

Moth Surveys in and around the Vale of Belvoir



Pete Leonard, January 2022



Contents

Why?

Mapping Distributions

My aims

Techniques and equipment

Results

What next?

Acknowledgements



above: Chocolate-tip; cover: Pink-barred Sallow; Contents page: Beautiful Carpet

Why?

Conserving the natural world is one of the greatest priorities and challenges of our time. But conservation must start with data. Without data, we do not know what we are trying to conserve or how we might attempt to conserve it.

Over the last few decades, a lot of moth and butterfly data have been collected in Leicestershire and Rutland, yet much has remained unpublished. In 2018, County Moth Recorder, Adrian Russell, announced his intention to rectify this by publishing a book on the subject, containing a summary of everything we know. I quickly discovered that we did not know that much about the Vale of Belvoir, so I decided to do something about it.



Bordered Beauty

Mapping Distributions

A central feature of the book was to be distribution maps for every species known from the county. I have been involved in several similar projects before and I have always found 'atlasing' to be very rewarding fieldwork. It is beautifully simple, yet vital and valuable. Your area (whether a county, country or continent) needs to be divided up into sections and then observers record whatever they find in each section, gradually accumulating enough data to create maps showing where each species has been found. Most satisfying is the fact that records of common species become valuable pieces in a larger puzzle.

For this project, the divisions used were based on the national grid reference system and comprised 2km x 2km squares known as tetrads. Leicestershire and Rutland have roughly 700 tetrads.

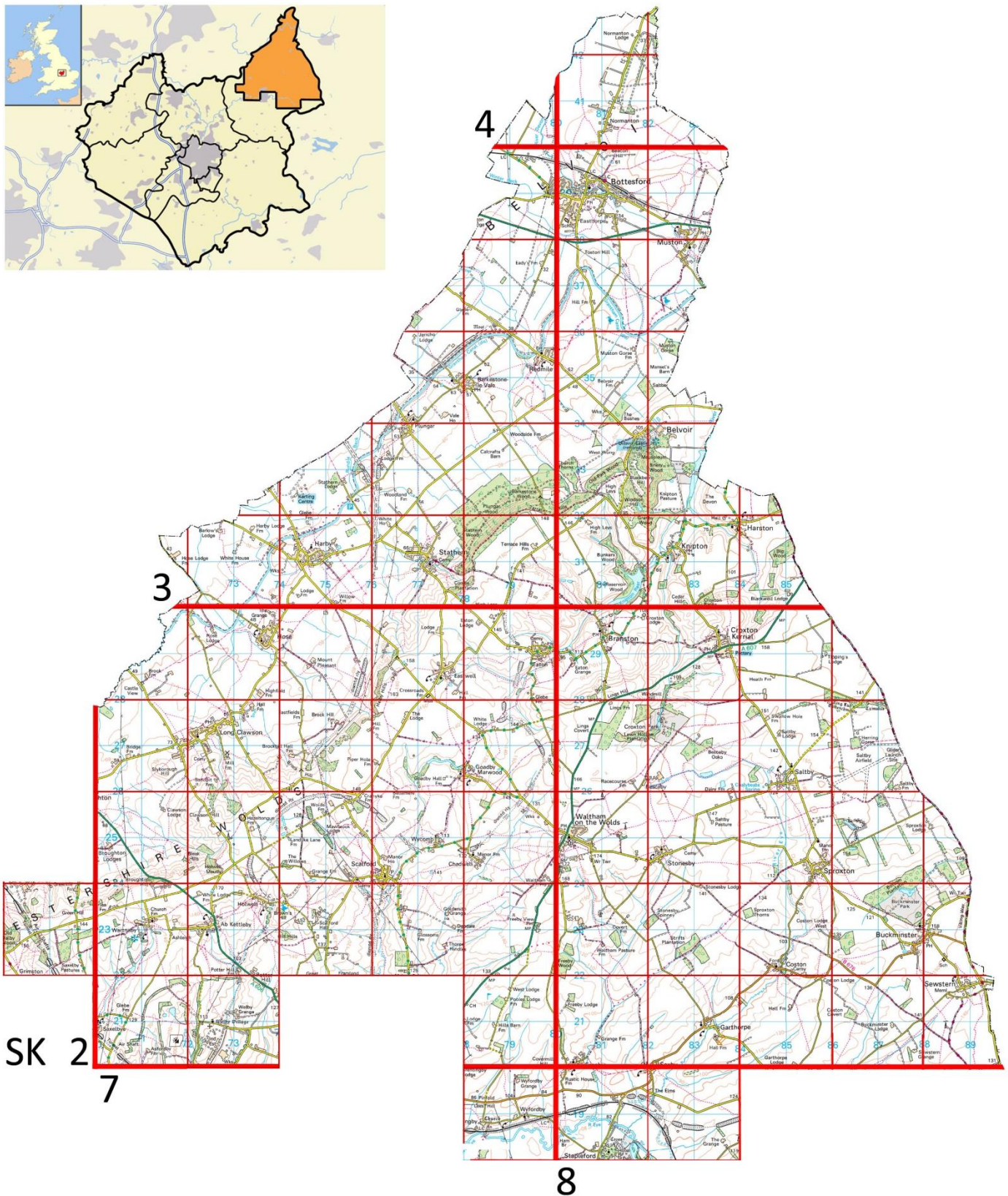


Early Moth, flying in January snow

My aims

My initial aims were modest and simply to trap in a few friends' gardens and collect data from a handful of sites other than my garden, but over the course of three seasons I realised that it would be feasible to achieve something much more thorough.

By 2021, I had decided to attempt to record 150 species in as many tetrads that were within striking distance of my home in Harby. This roughly equated to the portion of the county east of the A46 and north of Melton Mowbray (see map overleaf). My main aim was to achieve consistency of coverage across this stretch of the county, to give a clearer idea of population distributions and densities.



This map shows the area in which I have undertaken fieldwork. Some adjacent areas such as Melton Mowbray were omitted as regular moth trapping had already taken place.



Techniques and equipment

Most data were collected using light traps. These work by taking advantage of moths' well-known (and still unexplained) tendency to fly towards a light. Baffles and a funnel below the light direct moths into a collecting box where they can be examined and logged the following morning, before being released unharmed.



Traps are filled with egg boxes so that trapped moths have somewhere to hide. This also makes processing easier as boxes can be removed one at a time.

Moths of some sort can be seen at any time of year, but most species prefer

warmer temperatures so the summer months are the busiest. The most productive nights are warm and still with little or no moon.

Sometimes it is worthwhile sitting up over a light for a few hours as many moths approach a light, but do not enter a trap. This photo shows a line of traps set along a woodland ride.

Moth distribution is closely linked to the availability of the larval food plants, so I aimed to sample a broad range of habitats, ranging from open farmland to dense thicket, woodland and wetlands.





Sallow Kitten

In the first season I used a single mains-powered trap, so initially, the tetrads chosen were simply those in which I knew people who could supply power and a garden.

In the second season, I used two mains-powered traps and a single battery-operated trap. I also began to ask permission to trap in the gardens of 'friends of friends'. This enabled me to explore further afield.

In the third season (and the decision to aim for blanket coverage) I used two mains-powered traps and six battery powered traps. With the help of many friends, I managed to find landowners in all the remaining tetrads who were happy for me to trap on their property. The use of more battery-powered traps gave me much more flexibility when it came to finding suitable trapping sites as I was less restricted by mains power availability.



Knot Grass larva

Besides light traps, a few other recording techniques were used. Some moths fly in daylight and others can be netted at dusk. Although not specifically searched for, larvae (caterpillars) were recorded regularly, and occasionally also came to light traps.



Certain species can be attracted to artificial pheromone lures. Initially developed to tackle pest species, these are now used widely to assess the presence of certain species that are not easily found using other methods. The Clearwing moths (Sesiidae) are difficult to survey in any other way.

Red-tipped Clearwing

Perhaps the most profitable technique after light-trapping is searching for 'leaf mines'. A host of tiny moths can be logged through hunting for signs left by their caterpillars. 'Leaf mines' fall broadly into two categories, illustrated below.



On the left is a typical 'gallery mine'. These are tunnels that a miniscule caterpillar has chewed through a leaf interior. This one is made by *Stigmella aurella* on Bramble and the adult moth is shown below – barely 3mm long. On the right is a typical 'blister mine' under which a caterpillar feeds. This one has been made by *Phyllonorycter leucographella* on Pyracantha and the adult (below right) is also just 3 or 4mm in length.



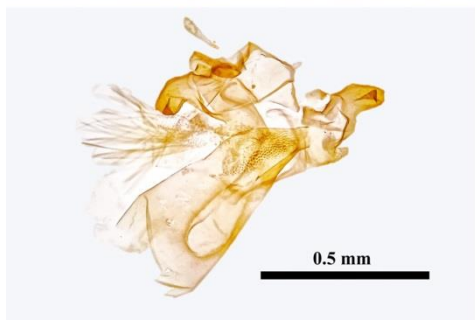
The shapes of leaf mines, the patterns of frass (caterpillar droppings) within them and the plant species on which they are found, enable many species to be identified and recorded in this way.

Finally, there are a few groups of moths that are impossible to identify using external features alone. For this reason, a small sample was collected from a range of sites. These specimens were then dissected in order to clarify which species occurred in the area.

For such species, the most distinctive part of the anatomy is the genitalia. Once dissected, the relevant anatomical features were photographed at high resolution under a microscope so that identifications could be made. A full report of these has already been deposited in the Leicestershire and Rutland Environmental

Records Centre.

Left are examples of species which require dissection for safe identification. Dark (left) and Grey (right) Daggers.



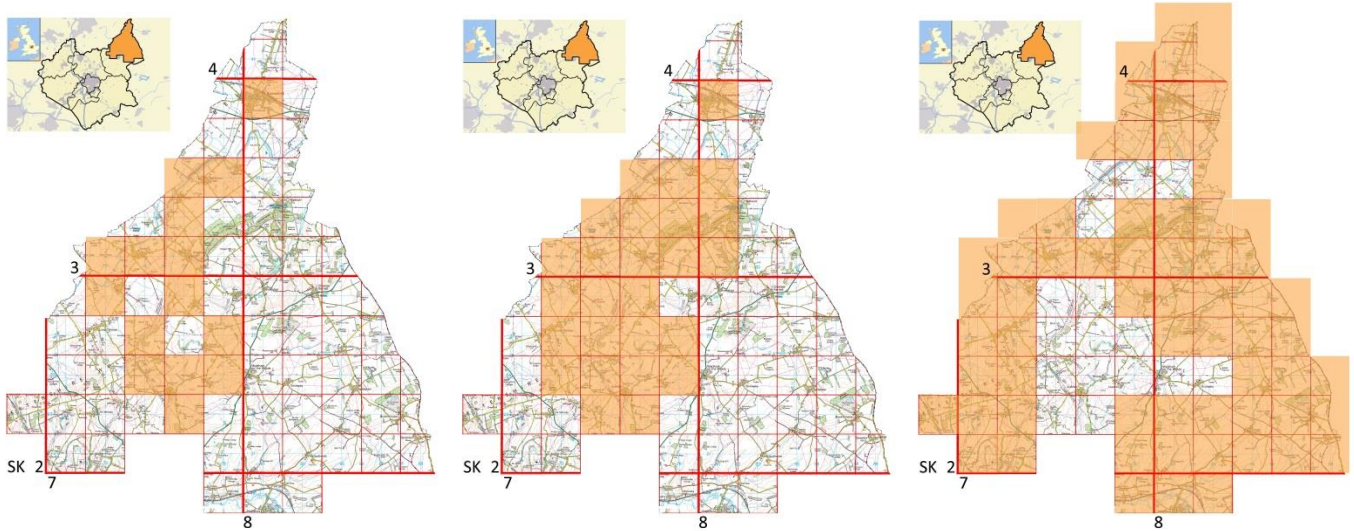
In the case of some micro-moths, many of the species can look similar in external appearance, yet dissection photos reveal dramatically different anatomy.

Oxypteryx (Eulamprotes) atrella
nr Sproxton, 20-08-2021

Aproaerema anthyllidella
nr Sproxton, 20-08-2021

Results

The orange tetrads indicate the areas in which I conducted fieldwork over the three seasons.

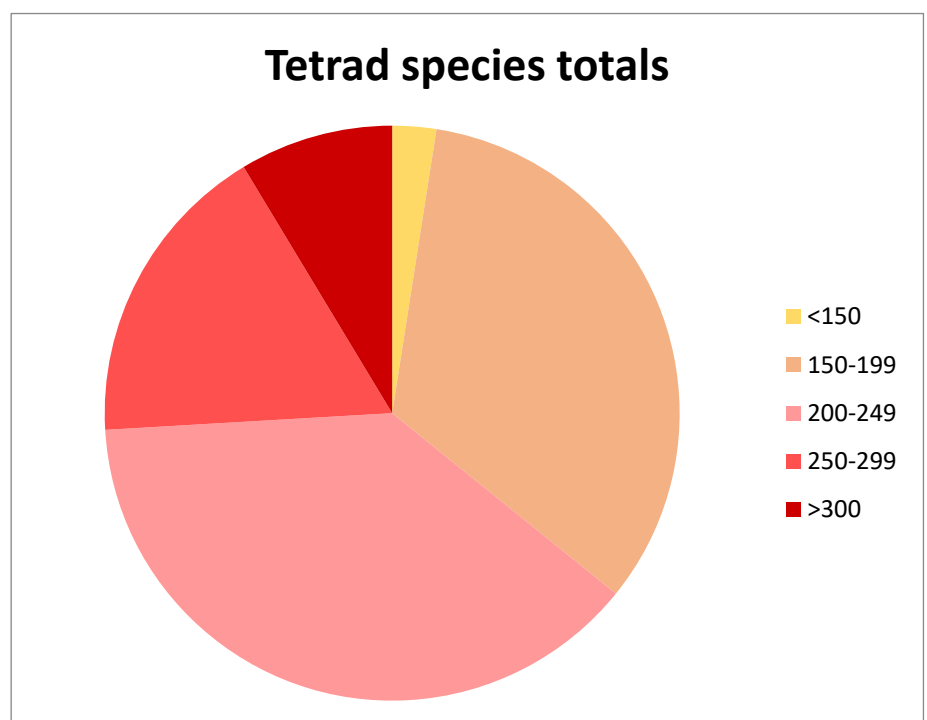


In 2021, there were 533 trap/nights and trapping took place in 65 tetrads. When combined with other methods of recording, a total of 44,652 moths were processed of 731 species.

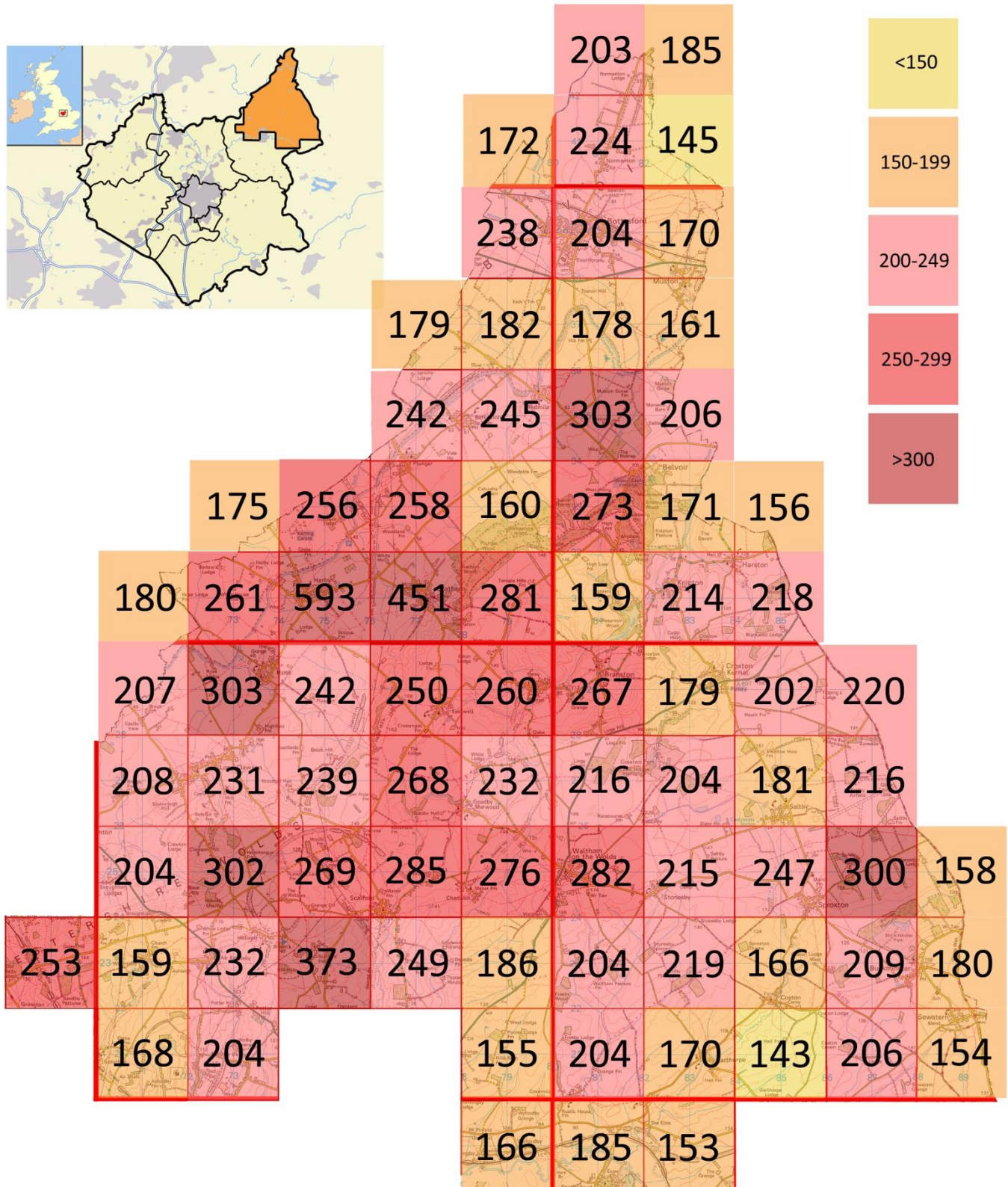
Over the three seasons, the cumulative total is about 100,000 moths of 856 species recorded across 81 tetrads.

I managed to record over 150 species in all but two tetrads, and in the majority I recorded over 200 species. The mean tetrad total was 223 species.

This chart shows the relative proportions of the varying totals.



The following map shows the individual tetrad species totals for the area covered.



Approaching fieldwork in this rigorous way produces good indications of relative abundance and distribution. The following nine species were recorded in all 81 tetrads and are therefore amongst the most numerous and widespread moths in the area:

Stigmella aurella

Parornix anglicella

Celypha lacunana

Green Carpet

Hebrew Character

Common Wainscot

Large Yellow Underwing (right)

Square-spot Rustic

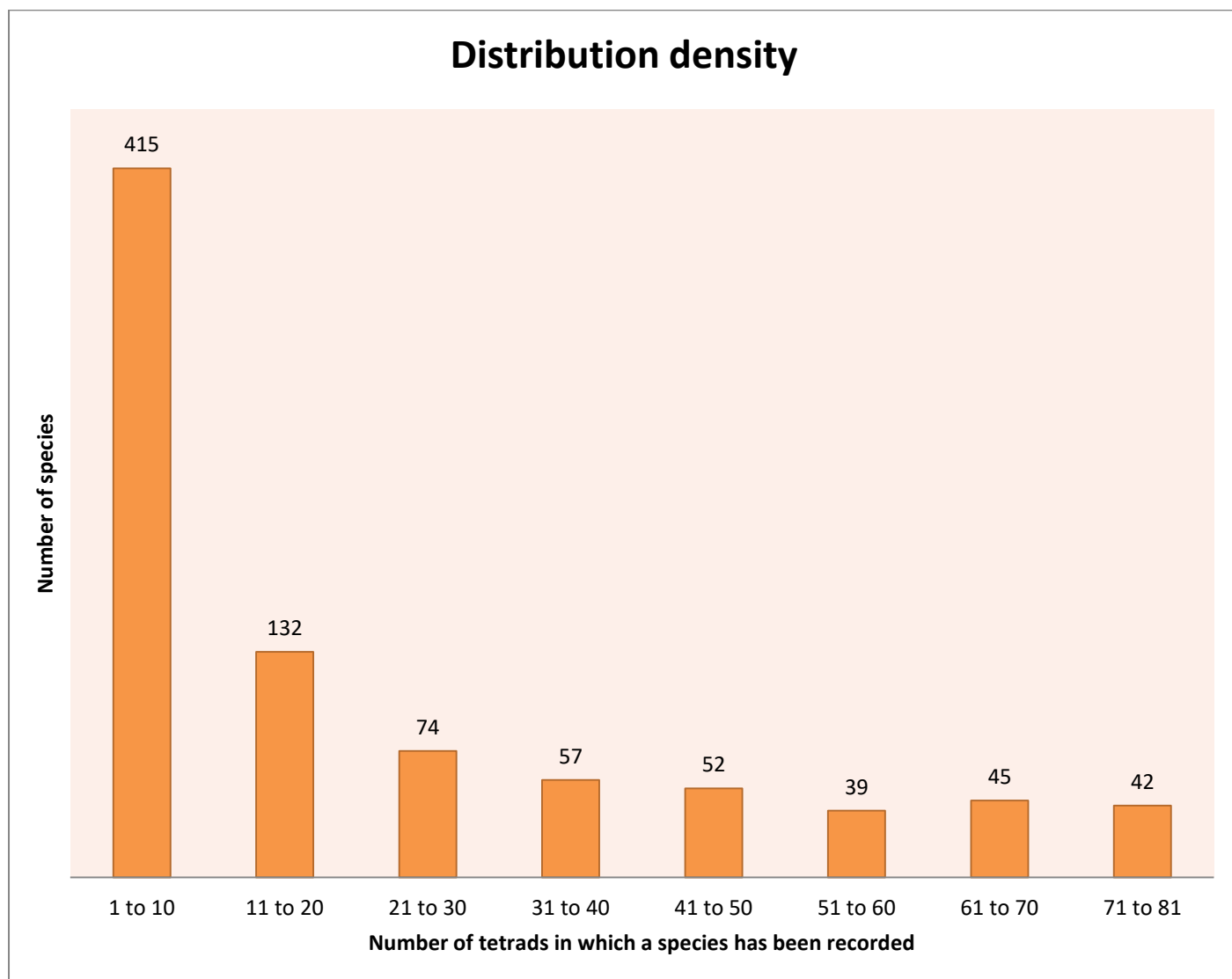
Setaceous Hebrew Character



Some of these species are also recorded in very large numbers, with the highest totals of individuals over the survey period being 9529 *Chrysoteuchia culmella* (below left) and 7230 Setaceous Hebrew Character (below right).

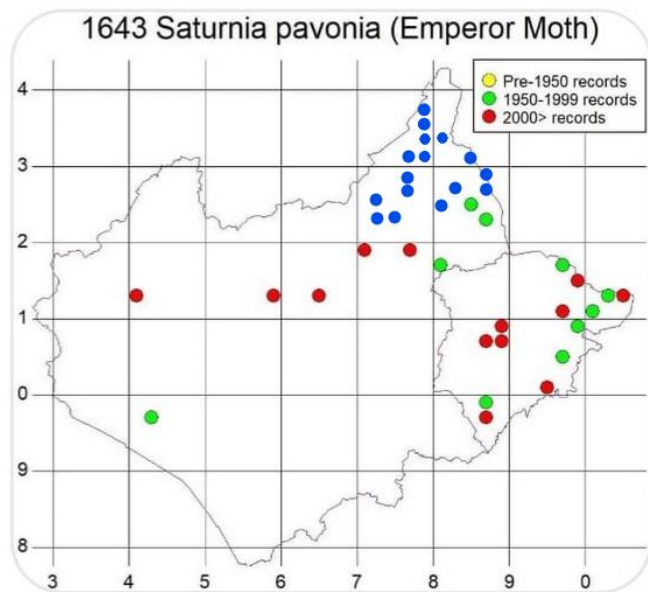


Of the 856 species recorded, 185 were recorded in at least half of the tetrads surveyed. Conversely, about 50 species have been recorded from just a single tetrad, and as can be seen from the graph below, almost half the species recorded (415) are known from between just 1 and 10 tetrads.



Although not yet quantified (and it may seem like stating the obvious) my experience suggested that sites which held a broad diversity of undisturbed native plants tended to hold the richest diversity of moth species. Furthermore, even small protected areas (such as Leicestershire and Rutland Wildlife Trust Nature Reserves) quickly proved their worth as they were regularly found to hold good numbers of species that seem scarce elsewhere.

Some of the most significant findings were records of moths that were beyond the limits of their known distributions, and therefore shown to be more widespread than thought.

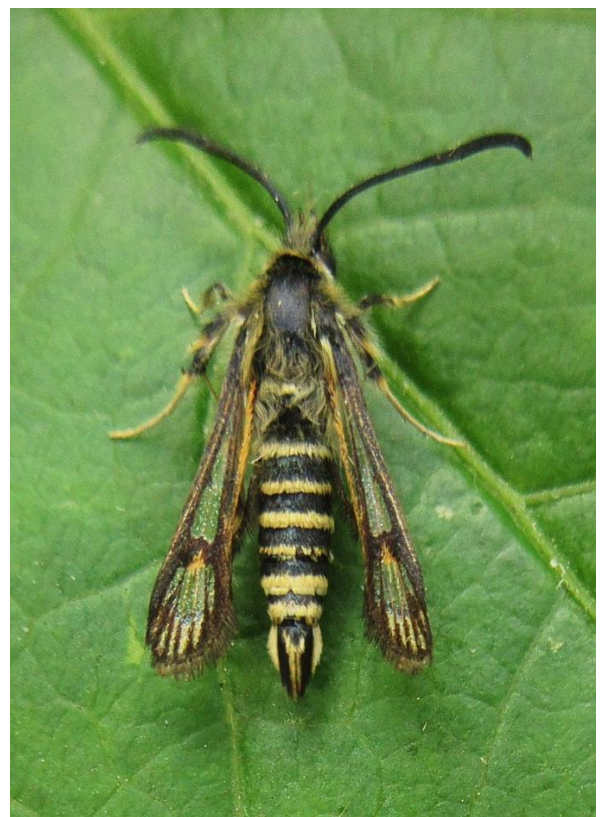
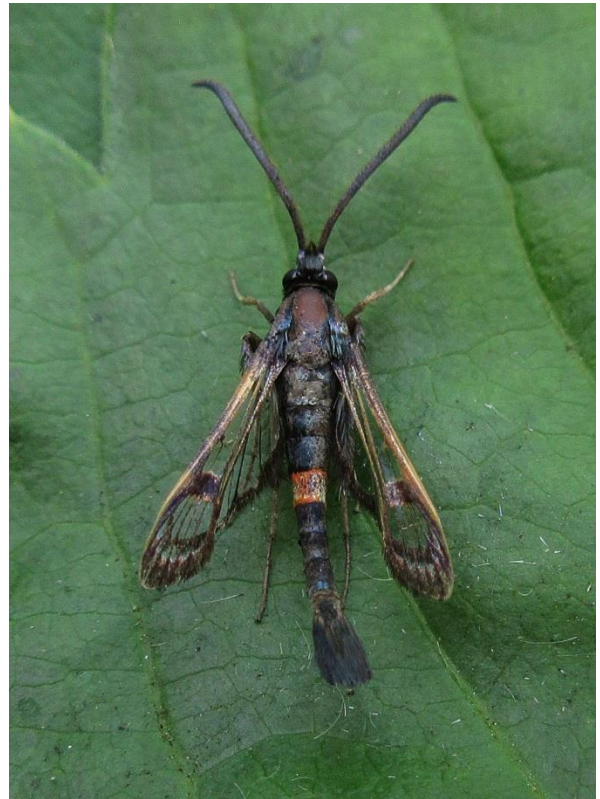
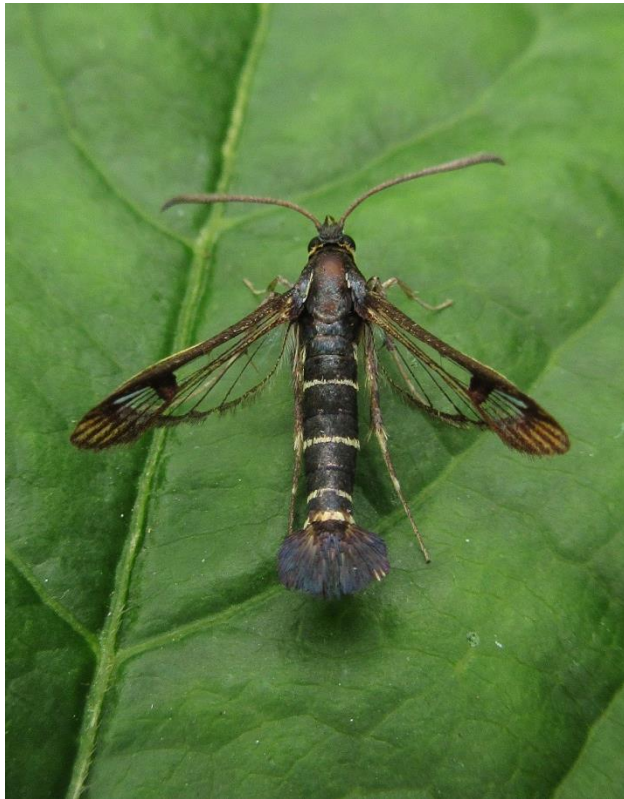


Perhaps the best example of this was the large and dramatic Emperor Moth (below).

Previously known thinly from a handful of sites, mainly in the east of the county, this species was located using a pheromone lure in almost every locality it was searched for in and around the Vale of Belvoir (blue dots).



Since almost no fieldwork using pheromone lures had been conducted in the area before, several species of clearwing moth (Sesiidae) were recorded for the first time.



Clockwise from top left: Cuckoo Clearwing, Red-belted Clearwing, Lunar Hornet Moth, Six-belted Clearwing.

Other species, previously unknown from the area, but recorded during these surveys, included those shown below.



Barred Hook-tip and Common Lutestring



Flounced Chestnut and Mallow



Mottled Grey and Ruddy Carpet



Mere Wainscot and Lead-coloured Drab



Pinion-streaked Snout and Square-spotted Clay



Barred Red



Yellow Horned

Several species have been undergoing rapid range expansions across the country. The reasons involved are not entirely clear, but the changing climate is likely to be a factor. Those that have reached the Vale of Belvoir include the following:



Webb's Wainscot and Tree-lichen Beauty



Clifden Nonpareil and White-point

Below is a selection of photographs of other species encountered through the year to give some idea of the tremendous beauty and diversity of the moths on our doorstep.



Antler Moth, Vestal



August Thorn



Black Arches



Bordered Pug



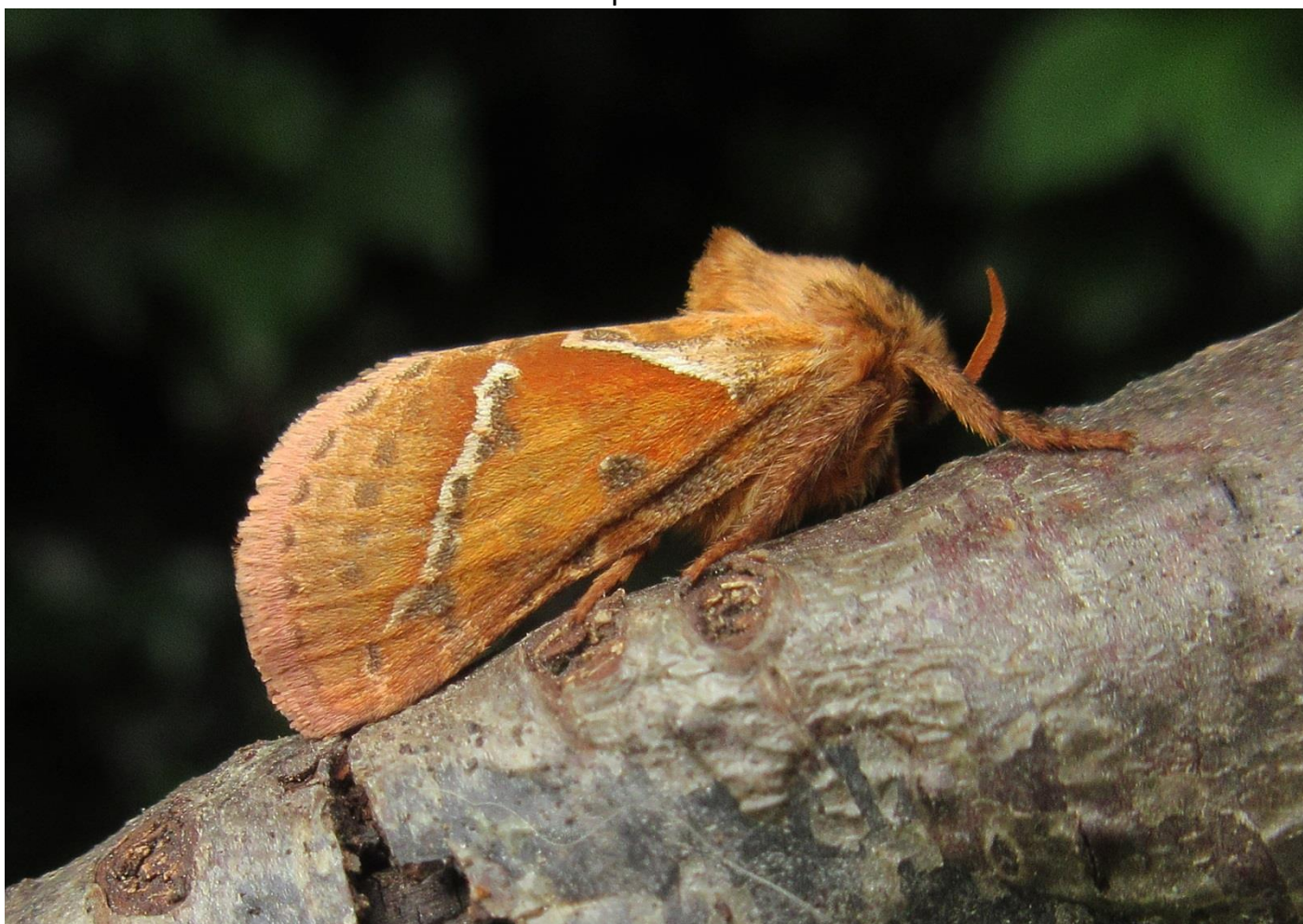
Canary-shouldered Thorn



Crescent, Rosy Minor



Lunar-spotted Pinion



Orange Swift



Pebble Hook-tip



Purple Bar



Rosy Footman, Grey Arches



two forms of Sallow



September Thorn



Bactra furfurana



Epinotia nisella



Celypha rosaceana



Brown Oak Tortrix and Variegated Golden Tortrix



Eudemis profundana



Gynnidomorpha alismiana



Notocelia roborana



Ypsolopha sylvella



Ypsolopha parenthesesella



Slender Pug



Small Scallop



The most interesting species recorded as a larva was undoubtedly a Red-necked Footman (above), previously unrecorded in the Vale of Belvoir, but apparently spreading and not yet trapped as an adult in the area. Other species shown below (left to right) are Oak Eggar, Svensson's Copper Underwing and Timothy Tortrix.



During the survey period, approximately 4000 leaf mine records were collected of 113 species. Samples of some interesting species are shown below.



Left to right: *Eriocrania salopiella*, one of several species found on birch early in the season; *Antispila petryi* on Dogwood, unknown in the county until 2021; *Bucculatrix albedinella* on elm, an uncommon species.



Left to right: *Ectoedemia argyropeza* mines on fallen Aspen leaves, very obvious due to their 'green islands'; *Ectoedemia intimella*, a late season Sallow feeder; *Stigmella aceris*, found on Field Maple and Norway Maple, one that has spread rapidly across the county in the last few years.



Merveille du Jour

What next?

The data collected have all been submitted and now begins the long process of collating and processing similar data from all over the county.

Once this is done, work can begin on the book on butterflies and moths of Leicestershire and Rutland and this will be published in due course.



Frosted Orange

Acknowledgements

I'm very grateful to Paul Palmer for his enthusiastic help and expertise with dissecting and photographing specimens. I am also indebted to Adrian Russell and Mark Skevington for guidance, advice and help with identification.

I would like to thank all those who have given permission for me to trap on their land or in their gardens: Bob Bayman & family, Don Pritchett, Paul Sheardown and the keepers at Muston Gorse, The Belvoir Estate, Beth Dunstan, Katrina Woodhead, Simon Curtin and the Belvoir Ark Team, Howard Menzies, Tom Scarborough, David Epton, John & Doone Chatfeild-Roberts, The Belvoir Hunt, Tom & Kate Kingston, Jim Burgoine & family, Sue Bradley, Ron Wells, Douglas Williams and The Buckminster



Gold Spot

Estate, Frazer Jolly, John Eggleston, John-Erich King, Matt Agger and Sue Dawson.

I would also like to thank all the observers who have sent photos of moths they have found in the Vale.

Lastly, many thanks to Andrea, Penny & Wilf, my ever-patient family.

I took all the photographs in this report and I take full responsibility for any errors which will have inevitably crept in.

Pete Leonard, January 2022

peteleonard72@gmail.com





Five Spring Ushers (can you spot them all?)