Brown. I had known the park all my life as a local naturalist, but it was not until I retired from a 35-year career as a science and biology teacher in 2010, that I took on the post of Chairman of what was then a failing Friends group. In the early days we organised a mini Bioblitz, ran a regular Bat Evening in September and participated in the annual 'Love Parks' organised by East Herts District Council every year in July where we ran a Bug Hunt for families and children. As part of my research, I discovered that the Park was a County Wildlife Site with an extensive entry and quoted as saying that it has "A* potential". A quick phone call to the Herts Biological Records Centre revealed that they had very few records held for the park but believed that it was a Local Nature Reserve and if it was not, 'it jolly well should be!' Taking this as my cue the matter was included on the agenda for the next AGM which was always attended by officers from East Herts and in which they agreed to the proposal that we apply for Local Nature Reserve Status. Being a qualified biologist teaching to A-level, I quickly looked up what was needed on the Natural England website and completed 80% of what Natural England would require. We were pleased to find that items such as Bylaws, Management Plan and Friends group were already in existence. My documentation was sent into the appointed officer at East Herts and we waited and waited and waited. Encouraging messages went back and forth, the item came up regularly on the agenda for the annual AGM, always with a hopeful response. It was not until seven years had gone by that we befriended a local District Councillor who had a reputation for getting things done and within a few short weeks the park was Declared a Local Nature Reserve at the end of July 2021. Still being partly in the throes of the pandemic, nothing much happened, for the rest of the year although it was understood that new noticeboards were out to

tender. We decided to take the initiative and put up our own small noticeboards 'What to look out for on the park in...'

We are now running a monthly public participation event on Wednesdays and Saturdays in order to cater for all elements of the community. East Herts are very helpful with publicity and Facebook regularly attracts people who would probably not see a poster. Similarly, we encourage positive feedback on social media sites which certainly draws others to participate. Our events have titles such as 'Bark and Buds', 'Wonderful Worms', 'Brilliant Brambles' and most recently 'Wonderful Wildflowers'.

The emphasis on all these small events is not simply to tell people, but to actually get them involved and down on their hands and knees and handling things! I look to follow the Chinese proverb '*I hear and forget, I see and remember, I do and understand'*. We make extensive use of the Field Study Council foldouts, which for our purposes are just at the right level for people who are interested in nature, but not necessarily knowledgeable naturalists. We are working with East Herts Council to liaise with their ecologist and their tree surgeon to ensure sympathetic management of old and veteran trees with which they are more than willing to comply. Because the park is a public open space, the local authority has an obligation to make things safe for users and this all too often involves treatment of veteran trees. The fact that some have had to be turned into 'monoliths' gives us the opportunity to explain the reasoning behind such a drastic process, but equally it preserves standing dead timber when not many years ago the whole tree would have been clear felled and taken away. Similarly, since we have got LNR (Local Nature Reserve) status, several older and veteran trees which would have been in line for quite drastic tree surgery have instead, been fenced around so that if a limb should fall off the tree, then it would not do anyone any harm.

With this subject in mind, we have obtained some funding which is going to be spent on bat roost boxes and bird nest boxes. The small wildlife group that we have formed will be closely involved with their siting, installation and monitoring. We have a bat transect walk formulated by a professional bat ecologist who very kindly gave her time free of charge. Similarly, we have a Butterfly Transect and records go into the record office.

The exciting thing about Local Nature Reserve, especially with regard to the park, is that it is a special area being 70 acres (30 ha) of virtually unimproved neutral grassland with associated wildflowers. The grassland itself has never been sprayed or fertilized and as a result we have a wide range of neutral grassland species, and people are always amazed to see the level of biodiversity present in just a square metre. Add to this the regular bug hunt for which we employ a battery-powered vacuum sampler, where just a few minutes working in the grassland in the summer results in a huge number and variety of invertebrates. Children especially enjoy trying to catch grasshoppers when the contents of the sampler are emptied into a white tray in front of them! We have several acres of wet woodland to explore, and a length of the old River Stort backwater where we shall be pond dipping in August. The Willows along part of the backwater are regularly pollarded which once again gives us an opportunity for

Species in the unimproved grassland

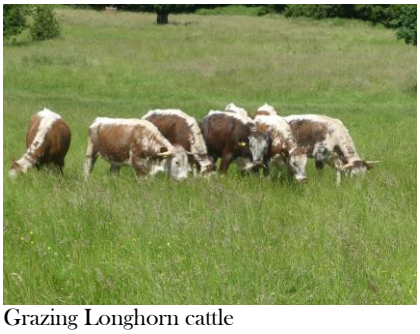
people to see and understand this conservation practice.

We have in the order of 20 different tree species on the park and this provides a great opportunity to run an event where people are given the task of using a map to find and identify different types of tree as well as doing more obvious things such as bark rubbing. The term Local Nature Reserve covers all aspects of an area and so we have included the geology which is primarily post glacial but interesting nevertheless, and gives us the opportunity to relate our area to the Ice Age. This, coupled with an investigation into different types of soil, gives the opportunity for people to experience the 'Dirty Hands Test!' The park also has a varied human history, starting with a Neolithic Causewayed Enclosure, and one of our members has built a scale model to demonstrate what this would have been like 4000 years ago. We had a Community Archaeology visit as well as our own 'Big Dig' (over what transpired to have been cattle sheds!) where people were encouraged to get down on their

hands and knees and get dirty! On the back of this, we have formed our own small History Group and using our soil auger, which we can in employ without the need for permission, we have already discovered a lot of new things about the park and particularly its ecological history.

Another aspect of the park which is frequently overlooked is that there is a close connection with the 18th-century plant breeder Thomas Rivers, who lived nearby and leased or rented areas of land adjacent to the park. Thomas Rivers planted the wet woodland with Osier Willow *Salix viminalis*, which at the time was used to make cradles for packaging of fruit trees to dispatch by rail to different parts of the country. In recent years, the wet woodland had been used to grow cricket bat willows but they contracted Watermark Disease and had to be felled, so what we see now is naturally regenerating Alder woodland. Friends have recently planted locally-sourced Osier Willow, which was no longer growing there, and this could well provide material for craft activities for children in the future. To make this area accessible the Friends worked with East Herts Council to establish a sympathetic route for a boardwalk so that visitors can access the woodland with low impact and also safely look out over the backwater and appreciate what is essentially an ancient landscape with grazed water meadows with the river floodplain in the middle distance. They can also appreciate and understand how physical river processes work over the centuries. We have an unimproved old floodplain meadow called Plovers Mead, giving us a historic link with tithe map field names as well as demonstrating a wide range of wetland plants and giving people the possibility of seeing wetland birds such as Snipe. Our other wetland area is a small freshwater spring with associated spring basins where frogs spawn and there is an eDNA record for Great Crested Newt *Triturus cristatus*.

The most recent development is the development of an Audio Trail whereby members of the public will be able to scan a QR code to be placed on the various gateposts whereon they will be connected to the East Herts website and the author will then tell them about what can be seen before them. We hold a monthly work party whose current project is the restoration of a length of mixed hedge including coppicing of old Hazel *Corylus avellana* and planting up with a mixture of native species, which will be carried out by the local community. The park is grazed by Longhorn cattle and it is a great opportunity to get people to meet the cattle, understand the benefit of conservation grazing and to see at first hand the work being done by the cattle. The park is a robust habitat where not a great deal of harm can be done and there is no real threat to any rare species.



Grazing Longhorn cattle

It cannot be denied that there is significant footfall impact on the park but looking at it positively and instead of complaining, we can take the opportunity of illustrating and explaining to people the effect of excessive human presence. This includes a ditch, which was almost certainly dug in Victorian times and which now takes surface run-off from the nearby main road which is not a great thing, but once again it gives us the opportunity for people to see the consequences that road travel has on the natural environment. The Park also has its fair share of invasive species, including Himalayan Balsam *Impatiens glandulifera,* Canadian Pondweed *Elodea canadensis*, Killer Shrimp *Dikerogammarus villosus*, Few-Flowered Garlic *Allium paradoxum* and a number of garden escapes on the margins. Looking at this positively once again, there is an opportunity here to inform and explain to people first-hand the concept of invasive species.

All these things give us the opportunity to engage with people who are not naturalists by inclination, and to see and experience just how the countryside and wildlife works makes it so rewarding at a time when so many of us see what appears to be natural history in decline. To conclude then, if you have the opportunity on a local green space or similar then please do not hesitate to take up the challenge and take natural history out to the community. If we do not take advantage of this opportunity and hesitate to embrace modern technology as a means of modern social communication, then it is highly likely that natural history is doomed. This would be an absolute tragedy at a time when the world is facing such a challenge to our natural environment.

Making people aware of and understanding wildlife around us is something which we as naturalists are in a prime position to deliver and we should be seeing this as a golden opportunity!

Bob Reed was Warden of Sawbridgeworth Marsh nature reserve, Essex and Leader of the Coppicing volunteers, Hatfield Forest.
All photos: B. Reed.

Two out of Three?
A Quest for Scottish Birds

Rachel Hinchcliffe, Photos: Kevin Hinchcliffe MBNA

Loch Malachie

My brother Andy, his wife Gillian and daughter Rebecca joined us for a holiday in the Cairngorm national Park (CNP) in April this year, having previously visited in 2018, when the emphasis was seeing "the three Cs" – Crested Tit *Lophophanes cristatus*, Crossbill *Loxia sp.* and Capercaillie *Tetrao urogallus.* Then, we managed two out of three, missing out on the Caper. This visit we were back determined to put that right! Would we be lucky this time?

The Capercaillie is a huge woodland grouse, but the UK population has declined so rapidly, it is at real risk of becoming extinct for the second time. Known as the 'horse of the woods' these shy birds are most likely to be seen flying away from you as you disturb them. In their breeding season, it's even more important not to disturb these birds. They are becoming rarer and need as little disturbance as possible.

Kev and I like our adventures and often follow little paths in hope of finding a hidden gem of some kind, but this visit, we vowed not to be drawn 'into the unknown' and to make sure we stuck to only the main paths. As much as any of us would love a glimpse of this iconic bird, we would be heartbroken if we knew we'd disturbed them in any way.

Arriving at the cottage late Friday afternoon, and after a bite to eat, we had a wander up the hill to stretch the legs after sitting in the car for almost 8 hours. We'd already seen several of the usual species visiting the feeders including Siskin *Spinus spinus*, but our saunter up the hill revealed more - Song Thrush *Turdus philomelos*, Goldfinch *Carduelis carduelis*, Swallow *Hirundo rustica*, Buzzard *Buteo buteo* and Redstart *Phoenicurus phoenicurus*! Reaching our end point for the night, a point on the hill that Kev wanted for a photo of the snow-covered mountains, it was time to head back and prepare for our first full day. Or so we thought. We had some shepherding to do before calling it a night. We had walked up the hill to the call and bleats of Sheep and new lambs. Where Kev had stopped to take his photo, he noticed that the call of some lambs sounded more alarming, and glanced over the wall to find three lambs had escaped the field and were trying to get back through the wire fence to their mothers. Between us, we managed to direct the lambs along the ditch and side of the fence and through a gap in the gate further down. Reunited with their mums and happily suckling away, it was time for a brew before bed.

Saturday morning saw us getting up and ready for our first walk when a cry of "Sparrowhawk!" Sent us all running to the window! Turned out it was going to be a regular visitor to us over the week, turning up almost every morning for its breakfast and most evenings we saw it too. With rain forecast from early afternoon we decided not to go far from the cottage, so made a visit to local woods. We weren't far into the woods before we started seeing the usual tit family, and as we neared a split in the path, we heard a now familiar "churr". Our first 'C' - Crested

Tit! It always brings a smile seeing this small bird with its spiky hair do. Further into the woods and Andy suddenly became excited! On looking up he saw a large bird flying over, but one that was different to anything he'd seen before. With a long neck, wedge tail, the colour and size of it, he was convinced it couldn't be anything else other than a Capercaillie! But that was it. A two second glance, and it was gone. The smile on his face though lasted the rest of the walk. As the rain arrived, we headed back to the cottage, ready to go shopping for the week ahead. Then with the fire lit, it was time for a cosy evening in ready for another adventure tomorrow.

Crested Tit

Common Crossbill *R. Panniker*

Capercaillie *K. Pickering*

Sunday saw us up and off to Loch Garten to walk the Two Loch Trail. A beautiful walk through woodland along the side of Loch Garten and down to Loch Mallachie where we saw Golden Eye *Bucephala clangula* and spent a few minutes watching buzzards soaring above the tree line. These are woods we've always seen Cresties in, and although we heard them numerous times on our walk, this time we failed to set eyes on them. We saw all the other usual Tit family, along with Treecreeper *Certhia familiaris*, Great Spotted Woodpecker *Dendrocopos major*, lots of Siskin, Song Thrush and Spotted Flycatcher *Muscicapa striata*. Time for a picnic back at the car before strolling down to the RSPB reserve to see the Ospreys *Pandion haliaetus*. Along the path to the visitor centre, Rebecca spotted a Common Lizard *Zootoca vivipara* before it hid underneath the heather preventing us getting photos of it! Once inside the visitor centre we could see the pair of Ospreys sat on the nest across the reserve and also see the video feed they have from cameras on a White-tailed Eagle *Haliateetus albicilla* and a Goshawk *Accipiter gentillis* nest! By now it was mid-afternoon and time to head back to the cottage. With Gillian and Rebecca staying in now, we decided not to go far, so across the road and into Boat of Garten woods for a stroll. A stroll that took us a few hours! Bird wise, we saw nothing new, but heard a new one which had just arrived after migrating from South Africa – Cuckoo *Cuckulus canorus!*

Monday morning and our group outing saw us go to Grantown-on-Spey for a walk in Anagach Woods. A first for all of us. Two minutes out of the car and our first sighting of Red Squirrel *Sciurus vulgaris*! This always puts a smile on all of our faces. We often see these at the cottage, but up to this point we hadn't seen any. A stop at the information board to decide which route we were taking, then we were off. Soon into the woodland with its floor covered in Heather *Calluna* sp. and Blaeberry *Vaccinium myrtillus*, beautiful and peaceful with the sound of bird song the only sound to hear, until the bark of a Roe Deer *Capreolus capreolus* greeted us as we startled it from its hiding place. After lunch and back at the cottage, and as tired as all our feet were, it was only early! With too many places to try and visit in a short time, three of us were out again! This time for a stroll in the woods at Carrbridge. Following the familiar paths, it was nice to notice changes that had been made since our last visit. Steps had been added to a couple of the slopes that can be tricky in wet conditions. A longer boardwalk had also been added to a section in the ditch that gets really boggy. It had really helped to make it more accessible and will help keep the public on the main paths rather than them trying to find a cleaner way through. Another walk with calls from Cresties gave us a quick glance of them, but nothing like the views of them we've had on previous visits. We did get close views of a deer that thought it was hiding from us laid in the heather, but that was the highlight of our walk. With the temperature dropping, and Kev having forgotten his coat, we decided to head back to the girls and have a night in.

BANG! BANG! BANG! The cottages pipes clattered, woke us up and scared us half to death! For a second, we honestly thought someone was trying to get into the cottage! Rebecca being the typical teenager slept through it, Gillian went back to bed, but Andy, Kev and I thought we'd take advantage of the early wakeup call and go

and enjoy the dawn chorus in the woods. It was quite an experience. Birds were already singing by the time we got into the woods, but as more and more joined in, it was quite magical. To add to the magic, I got what I believe to be my first sighting of a Capercaillie! Strolling up the main path and movement from a tree at the side of the path caught my eye. A large black bird with white markings flew across the path and disappeared into the woods at the other side. Just like Andy, all I saw was a two-second glimpse, but I couldn't think of anything else it could be. My first Caper? I believe so. Time to head back and get organised. We were taking Andy and the girls to somewhere they hadn't been before - Mount Cairngorm and Rothiemurcus. Mount Cairngorm is a place we've always managed to see Ring Ouzel *Turdus torquatus* when we've visited before and this would be a first for Andy. Unfortunately, he'll have to wait longer to see them as we couldn't spot one while there. Maybe they were on the nest rather than out and about this time. In the little alpine garden though, we did manage to get cracking views of numerous Willow Warblers *Phylloscopus trochilus* and Redpoll *Carduelis flammea*! Into Rothiemurchus and it was time to fuel up with a coffee and cake before heading on a walk. We'd only been in the woods a few minutes before getting lovely views of a pair of Bullfinch *Pyrrhula pyrrhula*. Most of the tit family greeted us again, then one of the smallest birds - the Goldcrest *Regulus regulus*, feeding on the edge of the branches. The walk through the woods leads you to Lochan Mor where there were Little Grebe *Tachybaptus ruficollis*, Mallards *Anas platyrhynchos* and Coots *Fulica atra*. After a few minutes rest sat on the wall, it was time to head back. Not ready to put our feet up for the day, we left Gillian and Rebecca at the cottage and headed up the hill and past the farmhouse. We've not explored the area around the farm much, so decided to follow a path and see where it would lead us. Unfortunately for us, when the path met another path, we had no idea where either way would lead us, so with time knocking on we decided it was safer to turn around and go back the way we knew. We will just have to explore that area better next time we go.

Roe Deer

Mountain Hare

Wednesday saw us splitting up and doing our own things. With Rebecca wanting entertaining, Andy and Gillian were taking her pony trekking and then onto the Highland Wildlife Park. Kev and I were off to Glenmore to walk among the Cairngorm Reindeer *Rangifer tarandus*.

After listening to the herders tell us about how the herd was started, and our safety information, we got to feed them and walk amongst them for a while. It was an experience that put a smile on both our faces and lifted our spirits. While stood on the hill observing the reindeer with their calves, movement of a different kind caught Kev's eye - Mountain Hare *Lepus timidus*! After leaving the herd and fuelling up, we decided to head back to Grantown-on-Spey and back to Anagach woods. With only the two of us to please we decided we'd pick up the red route and do the longest walk. We were glad we did. The woodland, we thought, was beautiful. It was like the time we fell in love with Dell Woods. It's hard to describe, but the mixture of Heather *Calluna sp.* or

Blaeberry *Vaccinium myrtillus* covering the floor between the trees, the colours, the serenity of it all just puts you at peace. We saw deer hiding, or trying to hide, among the Blaeberry and finished the walk with more Red Squirrels. A route that is badged up at almost 2 hours 45 minutes took us almost 4 hours! I think anyone walking it in that time must do it blindfolded! Either that or they simply don't keep stopping to take in the views and appreciate their surroundings! Back to the cottage for tea and reunited with Andy - why waste a nice evening indoors? Time for another gentle stroll around Boat of Garten woods. With it being later already, it was nice to capture the woods at a different time of day. As some wildlife was settling down for the night, some were just coming out to play. The call of Tawny Owl *Strix aluco* heard, we had bats flying over and around us, and as we followed the path back to the car park, we had two deer walking down the path in front of us!

Thursday and our last full day. We'd saved one of our favourite locations till last. Nethy Bridge and the walk along the river Nethy and into Dell Woods. Setting off on the river side path we were commenting on how much it had been opened up and cleared when we spotted a Dipper *Cinclus cinclus*! We'd not even been on the path one minute. The riverside path is always a lovely walk but made more lovely by the carpets of Wood Sorrel *Oxalis acetosella* and Wood Anemone *Anemone nemorosa*, and among them daffodils of different varieties. Into the woods and Great Spotted Woodpecker was drumming away. Roe Deer *Capreolus capreolus* munching away got us stopping to watch, while Cresties were near us again too. Along the path and a few minutes sat in the sun listening to nearby Song Thrush. Bliss. Movement at the side of us caught our eye near some wood ants - Green Tiger Beetle *Cicindella campestris*! An iridescent green beetle – one of the fastest in the UK. The last part of this walk is my favourite.

Green Tiger Beetle

When the vegetation turns to heather, it's the different colours/shades of it that can take my breath. I find it absolutely beautiful and could spend hours just sat looking out. Time for lunch and leaving Gillian and Rebecca at the cottage once we went back across to Boat of Garten woods. Despite how much our feet were aching already, we took Andy down a path he hadn't been before, and he wishes we'd taken him down sooner! The scenery down there is similar to Dell woods and it's the different hues of the heather that makes it beautiful. Our walk being longer than planned, we needed to head back and start packing up, but that wasn't the end of our fun though. Most of the packing done, what could be put into the car was being loaded up, when Kev heard a call, he knew he'd heard before and looked up just in time to see Woodcock *Scolopax rusticola* flying over! In hope we'd see it again, Andy and I went and sat outside watching. We soon noticed a few bats flying around us, so I went back inside to get the bat detector. Common Pipistrelle *Pipistrellus pipistrellus*. And then something I didn't expect to happen - Andy fed a bat! We'd noticed earlier a moth caught in a spider's web on the handrail. On hearing the bats feeding on the detector, Andy took the moth from the web and threw it in the air as one of the bats came flying towards us. The bat turned, swooped down and caught it, making a lovely raspberry sound on the detector. Wow!! I think the look of amazement on both our faces would have made a great photo. Time for bed ready for a long drive the following day. Sleep would have to wait a little longer though. Kev had a tick. Time to remove it and clean the site. But it was so tiny it was tricky to remove. We'd checked ourselves every night and thought we'd escaped the week tick free. Obviously not.

Friday dawned and time for home. So, we'd spent the week hoping for the 3 C's - definitely got Crested Tit, and we believe we got the briefest of glimpses of Capercaillie, but this time no Crossbill. You can probably guess Andy's last comment, "*We'll just have to come again next year*!"

Two Capercaillie

Footnote:

Kevin and Rachel re-visited the area in September and on their first nightly walk saw two male capercaillie fly from the bushes in front of them!

Kevin and Rachel are active members of South Yorkshire branch and have visited the Cairngorms with other members of the branch several times. Kevin received MBNA in 2015.

An Island Destiny?
The Brightlingsea Biodiversity Project.

Tony Thorn FBNA

Background

It is an undeniable and unfortunate fact that nationally our natural open spaces are under threat of deterioration in terms of both quality and quantity. Consequently, the biodiversity supported by this ever-decreasing space is also under threat. Large scale losses such as those produced by new housing estates are obvious, but it is often the less noticed removal of the smaller wooded area, field or hedgerow that has the most impact, not as a single loss, which may not be noticed, but as a cumulative loss that can be significant.

A country lane – a wildlife corridor

Historically, attempts have been made to mitigate deterioration by various recovery initiatives and programmes such as the introduction of SSSIs, nature reserves, national and local parks, rewilding enterprises and wildlife corridors, but these are by no means complete solutions. They are not even partial solutions. In fact, you can't have a partial solution – a solution is absolute. So, solutions to biodiversity decline should completely resolve problems.

Recovery programmes require initiatives, initiatives require sponsors and sponsors require focussed motivation. That is, the drive to produce effective solutions must exist and these solutions must be well thought through. Even relatively simple potential solutions, such as wildlife corridors, are not easy to introduce and may have the unfortunate result of introducing undesirable species to a biodiversity island. So, some consideration must be given to the overall consequences of all plans.

In Britain the human population is increasing such that the gains of this population are at the expense of other non-human populations that share the same environment and imbalance is inevitable. The dynamics are complicated and an expert in population dynamics – which I am not – would be better placed to expand on this.

Some of the more obvious detrimental effects of human activity include urbanisation and urban spread, forms of agriculture that remove or corrupt the natural environment, pollution, road kill, street lighting, land draining and the disturbance of habitats including nesting sites.

Then there is climate change and COPs (Conference of Parties) the latest for our purposes being COP26 and the Paris Agreement. These may seek to address climate change, but climate change of course also impacts on biodiversity. Overhanging all of this is the possibility that in addressing the problem of decreasing biodiversity, we have done too little too late.

However, on a brighter note, action to mitigate some of these detrimental effects is planned. My understanding is that one goal (there are several) of the Environment Act 2021 is to set up an Office of Environmental Protection (OEP) with the objective of halting or slowing the rate of decline in biodiversity. This will be through Local Nature Recovery Strategies (LNRS),

which will in future feed in to a national Nature Recovery Network. The reader is encouraged to access the relevant Government websites for sufficient information to place this in context and to keep updated. Readers may also like to read some background literature such as the *Wildlife Trusts' Nature Recovery Networks Handbook.* [Note 1] and (as an example of some current activity) *Essex Climate Action Commission: Land Use and Green Infrastructure Technical Annex.* [Note 2] These deal with land management and are aimed at progression to zero carbon emission and to achieve benefits such as biodiversity net gain. Other examples of interesting and relevant documentation include Natural England's *Nature Networks Evidence Handbook* [Note 3]. All of these, and more, need to be read to enable a clear understanding of where we are heading, but it may be that things will become more transparent with time and possibly with updated information. In particular I would be delighted to see how the various projects integrate to produce the desired outcome. The main thrust of these initiatives is to enhance the natural environment, both in size and quality.

In the Brightlingsea area, a degree of mitigation already exists in the form of designated sites, which include a Site of Special Scientific Interest (SSSI), Special Protection Area (SPA), Special Area of Conservation (SAC), the Colne Estuary Ramsar site, Marine Conservation Zone (MCZ), and a National Nature Reserve. There are also individuals and organisations with a keen interest in preserving what biodiversity we have and in enhancing the environment.

The Brightlingsea Biodiversity Project (BBP) currently works outwith the official methodologies of the various initiatives and in its present form has no connection with their future implementation or administration at any level. Nor is it currently connected with any other projects, though, in a small part, this could change in the future if we are invited to contribute.

The BBP seeks to provide a biodiversity baseline of what we have now, because without such a baseline overall change cannot be measured. Whilst there may be individually sponsored projects that concentrate on specific species, and other projects listing all species within smaller geographical areas, as far as I am aware the BBP is one of a few that seek to record a representative sample of all plants and animals in such a large geographical area. In addition to the baseline, it is proposed to select geographical areas where biodiversity is considered to be at most risk and to conduct more in-depth site-specific surveys and risk assessments, the main risks being to sustainability and stability.

The BBP commenced with an examination of the topography, identifying areas by type. These were considered to be arable and livestock farmland, built-up areas, marshland, wooded areas, water bodies such as ponds, drains and flooded gravel pits, recreational areas and coastal areas. Each feature within these categories was identified by a National Grid reference. In the case of fields, drains and gravel pits this was deemed to be the central point of the feature. There are twenty-three wooded areas and sixty-two fields, each identified by its grid reference. The challenge is then to list all species that these areas contain.

Current Activity

It would be unusual for a biodiversity survey to cover all species within a given area. Not only would such a survey require massive resources, there will always be species that are not found and those that perhaps choose not to be found. But we can obtain representative samples. The animals and plants identified are listed in tables headed, for example, Mammals, Reptiles, Aves, Insects, Fish etc.

A field in Brightlingsea in early summer

Here the first of several problems became apparent. Apart from the sheer size of the project, the level of expertise required in the identification of all of the plants and animals observed was far more than a single individual could cope with. I therefore asked for help from several organisations and advertised for assistance via a local wildlife publication. Although there was no result from this latter source, my son, who is a keen wildlife photographer, gave me a list of more than ninety bird species that he had observed and photographed within the Brightlingsea area, which gave a solid start to the project. Another organisation put me in touch with an expert on plants and trees, and detailed lists of these are being provided as and when. It is encouraging that another local expert is providing details of insect sightings from his walks and blogs, which are adding to an extensive list.

My own efforts currently, and before moving on, are concentrated on moths and butterflies, with a moth trap operating from April. So far, we have over a hundred and sixty moth species recorded, and this may improve as the night temperatures increase, and speed up as my so far limited expertise increases. In addition, I am conducting walk-over surveys of local fields where butterfly species are common. Simple observations of water bodies provide lists of flying insects such as damselflies.

Another problem is apparent when surveying specific sites, that need to be identified as such in any report. Access to wooded areas requires the owner's permission since the "right to roam" does not apply. This means identifying the owners and asking them for permission to access. Even if the owner is identified, permission may not be granted and my experience so far is that often the request for permission is simply ignored. But much information can be gained by observing from the roadside with camera and binoculars at the ready.

With water bodies, walk-over surveys do not give a great deal of data. By observation, the biodiversity of the general area can be tabulated from a visual listing of plants and animals, but of course not that of the water body itself. Several of the local gravel pits are managed by angling clubs, the managers of which have provided details of fish species stocked, and, surprisingly perhaps, this includes the huge Wels catfish. But the waters need to be physically surveyed for a detailed list of aquatic animals and plants, which, assuming the owner's permission can be obtained, are jobs for the future. As well as hand netting, underwater cameras are useful. Water quality is another consideration.

The future

This is a very brief summary of what I consider at this stage to be an embryonic project. It is only a few months old yet much data has already been gathered in this short period. It is also a flexible project in that the focus and methodology can be varied or fine-tuned in accordance with circumstances. It has weaknesses and vulnerabilities, which include the need for continuous and reliable expert input - and enthusiasm. Obviously, I'm not saying that those currently inputting are not continuous, reliable, expert and enthusiastic, it's just that we need more of them. Perhaps it also needs a clearer objective against which progress can be gauged. It needs recognition generally and perhaps recognition at a higher level if local specific objectives are to be met.

Box tree Moth *Cydalima perspectalis*

Common Marbled Carpet *Dysstroma truncata*

Lime hawk Moth *Mimas tillae*

It may, perhaps, also be deemed good enough to include in the processes being undertaken by the relevant bodies in connection with the 2021 Act. But to do so, some liaison will be required.

Those of us in our golden years can provide numerous examples of "what was" compared with "what is", and we know what has been lost. More recent generations may be unaware of the larger experience of "what was" and may not have the sense of urgency that is needed to prevent continuing deterioration.

One of the few natural ponds

Without projects such as this, I suggest that there are no easy means of gauging changes to biodiversity at a local level and with no data on change, no focused mitigation is possible. From a personal perspective, since I envisage the BBP to be ongoing, it may also need a change of ownership at some stage.

Climate change is a reality. My own calculations show local air temperatures to be rising at a mean rate of 0.0418 ^{0}C each year. However, this assumes a linear relationship with time – it could be closer to an exponential relationship. The Essex Climate Action Commission forecasts a possible 4.4 ^{0}C rise in Essex summer temperatures by 2050 compared to 1981-2000 in the high impact scenario. The effect of similar changes worldwide will result in a reduction in the Greenland and South Pole ice cover, changes in albedo i.e., a reduced heat reflection coefficient, and increased sea levels, these related mainly to the salt water coefficient of thermal expansion. The designated sites, the types of which were listed for Brightlingsea earlier, cannot be protected from these changes. Rising sea levels mean that Biodiversity will be placed under greatly increased pressure and the area will perhaps eventually become an island.

Protecting biodiversity is a fight against the negative impact of human activity, now and in the future. This competition must be replaced with harmony at some stage, but this can only be achieved with greater knowledge and an acceptance of the fact that almost all environmental problems are man-made and in particular are related to an ever-increasing human population. Even if the BBP achieves its aim of providing a reliable biodiversity baseline, a mechanism for achieving stability, perhaps using baselines as a tool, will still be needed and this is the great unknown.

As the Environment Act 2021 and related projects become implemented it may well be that great progress in the protection of the environment and its biodiversity is achieved and that the future is in fact far rosier than I thought. If so, the BBP will still have purpose in providing information about local biodiversity that we didn't previously have. But the BBP should not be the only project of this nature and which is (at this stage) entirely driven by enthusiastic amateurs.

My belief is that we should all be getting together at our respective local levels to form groups with the specific aim of producing our own area biodiversity baselines to inform ourselves and others of what we have now and, in time, what is changing for better or worse. There should also be a greater lead and encouragement for the public to participate and network from those at higher levels within the various organisations.

On which note, sincere thanks are given to those currently inputting to this project. If anyone has local knowledge of the biodiversity of the Brightlingsea area, their input to the Project would be much appreciated.

Note 1. *The Nature Recovery Network Handbook* was available from https://www.wildlifetrusts.org/sites/default/files/2020-11/Nature_Recovery_Network_Handbook_FINAL_Sept%202020.pdf

Note 2. The Essex Climate Action Commission web page can be found at: https://www.essex.gov.uk/climate-action. This page provides links to *Essex Climate Action Commission: Land Use & Green Infrastructure Technical Annex* at: https://assets.ctfassets.net/knkzaf64jx5x/3dW3CnB3EpMAgTXeqXGTuh/b76471e8b4b49ac2488ca7e67832df81/Climate-Action-Annex-Land-Use-and-Green-Infrastructure.pdf

Note 3. Natural England's documentation is found via: http://publications.naturalengland.org.uk/publication/6105140258144256

Tony Thorn was awarded FBNA in 2021 and is an active member with the Essex branch.
All photos: T. Thorn

Knettishall Heath Nature Reserve:

Ten years of conservation to create a more natural landscape, and how the journey has reflected the changes in the wider world.

Samantha Norris

Ponies on Knettishall Heath Photo: P. Rutherford

Knettishall Heath nature reserve is a Breckland site that is a remnant of the former extensive heaths of this area, characterised by very limited tree cover, poor soils and a rich historical timeline. It is a very interesting region where the land itself displays a tapestry of clues to its past which are tightly woven within the unique biodiversity found here. In more recent years it has also become reflective of modern issues such as climate, so here my aim is to offer an insight into the challenges faced in shaping a new nature reserve in the last 10 years and certainly many of the lessons learnt. The Wildlife Trust took over land management here in 2012 and during that time there have been new approaches to traditional conservation methods adopted in general, and most certainly a change to how the reserve has been used by visitors.

To give some background, the area started life as a network of post-glacial inland sand dunes, the scars of the glacial period often remain at the surface, and at Knettishall the periglacial stripes of alternating acid and calcareous soils are one of the best examples in the county. With such complex soils in close proximity and constant disturbance, the resultant ecosystem became reliant on open sandy ground with little competition from more invasive vegetation. With such poor soils the primary industry of the region was rabbit farming, and this continuation of ground disturbance combined with heavy grazing solidified the requirements of the local species. The plants and invertebrates of the Brecks are widely reliant on a short sward and little ground cover. Later ownership of the Knettishall Heath area by the Riddlesworth estate brought about varied land use including excavation for chalk and marl pits as well as a brick kiln, and later still it provided a training area for the home guard and military. To this day the reserve is pock-marked by training trenches, pits, parish boundaries and medieval plough lines, yet more disturbance which has over time provided a variety of niches for wildlife. The 1945 aerial photograph Figure 1 shows the extent of the open Breck heath landscape at the time, although it is difficult to know whether this was purely through rabbit grazing or through human intervention as well.

The loss of rabbits due to myxomatosis, change in local industry and other changes in local land use instigated yet more change, primarily the loss of the open Breckland heath, and by 2007 woodland was dominating the area as in seen in Figure 2.

10 years of restoration – aiming for a mess

Today the site designations include: Site of Special Scientific interest (SSSI), County Wildlife Site (CWS), County Geodiversity Site (CGS), Special Landscape Area (SLA), Open Access Land, Scheduled Ancient Monument and various rights of way. When

the Trust took over the reserve in 2012, the reserve had been managed as a popular country park for many years, the visitor infrastructure was well maintained, and we wanted to carry on the efforts that had been started to prevent the loss of Breckland heath.

In 2010 the Breckland Biodiversity Audit provided an evidence-based framework which was influential in assessing the priority species in the Brecks, many of which are nationally rare or scarce, and their requirements to inform the next stage of the journey for Knettishall. The key habitats comprised acid heath, calcareous heath, river and river valley grassland, mixed scrub, rides, conifer plantation, wet woodland and mixed woodland. The reserve was put into a Higher-Level Stewardship scheme, whilst a 10-year management plan and a 5-year heathland restoration plan were put together to restore a lot of the lost areas of Breckland and lowland heath, and critically to create a more permeable open landscape to support species that had become isolated.

In order to discover some of the species that had been lost or declined at Knettishall, the Trust had to gather a lot of local knowledge which was crucial in enabling us to shape an informed and educated goal. There has never been any doubt that this goal was most certainly not a fixed habitat that would remain unchanged. I have certainly come to understand that a successful nature reserve, or indeed a wild place of any kind, is one that is flexible and constantly evolving, often within perimeters, but these perimeters are much wider than one might or should anticipate. A resilient nature reserve is one that can be a haven for scare wildlife specific to its habitats (in particular if this is scarce habitat such as

Fig 1: 1945 aerial photo of Knettishall Heath

Fig 2: 2007 aerial photo of Knettishall Heath

time offer a haven for a broad spectrum of biodiversity. Therefore, the aim of the project was to return what had become a compartmentalised space with hard borders between woodland and heathland, to a more fluid fragmented landscape with structural complexity. But what does this look like? The short answer is a wonderfully messy mixture of all stages of succession. For example, at Knettishall an area of grassland or heathland should be interspersed with bare patches, dwarf shrubs and pockets of trees, whilst the most crucial element of scrub of varying ages providing that soft transition into woodland. The crux here is that by creating as much of a "mess" of habitats as possible, you massively increase the amount of edge habitat and micro-habitats closer together. The resources in close proximity are then far more accessible to the variable life cycles and demands of as many

different species as possible. For example, reptiles require open sandy soil to bask upon, as well as good ground vegetation cover to hide and hunt in. Ground burrowing invertebrates such as the Bee Wolf *Philanthus triangulum* or Heather Bee *Colletes succinctus* are so reliant upon heathland due to their need for the sunny open banks to burrow egg laying holes, but at the same time needing access to flowering heathland plants such as heather and bedstraw. Ground nesting birds such as Woodlark *Lullula arborea* and Nightjar *Caprimulgus europaeus* often require scrubby or shrubby areas to nest in cover, whilst having access to open areas for territorial song flights or to feed within the seed bank on the ground.

In order to achieve this the main part of the project encompassed turning back the successional clock with a programme of tree removal – not hugely popular on any site let alone a nature reserve. We estimated over 50% of what was scarce Breckland heath had become woodland since 1945, mainly secondary woodland and conifer plantation that had reached the end of its 'crop life'. Clear felling and thinning were followed up by stump mulching and the stripping of the subsequent organic matter such as pine needles, thus exposing the floral seed bank underneath. The immediate impact was not hugely sightly as demonstrated in Figure 3, however over the following two years these areas were being quickly colonised by heath, grassland and woodland plants, grazing animals and sun loving species such as Foxgloves *Digitalis purpurea*, butterflies and hunting dragonflies Figure 4. Throughout the project we have witnessed some of the scarcer indicators of success such as Heath Bedstraw *Gallium saxitile*, Tormentil *Potentilla erecta*, Dropwort *Filipendula vulgaris*, bryophytes, and lichens quickly move into these areas. The areas of mature woodland have been retained as fantastic habitats in their own right, with well-known woodland practices of glade and ride enhancement utilised to create space around veteran and mature trees.

Fig 3: area of mature woodland after thinning, and Fig 4: same area of woodland three years on *Photos: S. Norris*

The other significant change was introducing grazing across a 250-acre area which included the three individually isolated areas of Breckland heath as well as grassland, wood pasture creation areas and mature woodlands. The grazing pressure here is needed to maintain the constant disturbance and fluidity of successional stages in the vegetation. Native ponies such as Exmoors and Dartmoors were chosen to support native rare breeds wherever possible, with ponies being the best suited and most resilient to a busy site with lots of visitors encompassing a range of demographics including dog walkers. They also do a great job of grazing with variety, closely cropping turf in some favoured grazing spots, as well leaving long tussocky grasses in dunging areas, browsing on scrub in the winter and creating bare patches where they dust bathe.

This two-pronged approach to the restoration with both tree removal and grazing introduction has, now 10 years on, resulted in a wonderfully mixed mosaic of

habitats as demonstrated in Figures 5, 6 and 7.

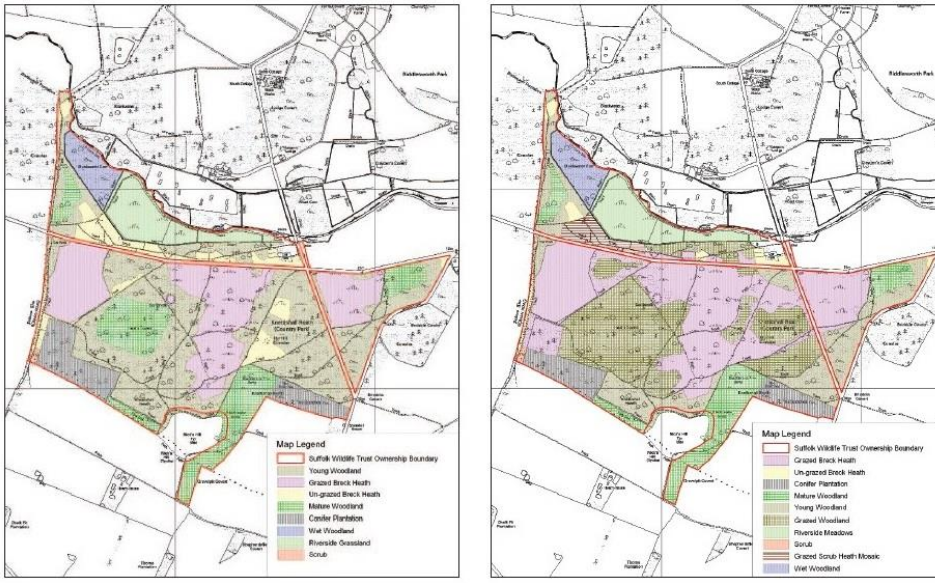


Fig 5: targeted habitat changes over 5-10 years Credit: SWT

Follow up challenges and achievements:

The most significant challenge in removing woodland to restore heathland is undoubtedly the follow up emergence of scrub, specifically Silver Birch and Scots Pine *Pinus sylvestris*, Bracken *Pteridium aquilinum* and in some cases Common Ragwort *Senecio jacobaea*. All these more invasive plants and trees are critical parts of the ecosystem, but if left in what is now such a man-managed environment will simply dominate. In some conservation scenarios, such as wilding of a much larger area this is not a problem, but where such rare habitat at the early successional stage is being protected, some control does need to be undertaken but not at the undervalue of scrub itself. The aim is to control enough of these more invasive plants to allow these rarer habitats to thrive, whilst allowing pockets and swathes of scrub and Bracken to also be maintained – as ever a balance. At Knettishall Heath we have adopted an annual winter cycle of scrub removal, very similar to coppicing in a woodland, leaving pockets of scrub of varying age ranges whilst preventing it from dominating. We are lucky enough to have a fantastic volunteer team to help us remove the scrub by hand, although some chemical treatment in the form of weed wiping is sometimes used. In a bid to move away from chemical use, we have also started the process of Bracken bruising as opposed to what is widely viewed as the more successful method of chemical spraying to control Bracken. We are in the early years of this trial, but 4 years along areas of bracken that are being repeatedly bruised are certainly becoming less prevalent.

Fig 6 & 7 aerial drone photos before and after restoration works *Photos: J. Lord*

Team of volunteers who work on the Heath
Photo: P. Rutherford

Ragwort has always been a challenge for land managers, and I shall not go into much detail here on how controversial it is. Simply put, it is a very important nectar rich food source for a range of invertebrates, and the only plant to support the life cycle of the cinnabar moth. As many people know however it can be poisonous to horses, but critically this is only in its dried form, such as in hay, and this simple fact means some conservationists are keen to leave the live ragwort plants where possible. Where land borders neighbours with equines or meadows that take a hay cut to feed equines Ragwort control is still a necessity. There is growing discussion around the possibility of the annual cut or removal of a Ragwort plant actually putting extra stresses on the local plant population, causing more and more booms in its growth similar to coppicing. There is therefore an increasing view that by leaving the plant to go through its cycle, it may naturally become outcompeted by other plants.

An unforeseen challenge was the Covid-19 pandemic which has undoubtedly had various impacts on many of our nature reserves and local green spaces. Many sites including Knettishall Heath saw a reduction in visitors during the first Spring lockdown, allowing ground nesting birds to thrive, followed by a massive influx of visitors as the limitations on outdoor mixing were more flexible than indoors. Unfortunately, like many reserves we saw an increase in problems such as overcrowding, fly tipping and increased rubbish. However, at the same time we experienced more positive changes of new visitors discovering the joy of their local spot for the first time and wanting to support it through volunteering, donations and becoming members.

Our most recent challenge facing most land managers now is the threat of drought and wildfire. On a heathland site this is merely exacerbating a concern that is always present, and so much of our work this year has been to inform visitors about the risks of disposable BBQS, glass bottles and cigarette butts. The concern now is how regular these prolonged periods of heatwaves and drought stress could become.

The project accomplishments and challenges are very reflective of wider conservation and societal ebbs and flows, so I would like to end on some of our success stories. At the start of the project there was a comprehensive list of over 1300 species recorded over time at the heath, but many of these, after initial surveys in 2012, were proven to have been lost. The restoration and maintenance of Breckland heath, species rich semi-natural grassland, the improvement in soft woodland edges and a mosaic of habitats has seen some fantastic wildlife returns in recent years. Some of our positive floral indicators now include Purple Milk-vetch *Astragalus danicus*, cushion forming mosses, Maiden Pink *Dianthus deltoides*, Common Rock-rose *Helianthemum nummularium*, Sheep's Sorrel *Rumex acetosella*, Harebell *Campanula rotundifolia*, and Mouse-ear Hawkweed *Pilosella officinarum*. Heather Bee populations have recovered and over seven species of bat including Barbastelle *Barbastella barbastellus* thrive here amongst the new invertebrate-rich glades and rides. We have seen Woodlark *Lullula arborea*, Stonechat *Saxicola rubicola* and Woodcock *Scolopax rusticola* return to breed after long absences or improve in number, and we hope to attract breeding Nightjar *Caprimulgus europaeus* back again someday.

Hand in hand with the practical work and crucial to the project has been welcoming our local visitors. Guided walks and events through the project, especially in the tree removal stage have been key in helping visitors understand why we went through that process.

In the time the Trust has been at Knettishall Heath, the conservation and the visiting world has changed around it rapidly. Rewilding has become the buzz word now with many diverse interpretations, but perhaps in the least it has raised an awareness for the need for wild places, and amongst land managers the need to adopt a more flexible approach, opening our minds to management techniques, or lack of, that support natural processes more.

Finally, I would like to offer a huge thank you to Steve and Pauline Rutherford from the BNA for their unwavering support and continued species lists after each visit – let's hope we can keep adding to them!

Samantha Norris has worked for Suffolk Wildlife Trust for 10 years and is the Warden of Knettishall Heath Nature Reserve

Forgotten Pollinators: the "other" bees

Professor Ted Benton BA BPhil PhD HonFBNA

In media shows, advertising and children's literature, bees generally get a very favourable press: they work hard together to provide us with honey – and in the process they pollinate our crops and wild flowers. Occasionally they might sting, but that's usually just our carelessness. Almost always, 'bees' means 'honeybees', and even these are usually portrayed as furry, cuddly black-and-yellow striped bumblebees that live in hives!

Male Hairy-footed Flower Bee

What is usually ignored is that in the UK alone there are some 270 species of wild bees, including 27 bumblebees, and just one species of honeybee. So, what are the 'other bees'? Keen gardeners might have been annoyed to find their prize roses with numerous neat, symmetrical holes cut out of the leaves. If they are also nature-lovers, they would have been reconciled to the damage when discovering the culprits are a species of wild bee – a 'leafcutter'. In fact, there are seven species of leafcutter bee established in Britain, and three of them are quite commonly found in gardens. Another well-known bee is the aptly named 'Hairy-footed Flower Bee' *Anthophora plumipes*. This species nests in crevices in old walls, and makes its appearance in early spring. The males emerge first, and establish regular patrols, awaiting the arrival of the females. When fresh, the males have a dense ginger-brown coat, and could easily be confused with the Common Carder Bumblebee *Bombus pascuorum* (though they are much smaller than the queens of that species, flying at the same time). The females are black- coated, with bright orange hairs on their hind legs, also looking very bumblebee-like. They have a black-and-white nest-parasite named the 'Mourning' Bee *Melecta albifrons* (see back cover) which is usually to be seen where the flower bees occur.

Another species that has become very familiar is the Ivy Bee *Colletes hederae*. It was first distinguished as a species by the great German bee expert, Paul Westrich and a colleague, as recently as 1993. It was first recorded in Britain in 2001, and has since spread astonishingly quickly across the UK up to Scotland. It has golden brown hair on the thorax, and the abdomen is black with bands of pale fawn flattened hairs across the segments. The bee nests in huge aggregations, sometimes in lawns, or other open areas with friable soil and sparse vegetation. There is a churchyard in Woodbridge, Suffolk, almost entirely covered with Ivy Bee nests. In most places where it occurs, it can be found on the flowers of almost any stand of Ivy from late August on into the Autumn.

The miners

These three species share with almost all the wild bees apart from the honeybee and the bumblebees a key feature of their life-cycle: they are 'solitary'. This is a bit puzzling, as they often nest in very dense aggregations – sometimes as many as thousands, all nesting within a few centimetres of one another. There is some evidence these species are attracted to sites where other bees are nesting, but they are still solitary in the sense that each female constructs its own nest, and provides food for its larvae, without any cooperation with other bees.


Leafcutter Bee carrying a leaf section


Holes in rose leaves made by a leafcutter bee


Female Ivy Bee


Brood cells of Early Colletes Bee

That is, unlike the social bees and wasps, there is no non-reproductive worker caste, enslaved into foraging and working for a dominant queen. In many species, the females make their nests by burrowing into the ground. At certain points in the burrow (or branches from the main tunnel) the wall is compressed to form a cell. This is usually (but not always) lined with a waterproof protective secretion. The female then stocks it with a 'loaf' of mixed pollen and nectar and lays an egg. Once the cell is completed, the female goes on to repeat the process. Meanwhile, the egg hatches and the resulting larva feeds on the store she has provided for it, going through several moults until it reaches the final larval stage (called a 'prepupa'). This is the most common stage for spending the winter, with pupation and subsequent emergence of the adult occurring during the following spring or summer. However, there are many variations on this theme: some species have two broods in a year, while some individuals of a few species may have a two-year cycle. A few species which fly very early in the year spend the winter in their cells as adults. I, with a local group of naturalists dug up some brood cells of the Early Colletes *Colletes cunicularius* (a spring-flying relative of the Ivy Bee) in winter, and the bees inside buzzed at us angrily. We kept them in cool conditions and they emerged at the appropriate time.

The cavity nesters

The ground-nesting bees belong to four families of solitary bee, but species belonging to two families usually nest above ground in cavities of various kinds. These might be cavities in old walls, steep quarry sides or cliffs, as in the Hairy-footed Flower Bee, or in hollow plant stems, as in some of the leafcutters and their relatives (family Megachilidae). These are the species that have benefitted greatly from the provision of garden 'Bee Hotels'. In fact, these need not be 5-star accommodation. Many people experiment with blocks of wood with holes of various widths bored into them, or bind together lengths of garden cane in a modified bird-table. These should be placed in a sunny part of the garden, with the openings roughly south-facing. There are also commercially supplied nest boxes of various designs, some of them with concealed transparent sides that make it possible to watch the bees' activity as they make and stock their nests.


A bee hotel

These features in a garden offer endless hours of fascination for those with time to watch. In spring, the most likely occupants of the hotel are females of the well-known Red Mason Bee *Osmia bicornis*. These begin by collecting mud in their mandibles, and use it to line their first brood cell. Then they bring back a load of pollen, carried in a brush of long hairs under the abdomen. They first turn round and scrape the pollen into the cell, and later regurgitate some nectar to mix with it. When the stock of food is complete, they lay a single egg and close the cell with more mud (which they manipulate with two 'horns' on the head). This forms the rear wall of the next cell, and the process is continued until the cavity is almost filled. A 'vestibule' is left empty near the nest entrance, and the completed nest is sealed with a thick wad of mud. The next species on the wing is likely to be another mason bee.

Orange-vented Mason Bee chewing a leaf

Yellow Loosestrife Bee collecting oil

The Orange-vented Mason Bee *Osmia leaiana* is the most frequent in our garden, and instead of mud it uses a form of mastic made from chewed-up fragments of leaves to construct its cell walls and to plug the nest entrance when it is complete.

Another species that readily uses bee hotels was once quite a rarity, but has become increasingly widespread in Britain. This is the Large-headed Resin Bee *Heriades truncorum*. The males usually appear in late May, but the females are actively constructing their nests through June and July and even continue to late August. Like the mason bees, they carry their loads of pollen in hair brushes (known as 'scopae') under their abdomen, but they use tree resin to make the compartments dividing their cells, and also to insert a 'plug' across the nest entrance – this can be as much as 5mm thick. As if that were not enough protection, they then collect tiny pieces of grit or stone and press them into the resin plug. The females of this species seem to be especially aggressive, and conflicts frequently break out between neighbours, often as a result of one attempting to usurp the other from her nest.

Also, from mid-summer the leafcutters are active, cutting their neat, symmetrical sections of leaf to line their nests and then plugging the entrance with numerous layers of disc-shaped sections. Several of the leafcutters will use the artificial cavities of the bee hotel, and it is fascinating to watch them cutting the leaves and then carrying them back to the nest caged between their legs. Another remarkable member of the family is the Wool Carder Bee *Anthidium manicatum* (see picture index P.1). The females line their nests with plant hairs that they clip off with their scissor-like mandibles. A patch of Lamb's Ear *Stachys bizantina* in the garden is a good way to attract them. The males patrol territories around the plants, diving onto females as they arrive to forage for nectar or pollen. Meanwhile, females that have mated and are searching for nesting material shear hairs from the lower leaves, unnoticed by the males.

The nesting behaviour of solitary bees is almost unendingly various, with three species that make their nests in the spiral cavities within snail shells, and another which nests in the cavity of a gall made by a fly that lays its eggs in flower-stems of Common Reed *Phragmites australis.* Another lines its nests with plant

Prepupae of Reed Yellow-face Bee

oils which it collects from the flowers of an uncommon wetland plant, Yellow Loosestrife *Lysimachia vulgaris*.

Solitary bees and flowers

If we shift focus to another aspect of bees behaviour – their relationship with flowers – the fascination continues. Most bees will suck nectar from a wide range of flowers, but pollen is another requirement for the nutrition of the larvae. It is high in protein and other nutrients, and is expensive for the plant to produce. The plants have evolved a huge variety of ways of attracting insect pollinators to do the necessary work of transferring pollen from one plant to another, whilst limiting the amount of pollen they 'waste'. Of course, this pollen that is wasted, from the point of view of the plant, is the indispensable food supply for the offspring of the bees. So, at least for those plants that rely on cross pollination, there exists a sort of competitive mutual dependency. This has produced a great variety of different adaptations on the part of both the bees and their plant 'hosts'. These include, of course, the huge variety of flower colours, scents and structures.

While some bee species are able to collect pollen from many flower species, others are very choosy – and some are very choosy indeed.

Some bees will collect pollen just from one, or a small range of flowers, for example, from one genus of plants only. One example is the Bryony Bee *Andrena florea*, which collects pollen only from plants of White Bryony *Bryonia dioca* in Britain, or from this and a close relative in its wider European range. As bryony has male and female flowers on separate plants, pollination depends on insect visitors to the male flowers being 'persuaded' to go on to the female ones for nectar. How is this done? Another example is the Yellow Loosestrife Bee *Macropis europaea.* This species seems to be completely dependent on the oil from the loosestrife flowers (or a close relative), and other insects do not seem to visit the flowers, so the plant may be dependent on the bee for pollination. But although the plant is widespread, it is also often very localised. So how do the bees find it?

These and many other puzzles abound in the realm of the solitary bees. It is often stated – and correctly so – that a majority of our wild flowers, and many of the crop plants we use for food are pollinated by solitary bees. There is evidence that they do better than honeybees in this respect – and also that honeybees can be a threat to the diversity of our wild solitary bees. So, their ecological function is indispensable, but for me, at least, it is the wonderful diversity of their modes of life, and the many unanswered questions about them, that inspire my appreciation of them.

What next?

The Bees, Wasps and Ants Recording Society (BWARS) is the national society for people interested in bees and their relatives. It has workshops to help beginners with identification, and issues two newsletters a year.

The authoritative, two-volume *The Bees of the British Isles* by Mike Edwards & George Else (2018) is the standard work, while the *Field Guide to the Bees of Great Britain and Ireland* (2015) by Steven Falk (illustrations by Richard Lewington) is an excellent, comprehensive guide (and is complemented by Falk's web feature). Books that focus less on identification, more on behaviour and ecology, include my *Solitary Bees*, in the Naturalists' Handbooks series (2017); *The Solitary Bees*, by Danforth, Minckley and Neff (2019); and *Solitary Bees* by Nick Owen and myself, in the New Naturalist series, forthcoming in May 2023.

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All photos: T. Benton

Recording Wildlife in a Changing World

Chris Raper

I'm often asked "why do you record?" and it's a fair question. Like many naturalists, I spend a lot of my time carefully noting down the wildlife that I see. In fact, a lot of the time I'm actively visiting sites specifically to look for wildlife or running moth-traps in my garden to help me record even more things. It's a lot of my time so it must be rooted in a need and it must be quite enjoyable. I suppose that if the world around us never changed then we would always see the same things. Just writing down what you saw would become boring very quickly and you could very easily predict what you were going to see tomorrow. But the key to my obsession is that the world never stands still - we have changing seasons and a changing climate which all create variability that causes knock-on reactions from the natural world. Science is about observation and by carefully watching the world around us and noting down what we see we can learn about how and specifically why it is changing. With more and more evidence supporting man-made climate change it is no surprise that observations of nature have also played a key part in our understanding of that too.

The author recording flies on Salisbury Plain with an unexploded mortar in the foreground *Photo: Vicky Gilson*

I have recorded insects since I got my first moth trap thirty plus years ago and along the way was convinced to start the Tachinid Recording Scheme, which I have run with Matt Smith since 2000. Then I was lucky to be offered a job at the Natural History Museum's Angela Marmont Centre for UK Biodiversity, maintaining the UK Species Inventory database, which provides all the standard naming and taxonomy for most of the UK's biological recording and reporting systems. So, if you are missing species in iRecord or the NBN Atlas then let me know and I'll sort that out.

The focus I needed to study and record Tachinid flies led to me taking a twenty-year break from recording moths, but having a nine-year old entomologist in the family, spurred me on to restart "mothing" and I soon realised that the landscape has changed noticeably in that time. Many species that I had counted as common (e.g., wainscots and yellow underwings) are very reduced in numbers while others have appeared out of nowhere and become very common (e.g. Jersey Tiger *Euplagia quadripunctaria* and Tree-lichen Beauty *Cryphia algae).* This experience really brought home how important it is to record, and not just the rarities either – everything that can be given a confident identification – and, if possible, to record the numbers you find too. There's a big difference between reporting that something was present and saying that there were 1000 one year and just 10 another. If we put all these observations together, we can plot how populations are changing and how peaks vary in each year too.

Moth trapping is an excellent way to get children like Victoria involved with recording and is a never-ending source of fun things to identify.
Photo: C Raper

Ectophasia crassipennis
Photo: T. Mathews

Chrysosomopsis aurata
Photo: M. Kerry

As an example, a friend many years ago told me that he was interested to research populations of reptile and amphibian in South Oxfordshire so he went through fifty years of the journals of a local Natural History Society where they published their sightings for each year. But he found that as he went back in time the frequency of frog and toad records just got fewer and fewer. Were frogs and toads rarer then than now? Did numbers suddenly rise and then fall away? The answer of course is "no" to both those questions but people in the past just didn't record what they considered to be common creatures. frogs and toads were just not significant enough to bother to put in their yearly report and in any case who records things like "Common Daisy *Bellis perennis*" or "Blackbird *Turdus merula*" whenever they see them? This causes a real problem because to prove declines in numbers we need big datasets where observations have been taken over a long time. But very often we lack this structure and it's a huge problem because nobody has yet invented a time machine!

I've also had interesting discussions with taxonomists about which species they think should go onto the British checklists. Traditionally most checklist maintainers would say they excluded imported, non-native species until there was proof they had been breeding in the wild. But of course, to get the evidence of breeding you need records so I have to be a bit more pragmatic. If a new species has been found in a wild situation (not dead on a container lorry, or wrapped in cling film around a lettuce) and there is a feeling that records would be useful because there is a chance of establishment, then it goes into my database so that we can track potential new arrivals. In the case of the Asian Hornet *Vespa velutina* I even included that species years before it was found because we needed a way for people to log the very first record. Being able to track the spread of non-native, invasive species is becoming a very important part of the biological recording world.

How do you record to make your records count?

It doesn't really matter much which platform/app/spreadsheet you submit records on – just that you submit them and that you do your best to make correct identifications, erring on the side of caution. Platforms like iNaturalist are superb at engaging with beginners because it emphasises the importance of photos plus computer-assisted identifications confirmed by humans, which means a person doesn't have to have any idea what they have photographed; they just upload the image, the computer tries to identify it and then people say whether they agree or they can correct it. In the UK we also have iRecord which takes records with or without photos and they can be verified by experts, but there is no computer identification and it works best when the people submitting the data are quite sure of their identifications, to reduce the work of the smaller verification team.

A few recording schemes are a bit unsure about iNaturalist because it could flood a scheme with records of common species and the identifications are confirmed by random people, not experts. There is also a problem that the taxonomy isn't directly compatible with the UK Species Inventory so their names don't always match up with the names used in the big UK systems. But I think we have to embrace new technologies and such user-friendly ways of recording and then just work out ways of solving the problems. I have had two species of Tachinid fly new to the UK - *Ectophasia crassipennis* and *Phasia aurigera* which first appeared on iNaturalist, and one exceptionally rare but expanding species *Chrysosomopsis aurata* has been spotted in many more localities. Of course, these are all very easy species to identify from photos and they are pretty so people take photos of them, but I'd rather have records than not have them.

Malaise Trap

Collecting specimens in the malaise bottle
Photos: C. Raper

Future ways of biological recording

Recording absolutely everything you see around you would be a massive undertaking and even the best of us have our limitations – how many people can count themselves an expert in every field of natural history? But just imagine the potential for understanding the biodiversity of the countryside if we could quickly and easily survey for everything in a way that allowed easy comparisons of data from different sites and years? Then we would be able to work out far more of the ecological associations and get a much more detailed picture of what is going on, which in turn would help us protect more habitats.

So, this brings us onto how we could possibly scale-up biological recording using the power of modern technology – what's known as eDNA metabarcoding. All organisms have DNA, the "blueprint of life", in their cells and as we move around, we actually shed large amounts of it as eDNA, or Environmental DNA – it's just impossible to see and needs a laboratory to analyse. At the NHM we have been investigating the practicalities of how this can be done – setting traps and then comparing how traditional human methods of identifying and counting can compare with what the laboratories can find. By using standard traps, like pitfalls and malaise traps, and collecting into alcohol you not only get large samples that experts can work through but you also get a lot of alcohol containing vast quantities of the DNA of everything that fell into the trap. You need to amplify it using the Polymerase Chain Reaction (PCR) and then extract the barcode you think will work best using the correct primers (like chemical scissors that cut away a particular strand of DNA). Then you feed your sample into a machine that actually does the reading. These machines used to be very slow and could only read small pieces of DNA but they are getting faster and faster so bulk reading of billions of base-pairs is possible within hours, not years. Once you have a computer file containing a list of all the barcodes found in your sample you can do what's called a BLAST search against huge online libraries of pre-identified DNA sequences and you get back a list of almost everything in your catch. But even more exciting, as our knowledge evolves and the gaps/mistakes in the DNA barcode databases are fixed, we will be able to run the BLAST searches again and again and continuously improve on the species lists. It's like going back in time with a new, better ID guide and having another go at identifying everything! At the NHM we are also investigating how to best use other innovative biological recording systems, such as acoustics to record bird and bat song and then feed that into computer systems that can identify the sounds. These systems don't rely on humans going out with detectors and can be left unattended 24/7, constantly reporting back on what they have heard. Others have pioneered the use of unattended moth trapping systems that at night turn on a light pointed at a white sheet and then regularly take photos of the sheet and send them back to a base station which automatically crops out the insects on the sheet and then sends them for computer-assisted identification. Just imagine the potential for this kind of recording – it's incredibly exciting. But it doesn't lessen the importance of the human recorders in the field – it just adds to their work. Also, we will always need taxonomic experts and ecologists to make sense of the species but they will no longer have to wade through samples, recording the same common species over and over again. Instead, they can focus their attention on the things they like doing most – discovering new species and doing cutting edge research into ecological interactions and species interdependencies.

So, please get your notebooks, apps, binoculars, moth traps and guide books out and note down what you see. All the data is vital for researchers who are trying to make sense of the changing world around us and to try to mitigate problems that might be caused. It's great fun, it gets me out of the house and there is always something else to learn!

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The Small Scabious Mining Bee: A Scottish Perspective

Genevieve Tompkins

The Rare Invertebrates in the Cairngorms (RIC) partnership project, which began in 2017, is working on several rare insect species found in the Cairngorms National Park, to increase our understanding of their distribution and ecology and improve their conservation fortunes. The focus species are Kentish Glory moth *Endromis versicolora*, Dark Bordered Beauty moth *Epione vespertaria*, Pine Hoverfly *Blera fallax*, Small Scabious Mining Bee *Andrena marginata*, Northern Silver Stiletto Fly *Spiriverpa lunulata*, Northern Damselfly *Coenagrion hastulatum* (2021), Northern February Red Stonefly *Brachytera putata* (since 2021) and Shining Guest Ant (2017-2020). Having introduced BNA members to the charismatic but overlooked Northern Silver Stiletto Fly in an earlier edition of Country-side (Ref. 1), I am now presenting another underappreciated invertebrate: the Small Scabious Mining Bee.

When most people think of bees, they generally think of honey bees, sometimes bumblebees but very rarely solitary bees. Despite this, solitary bees make up the majority of our bee fauna, with around 250 species in the UK. Solitary bee life histories vary wildly, from parasitic to primitively eusocial and fully solitary. The Small Scabious Mining Bee belongs to the biggest group of bees in the UK, the Andrena mining bees.

Andrena bees are a diverse group, with mini-miners achieving a maximum wing length 5.5mm, while other species can be larger than a honey bee. With females sporting a wing length of 7.5mm, the Small Scabious Mining Bee is a medium-sized representative of the group. However, because of the familiarity of honey bees and bumblebees, surprise at the species' small size is often the initial reaction upon seeing one.

Small Scabious Mining Bee female with dark abdomen

This is a distinctive bee, with sexual dimorphism between the males and females. The larger females are more easily spotted in the field. They have golden hair on the thorax and face and long white hairs on the hind legs, most often covered in large, white scabious pollen. The females also have an intriguing abdomen, which can vary from entirely bright orange to almost entirely dark, with brown stripes and a red tip. Those females with fully orange abdomens and carrying heavy pollen loads are especially

Small Scabious Mining Bee female with orange abdomen

A close up of a male Small Scabious Mining Bee showing white face with black spots

conspicuous! The smaller males are overall darker in appearance, but with a bright white lower face featuring two dark spots.

This species is found in areas of southern England, Wales and Ireland, is largely absent from the Midlands, northern England and southern Scotland, and appears again in the Scottish Highlands. Given the differences in geographical location, flight period and pollen source it is possible that the Scottish Small Scabious Mining Bee is genetically distinct from its southern counterparts. It is on these Scottish bees that I will focus.

The bee was thought to be extinct in Scotland from 1949, until it was rediscovered in Boat of Garten by Gill Nisbet, Strathspey, in 2002. Between 2007 and 2015, further populations were found in Glen Moriston, Daviot (South of Inverness) by Jane Bowman and three further sites in Strathspey (near Aviemore and Grantown).

From its inception in 2017, the Rare Invertebrates in the Cairngorms project set about trying to find more sites with the bee in the Cairngorms National Park. Since then, over 25 volunteers have carried out more than 100 surveys for the species, aided by 8 training sessions delivered over the course of the project. A total of 16 new 1km^2 sites have been found since the project began, extending the known distribution in Scotland south to Newtonmore and revealing a chain of sites through Strathspey. The average altitude across all positive sites found through the project is 212m, with the lowest altitude site near Nethy Bridge (197m) and highest altitude site at Highland Wildlife Park, near Kincraig (272m). Previously known sites are at a lower altitude, with Glen Morriston sites between 115m to 248m and Daviot at 177m. We have also searched in suitable habitat elsewhere within, or close to, the National Park, including in Deeside and Perthshire, but have found no new populations outside of Strathspey.

In Scotland, the Small Scabious Mining Bee is found in habitat with a combination of Devil's-bit Scabious *Succisa pratensis* plants and suitable nesting habitat. Our current understanding of the nesting habitat is that the bee requires relatively compact, flat or slightly sloping ground with sparse or no vegetation. We have found this sort of habitat to be provided on footpaths and their edges, the edges of farm or similar tracks, areas with livestock disturbance during winter and areas with rabbit activity. Devil's-bit Scabious is an essential element of the habitat as it is the sole source of pollen with which the nest is stocked for the developing young. The adults are thought to also feed on other sources of nectar, although we are yet to observe this during our surveys. Due to its reliance on the late-flowering Devil's-bit Scabious, this is a relatively late-flying species, with adults on the wing between the end of July and middle of September.

As it is the pollen which is required from the scabious, it is vital that suitable habitat is left ungrazed or unmown between April to October, to allow the plants both to flower and set seed. It is equally important that herbicides are not used to maintain footpaths or tracks in suitable locations, as this will impact on the bees' ability to use those sites for nesting and foraging. Along with all species that rely on flower-rich meadows, the Small Scabious Mining Bee is under significant threat from

Devils-bit Scabious flowerhead

Example of Small Scabious Mining Bee nesting habitat

changes in habitat use. This ranges from building developments to changes in farm management (such as the introduction of summer grazing, preventing scabious flowering, or a lack of winter grazing, leading to scrubbing-over of suitable sites). As sites are lost, the bee also suffers from the increased isolation of the remaining populations.

As well as discovering new sites, we work to protect and create Small Scabious Mining Bee habitat. This is achieved through a combination of advocacy and habitat management. We have worked with volunteers to create a bee nesting bank at RSPB Insh Marshes, remove scrub from two farmland sites and plant nearly 80 Devil's-bit Scabious plugs at Spey Valley Golf Course in Aviemore. We also talk to landowners and

managers about the bee and its needs, advising a relaxation of mowing regimes at visitor attractions and golf course roughs and encouraging farmers to maintain flower-rich areas of farmland. We deliver talks, with audiences ranging from Aberdeen University Conservation Society to The Wildlife Information Centre (TWIC) Conference, write articles and blogs and maintain active social media accounts. Through this outreach work, we hope to enthuse and inspire people to champion the bee and send in any sightings. Our data is also shared with the NBN Atlas, RSPB casework officers, Highland Biological Recording Group (HBRG) and North-East Scotland Biological Records Centre (NESBReC) to ensure the bee is considered when development proposals are put forward.

Our work with the project partners, and other related organisations, is central to our ambitions. In 2021, we gave a talk to the Cairngorms National Park Authority (CNPA) ranger team to familiarise them with the species and its habitat. This has already proven beneficial, with a new site for the bee found by CNPA ranger, Gillian Gibson, in 2022. We have given talks and training across the RSPB and we also work closely with the Royal Zoological Society of Scotland (RZSS). RZSS staff discovered the bee on their site at Highland Wildlife Park in 2020 and went on to plant Devil's-bit Scabious plugs to increase the available habitat in 2021. The first full survey in August and September 2022 found 70 bees and discovered important nest sites. Our work on the Small Scabious Mining Bee goes hand-in-hand with Buglife's B-lines project and in 2022 we began working with the Bumblebee Conservation Trust's (BCT) Skills for Bees: Scotland project, including a joint volunteer survey day.

The project also aims to increase our understand of the ecology of the Small Scabious Mining Bee, as this will allow us to better enrich and protect sites and advocate for the bee and any associated species. Through staff and volunteer surveys, we have collected records of three species of parasitic bee. A female Box-headed Blood Bee *Sphecodes monilicornis* has been seen entering and leaving known Small Scabious Mining Bee nest holes, while the Little Nomad Bee *Nomada flavoguttata* and Black-horned Nomad Bee *Nomada rufipes* have been seen at Small Scabious Mining Bee nest

these species are associated with Small Scabious Mining Bee, with aggregations. Further work is needed to understand if any of the Box-headed Blood Bee principally known to parasitise *Halictus* and *Lasioglossum* bees and Little Nomad Bee parasitising *Micrandrena* bees. However, highlighting the existence, and collecting records, of these species is important in itself, with only two previous records in the Highlands area for the Black-horned Nomad Bee. The project's Small Scabious Mining Bee Species Champion, Peter Stronach, has also recorded the sound of a female bee in her nest, raising enticing new possibilities for studying the activity of the bees.

Box-headed Blood Bee female
Photo: David Tompkins

Small Scabious Mining Bee nest hole


Black Horned Nomad Bee


Little Nomad Bee

In 2021, Christian Thelier, a Sustainability and Ecology MSc student at the Centre for Alternative Technology and Liverpool John Moores University, carried out a mark-recapture project on Small Scabious Mining Bees, based at Highland Folk Museum. We were particularly interested in better understanding the foraging and dispersal distances travelled by Small Scabious Mining Bees, as this affects where we plan to create habitat between known sites. With the help of volunteers, Christian was able to mark 93 bees and recapture 44. The latest recapture was on the 16th September, where the previous latest date was 31st August. The bee was found to travel an average of just 25.7m, with a maximum recorded distance of 100m. It's preferred foraging temperature was found to be between 15-18°C. A second mark-recapture study was carried out by RZSS staff at Highland Wildlife Park in 2022, to estimate the population size and better understand how the bee is using the available habitat. We await the full results of this year's study, but this research is already proving a vital asset in determining the best place for habitat creation.

This year, a study of the nesting habitat preferences of the bee is being carried out by Kelly Powell, undergraduate student at Scotland's Rural University College (SRUC). Variables will include soil compaction, soil pH and distance to nearest Scabious, with the aim of refining our understanding of the bees' distribution and aid in the creation and management of nesting habitat.

Many Small Scabious Mining Bee populations exist on "multi-use" sites, whether they be gardens, golf courses, visitor attractions or farmland. It is clear that these multi-use spaces are capable of supporting threatened wildlife if they are managed sensitively. This highlights the importance of working with a wide variety of local people. Invertebrates are undervalued, but often because they go unseen and unrecognised. Once they become aware of the bee, most people are thrilled to have the species on their land. It is often not a lack of willingness, but a lack of awareness and understanding which limits the potential of multi-use spaces. If important areas of habitat for the bee can be protected from development, protected from chemicals and left unmown or ungrazed during the warmer months, then this charismatic little bee does have a positive future. And the best way to ensure such a future is to increase our own understanding of the species and then spread this knowledge as widely, and with as much enthusiasm, as we can.

The Rare Invertebrates in the Cairngorms project partners are: RSPB, Buglife, Butterfly Conservation, Cairngorms National Park Authority, Nature Scot and the Royal Zoological Society of Scotland. The project was part-financed by the Scottish Government and the European Community LEADER 2014-2020 programme for the period between 2017-2019. Since 2020, the project has been funded by the Cairngorms National Park Authority, RSPB Scotland, Cairngorms Connect (via the Endangered Landscapes Programme), the Cairngorms Trust Green Recovery Fund and the Nature Restoration Fund. Work by RZSS on the Small Scabious Mining Bee at Highland Wildlife Park is part of a Biodiversity Action Plan project at the site, funded by NHLF.

With thanks to Murdo Macdonald and Dr Helen Taylor for comments.

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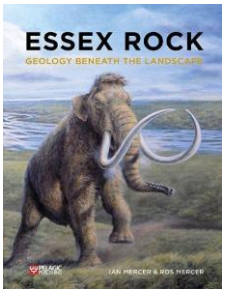
All photos: G. Tomkins unless indicated.

Book Reviews

Editor: Roy Stewart MSc, FIBMS, FLS, FRSB, MBNA



Essex Rock: Geology beneath the landscape by Ian Mercer & Ros Mercer.

Pelagic Publishing. June 2022 ISBN: 9781784272791. £29.99

30% BNA Members Discount visit www.pelagicpublishing.com use code: **BNA123**

Reviewed by Dr. Chris Gibson

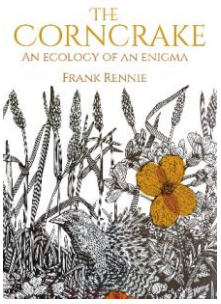
In 2000, I was asked to review the first edition of this book, then authored by Gerald Lucy. My view of it was almost wholly favourable, and indeed it has become a frequent reference point for me over the ensuing two decades.

This new edition simply makes it more indispensable for someone like me without a formal geological background. The larger format and almost four times as many pages allow the ideas in the book the space to breath, and to be supported by a much richer wealth of photos and images. The authors have done a great service to the naturalist community in producing enjoyable, readable text without sacrificing erudition. The simple, clear design also helps, although to my eyes at least the font of the body text is ever so slightly too weak for comfort.

Essex is a 'soft rock' county, relatively young, lacking in relief and many of the dramatic landforms found elsewhere, and in which many of the geological sites remain largely, stubbornly sub-surface - in other words, it is an acquired taste. The breadth of coverage is breath-taking, from long before the times of our earliest surface rocks to a distant, conjectured future, all told as a coherent story through time.

The easy writing style also lends itself well to something one might not expect in a book like this: humour. Just go and buy it and read to the end of p374 to see for yourself! Even if you have the first edition, do get this – it has so much more to add, and of course the science has progressed over the 20 years. But don't get rid of the old one. At only 259g as compared with 1180g, the first is a whole lot more portable, if you wish for example to take the gazetteer of important sites (found in both editions) around with you in the field.

Essential for anyone with an interest in Essex and soft-rock landscapes, this book is also for the person who just thinks they might be interested. After a few minutes you surely will be. I already know many of the key sites in it as I notified a good proportion of them as SSSIs but it has renewed my desire to get out and see them again with refreshed eyes.

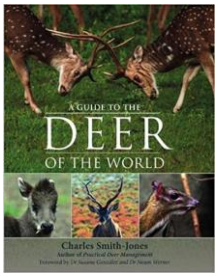


The Corncrake: An Ecology of an Enigma by Frank Rennie. 2022.

Whittles Publishing. ISBN: 10-1849955026. Paperback 208 pages. £18.99.

Reviewed by Steven Rutherford

My only sight of a corncrake was on the Isle of Lewis in 2011 as it ran across the road, head down and tail up in its typical and striking pose on the Isle of Lewis. The identification of this iconic bird was instant as every book that I have seen featuring them shows the bird in this horizontal position as it breaks cover. I was also lucky on that holiday to have a male corncrake in the garden of the cottage that I stayed in that called throughout the night. However, the identifying and naming of species is only the first step to understanding this bird and why we have to travel to such a remote place and be lucky to view and hear them. The inquisitive Naturalist must then ask questions of how do they nest and how successful are they when breeding? What are their requirements for territory and what food do they eat? Where else do they breed in the world and how are they coping with climate and land use changes across their range? And, as they are migratory birds, what routes do they use and where do they spend their non-breeding months? The author, Frank Rennie, is Professor of Rural Development at the University of the Highlands and Islands and is based in the Outer Hebrides and so is perfectly placed to write this book and answer these and other questions through his research as well as posing others for further research. He tells us in his introduction that it was a product of the Covid 19 Pandemic lockdown along with years of studying these birds on his doorstep (and through his bedroom window). The result, of which, is a well-balanced, beautifully researched book that is also very readable. Photographs to accompany the book are supplied by John A Lowe and show all of the typical poses of the corncrake. A book that is a joy to read and be stimulated into a more science-based approach to birding.



A Guide to the Deer of the World. Charles Smith-Jones.
Quiller Publishing. 2022. 320 pages. ISBN: 978 1 84689 362 9

Reviewed by Norma Chapman

This large format (270 X 210mm) weighty book (2.4kg) is beautifully produced and a mine of information on all recognised species and sub-species of true deer (Cervidae- 55) and also chevrotains (Tragulidae- 7) and musk deer (Moschidae -7).

Special features of deer in general – antlers, rumination, teeth, senses, scent glands, pelage, sexual dimorphism, hybridisation, health and diseases are described before the Lifestyles section deals with habitats, locomotion, food and drinks, relationships, communications, breeding strategies, birth and death. Discussion of deer and man follows before accounts begin of all currently recognised species and sub-species. Of the Cervidae 16 species are of Least Concern to the International Union for the Conservation of Nature but the rest share various degrees of vulnerability.

Text for each species includes description, habitat, distribution, behaviour, history and is accompanied by excellent colour photographs which show both sexes, young and habitat. Following the comprehensive account for each species there is Fact Box, some extend to two pages, where at a glance one can see world distribution, IUCN status, alternative names, recognition features, height, weight, food, habitat, voice, annual behaviour, rut, gestation and birthing, antlers, life span and threats.

The author has sourced information from around the world to present the most up-to-date available data. Apart from his own photographs I counted acknowledgements to 95 other sources. Serious researches may regret the lack of references to sources of information which would undoubtedly have added many more pages. A glossary of terms, a list of further resources and definitions of terms relating to deer are useful additions to the main text, all of which is easily read.

The previous book entitled *Deer of the World* by G. K. Whitehead was published in 1972 with 194 pages. Since then, there have been losses and gains, new species discovered and conservation concerns aroused. For biologists with deep interests *Deer of the World: their evolution, behaviour and ecology* by Valerius Geist (1999: 421 pages ISBN: 1 84037 0947) with the author's own drawings is a very valuable, scholarly reference book of similar size and 421 pages.

I thoroughly recommend Smith-Jones new book – any deer enthusiasts should place it at the top of their Christmas wish lists.

Volume 36 Number 1 Winter 2022

British Naturalists' Association the National Body for Naturalists ISSN No. 0011-023X