



# The Status and Recorded History of Nottinghamshire's Butterflies (1850-2023).

**Steve Mathers**

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# Preface

I am publishing this review of the status and recorded history of Nottinghamshire's butterflies as I begin my fourth season as the County Recorder. I have undertaken this research to provide both a spatial and temporal context in which to understand the present-day situation, and to provide recorders with an enhanced appreciation of this aspect of our local natural history.

There are about a third of a million butterfly records for Notts stretching back over 175 years, the vast majority are from the last 20 years. At one time or another, some 54 species have been claimed to have been sighted in the County, and these are all discussed in this account. Of these, 46 species (listed in Appendix A) are regarded as having occurred naturally in Notts, of which 11 are now extinct. Some doubt must remain about the status of a few species however given the paucity of the evidence for much of the period since recording began. It is important in such cases to consider contextual evidence from the surrounding area and the availability, over time, of suitable habitat.

I am releasing this free report only in digital form, this is Version 1.0. This approach will enable periodic revision of the document as new understanding emerges, by myself, and future recorders. As author I assert copyright of the document, the images supplied by my colleagues remain their copyright, and this is noted in the figure captions.

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# The Status and Recorded History of Nottinghamshire's Butterflies

## Nottinghamshire (VC56)

Situated in the East Midlands of England Nottinghamshire covers an area of 2160 km<sup>2</sup> so it is a modest-sized county. Elongated north-south stretching to almost 80 km (50 miles) in length it barely reaches 40 km (25 miles) across at any point in an east-west direction. The distribution of 10 x 10 km national grid squares is shown in Figure 1, all are prefixed by SK. The main settlements are Nottingham, Mansfield, Newark on Trent, Worksop and Retford. The Trent is the main river flowing north-east from Derbyshire, through Nottingham to Newark before turning northwards to flow eventually into Yorkshire and the Humber Estuary. Nottinghamshire is predominantly low-lying with the highest points slightly over 200 m (660 feet) above sea-level near Huthwaite, west of Mansfield.

Biological recording in Great Britain is arranged by Vice-counties (VCs). These were proposed in Victorian times, they divide England based on our historical counties. Nottinghamshire is Vice County 56, Derbyshire is VC57, and Leicestershire combined with Rutland is VC55. The larger counties such as Lincolnshire and Yorkshire are subdivided into two or more vice-counties to create a national network of similar-sized recording units.



Figure 1. Nottinghamshire showing the distribution of national grid squares

Our modern landscape has been so modified by man that often general landscape classifications based on morphology, geology, soil type or flora are mainly of interest to scientists but don't always yield divisions that are very meaningful in terms of understanding the detailed distribution of our butterflies. In general terms though it can be said that limestone and calcareous soils are very poorly developed in Nottinghamshire. But much more localised factors including soil structure, land-use history, vegetation, shelter and aspect are very important for our resident species especially those that tend to remain in discrete colonies.

Easily recognisable habitats include those formed by woodland of various types that are well shown in dark green on satellite imagery (Figure 2), they occur extensively in the Sherwood Forest area. Heathland and native grassland are now very restricted in Notts. The larger river valleys possess flood meadows, whilst extensive areas of arable, pastoral and mixed farmland occur throughout much of the rural areas of the County. Other habitats include those extensively modified by man, relating to former collieries, power stations, disused railways and large industrial works. There are many former pits and quarries relating to the extraction of commodities such as coal, gypsum, clay, limestone and sand and gravel. Some of these have been used for landfill, others maintain their excavated form. These are either flooded, like the extensive sand and gravel workings in the Trent and Idle valleys or landscaped leaving areas with very thin or no soil cover. The main urban areas include extensive areas of residential development interspersed with parks, gardens, cemeteries and other green spaces.



*Figure 2. Google Earth satellite image of Notts showing the main areas of woodland in dark green. Map data ©2015 Google.*

In terms of our butterflies the most useful habitats tend to be woodland of various types supporting species such as Purple Emperor, Silver-washed Fritillary, Purple and White-letter Hairstreak; and brownfield sites that are characterised by thin or no soil cover that enable

the development of ground spreading plants that are important for many of our species such as Common Blue, Brown Argus, Green Hairstreak, Dingy and Grizzled Skipper. Most of these species have expanded their distribution in the County in recent decades.

The butterfly fauna of Notts is only modest compared to many counties of similar size. A total of 32 species has been recorded in each year since 2021. The last species lost to the County was Wall, it was last recorded in 2020 following a swift decline.

The data presented here is up to the end of 2022, although some significant events of the 2023 season have also been added. Notts currently has no reserves, or wild areas, managed primarily for their butterfly populations.

## Recorded History

There is a strong history of literature on the butterflies of Britain stretching back to at least the mid 17<sup>th</sup> Century, for a review of some of the important events see for example Eeles, (2010). Unfortunately, the recorded history in Notts is somewhere shorter with the oldest accounts dating from the mid 19<sup>th</sup> Century. Sadly, Notts lacks the copious Victorian literature that some other counties, such as Yorkshire, possess.

Nevertheless, there are now about a third of a million butterfly records for Notts stretching back almost 175 years. At one time or another some 54 species have been claimed to have been sighted in the County, these are all discussed. Of these 46 species (listed in Appendix A) are regarded as having probably occurred naturally, of which 11 are now extinct. Some doubt must remain about the status of a few species given the paucity of the evidence for much of the time since recording started.

The list of butterflies encountered in Sherwood Forest and surrounding areas by E.M. Brameld and appended to the chapter on the zoology of the area by Sterland (1875) is the first authoritative source on the species present in any part of the County (see Appendix B). The subsequent activities of a group of Victorian and Edwardian recorders including Thornley, Leviers, Miss Alderson (later Lady Robinson) and her brother Ellerton, Becher, Daws and Carr amongst others, form the basis of the account compiled by Carr (1916) as the comprehensive *Invertebrate Fauna of Nottinghamshire*. This expanded and updated the information from an earlier account (Carr, 1906) in the Victoria History of Notts. Later, a supplement was also compiled by Carr (1935). These sources comprise most of what is known about butterflies in Notts prior to the 1970's. Summaries of Carr's works are contained in Walker (1997) and Eakring Birds (2017). For a brief biography of Carr and other notable recorders see Appendix D.

Recording prior to World War 1 was mainly restricted to the professional classes, the clergy and landowners. We should also remember that In Victorian times the railway network and horse-drawn vehicles, offered the only means that butterfly enthusiasts could travel any distance, and visit many rural areas.

A major facet of the butterfly scene in Victorian times was the extensive collecting of specimens for museums and private collections. This no doubt contributed strongly to the disappearance of some species from large areas. It seems possible that Purple Emperor, a prized species, may well have become extinct in counties such as Notts due to over-collecting.

Low resolution distribution maps of species in Britain are contained in Sandars (1939) and Ford (1945). But it wasn't until a widespread compilation of records from published sources by the Biological Records Centre in the 1970-1980's, that a database was built that enabled systematic atlas coverage to be published by Heath, Pollard and Thomas, (1984). Further similar coverage has been published by Emmet & Heath (1989), Asher et al. (2001) and is now regularly updated by a team at Butterfly Conservation, for example for 2010-2014 by Fox et al. (2015) and Butterfly Conservation (2015).

The first atlas-style distribution maps of species in the East Midlands were produced by the local branch of Butterfly Conservation using the Levana mapping software and presented in annual reviews of records, for example Birch (1998), and Billings (2002). Five year and latterly annual distribution plots produced in Levana for species in the East Midlands region can be found at <https://www.eastmidlands-butterflies.org.uk/embutterflies.html>. The similar MapMate software is also widely used by County Recorders to map distributions and is particularly favoured by moth recorders. The topographical framework for these systems is generally the county outlines, and gridlines. Commercial Geographic Information Systems (GIS) developed in the 1980's were for many years expensive to licence, but in recent years the development of QGIS, a free, open-source application, has enabled a much wider uptake of these systems. QGIS has been used to produce the map outputs in this account. These contains raster topographic map backdrops, in QGIS the data is a capable of very sophisticated analysis.

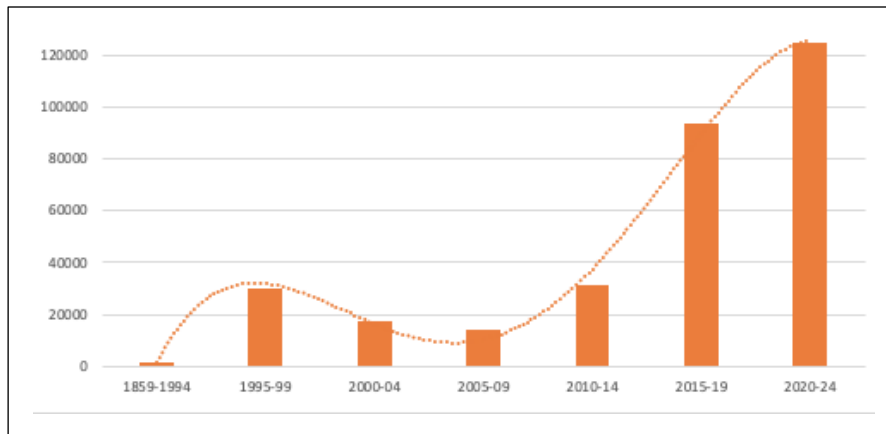
Many of our older records are imprecise in terms of date and location by modern standards. Often the record date is simply given as a year. The location given includes names such as Mansfield, Nottingham, or Sherwood Forest, these potentially cover quite large areas and can only be expressed at a 2 figure (10km<sup>2</sup>) resolution. Names of parishes-villages or large woods, enable a generalised 4-figure national grid reference (resolution 1km<sup>2</sup>) to be assigned. This enables a reasonable representation of the data distribution. Around the Millennium there was a trend to record at the tetrad level using a scheme called DINTY. Each 2 by 2 km square was assigned an alphabetic letter within a 10 by 10 km hectad. DINTY represents the letters used on the fourth row of tetrads, 25 letters being used (all except O). These records have been converted to centroids for their respective tetrad.

Recording in Notts really took off in the mid 1990's under the aegis of Barry Prater, Alan Birch and Michael Walker so that several thousand records were then being collected each year.

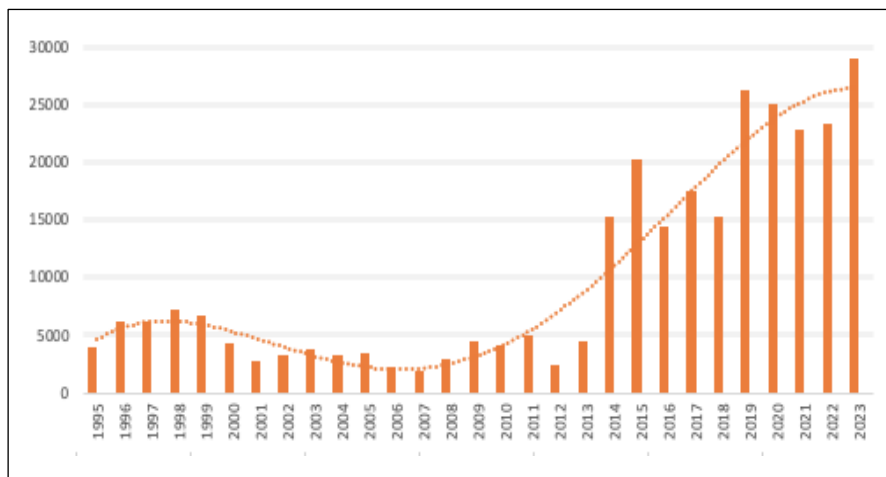
The number of records for the County (Figure 3) is expressed as, up to 1994, and after in 5-year intervals, and annually since 1995 (Figure 4). The 1995-2022 data comprises well over 99% of all records. Perhaps surprisingly it doesn't show a gradual increase over time but a more variable pattern. Factors to explain this include the Foot and Mouth epidemic of 2001



when most rural areas were off limits for recording, and the COVID lockdown of 2020 that boosted local and garden-based recording. The impetus generated by the Big Butterfly Count from 2010 gradually enhanced record numbers and now constitutes 20-25% each year, and Richard Rodgers as County Recorder (2014-2018) encouraged a spectacular increase in recording. This has continued to the present with over 25,000 records now being gathered each year. A recent trend has seen an increased interest in the recording of early stages turning an interest in butterflies from flight season only, to a year-round, activity.



*Figure 3. Number of Notts records since 1859. Data extrapolated to 2024 based on current levels to produce even 5-year classes.*



*Figure 4. Annual total of Notts records collected since 1995.*

Whilst it is impossible to be certain about the former presence of some species and the dates at which others became extinct or appeared in the County Figure 5 attempts to show the number of migrant and resident species likely to have been present at intervals, since the mid 19<sup>th</sup> Century. Overall, this shows a decline in numbers, though the lower values between 1930-90 are thought, in part, to reflect a lower number of species but it should be noted that there are very few records covering that period, so this is far from certain.

A significant recent development came from an unexpected direction following a PhD by Jamie Wildman based at the University of Northampton done in collaboration with Butterfly Conservation and summarised in Wildman et al. (2022). The desk-bound study focussed on the loss from England of the Chequered Skipper. It investigated records of specimens held in museums and private collections many of which have never been formally integrated into the principal recording schemes held by NERC (CEH), BC and Local Records Centres. The results fundamentally alter our understanding of the former status and distribution of Chequered Skipper in Notts, and this approach is likely to be replicable for other strategic species.

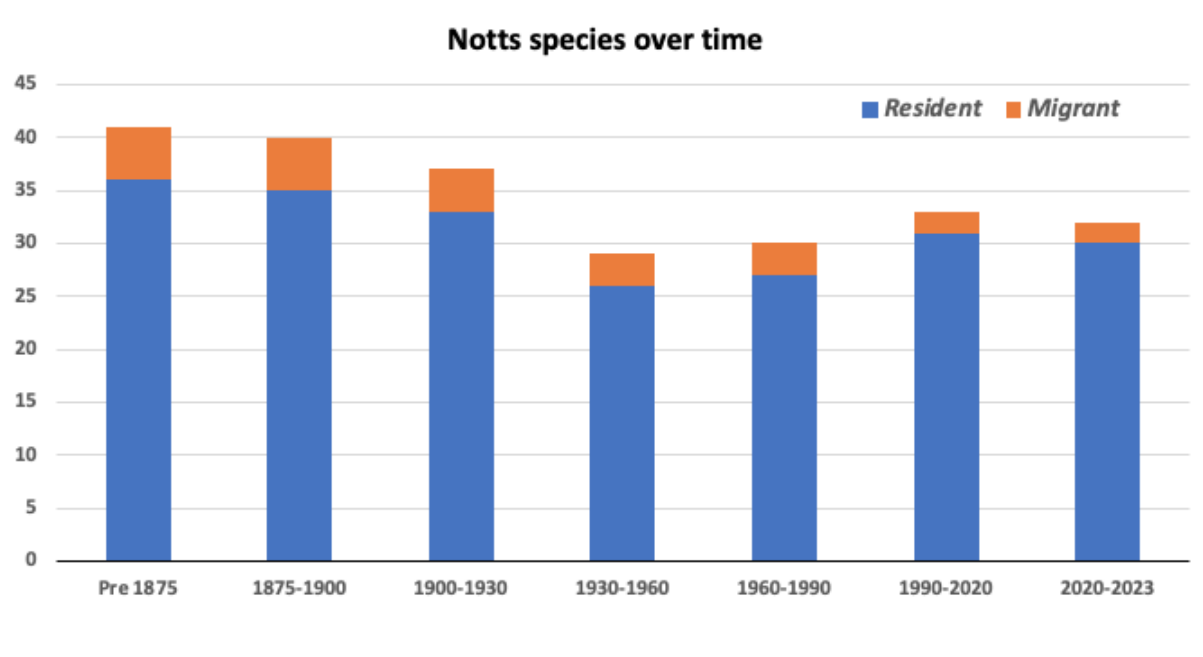


Figure 5. Number of species thought to be present in Notts at various time intervals.

Despite the large number of records available for the County a large proportion are from the last decade. This makes analysis of any changes over time of the flight season of key species (phenology) unreliable and such observations in Notts must remain anecdotal rather than proven. Analysis of larger datasets at national level do however suggest that many flight periods have started earlier, and ended later, because of a warming climate.

When describing the recorded history of a species, the following terms are often used regarding human interventions.

*Introduction:* Trying to establish a species outside the known distribution.

*Re-introduction:* Trying to establish an absent species in part of its recorded historical range.

*Translocation:* Movement of wild stock for the purpose of introduction/re-introduction.

*Supplementation:* Enhancing populations by addition of individuals.

*Released:* Captive bred individuals at any stage of the life cycle introduced into the natural environment ideally into suitable habitat.

The species and locations of known, and suspected interventions, are listed in Appendix C whilst a list of larval foodplants forms Appendix E, and a short glossary of some of the technical terms used in this report forms Appendix F.

## Normalisation of Recent Records

Since 1995 there have been good numbers of butterfly records recorded each year in Notts. One might assume that recording has increased progressively over time due to growing interest in nature and citizen science projects. However, as Figure 3 above shows, the total number of records each year has varied by a factor of over ten. To examine abundance trends for many species over the 1995-2022 period it is best to normalise each years' results to remove the effects of this varying recorder effort. This isn't to say trends aren't apparent from year to year in the raw data, but to consider the whole period normalisation seems desirable. The Big Butterfly Count (BBC) only started in 2010 and today comprises 20-25% of annual records. This survey occurs over a narrow time window in July-August it is best to exclude the BBC records from normalisation as many species do not fly at that time. It was decided to set the 18,081 non-BBC records in 2019 as the standard to benchmark the total for each other year against. So, for each year the total of records is divided by the 2019 total to produce a fraction for recorder effort each year. To calculate a conversion factor for each years this fraction is divided into 1 (Figure 6).

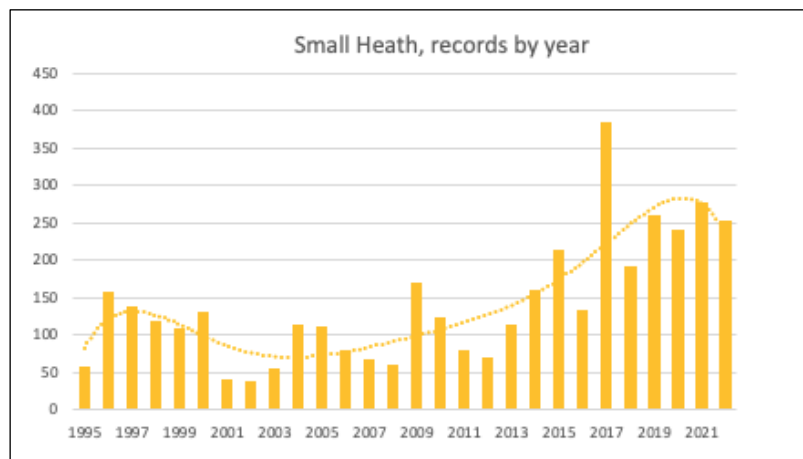
So, if in year X there were 1808 records, dividing that by the 2019 total of 18,081 would yield a fraction of 0.1 (or 10% of the 2019 figure). To convert this to a multiplication factor to normalise the totals the fraction (0.1) is then divided into 1. i.e., 1 divided by 0.1 = 10. So, to make Year X's records equivalent to those of 2019 we multiply by 10.

Year	Records excl. BBC	Recorder Effort n/2019	Normalisation Multiplier
1995	3938	0.22	4.59
1996	6242	0.35	2.90
1997	6152	0.34	2.94
1998	7149	0.40	2.53
1999	6639	0.37	2.72
2000	4354	0.24	4.15
2001	2767	0.15	6.53
2002	3208	0.18	5.64
2003	3734	0.21	4.84
2004	3316	0.18	5.45
2005	3407	0.19	5.31
2006	2154	0.12	8.39
2007	1907	0.11	9.48
2008	2988	0.17	6.05
2009	4398	0.24	4.11
2010	3539	0.20	5.11
2011	3234	0.18	5.59
2012	2425	0.13	7.46
2013	4525	0.25	4.00
2014	12268	0.68	1.47
2015	16696	0.92	1.08
2016	11674	0.65	1.55
2017	13098	0.72	1.38
2018	8524	0.47	2.12
2019	18081	1.00	1.00
2020	17011	0.94	1.06
2021	16204	0.90	1.12
2022	18087	1.00	1.00

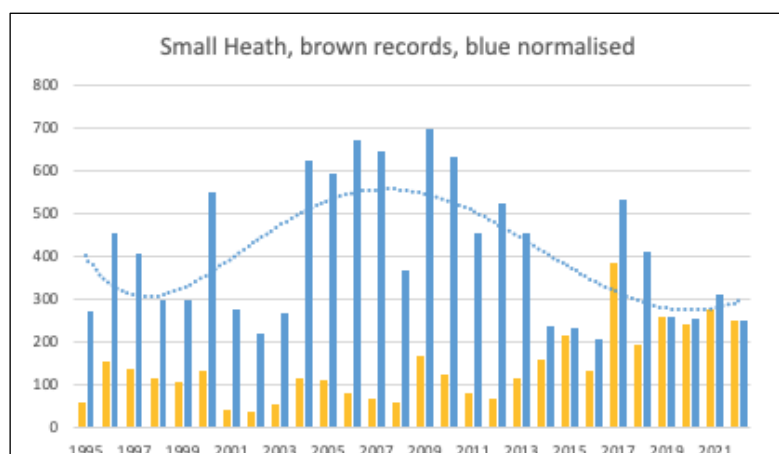
*Figure 6. Total non-BBC records by year for 1995-2022 expressed as a fraction of the 2019 total and then inverted to produce a multiplication factor to normalise the results*

Applying this conversion produces some unexpected effects compared to simply judging how a species is faring based on the number of records for it each year. This approach can only be used for species where there are a moderate number of records for the species each year. Further, some species do not lend themselves to this sort of treatment. Examples include those where targeted projects have led to an enhanced number of records over a specific period (e.g., Grizzled and Dingy Skipper post 2011); species that are migratory with the size of their annual influxes varying due to weather conditions (e.g., Painted Lady); and species that because of their rarity, result in twitching and multiple recording of individuals whenever they turn up (e.g., Clouded Yellow).

Let us consider the Small Heath, a regularly recorded species that has been present in Notts in good numbers since before 1995. Figure 7 shows the records numbers by year and appears to show an increase in recent years. However, Figure 8. shows the same data in brown together with the normalised numbers. This shows a very different trendline suggesting the Small Heath has been in decline in recent years. It emphasises the importance of comparing like with like, not just using raw data to draw conclusions.



*Figure 7. Small Heath, records by year 1995-2022.*



*Figure 8. Small Heath records by year 1995-2022 in brown with normalised data and trendline in blue.*

# Species

## Papilionidae – Swallowtails

The Swallowtail is the only British example of this family of large spectacular butterflies that are widely distributed worldwide.

### Swallowtail *Papilion machaon*

#### *Description and Status*

The largest of our British butterflies, the Swallowtail (Figure 9) is unmistakable with long wings and hindwing tails, it is a strong flier with wingspans in the range 76-93mm. The female is larger than the male by about 10%. Traditionally a fenland species of Lincolnshire, Cambridgeshire and Norfolk, it is today confined to colonies in the Norfolk Broads as much of our former fenland has been drained for agriculture. Many past records outside former fenland habitats are likely to be of the Continental *gorganus* sub-species that is migratory and is a probable former resident of southern and eastern England (Eeles, 2023).



*Figure 9. British Swallowtail britannicus subspecies (left) and the similar Continental gorganus subspecies (right)*

#### *Annual cycle*

Swallowtail is usually single-brooded in Britain with a flight period of late-May to June, it over-winters and spends most of the year as a pupa (chrysalis). In warm years there may be a limited second brood in August.

#### *Habitat*

British Swallowtails are a species of Fenland, a marshy flat landscape with a high watertable and bodies of standing water with extensive areas of marginal sedge and reed vegetation.

### *Larval Food plants*

British Swallowtail colonies of the subspecies *britannicus* use Milk Parsley, whereas the continental subspecies *gorganus* uses a wide range of umbellifers including Wild Carrot and Fennel (Thomas & Lewington, 2016).

### *Recorded Distribution*

There have been a few occasional sightings of Swallowtail in Notts these are mainly released captive-bred individuals or in some cases just possibly rare migrants of the wandering continental *gorganus* subspecies, although such examples are more common in Southern England.

Eakring Birds (2017) state

*'Livestock of the continental form 'gorganus' is readily available through entomological suppliers and any Nottinghamshire Swallow-tail records are due to captive escapes and releases. There was certainly a known release of a number of second brood adults in Blidworth in 2019 and also a single seen and photographed in a Shelford garden in July 2019'.*

## Hesperiidae – Skippers

Skippers are small active butterflies that resemble moths, there are 8 British species, 6 of which have occurred naturally in Notts although the Chequered Skipper has long been extinct, and the Essex Skipper seems to be a relatively recent colonist.

### Chequered Skipper *Carterocephalus palaemon*

#### *Description and Status*

A beautiful, rare Skipper, the upper wings show a chequered yellow pattern on a chocolate background, wingspans are about 30mm (Figure 10). The female is marginally larger than the male, but the markings are very similar. Never abundant, it became extinct in England in 1976 (Wildman et al. 2022), leaving the population centred about Fort William in the west of Scotland as the only British presence. In recent years, using donor stock from Belgium, Butterfly Conservation has tried to re-introduce the Chequered Skipper to woodland in Northamptonshire, one of its former strongholds.

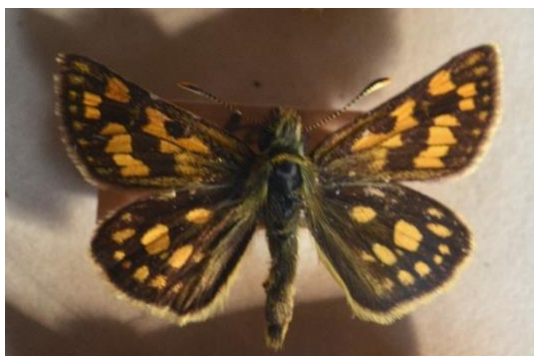


Figure 10. A pinned specimen of Chequered Skipper

#### *Annual cycle*

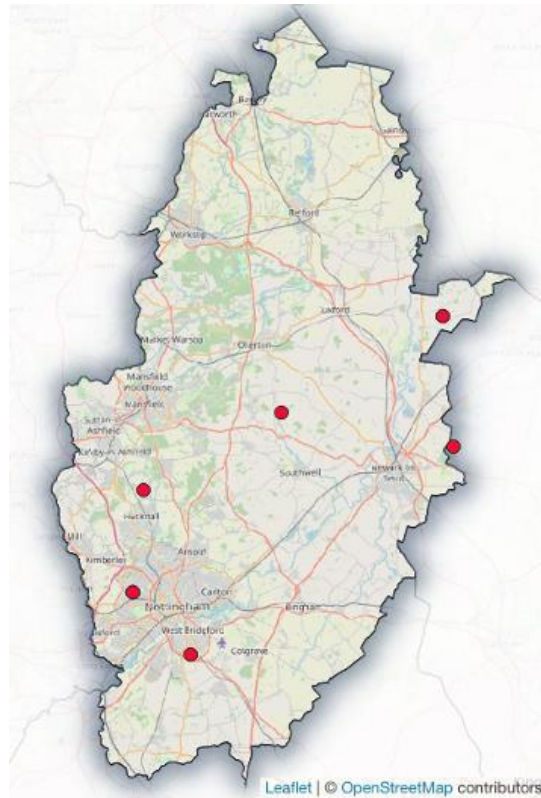
Single-brooded, flying in late May-June Chequered Skipper spends most of the year, and over-winters, as a larva.

#### *Habitat*

Wide grassy rides and tracks with a sunny aspect in woodland.

#### *Larval Food plants*

Grasses particularly False and Hairy Brome grass.



*Figure 11. Chequered Skipper records including locations of museum specimens.*

Newman (1884) cites a record by Brameld in a wood near Newark, also Gascoyne reports the species near Newark and at ‘Stapleford’. Presumably this is Stapleford Wood that lies astride the Lincs-Notts county boundary 5km NE of Newark. Carr (1916) casts doubt on all pre-1916 records but in his supplement (Carr, 1935) he mentions having taken a specimen at Wigsley Wood in early June 1934, and a week or so later, he saw about a dozen individuals at the same locality. Wigsley Wood lies in the small enclave of Notts that stretches eastwards to the outskirts of Lincoln.

This single site remained the only certain occurrence of Chequered Skipper until recently. Following research and compilation of records of specimens held in many leading British museums and private collections (Wildman and others 2022) it became apparent that Chequered Skipper was present in the early 20<sup>th</sup> Century at several locations across Notts (Figure 11). Some of these location names from the museum catalogues are general, such as Nottingham or West Bridgford, whilst others are very specific, for example Abbey Wood, Newstead and Old Basford. Given the precise woodland habitat requirements for the species, by consulting old maps, more precise locations can be suggested as most likely for these more generalised locations.

There will always be the chance that some of this information is questionable as breeders might have sold captive specimens to museums or have blurred the location of their favoured collecting sites, considering such knowledge to be commercially sensitive. However, the reputable museums involved, including the Natural History Museum, and those at Oxford and Cambridge Universities, would surely have been aware of the identity



of most rogue traders. So, in conclusion, it seems Chequered Skipper was present at several sites in Notts in the early 20<sup>th</sup> Century and finally died out in the County probably at Wigsley Wood sometime soon after 1964, the date of the last record.

## Dingy Skipper *Erynnis tages*

### *Description and Status*

As the name suggests the Dingy Skipper is a small rather nondescript brown butterfly (Figure 12), that is present in a series of colonies across Notts. This localised distribution is because it has quite specialised habitat requirements. The male and female are very similar in size with wingspans in the 27-34mm range, and in markings.



Figure 12. Dingy Skipper.

### *Annual cycle*

Generally single-brooded with a flight season of mid-April to mid-June, there are occasional reports of a restricted second brood in August. Dingy Skipper lays spherical eggs that hatch and go through five instars before they over-winter in a protective hibernaculum. Finally, they pupate and emerge as an adult from mid-April onwards.

### *Habitat*

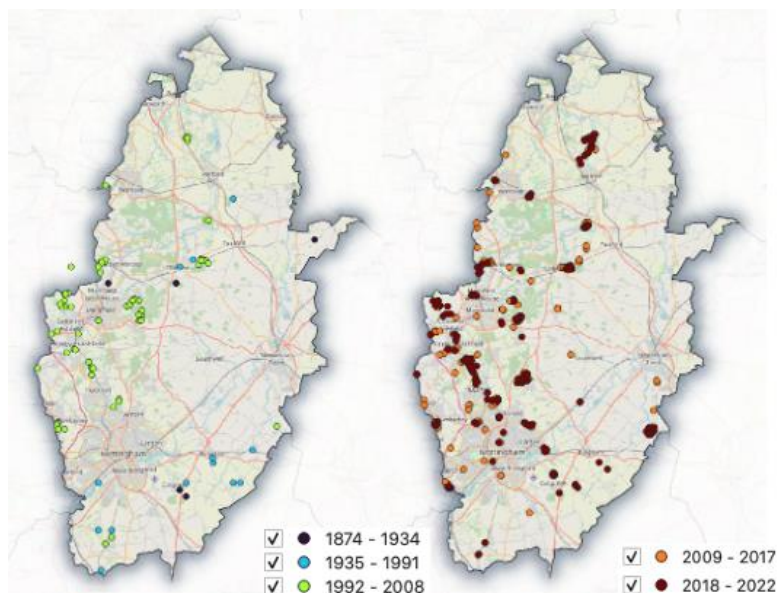
Dingy Skipper thrives in habitats with thin, or no, soil cover, so brownfield sites like former collieries and quarries are particularly favoured. It seeks out sheltered and sunny locations within these areas.

### *Larval Food plants*

The preferred food plant is Common Bird's-foot Trefoil, a low spreading plant that thrives in areas of bare ground and limited soil cover.

### *Recorded Distribution*

Despite a decline in distribution nationally in recent years, Dingy Skipper appears to be doing quite well in Notts. There are over 1250 records of this species and in favourable habitats individual colonies of 50-100 individuals have recently been noted. Figure 13 shows the distribution of records for different time intervals.



*Figure 13. Distribution of records of Dingy Skipper for various time intervals.*

*Base Map Copyright  
OpenStreetMap contributors.*

Brameld (1875) regarded it as rare in Sherwood Forest, and Carr (1916) came to the same conclusion for the whole County, excepting the Mansfield area; he also reports evidence of occasional second broods. In his supplement Carr (1935) mentions an increase in numbers in the 1920's especially around Cotgrave and Owthorpe. In more recent times there are scattered records from the 1980's, many from around East Leake, and from the 1990's colonies start to become apparent at several former colliery sites.

As early as 2003 the Dingy Skipper was identified as a species in overall decline and studies were undertaken to assess the known sites and distribution in the East Midlands. In 2011 funding was secured to set up a project to investigate and manage the populations of Dingy (and Grizzled) Skipper in Notts under the aegis of Butterfly Conservation (Bill Bacon) and the Nottinghamshire Biodiversity Action Group (Nick Crouch and Chris Jackson). This resulted in much more extensive efforts to locate and record these species to support habitat management and benefit the population. This activity seems to be the primary reason for the sudden increase in records of Dingy Skipper and the number of sites it has colonised (Figure 14).

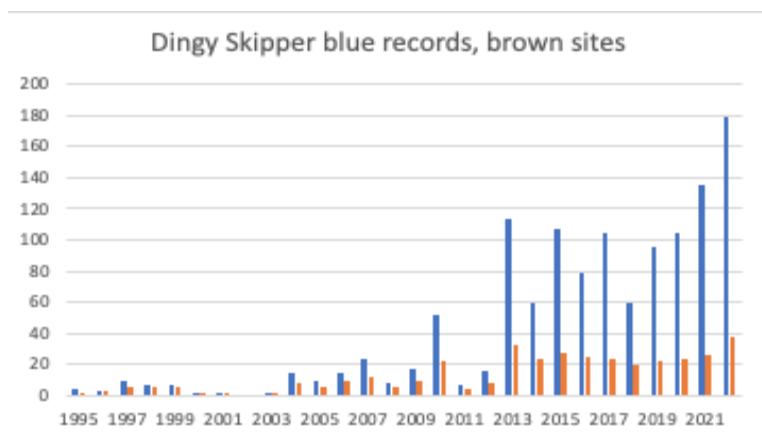


Figure 14. Dingy Skipper records in blue and sites in brown 1995-2022.

Over a decade later Dingy Skipper is thriving with records from over 20 sites reported each year. Considering the total number of records, or even trying to normalise them is much less instructive, as it is more an indication of recorder effort. This is largely the result of the setting up of the biodiversity project from 2011, which is carried out year each by an experienced, and dedicated, group of recorders.

## Grizzled Skipper *Pyrgus malvae*

### Description and Status

The Grizzled Skipper is a small black butterfly with an attractive pattern of white speckling (Figure 15). It is one of over 20 similar species across Europe, but the only representative in the British Isles. Nowhere common, the species is mainly confined to the Midlands, Southern England, and along the coastline of South Wales. The sexes are very similar in markings and size, wingspans range from 23-29mm. In flight Grizzled Skipper is extremely rapid and often very hard to follow.



Figure 15. A pair of Grizzled Skippers (left) and underwing view © Brian Johnson (right).

### *Annual cycle*

In Notts this species is generally single-brooded (univoltine) with a flight season from mid-April to mid-June. The eggs hatch and the larvae pass through five instars in June-July before spending much of the year, and over-wintering, as a pupa. There is limited evidence of a second summer brood in some areas, but this is rare in Notts.

### *Habitat*

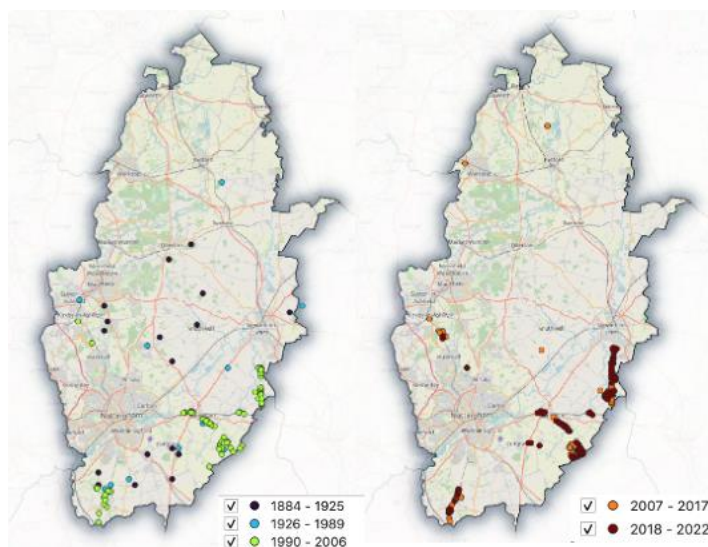
Nationally Grizzled Skipper is a butterfly that favours warm sheltered areas with thin, or no, soil cover, such as brownfield sites, disused quarries and railways.

### *Larval Food plants*

Grizzled Skipper has a long list of host plants, most are low, ground covering, species that favour bare ground with poor soil cover. In Notts, Creeping Cinquefoil, Wild Strawberry and Agrimony are the main hosts.

### *Recorded Distribution*

There are about 1200 records of Grizzled Skipper for Notts. Carr (1916) gives a long list of sites where the species was known to be present, and these reflect a wide range of habitats (Figure 16). There are only sporadic records until the 1990's.



*Figure 16. Distribution of records of Grizzled Skipper for various time intervals. Base Map Copyright OpenStreetMap contributors.*

Over the last 30 years however Grizzled Skipper has developed a more restricted distribution along stretches of disused and heritage railway (Figure 16) and adjacent quarries. These routes comprise the Great Central line around and south of East Leake, the Bingham Linear Park, and the Sustrans cycle route from Cotham northwards to Newark. A further population near Newstead-Annesley appears to have now died out, and the East Leake population appears to be contracting to a single short stretch of the railway south of Barnstone Tunnel.

As noted above for Dingy Skipper, a project was set up to investigate and manage the habitats for Grizzled Skipper across the County. This has resulted in much more extensive efforts to record the species and measure the impacts of such management. Grizzled Skipper, now thought to be more at risk than Dingy Skipper, is now the focus of these efforts. As a result, there has been a massive increase in the number of records over the last decade (Figure 17). With a team of experienced and dedicated recorders, there has also been a trend to try and record and study the early stages and larval host plant association.

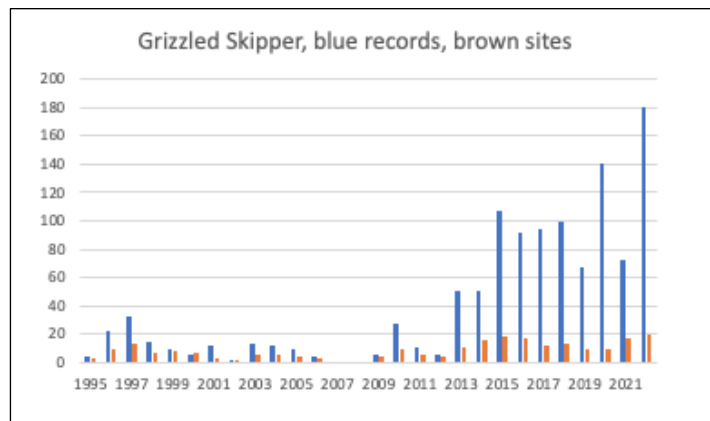


Figure 17. Grizzled Skipper records and sites 1995-2022.

## Large Skipper *Ochlodes sylvanus*

### Description and Status

The largest of the golden skippers with wingspans of 29-36mm, the females are slightly larger on average, Large Skipper has a dappled pattern of markings on the wings, and the male is told by the strong thick curving sex brand mark on the forewing (Figure 18). The antennae are hooked unlike the Small and Essex Skipper. Large Skipper has been a common widely distributed resident species in Notts since recording began.

### Annual cycle

Single brooded, Large Skipper flies in June-July, the eggs hatch and the species over-winters as a larva followed by a short period of pupation before adults emerge once more each June.



Figure 18. Large Skipper, male with sex brand (left), female (right).

### Habitat

A grassland species common across rural parts of the County.

### Larval Food plants

False brome-grass.

### Recorded Distribution

Widespread in the County in most rural settings, present in reasonable numbers since records began. Normalisation for 1995-2022 show that the population is stable (Figure 19).

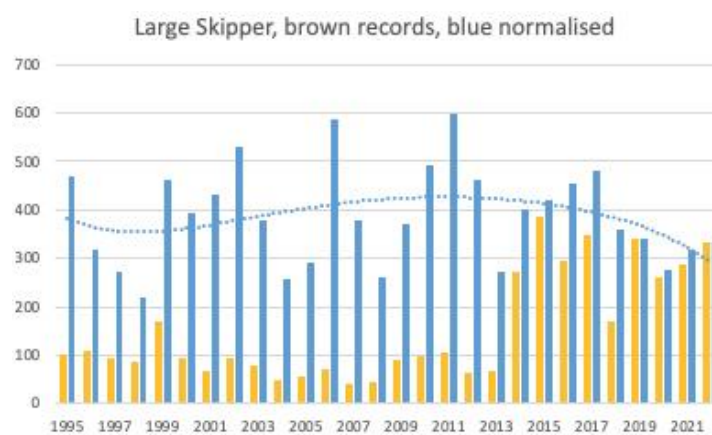


Figure 19. Large Skipper record totals in brown and normalised totals with trendline in blue 1995-2022.

## Small Skipper *Thymelicus sylvestris*

### Description and Status

Small Skipper has a wingspan of 27-34mm with the sexes of similar size. It is one of two very similar small golden skippers of the *Thymelicus* genus, the other is the Essex Skipper. These species are difficult to tell apart except as captured specimens, or where good photographic evidence has been obtained. The main helpful ID features are the antennae tips which are



brown underneath and flattened off in shape. The forewing sex brand mark of the males is narrow and curved veering away from the costa towards the body (Figure 20).



*Figure 20. Small Skipper, male with curved sex brand mark on (left), female (right).*

#### *Annual cycle*

Small Skipper is on the wing mid-June to mid-August, so just a couple of weeks later than the Large Skipper. The eggs hatch quickly and the species over-winters as a larva before a short pupation phase and the adult emerging.

#### *Habitat*

A grassland species common across rural parts of the County.

#### *Larval Food plants*

Various long grasses including Timothy, Yorkshire Fog and False brome grass.

#### *Recorded Distribution*

A common and widespread species in rural locations across Notts since records began.

### **Essex Skipper *Thymelicus lineola***

#### *Description and Status*

Very similar to the Small Skipper, the sexes are similar, and wingspans are in the 26-30mm range. It is best distinguished by the black undersides of the antennae tips (Figure 21) and the short sex brand mark of the male that parallels the costa. The antennae tips are bulbous and almost symmetrical, and the underwings are rather straw coloured. There are few, if any, definite records of Essex Skipper prior to its sudden arrival in Notts in the mid 1990's. It has now spread to much of the County although it is less abundant than the Small Skipper.



*Figure 21. Essex Skipper showing antennae (left), and male with short straight sex brand mark arrowed © Laurence Archibald (right).*

### *Annual cycle*

Essex Skipper has a similar flight season to the Small Skipper, but a major difference is that the former over-winters as oval-shaped eggs that contain a fully formed larva, these hatch from late March onwards with the larva progressing through five instars, and a short pupation, before the adults emerge from mid-June onwards.

### *Habitat*

A Grassland species that seems to be now widely distributed across Notts.

### *Larval Food plants*

Long coarse grasses including Couch Grass, Timothy and Meadow Foxtail

### *Recorded Distribution*

It is possible that one or two of the older claimed records of the species are genuine, for example the specimen taken at Clumber in 1880 by J.N. Young, but the difficulties of identification of the species make most such records doubtful. Certainly, before 1995 it was never common and may have been absent for long periods. The first modern record was by former County Recorder Michael Walker at Colwick Country Park in 1995, and my colleague Bill Bacon recalls seeing good numbers of the species arriving in the East Midlands area, along the A1 corridor from Rutland northwards, in 1996. A similar pattern was observed in adjacent Lincolnshire with a progressive northward colonisation, perhaps using railways and riverbanks as corridors, through the 1970-80's (Cawdell & Smith, 2021)

Even today many Essex Skipper records are not supported by photographs, so only those from the most experienced recorders can be accepted as certain, but it does seem that this species has now spread across the County, and far beyond to the north and west.



## Pieridae - Whites and Yellows

Mainly medium-sized butterflies characterised by white and/or yellow wings, most species exhibit sexual dimorphism (the sexes are distinct). Predominantly double-brooded, with bottle-shaped, ribbed eggs. Most species are wanderers rather than living in fixed colonies.

### Wood White *Leptidia sinapis*

#### *Description and Status*

A small delicate white woodland butterfly with grey markings (Figure 22). Just possibly a rare former resident of Notts.



Figure 22. Wood White.

#### *Annual cycle*

Wood White has a spring brood flying in May-June and a weaker second, summer brood, in August.

#### *Habitat*

Deciduous woodland.

#### *Larval Food plants*

Meadow Vetchling, Tufted Vetch, Common Bird's-foot Trefoil and Tuberous Pea.

#### *Recorded Distribution*

There are 4 records between 1868 and 1906, two each from the Newark and the Sherwood Forest areas. Brameld does not mention the species in the Sherwood Forest area after his studies covering 1859-74, this is significant given the abundance of deciduous woodland in this area. Carr (1916) doubts the species was ever indigenous in the County, a view supported by Eakring Birds (2017) and similarly also with respect to South Yorkshire (Garland, 1981) and Lincolnshire (Cawdell & Smith, 2021).

However, there are records of the species in the first half of the 19<sup>th</sup> Century from around Huddersfield, Doncaster and Sheffield, Frost (2005); Rimington (1992). There are also records from 1963 and 1966 of the species at Gotham Hill Wood in South Notts these are very anomalous and may relate to museum specimens, they warrant further investigation.

The nearest colonies of Wood White to Notts today are in the woods south of Corby in Northeastern Northamptonshire. Other favoured areas include the Welsh Borders, South and Southwest England.

### Orange-tip *Anthocharis cardamines*

#### *Description and Status*

A medium-sized white butterfly, with a wingspan of 40-53mm, exhibiting strong sexual dimorphism as expressed by the bright orange forewing tips in the male, and the smaller black ones in the female (Figure 23). The underwings of both sexes exhibit a complex pattern of green mottling providing excellent camouflage and make this butterfly easy to ID. A very common spring butterfly present across all of Britain except the most mountainous parts of Northern Scotland. As with many species the males tend to emerge first and establish territories. Females are of a similar size to the Green-veined and Small White that fly at similar times and so many are probably misidentified as such by inexperienced recorders.



Figure 23. Orange-tip, clockwise from top left, Male, Female, Egg, underwing View.

#### *Annual cycle*

Early spring flying from April to mid-June, it lays single bottle-shaped eggs that hatch into larvae with 5 instars before pupating from July onwards. Orange-tip over-winters as a pupa spending about 9 months of the year in this form.

#### *Habitat*

A wide range of damp habitats including woodland clearings, hedgerows, meadows, farmland, parks and gardens.

#### *Larval Food plants*

Cruciferous plants including Cuckooflower, Garlic Mustard and Hedge Mustard, and Honesty.

### *Recorded Distribution*

A very common resident across the whole of Notts since records began.

## **Large White *Pieris brassicae***

### *Description and Status*

The largest of Britain's white butterflies the Large White has wingspans in the range 58-63mm and is a powerful flyer. The sexes are similar, but the slightly larger females have two prominent black spots on the forewing upper surfaces, the apical area of the forewing of both sexes has a black patch that extends farther along the termen than the costa (Figure 24). The underwings are yellow and white. Very common and present across Britain except in mountainous regions. Commonly also referred to as a Cabbage White.



*Figure 24. Large White, clockwise from top left, larva, adult female, underwing and adult male.*

### *Annual cycle*

Over two broods Large White is on the wing continually from April to September, the bottle-shaped eggs are laid in large batches on the undersides of brassica leaves, the black and yellow larvae feed voraciously on brassicas in gardens, allotments and farmland and so are regarded as a pest species. This species over-winters as a pupa. Summer populations can be augmented by migrants from the Continent.

### *Habitat*

Occurring in a wide variety of habitats from urban gardens, parks and allotments to farmland and brownfield sites.

### *Larval Food plants*

Cultivated Brassicas especially cabbages, also cruceriform wildflowers including turnips, radishes, and cresses plus nasturtiums.

### *Recorded Distribution*

Large White has always been common across Notts since records began.

## **Small White *Pieris rapae***

### *Description and Status*

The Small White although smaller has much in common with the Large White. It has wingspans in the range 38-57mm. The sexes are similar although the markings of the male first spring brood are often faint. The apical area of the upper forewing of both sexes has a grey patch that extends farther along the costa than the termen (Figure 25). The underwings are yellow and white. Very common and present across Britain except in mountainous regions in Scotland. Also commonly referred to as a Cabbage White.



*Figure 25 Small White, clockwise from top left, Male spring brood, Female spring brood, Pupa and underwing view.*

### *Annual cycle*

Over two broods the Small White is on the wing continually from April to September, the bottle-shaped eggs are laid singly on the undersides of brassica leaves, the green larvae feed voraciously on brassicas in gardens, allotments and farmland and are regarded as a pest species. This species over-winters as a pupa. Summer populations can be augmented by migrants from the Continent.

### *Habitat*

Occurring in a wide variety of habitats from urban gardens, parks and allotments to farmland and brownfield sites.

### *Larval Food plants*

Cultivated Brassicas especially cabbages, also cruceriform wildflowers including turnips, radishes, cresses plus nasturtiums.

### *Recorded Distribution*

Has always been common across Notts since records began.

## **Green-veined White *Pieris napi***

### *Description and Status*

A medium-sized white distinguished by the strong dark green veining on the underwings of both sexes (Figure 26). The female is more strongly marked with two black spots on the forewing, the male has one black spot in the summer brood, the apices of both sexes are also black. Common across Britain except the very highest mountain peaks of northern Scotland.



*Figure 26. Green-veined White female (left), underwing views (right).*

### *Annual cycle*

On the wing from April to September with spring and summer broods, over-winters as a pupa. Eggs are laid singly on a variety of crucifers.

### *Habitat*

Moist sheltered habitats such as damp grasslands, meadows and woodland rides.

### *Larval Food plants*

Mainly wild crucifers including Charlock, Garlic Mustard, Winter Cresses, Cuckooflower and Hedge Mustard.

### *Recorded Distribution*

Very common across Notts since records began.



## Black-veined White *Aporia crataegi*

### *Description and Status*

A large white butterfly with fine black veining (Figure 27), extinct in Britain since the 1920's. A strong flying mobile species which seems to have a propensity to colonise rapidly and to die out suddenly.



Figure 27. Black-veined White.

### *Annual cycle*

Single brooded with a short flying season from mid-June to July, tall conical eggs laid in large batches on leaf undersides, over-winters as a larva, the pupa is colourful.

### *Habitat*

Varied, mainly farmland, orchards, hedgerows.

### *Larval Food plants*

Blackthorn and Hawthorn plus orchard fruit trees

### *Recorded Distribution*

Formerly present along much of the coast of Southern England, the Severn Valley, Lincolnshire-South Yorkshire (Thomas & Lewington 2016) the species became extinct in England in 1923 (Eeles, 2023).

There are 4 records of this species in Notts between 1859 and 1900, three are in the Sherwood Forest-Clumber area dated 1859 and 1874 and one in 1900 near Cottam east of Retford. Carr (1916) also discusses a single undated and dubious record described by Sterland and ascribed to Trueman. It is said to have been taken at Thoresby Park, but Carr (1916) discounts this record. In the late 19<sup>th</sup> Century, the species used to be common at White's Wood Lane in Gainsborough just 2km from the county boundary with Notts. Given this is a strong flying mobile species it remains very plausible that the Notts records are genuine, especially the record from Cottam in the Trent Valley south of Gainsborough.

## Clouded Yellow *Colias croceus*

### *Description and Status*

An attractive medium-sized butterfly with deep yellow and black over-wings (Figure 28), but normally seen at rest with the wings tightly folded to reveal the pale-yellow under-wings (Figure 29). The females have several yellow dots within the black over-wing borders whereas the males have solid black borders. A variant of the female is the *helice* form in which the over-wings are white and black, so it superficially resembles the female Pale Clouded Yellow (Figure 29). However, the *helice* form has a much more extensive black borders to the hindwings enabling easy separation.



Figure 28. Notts Clouded Yellow specimens held at Wollaton Park by Nottingham City Council, male (left), male underwing (centre), and female (right).



Figure 29 Clouded Yellow male (left) and female *helice* form © Paul Coombes (right).

### *Annual cycle*

An annual summer migrant to Britain from Southern Europe, in exceptional years the first arrivals are in Spring it may breed to produce subsequent 'British' generations that can fly as late as October. It rarely manages to over-winter successfully.

### *Habitat*

A migratory species found in a wide range of predominantly rural settings.

### *Larval Food plants*

Clovers and Lucerne (alfalfa).

### *Recorded Distribution*

There are over 400 records of Clouded Yellow for Notts and most of these are of sightings of individuals. However, in Victorian times there were large influxes of this species sometimes accompanied by smaller numbers of Pale Clouded Yellow. Big Clouded Yellow years included 1877, 1892 and 1900. The latter included a large swarm present in August along the Fossway around Cotgrave and Owthorpe. I quote from the account in Carr (1916) of this remarkable event.

*“1900 when it reappeared in considerable numbers and in many localities, even penetrating into Nottingham gardens. On the Foss Road near Cotgrave it was so abundant that one collector (Mr A. Simmons) captured 50 specimens in perfect condition in two hours on August 18, and it was still common there on September 6.”*



*Figure 30. Two male Clouded Yellows from the Cotgrave swarm of August 1900 from Mathers (2023).*

It is swarms like the one at Cotgrave (Figure 30) that give the butterfly its' name Clouded as it can appear in dense clouds. In recent years Clouded Yellow has been rather scarce,

As a rare species, Clouded Yellow is very twitch-able, so a single individual may be recorded many times from one site, so the number of sites where the species was seen is almost certainly a better guide to the magnitude of an influx.

The data from Notts covering the period 1995-2022 (Figure 31) indicate that good years included 1996, 1998, 2000, 2013 and 2014, but even in these years the record numbers are very low when compared to those of many of the coastal counties of southern and eastern England.



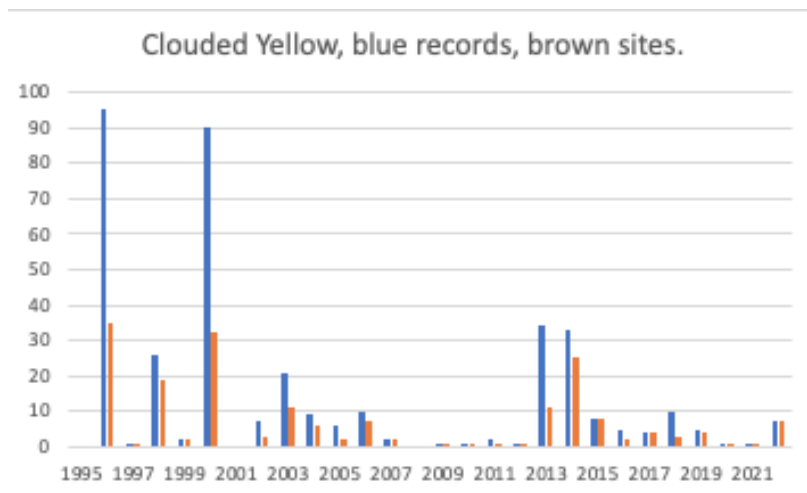


Figure 31. Clouded Yellow records and sites. 1995-2022.

## Pale Clouded Yellow *Colias hyale*

### Description and Status

The Pale Clouded Yellow was a rare migrant in Notts found mainly in association with Clouded Yellow swarms in Victorian times. The last record is in 1901. The sexes are distinct the male being yellow and black whilst the female is white and black (Figure 32). Nationally 1900 and 1947 saw the biggest influxes of the species (Emmet & Heath, 1989). Today it is an occasional migrant to southern England, and very rare elsewhere in Britain. On the Continent it is widespread across France, the Benelux countries and Germany, then eastwards to Russia, it is largely absent from the Iberian Peninsula where it seems to be replaced by the very similar Berger's Clouded Yellow.



Figure 32. Notts Pale Clouded Yellow specimens held at the Natural History Museum at Wollaton Park by Nottingham City Council, males from Southwell collected by Becher on left, females from 'Notts' on right from Mathers (2023).

### *Annual cycle*

A migrant that arrives in adult form and is not thought to breed in Britain.

### *Habitat*

A migratory species found in a wide range of predominantly rural settings.

### *Larval Food plants*

Lucerne (alfalfa).

### *Recorded Distribution*

Today this is an occasional migrant to Southern England, rare elsewhere in Britain, it has an extensive distribution on the Continent. There are 8 Notts records of the species, the last being from Plumtree in 1901. Four individuals were noted in the swarm of Clouded Yellow near Cotgrave in August 1900 and 3 were taken at Normanton near Southwell in 1877 (Becher). The two males pictured above are labelled 1881 but it is likely these are two of the examples taken by Becher in 1877 and perhaps not donated to the Museum until 1881?

In Derbyshire there are only four records, three from the 19<sup>th</sup> Century, and as for Notts, 1901 is the last record that coming from Calke (Harrison & Sterling, 1985). Whilst in Leicestershire it was recorded in the mid 19<sup>th</sup> Century, but apparently not since an individual in 1877 (Bouskell, 1907).

## **Brimstone *Gonepteryx rhamni***

### *Description and Status*

A large butterfly with distinctive hooks on all wings, wingspan in the range 60-74mm with a small orange discal spot on each wing. The underwings and overwings are of similar colour, the male is a deep yellow whereas the female is a pale greenish-white colour (Figure 33) leading to possible misidentification as a Large White when only seen in flight. When perched, it usually has the wings folded and is well camouflaged. A strong flyer that is widespread throughout England, parts of Wales and small parts of southernmost Scotland.

### *Annual cycle*

Brimstone can be seen on the wing in all months of the year although it hibernates during cold conditions in the winter. Single-brooded, peak flying times are on emergence after hibernation in spring and with the emergence of a fresh brood each summer. It lays single bottle shaped eggs in April-May the larvae hatch and pass through five instars before

pupating in June-July in a large leaf like cocoon attached by a silk pad and girdle to the underside of leaves.



*Figure 33.  
Brimstone,  
male (left),  
female (right).*

### *Habitat*

Brimstone is a wandering species and so can be seen in almost any habitat.

### *Larval Food plants*

Buckthorn and Alder Buckthorn.

### *Recorded Distribution*

Widely distributed in Notts since records began.

## Nymphalidae – Fritillaries

Large and medium-sized orange or brown butterflies with intricate markings, the underwings are especially beautiful. Six of the eight British species have been reported from Notts, including all the three large *Argynnis* species. Only two species are found at present, and only Silver-washed has a strong presence, the Dark Green now being very rare. In recent years our populations are largely from re-introductions. Most species are usually single-brooded and prefer violets as their larval host plant. All are part of the Heliiconiinae subfamily except for Marsh Fritillary.

The decline of the *Argynnis* and *Boloria* Fritillaries in Notts appears to be the result of woodland management, the main foodplant violets formerly thrived in coppiced clearings that became shaded once the wood was allowed to grow. Another factor may be a drastic reduction in grazing of the grasses that compete with the violets by rabbits, from the 1950's onwards, because of myxomatosis (Walker, 1997).

### Dark Green Fritillary *Argynnis aglaja*

#### *Description and Status*

Dark Green Fritillary is a large orange Fritillary, the sexes are very similar although the females are about 10% larger and more strongly marked. Wingspans are in the range 64-70mm. The species is named for the colour of the underwings (Figure 34) with large white spots set against a greenish background. The species is present in Scotland, Wales and England, it favours western locations and has an affinity for coastal areas.



Figure 34. Dark Green Fritillary, (left) and underwing pattern (right).

#### *Annual cycle*

This is a single-brooded species flying from June-August. The conical eggs quickly hatch into dark larvae that over-winter, passing through 6 instars before pupating for up to a month attached to a silk pad in vegetation (Eeles, 2019).

### *Habitat*

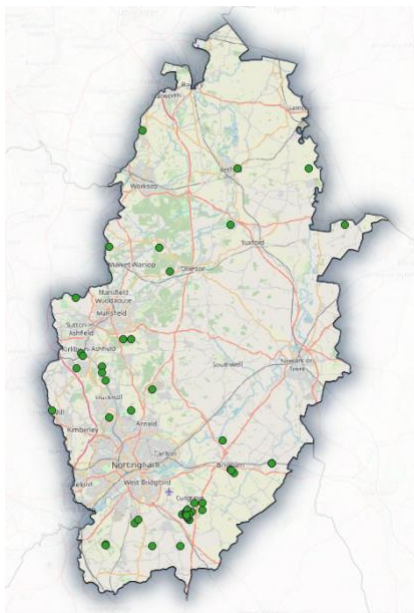
Predominantly a species of calcareous grassland developed on limestone bedrock such as in the Peak District of Derbyshire and the Chalk Downlands of southern England. Also found in rough grassland with bracken, heaths and sand dune belts.

### *Larval Food plants*

Dog Violet and other violets.

### *Recorded Distribution*

There are 18 records of the species spread around the County between 1874 and 2010 including good numbers reported in the 1920's from Cotgrave, Owthorpe and Widmerpool (Carr, 1935). These are followed from 2010 by regular records from an introduction at Cotgrave Forest until 2015 when the re-introduced Silver-washed Fritillary may have displaced the population. Since then, there are a few sporadic records probably of single wandering individuals mainly in the south of the County and a couple of other possible records of released stock for example at Dyscarr Wood (Eakring Birds, 2017).



*Figure 35. Distribution of all records for Dark Green Fritillary. Base Map. Copyright OpenStreetMap contributors.*

Dark green Fritillary was never common in Notts (Figure 35), and now only a couple of individuals are seen each year, these may well be migrants from populations in adjacent counties such as Derbyshire and Lincolnshire.



## Silver-washed Fritillary *Argynnis paphia*

### *Description and Status*

A large orange Fritillary in which the males are easily distinguished by the broad sex brand on the forewings (Figure 36). Wingspans vary from 69-80mm with the females on average 10% larger than the males. Named for the silver-grey streaking on the underwings (Figure 36). Absent from Northern England and Scotland this woodland species has never been common in Notts. The dark *valesina* form shown by some females is one of the best-known and common variants amongst British butterflies.



*Figure 36 Silver-washed Fritillary. clockwise from top left male showing sex brand marks, underwing showing silver-washing ©Chris Overton, female, and valesina form female ©Brian Johnson.*

### *Annual cycle*

Single brooded flying in June to August, it lays conical eggs that hatch and overwinter as larvae passing through five instar phases before pupating.

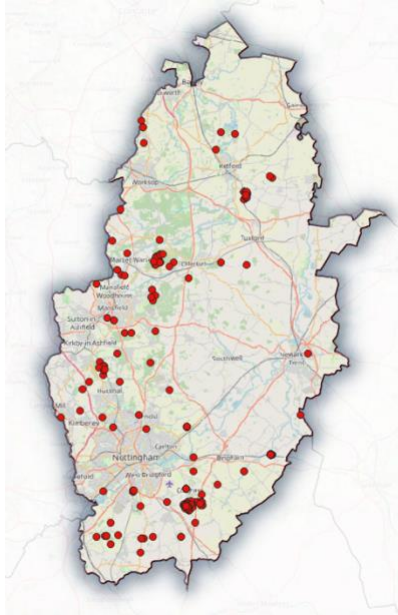
### *Habitat*

A species of open deciduous and mixed woodland in which violets can grow.

## Larval Food plants

Dog-violet.

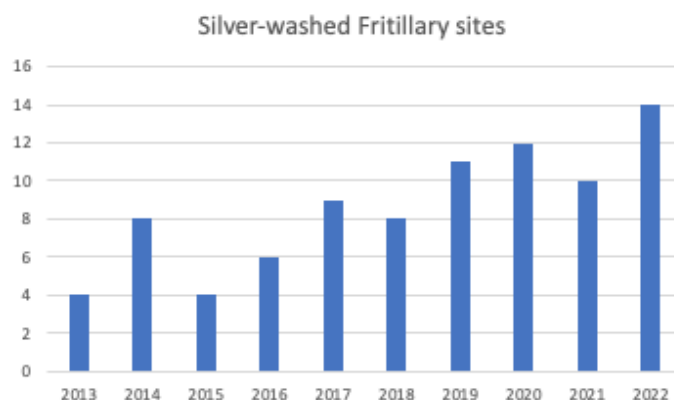
## Recorded Distribution



*Figure 37. Distribution of all records for Silver-washed Fritillary. Base Map. Copyright OpenStreetMap contributors.*

There are 14 pre-1920 records of the species, Brameld, in Sterland (1875), regarded it as rare in Sherwood Forest. Probably in the 1890's Daws noted that the species was very common and occurred in swarms in Thieves and Harlow Woods south of Mansfield (Carr, 1916). It is probable that the species died out in Notts for a long period as there are only a few scattered records covering 1980-2012. From 2013 following a release of stock at Cotgrave Forest records become plentiful and this continues to the present day with some individuals seen across the Fossway in the adjacent Borders Wood at Owthorpe (Figure 37).

Eaton and Gamston Woods south of Retford have also yielded records since 2010, from another release, and at Dyscarr Wood from 2016. (Eakring Birds, 2017). The species then seems to have spread out from these strongholds in the last 5-6 years and is now reported each year from more than 10 sites across the County (Figure 38).



*Figure 38. Annual total of sites occupied by Silver-washed Fritillary in Notts 2013-2022.*

## High Brown Fritillary *Argynnis adippe*

### *Description and Status*

The third of the large *Argynnis* Fritillaries, the High Brown has in recent years been labelled Britain's rarest butterfly. This is particularly tragic when one considers it used to be very common in parts of Notts. It is best told from the Dark Green Fritillary by an extra ring of silver dots with red-brown rings in the submarginal area of the hindwing underside (Figure 39, red arrow). The sexes are very similar with the females on average about 10% larger, wingspans are in the 55-69mm range. Now long extinct in Notts it is confined to very small pockets in Northwest and Southwest England and South Wales.



Figure 39. High Brown Fritillary (left) and underwing pattern (right).

### *Annual cycle*

Single brooded and flying in June-July High Brown Fritillary is distinct from our other two *Argynnis* species by over-wintering in egg form. The conical ribbed eggs hatch from early March onwards into dark spiky larvae that have six instar phases, the pupa is attached to leaves and hangs head-downwards.

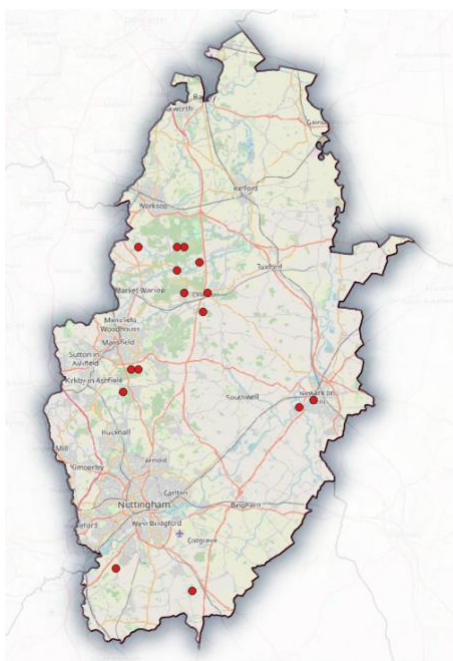
### *Habitat*

Bracken-dominated heath and moorland and limestone areas with bracken, scrub, rock pavement, grassland and woodland. (Eeles, 2019).

### *Larval Food plants*

Dog Violet.





#### *Recorded Distribution*

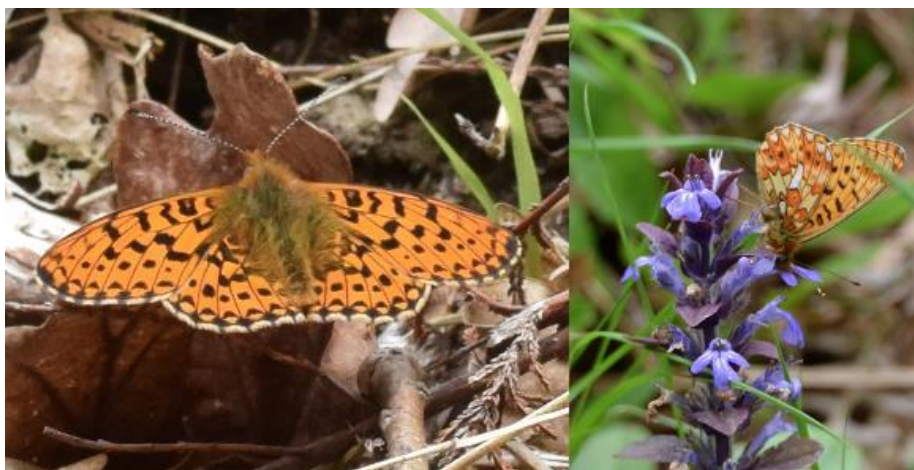
There are 15 records or localities mentioned for High Brown Fritillary (Figure 40) with the last record being from Widmerpool in 1920. Said to be common in the Sherwood Forest area and especially at Clumber in the late 19<sup>th</sup> Century it was still not uncommon when Carr (1916) published his compilation. Sites mentioned in Carr include Clumber (Brameld and Alderson), Carburton, Welbeck Park (Lady Robinson), Ollerton (Becher), Birklands (Leivers), Budby Carr, (Carr) Thieves and Harlow Woods where it was noted to be less common after 1890 (Daws).

*Figure 40. Distribution of High Brown Fritillary records. Base Map. Copyright OpenStreetMap contributors.*

### **Pearl-bordered Fritillary *Boloria euphrosyne***

#### *Description and Status*

The Pearl-bordered Fritillary is a medium-sized Fritillary, the sexes have similar markings and wingspan ranges from 38 to 47mm with the females on average slightly larger. The name derives from the string of white 'pearls' along the termen of the underside of hindwing. It shares this in common with the Small Pearl-bordered Fritillary but can readily be distinguished from the latter by other aspects of hindwing underside. The Pearl-bordered has two white cells straddling a cell with a back dot (Figure 41). This species is restricted to small areas around England but occurs across larger parts of the Scottish Highlands. Once common in Notts it has been extinct here for several decades.



*Figure 41. Pearl-bordered Fritillary (left) and) underwing pattern with two white panels (right).*

### *Annual cycle*

Pearl-bordered Fritillary's main flight period is in late April-June whilst a smaller second summer emergence can occur in August (Thomas & Lewington, 2016). Like many other Fritillaries the eggs are conical, and the over-wintering larvae are black and spiky and have a total of 5 instars before pupating near the ground in a head-downward pupa that resembles a dead leaf and is attached by a silk pad to withered vegetation including bracken.

### *Habitat*

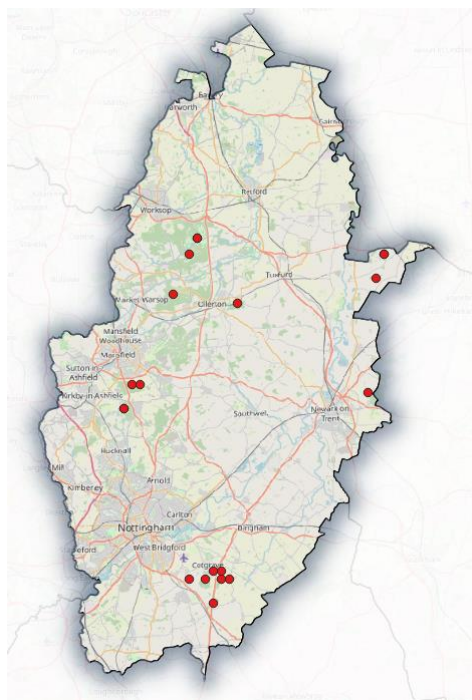
Woods with clearings, bracken scrub and grassland, and open woodland. and maintained by regular coppicing or burning, to enable sufficient light to encourage fresh wildflowers and violets to thrive. The leaf litter helps provide warm shaded microclimates

### *Larval Food plants*

Dog Violet, also primroses and pansies.

### *Recorded Distribution*

There are 19 occurrences of this species (Figure 42) most between 1874-1934 and mentioned in either Carr (1916) or Carr (1935). Most of the locations were deciduous woods. There is a record from 1947, and three from the 1970's in South Notts at locations where the species was present in the 1920's-30's. The last record I have unearthed was at Cotgrave Forest in 1977, although Walker (1997) cites one in 1981 from the same locality.



*Figure 42. Distribution of all records for Pearl-bordered Fritillary. Base Map. Copyright OpenStreetMap contributors.*

## Small Pearl-bordered Fritillary *Boloria selene*

### *Description and Status*

The Small Pearl-bordered Fritillary is a medium-sized Fritillary, it is only marginally smaller than the Pearl-bordered and flies slightly later in the season. The sexes have similar markings and wingspan ranges from 35 to 44mm with the females on average slightly larger. The name derives from the string of seven white 'pearls' along the termen (outer border) of the hindwing underside (Figure 43). With the same view it can readily be distinguished from the Pearl-bordered by having many more white panels and a more prominent black dot. This species occurs widely in Scotland, Wales and Southwest England but is restricted to small areas elsewhere in England. Once common in Notts, it has also been extinct in for many decades.



Figure 43. Small Pearl-bordered Fritillary male (left) and underwing pattern with many white panels (right).

### *Annual cycle*

The Small Pearl-bordered Fritillary's main flight period is in late May- early July whilst a smaller second summer emergence sometimes occurs in August (Thomas & Lewington, 2016). Like many other Fritillaries the eggs are conical, and the over-wintering larvae are black and spiky, they have a total of 5 instars before pupating near the ground surface in a head-downward pupa that resembles a dead leaf and is attached by a silk pad to withered vegetation including bracken.

### *Habitat*

Damp heathlands and woodland clearings, rides and margins with violets.

### *Larval Food plants*

Dog Violet.

### *Recorded Distribution*

There are only 9 occurrences of this species recorded in Notts (Figure 44) seven were mentioned by Carr (1916). There are 2 records reputedly from 1939 at Bawtry and Welbeck but these may be re-iterations of earlier published records. So, it is likely the species died out in the County early in the 20<sup>th</sup> Century. In neighbouring Lincolnshire, it persisted until 1955 and in Derbyshire until 1971.

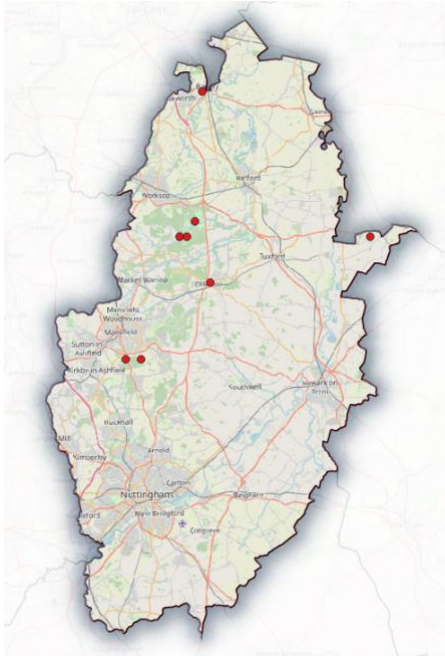


Figure 44. Distribution of all records for Small Pearl-bordered Fritillary. Base Map. Copyright OpenStreetMap contributors.

## Marsh Fritillary *Euphydryas aurinia*

### Description and Status

A medium-sized, strongly marked, Fritillary (Figure 45) with wingspans in the range 30-50mm, there is limited size overlap with the females that are much larger (minimum 40mm). Mainly restricted to western parts of England, Scotland and Wales.

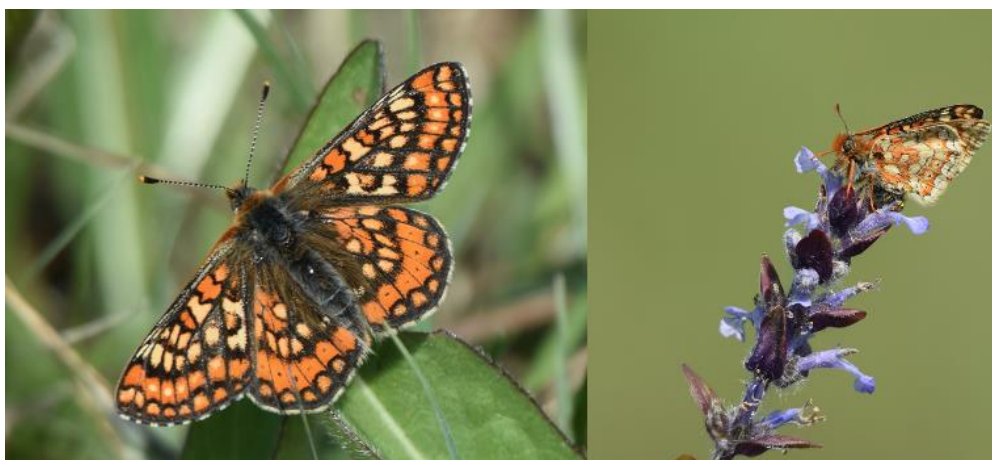


Figure 45. Marsh Fritillary (left) underwing view (right).



### *Annual cycle*

Marsh Fritillary is single brooded and flies in May-June, it lays eggs in clusters and these hatch into black spiky larvae that for the first few instars live, and over-winter communally in silk webs. The pupa is brightly coloured and attaches to grass stems and leaves by a silk pad (Figure 46).



*Figure 46. The Marsh Fritillary pupa.*

### *Habitat*

Damp neutral-acid grassland and clearings within woodland.

### *Larval Food plants*

Devil's bit Scabious, also Plantains, Foxglove and Wood Sage (Sandars, 1939)

### *Recorded Distribution*

There are 3 records from 1874-1906 in the Sherwood Forest-Worksop area, two ascribed to Trueman and one to the experienced butterfly recorder Miss E. Alderson. Carr (1916) accepts this evidence but states that the species is very rare. These records are plausible as there are contemporaneous records nearby around Doncaster in South Yorkshire (Rimington, 1992) and in Lincolnshire a colony existed until 1958 just over the border from Notts at Skellingthorpe near Lincoln (Duddington & Johnson, 1983; Cawdell & Smith, 2021)). In recent years there has been an introduced colony at Chambers Farm Wood NE of Lincoln.

## Nymphalidae – Satyrs or Browns

Formerly a separate family (the Satyridae) and now the subfamily Satyrinae which is part of the Nymphalidae. Most are medium-sized, brown and have prominent eyespots. Eggs are mainly barrel-shaped.

### Meadow Brown *Maniola jurtina*

#### *Description and Status*

A medium-sized brown butterfly with wingspans from 49 to 56mm. the female being slightly larger. The sexes can be distinguished in an overwing view by the orange panels on the female forewing, these are almost absent in the male, in which a broad dark brown sex brand lines are also apparent (Figure 47). The underwing pattern of markings are similar although the females have a larger eyespot and more distinct markings. Normally eyespots have a single white dot, but some varieties do have a second smaller white dot leading to frequent misidentification as Gatekeeper. Common throughout Britain excepting the most mountainous areas of north Scotland



Figure 47. Meadow Brown, female (left), male (centre) and female underwing view (right).

#### *Annual cycle*

This is a single brooded species flying in June-September and sometimes even later. Meadow Brown over-winters as a larva with six instars. The pupa is attached to the old larval skin, that is itself already attached to a silk pad on grass stems.

#### *Habitat*

A wide range of habitats including ungrazed grasslands, woodland clearings, brownfield sites, road verges, gardens and parks.

### *Larval Food plants*

Grasses including Common Meadow Grass.

### *Recorded Distribution*

Thought to have been widespread in Notts since records began.

## **Ringlet *Aphantopus hyperantus***

### *Description and Status*

A rather drab medium-sized brown butterfly with wingspans 42-52mm, the females are on average about 10% larger. Ringlet is most attractive with the wings closed due to the presence of large prominent eyespots on the underwings (Figure 48). Eyespots are also present but usually rather faint on the overwings, these surfaces are mid-brown in females, but in males, they are very dark brown, almost black. The species is common across Britain except in Northwest Scotland.



*Figure 48. Ringlet, female (left), male (centre) and underwing view (right).*

### *Annual cycle*

Single brooded (univoltine) flying in June to August. Ringlet lays single dome-shaped eggs that fall into the vegetation and so are not attached to any surface. Over-wintering as a larva. The finely speckled brown larvae pass through five instars then pupate on the ground in June remaining unattached to any vegetation.

### *Habitat*

Ringlet prefers damp, sheltered and shaded environments found in woodland clearings, hedgerows and meadows.



### *Larval Food plants*

A wide range of grasses.

### *Recorded Distribution*

Always present, but sometimes not abundant, Ringlet is now a common butterfly across Notts with numbers having recovered in the County, and nationally, over the last 50 years following a period when this butterfly was absent from parts of England. Brameld in Sterland (1875) noted it was common in the Sherwood Forest area, and Carr (1916) relates accounts of swarms of the species in the 1880's in Clumber and Welbeck parks. Carr also mentions that whilst the species remained common in some favourable habitats it had become absent by 1916 in others, including Clumber and Welbeck, so some decline was apparent. Thought to have been mainly a South Notts species during the 1970s (Bill Bacon pers. comm) it is once again widespread across the whole County.

## *Gatekeeper *Pyronia tithonus**

### *Description and Status*

Gatekeeper, also known as Hedge Brown, is a medium-sized brown butterfly with wingspans in the range of 37-43mm for males, and 42-48mm for females. The sexes both have orange panels on the upper wing surfaces and an eyespot with two white dots, the females have more extensive orange panels, and the male has strong brown sex brand lines crossing the centre of the forewings (Figure 49). Common across most of England and Wales excepting the most mountainous areas, but absent in Scotland and northern-most England.



Figure 49. Gatekeeper, female (left), male with sex brands (centre) and underwing (right).

### *Annual cycle*

Single brooded and usually emerging slightly after the Meadow Brown and Ringlet, Gatekeeper is usually on the wing in July and August. The eggs are laid or just dropped onto suitable foodplants. This species spends about 9 months including over-wintering as a larva.

Like the Meadow Brown the pupa of this species attaches itself to the old larval case that is in turn attached to a silk pad spun on shrub vegetation.

### *Habitat*

Occupies an extensive range of habitats with shrubs and grasses including scrubland, hedgerows, meadows, woodland clearings and road verges.

### *Larval Food plants*

Various common grass species.

### *Recorded Distribution*

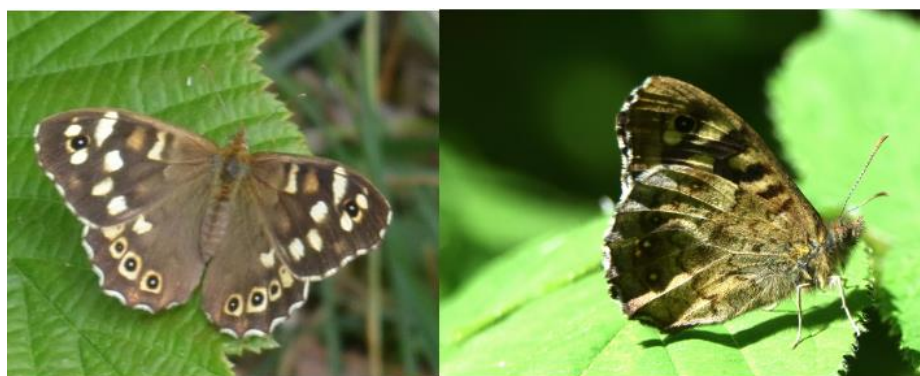
Brameld in Sterland (1875) regards this a common species whilst Carr (1916) suggests it is more abundant in the south of the County but present widely, he also notes it had disappeared from the South Leverton area near Retford in the late 1890's. Today Gatekeeper is widespread across the County and this has been the case since at least the 1970's.

Nationally, Gatekeeper appears to have contracted in range in northern Britain having been reported from southern Scotland and northern England by Sandars (1939). Ford (1944) writing just five years later gives a distribution similar to that of today. Heath, Pollard & Thomas (1984) show a distribution covering southern England, most of lowland Wales and stretching northwards in England on either side of the Pennines, as far as Cumbria in the west and Yorkshire in the east. Since then, Gatekeeper has spread a little farther northward and now occupies almost all of England.

## **Speckled Wood *Pararge aegeria***

### *Description and Status*

A medium-sized brown butterfly (Figure 50) that likes shaded conditions. Wingspans are 46-56mm, the females being slightly larger. The sexes are very similar in markings. Common throughout most of England and Wales and parts of Scotland.



*Figure 50. Speckled Wood, adult (left), and underwing view (right).*

### *Annual cycle*

On the wing from late March through to the end of October with a rapid succession of new broods. It over-winters as a larva and later as a pupa. The spherical eggs are laid on grass species and hatch into green larvae that have four instars, before pupating head downwards attached to a silk pad on vegetation by the cremaster. The whole cycle can be completed quickly with three successive brood achieved most years.

### *Habitat*

Shaded woodland, also hedgerows, gardens and parks.

### *Larval Food plants*

Coarse grasses such as Cock's-foot, Couch and Annual Meadow Grass.

### *Recorded Distribution*

Speckled Wood declined nationally in the second half of the 19<sup>th</sup> Century. It was described as local in the Sherwood Forest area by Brameld in Sterland (1875). Carr (1916) regarded it as rare. From the 1930's the species started to recover in Wales and southern England. Heath, Pollard & Thomas (1984) show the species had recovered to occupy southern England, the South Midlands, parts of Norfolk and Lincolnshire and coastal parts of Wales. Eakring Birds (2017) state:

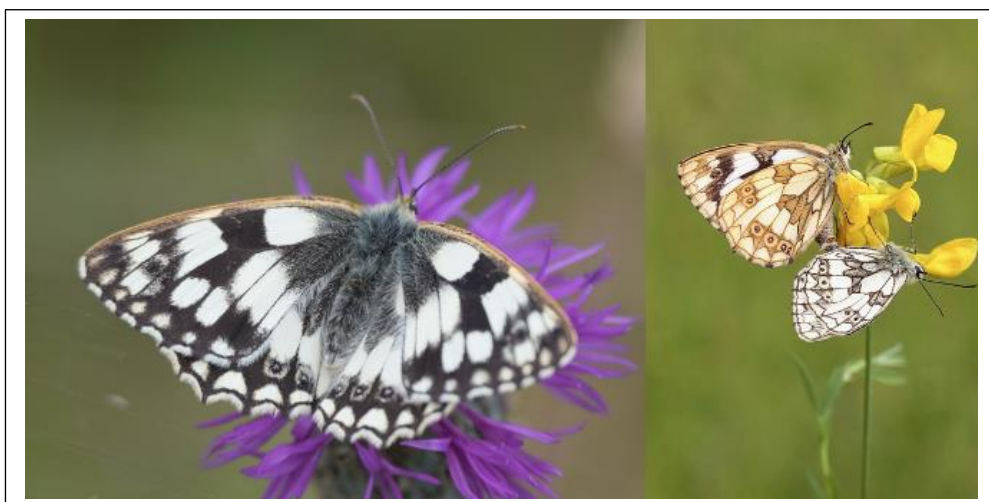
*Although now one of our most common butterflies, the Speckled Wood was far from achieving that county status as recently as the early the 1980's. It's north-easterly range expansion through the county continued throughout the 1990's and during the opening decade of the present century and it is now widespread in western areas of Nottinghamshire*

Today Speckled Wood is a common Notts species occurring widely wherever suitable conditions exist, nationally it has spread northwards to occupy almost all of England, Wales except for mountainous areas, and parts of Scotland.

## **Marbled White *Melanargia galathea***

### *Description and Status*

A medium-sized pied butterfly (Figure 51), wingspans are 53-58mm, with the females being slightly larger, and with a brownish hue to their underwings (Figure 51). Common in Southern England, also with a patchy distribution in Wales and northern England.



*Figure 51. Marbled White female (left), underwing view of a pair showing the brownish colour of the hindwing in the larger female © Samantha Batty (right).*

### *Annual cycle*

Single brooded flying in June-July, it spends most of the year, and over-winters, as a larva.

### *Habitat*

Unimproved grassland, rough or disturbed ground, grassy hillsides and meadows, woodland clearings.

### *Larval Food plants*

Prefers Sheep's Fescue Grass, but a whole range of common grasses are eaten.

### *Recorded Distribution*

There are nearly 900 records for Marbled White with only a dozen pre-dating 1940. These older records relate to woodland and are well spread across the County. Then the species seems to have died out for at least 50 years. From 1996 records relating to a release at Portland Park in Kirby in Ashfield start to occur. Up to about 2010 records were only received from 3-4 locations, including the Hills and Holes SSSI near Market Warsop and Toton Sidings. Since 2010 records have been more varied following a natural expansion of the species (Figure 52). We now get reports of this species from 15 or more sites each year (Figure 53) and counts of individuals often exceeding 40. So, it appears Marbled White is now well re-established in the County with records from a wide variety of habitats.

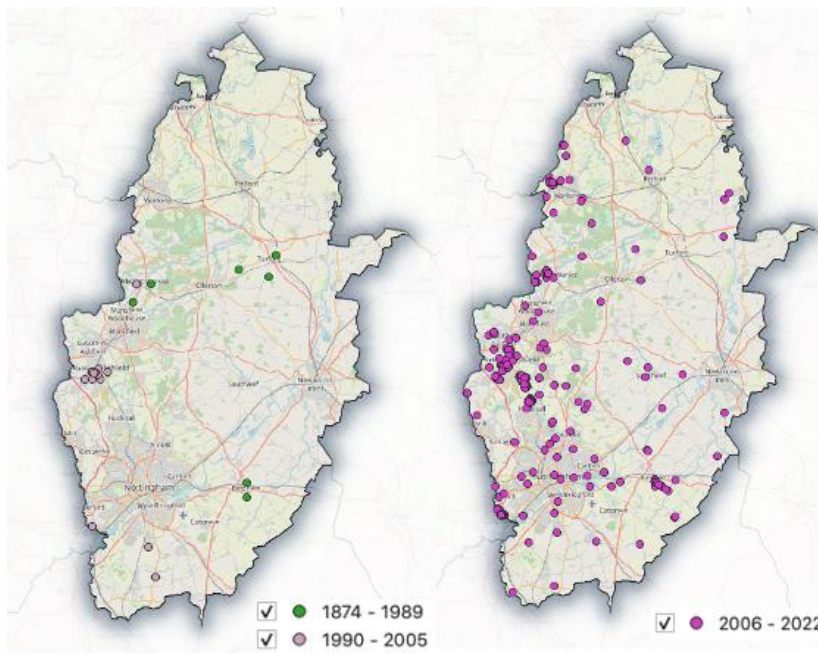


Figure 52. Distribution of Marbled White records for several time intervals. Base Map Copyright OpenStreetMap contributors.

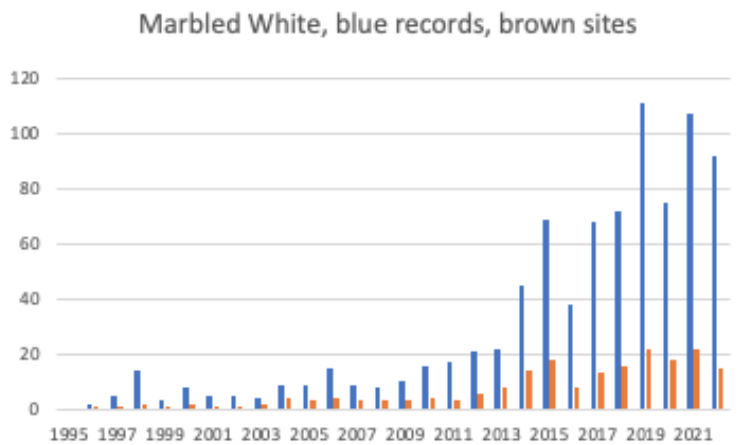


Figure 53. Marbled White records and sites 1995-2022.

## Wall *Lasiommata megera*

### Description and Status

Wall, sometimes referred to as Wall Brown, is an attractive medium-sized butterfly with an average wingspan of about 50mm, the sexes can be told apart by the strong sex brand mark on the forewings of the male (Figure 54). For many years Wall was common and widespread in Notts, however post 2000 it went into a steep decline and is now thought to be extinct.

### Annual cycle

Wall is usually double brooded with a spring and summer generation, and occasionally in autumn there can be a third partial brood. Wall over-winters as a larva.





*Figure 54. Wall, female (left and centre), and male with sex brands (right).*

### *Larval Food plants*

Common grasses including Annual Meadow Grass and Cock's-foot (Sandars, 1939).

### *Recorded Distribution*

After fluctuating fortunes nationally throughout most of the 20<sup>th</sup> Century Wall has been in decline in recent decades. It is now virtually absent from the South Midlands, the Thames Valley upstream from London and parts of the downlands of Hampshire, Sussex and Kent. It is however present around the entire coastline of England, Wales and Southern Scotland.

In Notts there are over 1200 records of Wall, the majority from 1995-2005 (Figure 55). Noted as common in Sherwood Forest in 1859-74 by Brameld (in Sterland, 1875) by the early 20<sup>th</sup> Century Carr (1916) regarded it as a species already in decline.

Figure 55 shows the species was widespread in the County until about 2005, after 2010 the species was restricted to isolated sightings except for the concentration of records in the extreme north of the County. Plots of the annual totals of records of Wall in Notts (Figure 56) show a steep decline with few records after 2005.

The last toehold of the species was around Misson in the extreme north of the County where it was last seen in 2020. Nationally this is part of the northward expansion of a large area from which Wall is now absent. Elsewhere in the East Midlands, Wall is just about hanging on around a few rocky outcrops in Charnwood Forest in Leicestershire, and more widely in the Peak District of Derbyshire.

The jury is still out as to the reasons for this rapid decline of Wall over recent decades, it is a butterfly that seems to like hot dry weather so given recent climate trends you might expect it to be expanding, but I guess the right weather must come at the right time in terms of the life cycle of the species. Wall also seems to prefer light well-drained sandy soils and grassland that has not been heavily fertilised, and more intensive agricultural methods may well explain the decline of this species.



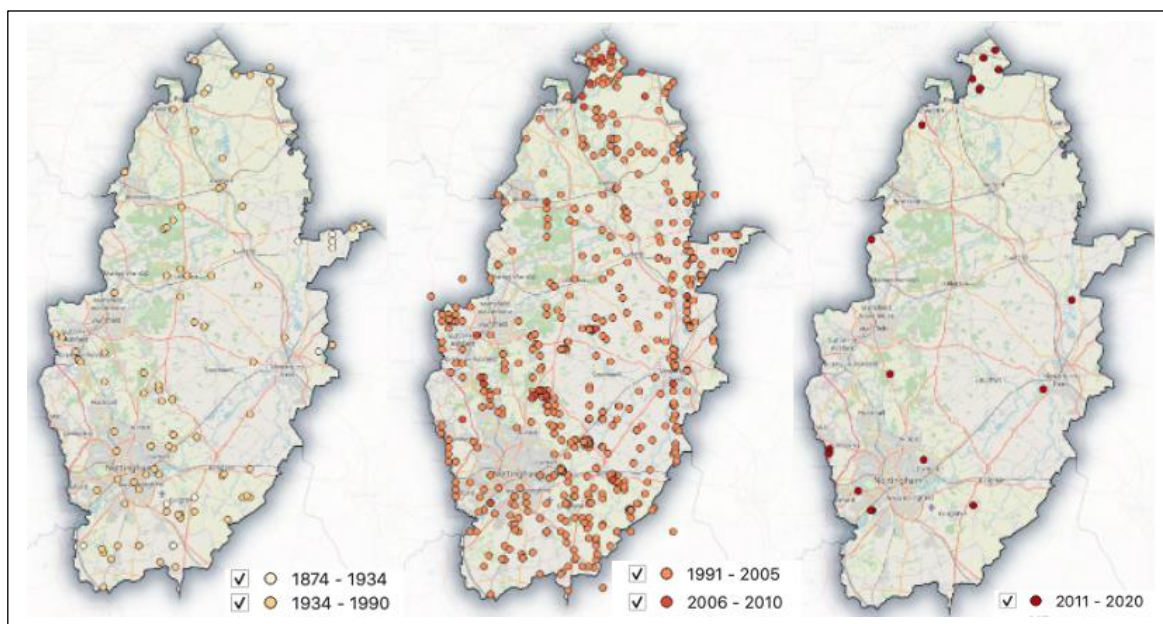


Figure 55. Distribution of records for Wall in Notts for various time intervals. Base Map Copyright OpenStreetMap contributors.

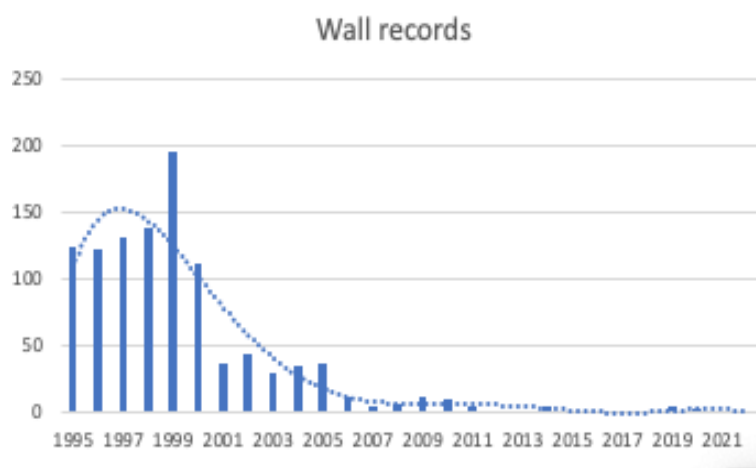


Figure 56. the rapid decline in records of Wall in Notts, 1995-2022.

## Grayling *Hipparchia semele*

### Description and Status

A medium-sized brown butterfly usually seen with the wings tightly closed (Figure 57). Once common in Notts in the mid-19th Century on the sandy heathlands around Mansfield and Sherwood Forest, the last reliable record is in 1958.



*Figure 57. Grayling.*

#### *Annual cycle*

Single brooded and flying in July to September, over-winters as a larva.

#### *Habitat*

Dry areas with thin or no soil and vegetation cover such as grassland and dunes near the coast and lowland heaths.

#### *Larval Food plants*

Grasses including Fescues, various species of Hair-grasses and other common species.

#### *Recorded Distribution*

There are 6 records for Grayling in Notts. Four cover 1874-84 and are all located in the Mansfield-Sherwood Forest area where it was said to be formerly common by Brameld in Sterland (1875). A record from Haxey in 1898 probably lies just into Lincolnshire (plotted in Haxey Village on Figure 58). A further record in nearby Misterton in 1958 lies just within Notts and is the last reliable record for the County. A 1963 record from South Notts lacks details and must be suspect as it is so far removed from other past occurrences and suitable habitat, it may have been released or a rare vagrant.



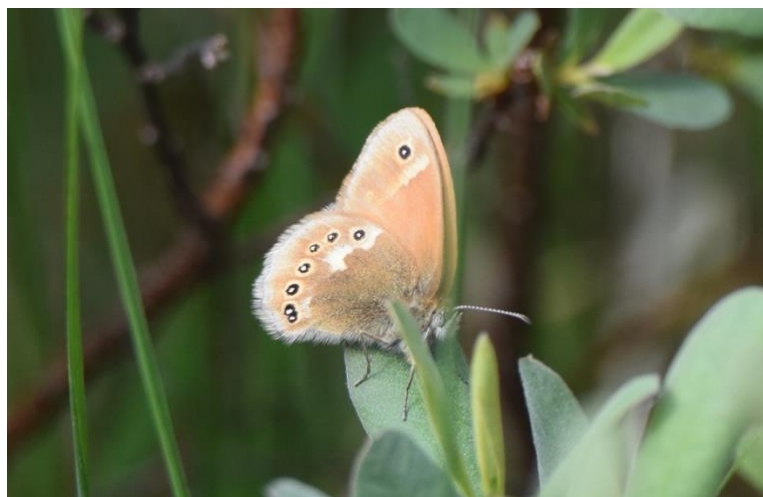
Formerly much more widespread inland across Britain, now mainly a coastal butterfly in England, Scotland and Wales.

*Figure 58. Distribution of Grayling records for Notts. Base Map Copyright OpenStreetMap contributors.*

## Large Heath *Coenonympha tullia*

### *Description and Status*

A rare species in England that has probably never occurred in Notts, usually seen with the wings folded showing orange-brown underwings (Figure 59) with eyespots and streaks of white.



*Figure 59. Large Heath.*

### *Annual cycle*

Single brooded flying in June to August, over-winters as a larva.

### *Habitat*

Acid bogs, peatlands and wetland.

### *Larval Food plants*

Hare's-tail Cottongrass.

### *Recorded Distribution*

There is a single unlikely record of this species from 1874 in Sherwood. The nearest known colony in recent years has been in the peatlands of Crowle Moor NW of Scunthorpe in South Yorkshire. Elsewhere it occurs in North Wales, Cumbria and large parts of Scotland.

## Small Heath *Coenonympha pamphilus*

### *Description and Status*

The Small Heath is a butterfly that is almost always seen with its' wings folded (Figure 60) so the bright orange upper surfaces are rarely seen except in photographs and as brief flashes whilst in flight. The females are slightly larger with wingspans up to 37mm, the sexes are very similar in markings. It is a widespread, common species in Notts, and this seems to have always been the case.



Figure 60. Small Heath.

### *Annual cycle*

Small Heath can be seen on the wing anytime from May to October with overlapping spring and summer broods each year, over-winters as a larva.

### *Habitat*

A species of heathland and grassland and also brownfield sites with sparse vegetation and limited soil cover.

### *Larval Food plants*

A variety of small-leaved grasses including Meadow and Fescue Grass.

### *Recorded Distribution*

Regarded as common and universal in the County by Carr (1916) it has been recorded widely across Notts in recent years. The number of records has increased due to an overall increase in recording (Figure 61). However, normalisation of the results since 1995 suggests that the Small Heath is currently experiencing a period of relatively low abundance when compared with the first decade of the 21<sup>st</sup> Century shown by the blue trendline (Figure 62).

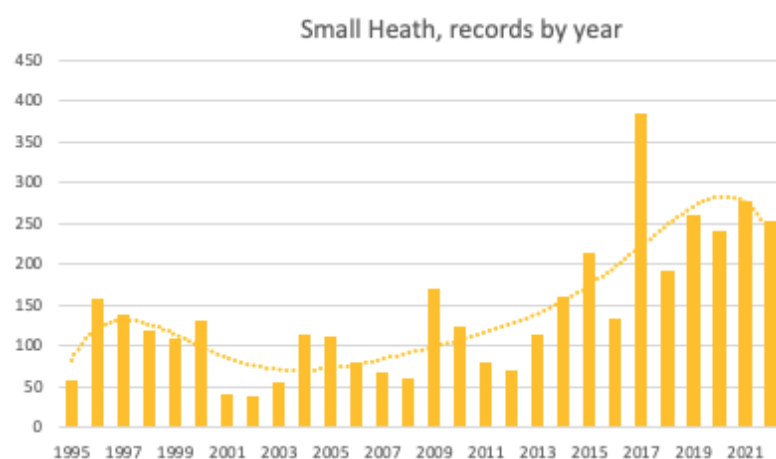


Figure 61. Number of records of Small Heath 1995-2022.

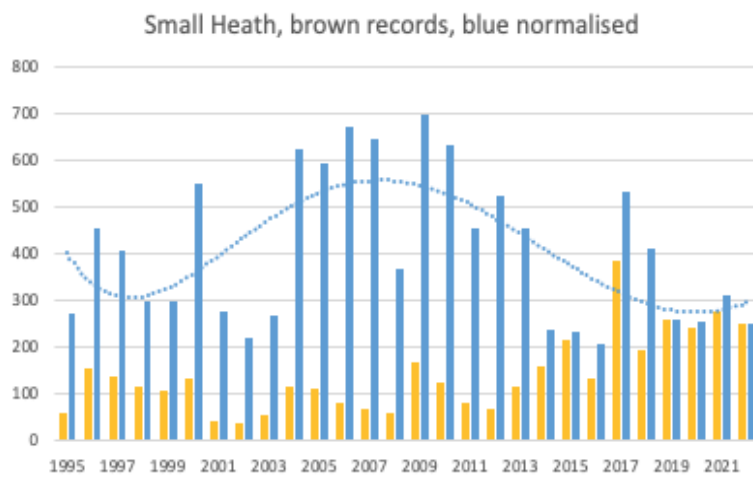


Figure 62. Small Heath record totals 1995-2022. Normalised data in blue.

## Nymphalidae – Others

Including all the remaining Nymphalidae i.e., emperors, admirals, vanessids and the Monarch which was previously classified alone in a separate family (Danaidae). These are mainly colourful, large, strong flying butterflies, some are migratory.

### Monarch *Danaus plexippus*

#### *Description and Status*

A very large unmistakable American species (Figure 63), a strong flyer capable of long-distance migration. A few individuals turn up each year mainly in coastal parts of SW England having inadvertently crossed the Atlantic under favourable weather conditions during their southward autumn migration.

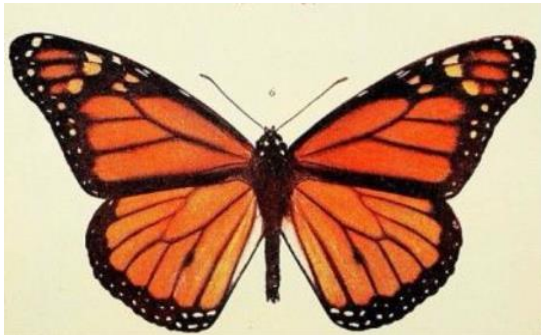


Figure 63. Monarch Butterfly from South (1906).

#### *Annual cycle*

Mainly seen in Britain in September or October. They migrate south to Mexico in autumn where they over-winter in large communal roosts.

#### *Habitat*

Occurs widely in North America

#### *Larval Food plants*

Milkweed

#### *Recorded Distribution*

Rare migrant, a single record exists from the Centre Parks, Sherwood Forest in 2017, this was not at a time when there was a noticeable influx of the species to Britain and was almost certainly a captive bred individual that escaped or was released (Eakring Birds, 2017). The last major influxes to Britain occurred in 1999 and 2001 and overall numbers seem to be on the increase (Thomas & Lewington, 2016).



## Camberwell Beauty *Nymphalis antiopa*

### *Description and Status*

A scarce, striking, and large migrant species (Figure 64) from Northern Europe, also termed 'The Grand Surprise'. First described in the mid 18<sup>th</sup> Century from Camberwell, South London, it seems to have been much more common in the late 19<sup>th</sup> Century, it has become a real rarity in Notts, even in years of large influxes into Britain.



Figure 64. Camberwell Beauty, the Annesley Pit Top individual from September 2011. © Chris Bradbury.

### *Annual cycle*

Most individuals are seen in autumn following expansions of the range during hot weather when the populations increase markedly. They are not thought to hibernate successfully in Britain due to our damp winter climate.

### *Habitat*

Widespread in Northern Europe.

### *Larval Food plants*

Principally Grey Willow in Scandinavia.

### *Recorded Distribution*

About 12 records can be inferred from the descriptions in Carr (1916), mainly from the Sherwood Forest area, dated between 1846 and 1890. Since 1950 there were large influxes to Britain in 1976, 1995 and 2006. Most records now come from eastern coastal counties of England. For example, in 1976 there were 10 records in Lincolnshire in August-October, but none were recorded in Notts.

Of more recent records Eakring Birds (2017) report, *there were at least three individuals recorded in the latter part of the 1990's, coming from Calverton and Chilwell in Spring 1996, with another at Chilwell in*

August of the same year. There was one recorded at Carlton (Cox, K.) in Spring 1997, but the most recent (and twitchable) Camberwell Beauty, was one found at Annesley Pit in September 2011.

Caution should be taken with records of this species as it is popular with breeders and is released at funerals reflecting its American pseudonym 'the mourning cloak'.

## Red Admiral *Vanessa atalanta*

### *Description and Status*

Arguably Britain's most iconic and beautiful butterfly, this large vanessid has a wingspan in the range 64-78mm, the females being on average about 10% larger. The markings of both sexes are very similar, the brown hind underwing contrasts with forewing that reveals red and white markings (Figure 65). Present everywhere in Britain this is a migratory species that wanders widely. Until recently it was thought that all over-wintering individuals died off by the spring and did not go on to breed successfully.

The excellent UK butterflies website updates things nicely:

<https://www.ukbutterflies.co.uk/species.php?species=atalanta>

*the sightings of individuals and immature stages in the first few months of the year, especially in the south of England, mean that this butterfly is now considered resident. This resident population is considered to only be a small fraction of the population seen in the British Isles, which gets topped up every year with migrants arriving in May and June that originate in central Europe. Unfortunately, most individuals are unable to survive our winter, especially in the cooler regions of the British Isles.*

Most individuals perform a reverse migration in autumn and are a common sight crossing the south and east English coast in large numbers at that time of year. However, this species has been recorded in every month of the year within the region, for example it was seen regularly in Mansfield in December 1900, the year that had seen a big influx of other migratory species.



Figure 65. Red Admiral (left) and underwing view (right).

### *Annual cycle*

This species over-winters as an adult emerging on warmer days, however most of the over-wintering adults die off in the spring and do not breed to contribute to the spring and summer numbers of the species. Migrants from the Continent start arriving from April onwards and these individuals do breed here leading to a late summer-autumn generation. Many individuals perform a reverse migration in autumn and are a common sight crossing the coast at this time of year. The barrel-shaped eggs are laid on the upper surfaces of nettles, the larvae are very variable in colour, but spiky black larvae characterise the later instars. The pupa is attached by the cremaster to a silk pad on the underside of nettles, so it hangs head downwards.

### *Habitat*

Diverse habitats of all kinds reflecting the migratory nature of this species.

### *Larval Food plants*

Mainly Stinging Nettle

### *Recorded Distribution*

A common butterfly occurring everywhere in Notts since records began.

## **White Admiral *Limenitis camilla***

### *Description and Status*

An attractive large nymphalid, only known in Notts through introductions. The sexes are very similar in size, wingspans 56-66mm and markings (Figure 66). Present in some nearby counties and may spread to Notts in future.



Figure 66.  
White Admiral  
underwing  
view (left) and  
overwing view  
(right).

### *Annual cycle*

Single-brooded flying in June-August, the eggs are laid on honeysuckle leaves, they are dimpled resembling a golf ball (Eeles, 2019). White Admiral over-winters as a third instar larva in a protective hibernaculum that resembles a dead and shrivelled honeysuckle leaf attached by silk threads. All instars of the larvae are spiky. Finally, the pupa attaches to a silk pad head down to the underside of a honeysuckle leaf for a couple of weeks before emerging.

### *Habitat*

Deciduous woodland dominated by Oak, and conifer plantations, with honeysuckle.

### *Larval Food plants*

Honeysuckle.

### *Recorded Distribution*

White Admiral is not generally regarded as a Nottinghamshire butterfly. Despite a single doubtful record from Ollerton in 1874 and one from Cottam east of Retford in 1905. Brameld does not list it as present in Sherwood Forest between 1859-74, which is telling, as White Admiral is a woodland species. Carr (1916) does not even mention it. There have been about 40 sightings of White Admiral in Notts since the mid 1990's, most are from Eaton and Gamston Woods south of Retford where there was an attempt to introduce the species. The regular records in the following years reflect the twitch-able attraction of this species. This colony had however died out by 2010 demonstrating the difficulty of fully establishing introduced species even if they appear to thrive initially for some years. There are a few other scattered records from around the county since 2010 but most are not from known or experienced recorders and may represent released stock. Also, an overall similarity to Purple Emperor could easily cause confusion if individuals were seen in flight, and so any records not supported by a photograph, must be treated with caution.

White Admiral does occur today in woodland in nearby counties such as Lincolnshire, Northamptonshire and Warwickshire, and probably Rutland. It has also been reported recently from Barkestone Wood in NE Leicestershire only a few kilometres south of the county boundary with Notts. It seems possible that White Admiral might now spread naturally into Notts.

## **Purple Emperor *Apatura iris***

### *Description and Status*

The majestic nymphalid the Purple Emperor (*Apatura iris*) is our second largest British butterfly, named for the iridescent purple sheen seen on the male's wings when they refract

light at a certain angle (Figure 67). The female is slightly larger (76-92mm wingspan) than the male (70-78mm) with similar markings but lacks the purple colouration. Purple Emperor is widespread at mid-temperate latitudes across Eurasia. Present in Notts in Victorian times it seems to have died out, then sporadic sightings started to be reported again from the 1970's onwards.

### *Annual cycle*

The Purple Emperor has a single generation each year (termed univoltine) flying in Britain from mid-June to early August. The females lay their eggs on the upper leaf surfaces of the host species in shaded locations bordering rides or clearings. On hatching the small larvae sit facing inwards on the leaf tips and undergo successive moults in autumn developing their characteristic horns. Dormant over-winter, the larvae start to feed again on the leaves in spring until in June, then they move and form a pupa on the underside of a suitable leaf, followed shortly by emergence of the adult.



*Figure 67. Purple Emperor, male with purple wings (left), underwing view (centre), lugenda aberrant Cotgrave Forest 2017 © Brian Johnson.*

### *Habitat*

A butterfly of deciduous woodlands with clearings and rides and lofty oak trees that the males can define as territories.

### *Larval Food plants*

Broad-leaved *Salix* species are the favoured host plants, particularly the Goat and Grey Willow.

### *Recorded Distribution*

There are about 200 records of this species for Notts with 13 widely spread records up to 1939. It seems to have died out for several decades, then in the 1970-80s residents relate



stories of Purple Emperor in Clumber Park often attracted to car diesel fumes especially in the vicinity of Clumber Bridge, and on the adjacent Osberton, Thoresby and Welbeck Estates.

The population at Cotgrave Forest is thought to have been introduced with records from 2014 onwards and the one at Wellow Wood that was augmented by larvae in 2016 (Eakring Birds, 2017). A dark *lugenda* aberrant was noted at Cotgrave in July 2017 reported by Smyth (2017). There has been a widespread expansion since 2019 across the County (Figure 68), and in particular in Sherwood Forest see Brownley (2023), a pattern also mirrored in Leicestershire and as discussed by Mathers, Dell & Jeffery (2021).

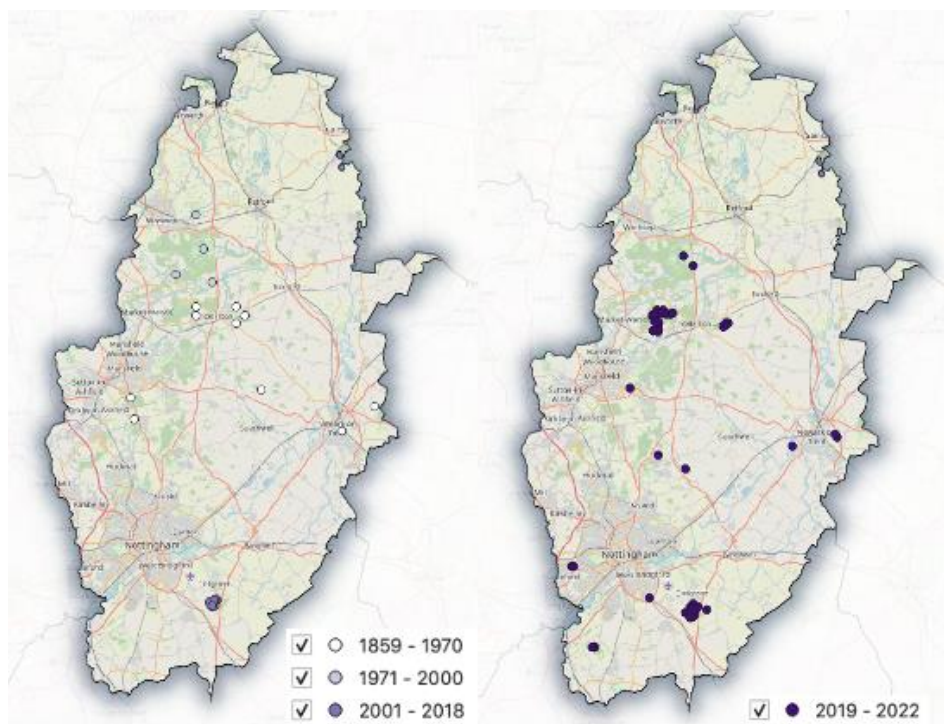


Figure 68.  
Location of  
Purple Emperor  
records over  
time. Base map  
Copyright  
OpenStreetMap  
contributors.

## Painted Lady *Vanessa cardui*

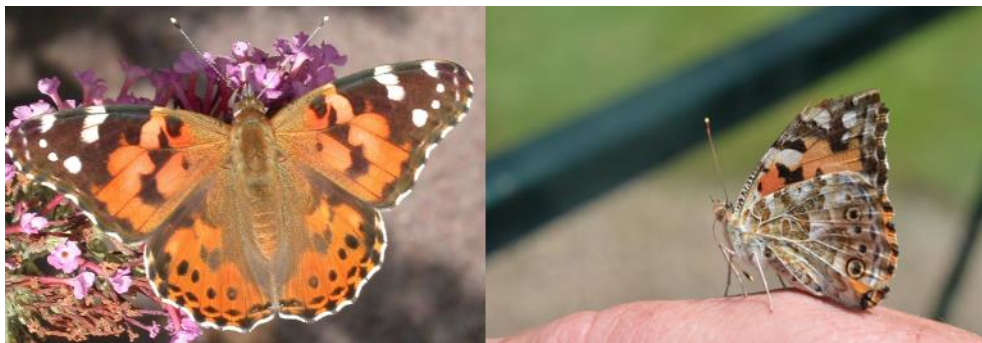
### Description and Status

Our most famous migrant butterfly arriving in variable numbers each season from Continental Europe, the predominantly orange wings have black tips with prominent white spots (Figure 69). Wingspan 58-74mm, with the females a little larger on average. The underside of the hindwing is marbled grey, brown and white, with a sub-marginal row of ocelli, it provides good camouflage, whereas the forewing underside reflects the orange, black and white pattern of the upper wing surface. A strong flyer, the species can occur across the whole of Britain reflecting its migratory nature.



### *Annual cycle*

Painted Lady arrives in waves from late-March onwards, and breeds to give rise to one or two local “British” broods each season. Many individuals reverse migrate to southern Europe and beyond in the autumn, any that stay perish over-winter. The barrel-shaped eggs are laid singly on the upper sides of thistle leaves, they hatch and progress through five instars, the latter ones being mainly black and spiky. The pupa is attached by the cremaster to a silk pad on the underside of thistle leaves and the adult emerges in about 10 days. The entire adult to adult lifecycle lasts about 6 weeks which is very rapid, but typical and necessary for many migratory species.



*Figure 69.  
Painted Lady  
(left),  
underwing  
view (right).*

### *Habitat*

A migratory form that can be found in all habitats.

### *Larval Food plants*

Most thistles, also Mallows, Viper’s bugloss, and Stinging Nettle.

### *Recorded Distribution*

Recorded every year in Notts, numbers vary considerably due to the size of each years’ migratory influx. The graph below (Figure 63) shows the number of recorded sightings in Notts each year since 1995 in blue and reveals that in some years the species only occurs in quite small numbers. Normalising the totals by benchmarking against 2019 levels reveals the totals shown in brown and reflects the largest scale invasions were in 1996, 2003, 2009 and 2019 (Figure 70).

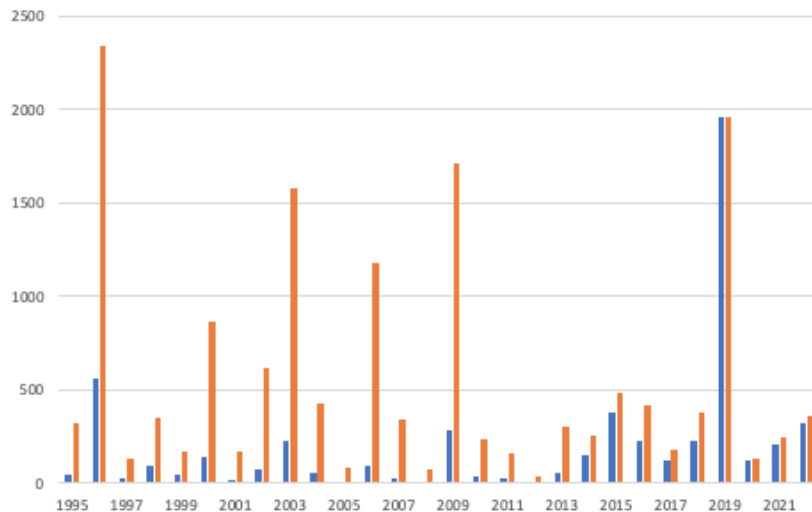


Figure 70. Painted Lady records 1995-2022 blue actual records, brown normalised totals.

For many years scientists were unsure whether the Painted Lady population in Britain reverse migrated in the autumn or simply died off in the cooling autumn and winter conditions. This question was resolved by a study just over a decade ago by NERC (CEH), the University of York and Rothamsted Research in collaboration with Butterfly Conservation. It is reported on the Butterfly Conservation website; <https://butterfly-conservation.org/news-and-blog/painted-lady-migration-secrets-revealed>

this key study found that-

*the Painted Lady did indeed migrate south each autumn but made this return journey at high altitude out of view of butterfly observers on the ground. Radar records revealed that Painted Ladies fly at an average altitude of over 500 metres on their southbound trip and can clock up speeds of 30 mph by selecting favourable conditions.*

*The findings also revealed that the species undertakes a phenomenal 9,000 mile round trip from tropical Africa to the Arctic Circle – almost double the length of the famous migrations undertaken by the Monarch butterflies in North America.*

*The whole journey is not undertaken by individual butterflies but is a series of steps by up to six successive generations so Painted Ladies returning to Africa in the autumn are several generations removed from their ancestors who left Africa earlier in the year. Radar in Hampshire operated by Rothamsted Research revealed that around 11 million high-flying Painted Ladies entered the UK in spring 2009 with 26 million departing in autumn!*

## Small Tortoiseshell *Aglais urticae*

### Description and Status

A medium-sized butterfly with attractive wings, wingspans 45 to 62mm, the female is slightly larger. The markings of the sexes are very similar, and the underwings are mainly dark with buff streaks (Figure 71). Present throughout Britain but becoming increasingly rare in southern England.



Figure 71. Small Tortoiseshell (left), underwing view (centre) and larvae (right).

### *Annual cycle*

Flying most of the year, there are two broods each year, the over-wintering adults become active and breed, with the new spring brood emerging in April-May, followed by a summer brood in July-August. The summer brood then goes on to over-winter as adults. The barrel shaped eggs are laid in heaps on the underside of young nettle leaves. The larvae progress through 5 instars, and the later stages are black with yellow stripes (Figure 71), they are often seen feeding communally on nettles between May and August.

### *Habitat*

All kinds of habitats, a truly cosmopolitan species.

### *Larval Food plants*

Stinging Nettle.

### *Recorded Distribution*

Very common across Notts since records began.

## **Large Tortoiseshell *Nymphalis polychloros***

### *Description and Status*

This large colourful Nymphalid (Figure 72) is distinguished from the familiar Small Tortoiseshell by a larger size (wingspans 68-75mm) and the slightly different markings on the upperwings. The sexes are very similar. This species was formerly widespread in Notts and surrounding counties and throughout most of England, the species has been regarded as extinct in Britain for many years. Over the last two decades a strong increase in numbers on the Continent and especially in the Netherlands has been observed. Coincident with this are sightings of adults, and recently also larvae, that have become increasingly frequent

along the south coast of England and In East Anglia. This has promoted the hope that a full-scale recolonisation could now be in progress.



*Figure 72. Large Tortoiseshell pinned specimen from the Bassetlaw Museum*

### *Annual cycle*

New brood butterflies emerge from August onwards and over-winter as adults, Egg laying is in batches around tree twigs in April, with hatching into larvae and pupation is in June and July.

### *Habitat*

Deciduous and mixed woodland with appropriate tree species.

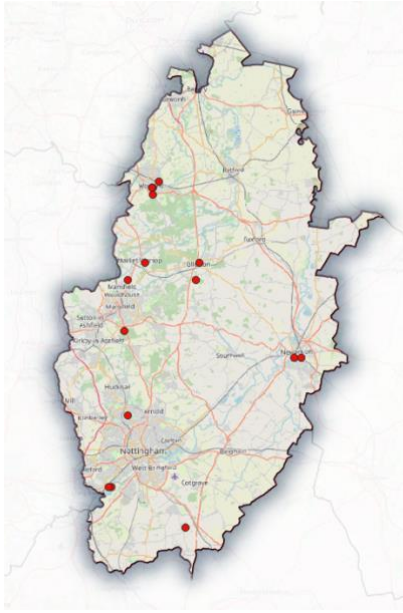
### *Larval Food plants*

Elm, Wych Elm, Sallows and other tree species

### *Recorded Distribution*

Until 2023 there had been 16 records for this species in Notts. Most are from the Mansfield – Sherwood Forest part of the County (Figure 73), the last of which is from 1916. Two time-isolated records from Attenborough in 1967 and 2003 are likely to relate to escaped or released individuals, or just possibly vagrants. So, it is likely that the species died out in Notts soon after 1916, and this is mirrored by evidence from surrounding counties.

However, in 2023 3 sightings of the species occurred in Notts, all by very experienced observers and one well supported by photographs. These observations were widely spaced, at West Leake, Eakring and near Retford. Enquiries yielded little corroborating evidence of a possible influx into surrounding counties; however, 3 dispersed sightings in a single season cannot be easily dismissed as releases, although this remains possible. So, we await further developments. A record of the very similar Scarce (Yellow-legged) Tortoiseshell, possibly a migrant, was reported from Lincolnshire in 2014 (Cawdell & Smith, 2021).



*Figure 73. Distribution of Large Tortoiseshell records for Notts up to 2022. Base Map Copyright OpenStreetMap contributors.*

## **Peacock *Aglais io***

### *Description and Status*

A large colourful nymphalid with prominent eyes on the tips of all the wing uppersides (Figure 74). Wingspans in the range 63-75mm with the females marginally larger although the sexes appear very similar otherwise. With the wings folded the black underwings are apparent. A common butterfly found right across Britain except for a few northern Scottish mountain tops, wanders widely.



*Figure 74. Peacock (left), underwing view (centre) and larvae (right).*

### *Annual cycle*

Seen on the wing year-round, Peacock hibernates as an adult during the coldest weather in winter. Emerging adults breed in the Spring and a single new generation appears from July onwards. The barrel-shaped eggs are laid in heaps in May, the larvae, which in their later instars are spiky and black, and are commonly seen in very large numbers on nettles in May-June. Pupation takes place in June-July as a large head-downward pupa is attached to a silk pad by the cremaster.

### *Habitat*

Rough ground or scrub, gardens, fields, woods, anywhere with nettles. Strong flying and mobile they can turn up anywhere.

### *Larval Food plants*

Stinging Nettle.

### *Recorded Distribution*

A very common butterfly across Notts since records began.

## *Comma **Polygonia c-album***

### *Description and Status*

The deeply scalloped orange and black wings of the Comma gives this butterfly an unmistakable outline when compared to other British butterflies (Figure 75). Wingspans vary between 50 and 64mm, the sexes are very similar. The specific name refers to the white comma mark located centrally on the brown hind underwing. Common across all of England and Wales and the eastern side of Scotland this species has experienced marked changes in abundance and distribution during the 20th Century. The summer brood often contains some examples of a short-lived brighter golden *hutchinsoni* form that produce normal adults by the autumn.





*Figure 75.  
Comma (left),  
underwing  
showing white  
comma mark  
(right).*

### *Annual cycle*

Can be seen flying in most months of the year, there are two broods after the over-wintering adults emerge each year. The first new brood emerges from June onwards with a second late autumn brood. Eggs laid on the upper side of nettle leaves pass rapidly through 5 instars the later ones having the spines and the rear half is coloured white. Comma pupates head-downwards in a cocoon attached to a silk pad spun on plant stems by the cremaster (a hook for this purpose on the tip of the abdomen). It resembles a crinkled dead leaf.

### *Habitat*

Gardens, fields, woodland clearings, scrubland.

### *Larval Food plants*

Stinging Nettle and Hop.

### *Recorded Distribution*

Common across the County in recent decades, nationally the species has experienced considerable fluctuations and around 1920 it was largely confined to the Welsh Borders and at this time it was considered as rare in Notts (Carr,1916). Brameld in Sterland (1875) notes it as only occasional in Sherwood Forest in 1859-74, although Carr (1916) suggests it was formerly not uncommon in the County in mid 19<sup>th</sup> Century.

## Lycaenidae – Blues and Coppers

Small, fast flying butterflies of the subfamilies Lycaeninae (Small and Large Copper) and the Polyommatainae (Blues and Arguses). The early stages of many species have a close association with ants, most blues have brown females and so exhibit marked sexual dimorphism.

### Common Blue *Polyommatus icarus*

#### *Description and Status*

A small butterfly with marked sexual dimorphism, the male has entirely blue overwings with pale grey-brown undersides studded with black and white eyespots and a submarginal row of orange crescents. The female by contrast has brown overwings with varying amounts of blue plus a row of submarginal eyespots with fringing orange crescents. Their undersides have a darker grey-brown colour than the males (Figure 76). Females are also well known for aberrant forms which can include blue varieties. Wingspans in the range 29-36mm. Common and widespread nationally except for mountainous areas,



*Figure 76. Common Blue, male (left), female (centre) and pair (right) with the female on the right showing darker colouration.*

#### *Annual cycle*

On the wing from May to October with a rapid succession of up to three broods, the main ones being in May-June and August-early September. Small, dimpled muffin-shaped eggs hatch into wood-louse shaped larvae (Sandars, 1939) these over-winter and progress through five instars before pupating on the ground possibly attended by ants.

#### *Habitat*

Unimproved grassland, brownfield sites, parks, gardens and woodland.

#### *Larval Food plants*

Bird's-foot Trefoil, Black Medick, Restharrow and Clovers.

### *Recorded Distribution*

A common butterfly in Notts since records began.

## **Silver-studded Blue *Plebejus argus***

### *Description and Status*

The wings of the sexes are blue in males and brown in females (Figure 77). The name derives from small silver highlights or 'studs' in the submarginal black ocelli of the males.



*Figure 77. Silver-studded Blue male (left), male underwing with silver studding arrowed © Samantha Batty (centre), and female (right).*

### *Annual cycle*

Single brooded flying in June-July, the species over-winters as an egg before hatching from mid-March onwards, the larvae and pupae are attended by the Black Ant *Lasius niger*.

### *Habitat*

Lowland heaths.

### *Larval Food plants*

Gorse and Broom plus heathers and legumes.

### *Recorded Distribution*

Classified as common in the Sherwood Forest area by Brameld (1875) there are several localities from that area mentioned by Carr (1916) including Clumber Park. A short note by Smith (1859) listed it as occurring close to the City of Nottingham, there is also and a single record from West Bridgford in 1908, this is the last record (Figure 78).

I understand however that the population at Clumber Park persisted well into the 1920's according to estate data held by the National Trust. There are currently hopes of re-establishing a colony at Clumber over the next decade. For several years there has been a re-introduced colony (believed to be by the late Martin White) at Lindrick Golf Course NW of Worksop, just over the border in South Yorkshire.



Figure 78. Distribution of Silver-studded Blue records for Notts. Base map Copyright OpenStreetMap contributors.

## Chalk Hill Blue *Polyommatus coridon*

### *Description and Status*

The Chalk Hill Blue has a pale blue-grey male and a brown female, it is normally restricted to Limestone and Chalk areas, a few individuals were spotted in summer of 2013 in South Notts (Figure 79). But, never otherwise considered as a Notts species.



Figure 79. Chalk Hill Blue male, East Leake area, late July 2013.  
©Brian Johnson and Kevin Gibbons.

### *Annual cycle*

Single brooded flying from mid-July until early September, this species over-winters as an egg, hatching into a larva in April, and finally pupating underground in an ant nest or cavity formed by ants, Thomas & Lewington, (2016).

### *Habitat*

Areas with calcareous soils developed on limestone of various ages and the Chalk Downlands of Southern England.

### *Larval Food plants*

Horseshoe Vetch, Kidney Vetch and Common Bird's-foot Trefoil.

### *Recorded Distribution*

There are 4 records from 4 locations in South Notts from July-August 2013 all observations are from amongst the County's most experienced recorders. This was a very warm dry period. One record is from Radcliffe on Trent, another from Owthorpe and two closely spaced sightings over 3 days, probably of a single male, come from the East Leake area. (Figure 79). The nearest colonies of the species at the time were in Rutland and near Stamford, Lincolnshire.

The spread of locations argues against a release event and favours some unusual intra-regional migration of a few individuals perhaps from a population explosion during the hot weather.

## **Holly Blue *Celastrina argiolus***

### *Description and Status*

A small blue butterfly with blue overwings and underwings in both sexes making this species unique amongst our blues. Wingspans are 26-34mm, the males have a thin black margin along most of the termen whilst the females have black borders to all overwing surfaces (Figure 80), though these are more extensive in the summer brood than in the spring generation. The underwings are uniformly pale blue with a pattern of small black dots, Small Blue is the only possible confusion species given an underwing view. Common across almost all of England, Wales except mountainous areas, and small coastal pockets of southern Scotland. Populations may be cyclical due to the parasitic wasp *Listrodomus nycthemerus*



### *Annual cycle*

Double brooded flying in April-early June and July-early September, in 2021 there were a few sightings in the East Midlands of a small third brood in mid-November, only time will tell if this trend continues. The small circular flattened eggs have a rough dimpled pattern and hatch into larvae. After four instars they pupate, those of the summer brood over-winter attached to vegetation by a silk girdle and by the cremaster (a hook on the tip of the pupa) to a silk pad.



*Figure 80. Holly Blue, female summer generation (left), male (centre) and underwing view of female (right).*

### *Habitat*

Diverse habitats wherever the food plant is present, farmland, woods, hedgerows, gardens and parks.

### *Larval Food plants*

Mainly Holly in spring and Ivy later in the year but also many other shrubs in Spring.

### *Recorded Distribution*

There are very few records of Holly Blue before 1990 in Notts, after which the species gradually became common and quickly spread across the whole County. A similar pattern was observed in Lincolnshire (Cawdell & Smith 2021). The normalised record numbers suggest a possible modest decline in the 2000's but the species is now well established (Figure 81). This expansion of the range of Holly Blue northwards was part of a nationally recognised trend.

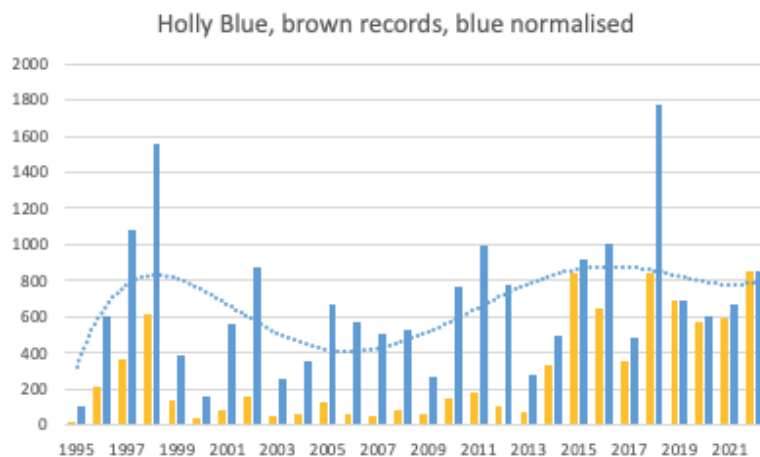


Figure 81. Holly Blue 1995-2022 Annual record totals in brown and normalised values with a trendline in blue.

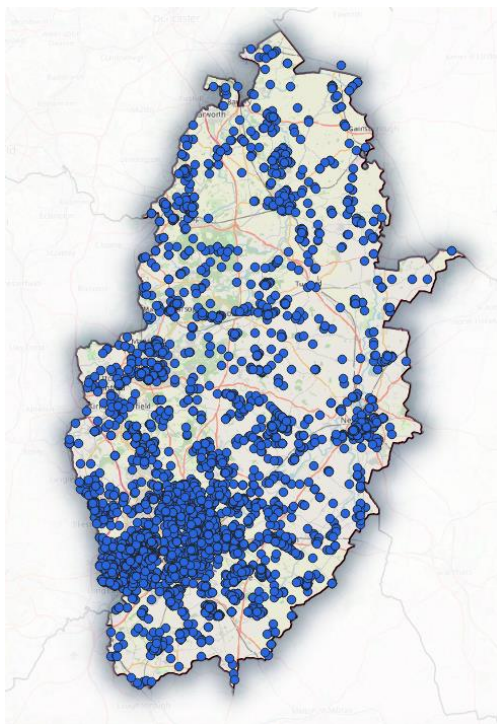


Figure 82. Distribution of Holly Blue records, almost all are since 1990. Base map Copyright OpenStreetMap contributors.

The distribution of records (Figure 82) of this cosmopolitan species is largely a reflection of where people live and go to record butterflies rather than any specific habitats.

### Small Blue *Cupido minimus*

#### *Description and Status*

A small sooty coloured butterfly with bluish tinges to the wings of the male, the underwings are pale blue with small black dots (Figure 83). One of the smallest British species with wingspans in the range 18-27mm. Forming small discrete colonies in a variety of habitats. Formerly common across Britain it was never regarded as a Notts species, also known as the Little Blue.



*Figure 83. Small Blue (left) and underwing view (right).*

#### *Annual cycle*

Usually has two broods the main one from late May to July, with a second weaker emergence in August. This species over-winters as a larva.

#### *Habitat*

Grassland on Brownfield sites, Chalk Downland, sand dune belts and areas with calcareous soils developed on limestone.

#### *Larval Food plants*

Kidney Vetch.

#### *Recorded Distribution*

There is a single supposed record in 1874 from Ollerton, Carr (1916) clearly doesn't accept it as a species that occurred in Notts although he mentions Howitt's Book of the Seasons that said it was infrequent in the County! I have searched this source without success to try and establish the veracity of this claim. Formerly widespread in Britain, except parts of the Midlands, it is today more restricted to South Wales, some coastal parts of NE Scotland, Cumbria, the South Midlands and Southern England.

In the last couple of years there has been an introduced population at Pleasley Pit just over the border in Derbyshire and in 2023 reports from Newstead-Annesley Country Park presumably another introduction.

### **Brown Argus *Aricia argestis***

#### *Description and Status*

A small brown butterfly with wingspans in the range 25-31mm, both sexes are similar. In overwing view it can be separated from the female Common Blue (the only likely confusion species in Notts) by the sharp angular shape of the forewing, lack of any blue suffusion in

the wings, the straightness of the costa, the clear crisp wide white borders and the strong discal spots in the male which may contain white rims (Figure 84). The most characteristic feature though is apparent on the hindwing underside with a double dot 'colon' mark present midway along the costa. Additionally, there are no spots in the basal parts of the underside of the forewing, but these are present in Common Blue. Restricted to southern and eastern England, and parts of the Welsh coast, parts of northern England and Scotland.



*Figure 84. Brown Argus adult (left) and underwing view (right).*

### *Annual cycle*

Double brooded with spring (May-June) and summer (August-September) generations. Brown Argus over-winters as a larva. The doughnut shaped eggs hatch and pass through 5 instars before pupating on the ground possibly attended by ants.

### *Habitat*

Classically the species is one of dry calcareous (Chalk and Limestone) grasslands although other well drained habitats such as heaths, woodland clearings, old quarries, disused railways and brownfield sites are used.

### *Larval Food plants*

Mainly Common Stork's-bill and Dove's-foot Crane's-bill in the Midlands, elsewhere, and especially on limestone and chalk bedrock, Common Rock-rose,

### *Recorded Distribution*

There are few reliable records of the species in Notts before 1995. It is not mentioned by Brameld in Sterland (1875) nor in Carr (1916). Looking at the distribution in Heath, Pollard & Thomas (1984), compared to more recent distributions e.g., Eeles (2019), the species has expanded considerably up the eastern side of England to North Yorkshire. Part of this expansion included the establishment of the species in Notts in the late 1990's.



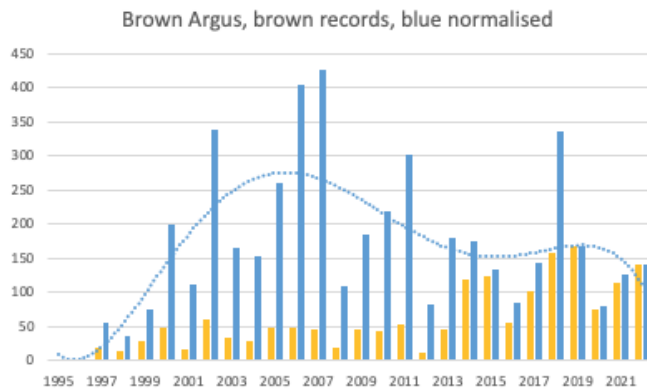


Figure 85. Brown Argus Record totals 1995-2022. Brown actual record totals, blue normalised totals with trendline.

The plot of records with normalised values and trendline suggests a rapid colonisation of the County that has now led to a stable population (Figure 85).

## Small Copper *Lycaena phlaeus*

### Description and Status

An attractive small butterfly with striking orange forewing panels, the sexes are very similar although the females are on average about 10% larger. Overall wingspans are in the range 26-40mm. The undersides are paler and provide a degree of camouflage (Figure 86). A common butterfly throughout Wales, almost all of England and parts of Scotland.



Figure 86. Small Copper, adult (left), underwing view (centre), common aberration *caeruleopunctata* with sub-marginal blue spots on the hindwings (right).

### Annual cycle

On the wing almost continuously from late April until October over which time three broods spring, summer and autumn, are usually achieved. The species over-winters as a larva. The eggs are unusual with a polygonal pattern of raised ridges separated by pits. The larvae have five instars, the later ones being green and sometimes with purple stripes. The pupa



attaches itself to loose vegetation on the ground by means of the cremaster and a silk pad, plus a silk girdle.

### *Habitat*

A wide range of warm, dry, and open habitats are favoured where the larval food plant is present, this may variously include woodland clearings, heaths, farmland, parks and gardens.

### *Larval Food plants*

Sheep's and Common Sorrel.

### *Recorded Distribution*

Widely distributed across Notts since records began. Common in Sherwood Forest and surrounds (1859-74) as reported by Brameld in Sterland (1875). Carr (1916) states it is common and universal but most common on the dry well-drained soils developed on what we now call the Sherwood Sandstone as opposed to heavier, damper, clay-dominated soils that characterise many other parts of the County.

## **Large Copper *Lycaena dispar***

### *Description and Status*

Extinct in Britain since 1864 an attractive species with clear differences in markings and size between the sexes (Figure 87).



*Figure 87. Large Copper, pinned specimens from captive-bred continental stock showing overwings (above) and underwing views (below) with the slightly smaller males are on the left and females to the right.*

### *Annual cycle*

Single brooded flying in June-July in western Europe and over-wintering as a larva.

### *Habitat*

Fenland and other damp habitats.

### *Larval Food plants*

Water Dock.

### *Recorded Distribution*

There are no records for Notts, however there was a colony in the mid 19<sup>th</sup> Century at Morton Carrs near Gainsborough on the eastern bank of the Trent (Duddington & Johnson 1983). As the river is only about 100m wide with the centreline forming the county boundary, and similar habitats occur on both banks, it would be perfectly reasonable to assume that this species did at that time also occur in places on the Notts bank.

Formerly present in the Fens around the Wash Embayment and the Norfolk Broads. Still present on the Continent, several re-introductions have been attempted in Britain most notably at Woodwalton Fen, Cambs, where after many attempts to try and establish a sustainable population the initiative was finally abandoned in the 1990s (Thomas & Lewington, 2016; Eeles, 2023).

## Lycaenidae – Hairstreaks

Comprising the subfamily Theclinae these are small active butterflies with short hindwing tails, they tend to rest with their wings folded displaying the underwings. There are five British species, three of which occur naturally in Notts at present. Most spend much of their time flying high in the canopy and so are rarely seen and they are almost certainly under-recorded. They are single-brooded and most over-winter as eggs, in some species the larvae and pupae are known to interact with ants.

### Black Hairstreak *Satyrrium pruni*

#### *Description and Status*

Black Hairstreak is a rare species, for many years restricted to a belt of countryside stretching from Oxfordshire and Buckinghamshire north-eastwards through Northamptonshire to Cambridgeshire and Rutland. The sexes are similar with wingspans ranging from 34-40mm, with the wings spread open it is mainly brown, with some sub-marginal orange that is more extensive in the female. With the wings folded a thin, almost straight, white line is apparent crossing both wings and the submarginal areas are orange with black spots, again these are more extensive in the female.



Figure 88. Male Black Hairstreak.

#### *Annual cycle*

Black Hairstreak is single-brooded (univoltine) with a very short flight season, usually restricted to June and early July. The eggs have a doughnut shape with an uneven surface, they are usually laid singly near the buds of blackthorn twigs, these over-winter before hatching into larvae from March onwards. Finally, it pupates on the upper surface of blackthorn leaves mimicking bird droppings and is attached by a silk pad (Eeles, 2019). After a few weeks the adult emerges.

### *Habitat*

Hedgerows and woodland with Blackthorn.

### *Larval Food plants*

Principally Blackthorn.

### *Recorded Distribution*

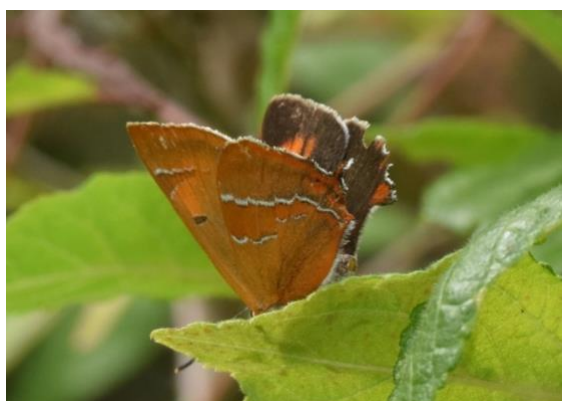
There are only a couple of records of 'Black Hairstreak' from Notts both predate 1884, one from Ollerton and another near Newark, the latter may relate to Stapleford Wood which is in fact mainly in Lincolnshire.

However, matters are complicated by the fact that the White-letter Hairstreak, which has always been common in Notts, was not recognised as a species distinct from the Black Hairstreak until 1828, and through much of the 19<sup>th</sup> Century some White-letter Hairstreaks were called Black Hairstreaks by assorted authors. So, it is unlikely that Black Hairstreak has ever been a naturally occurring Notts species. There is a single recent record with a photograph of Black Hairstreak from Cotgrave Forest (July 23), this is believed to be an introduction (Appendix C).

## **Brown Hairstreak *Thecla betulae***

### *Description and Status*

The largest British Hairstreak, the sexes are similar, but the female is slightly larger, adult wingspans are in the range 36-45mm. With the wings open they are mainly brown but females can be distinguished by prominent patches of orange on the forewing. The tails of both sexes are also orange. The underwings are yellow-brown traversed by white-edged orange streaks (Figure 89). Formerly quite widespread nationally, it is now confined to pockets in Southern England, the Midlands and Southwest Wales (mainly Pembrokeshire). The nearest colonies to Notts are in Lincolnshire and Worcestershire.



*Figure 89. Brown Hairstreak.*

### *Annual cycle*

The Brown Hairstreak is single-brooded (univoltine) and flies from July-September appearing later than the other British hairstreaks. The eggs are globular, pitted and white, so are relatively easy to spot in the forks of dark blackthorn branches, they are often laid in small groups. The larvae hatch from late April onwards and go through 4 instars before pupating in the leaf litter, or in a crack in the ground, where they may become buried and tended by ants.

### *Habitat*

Hedgerows and woodland with Blackthorn.

### *Larval Food plants*

Principally Blackthorn.

### *Recorded Distribution*

Eakring Birds (2017) stated.

*interesting records are from Duke's Wood and/or Dilliner Wood on 26/01/2005 and 11/04/2005. Both records would refer to eggs, which no local naturalist would ever be likely to consider looking for in Nottinghamshire. The third record would refer to at least one adult Brown Hairstreak, with the record coming from the same general area of Dukes Wood and/or Mansey Common on 31/08/2005..... and a potential release of captive stock at woodland in the Southwell area a few years ago.*

Apart from these records and a poorly documented record from Sherwood Forest in 1874, there are no other records from Notts prior to 2023. It may have also been present in South Yorkshire in the early 19<sup>th</sup> Century (Frost, 2005). A recently introduced colony at Pleasley Pit lies in Derbyshire, but very close to the county boundary. Brown Hairstreak eggs have recently been reported from Cotgrave Forest (Jan 2023), these are also believed to have been introduced (Appendix C).

## **Green Hairstreak *Callophrys rubi***

### *Description and Status*

Across its pan-European distribution the Green Hairstreak occurs at altitudes ranging from sea-level to 2500m and utilises up to 50 different host plants, so it is a very flexible species in terms of its habitat and food requirements. A small butterfly with a wingspan of 27-34mm, it has green underwings (Figure 90), and it is almost always seen with the wings closed, tails are lacking. The green colour of makes it unmistakable as our only green butterfly. By contrast the upper wing surfaces are a uniform dark brown that is usually only



seen in pinned museum specimens. With wings closed the sexes cannot easily be separated on their appearance. Currently widely distributed in the southern half of the County.



*Figure 90. Green Hairstreak.*

### *Annual cycle*

Green Hairstreak is single-brooded (univoltine) with a flight season in recent years of late April to mid-June, texts from about 50 years ago indicate May-June so in common with many species the flight season has become earlier presumably in response to a warming climate. The higher altitude populations in Charnwood (Leics) and the Peak District (Derbs) tend to have a slightly earlier flight season. The flight season is much earlier than all the other British hairstreaks that tend to peak in July-August. Green Hairstreak over-winters and spends a very large part of the year in the pupal stage. The females lay the doughnut-like eggs on the local host plants and then, after a few days, these hatch into larvae. They then grow and undergo a rapid series of moults (instars), pupation takes place over the summer.

### *Habitat*

Across the East Midlands the Green Hairstreak occupies a diverse array of habitats stretching from moorland and heathland, old quarries and former brownfield sites all characterised by thin or no soil cover and disturbed ground. It is postulated by some that the ant *Myrmica sabuleti* may play a role through interactions with the larvae and/or the pupae and so the presence of this ant species might also control suitable locations.

### *Larval Food plants*

In Notts Common Bird's-foot Trefoil is the only recorded host plant, although elsewhere in the East Midlands Gorse, Bilberry and Common Rock-rose are also used (Mathers, 2022).

### *Recorded Distribution*

Records from Notts go back to the mid 19<sup>th</sup> Century but the species has never been widespread or abundant, of over 300 records only 13 are pre 2002 (Figure 91).

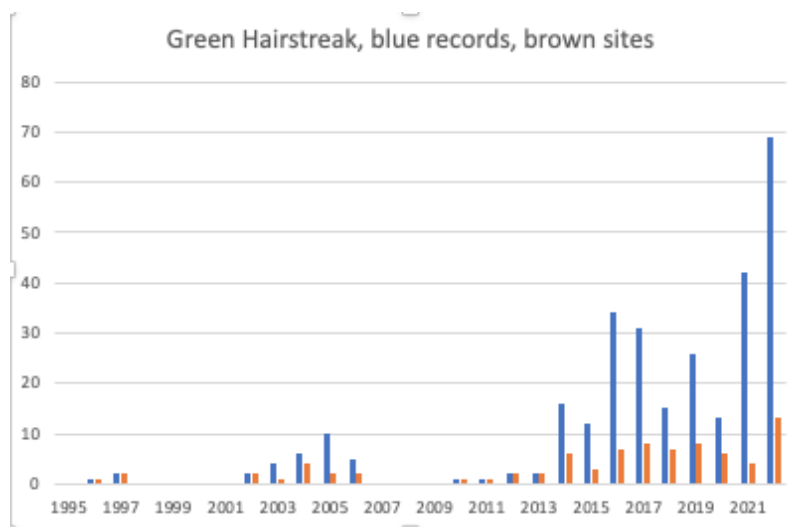


Figure 91. Green Hairstreak records and sites 1995-2022.

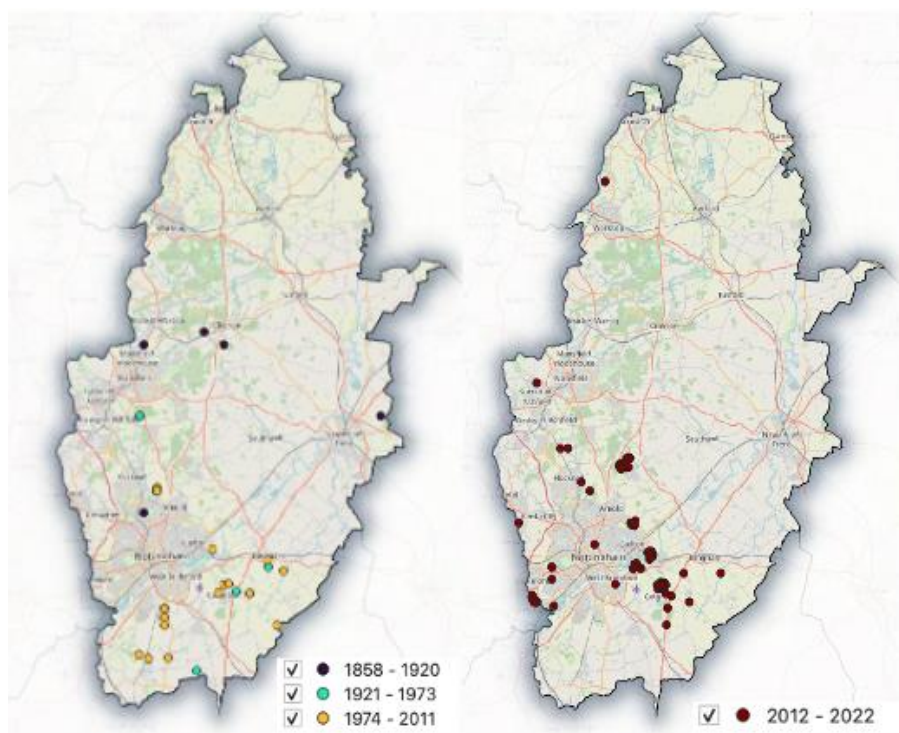


Figure 92. Distribution of Green Hairstreak records for several time intervals. Base map Copyright OpenStreetMap contributors.

Based on the available records there appears to have been a shift in the siting of many of the colonies around the City of Nottingham over the first two decades of this century (Figure 92). Green Hairstreak was formerly found at sites like Rushcliffe Country Park but there are almost no recent records. Rather, it is now found at a series of former colliery and industrial sites around Nottingham many of which have been designated as country parks or reserves. These include Calverton Pit, Gedling Country Park, Netherfield Lagoons, Skylarks NWT Reserve at Holme Pierrepont, Cotgrave Country Park and Toton Sidings. In 2023 a single Green Hairstreak was recorded on a further brownfield site at Ollerton well away from any other 21<sup>st</sup> Century records. In all these cases past disturbance of the ground or tipping of waste materials has resulted in there being thin, or no, soil cover. The impression is that Green Hairstreak is currently thriving and spreading in the County.

## Purple Hairstreak *Favonius quercus*

### *Description and Status*

This hairstreak is named for the purple sheen on the upper surfaces of the wings which unfortunately are rarely seen. The female has much less purple (Figure 93), the underwings are mainly grey-brown with a fine white line and a pair of orange eyespots on the hindwing (Figure 93), the sexes are similar. The overall wingspan range of adults is 31-40mm with the female more variable in size. Widely distributed in England, Wales, and parts of Scotland. It has been a resident species in Notts since records began. As the species name suggests it has a strong affinity with Oak.



Figure 93. Purple Hairstreak (left), female overwing view ©Brian Johnson (centre), and eggs laid adjacent to Oak buds ©Nicholas Brownley (right).

### *Annual cycle*

Purple Hairstreak is single-brooded flying in July and August, it lays sea-urchin like eggs at the base of oak buds, these over-winter before hatching as the buds burst and then go through 4 instars before pupating in the soil or in a nest tended by ants. The pupa is not attached. The adults emerge from July onwards (Eeles, 2019).

### *Habitat*

Mature deciduous and mixed woodland with Oak also large parks and country estates with oaks.

### *Larval Food plants*

Oak is the main larval food plant.

### *Recorded Distribution*

There are over 750 records of the species up to 2023, with 126 of these pre-dating 1995. Given the difficulty of recording hairstreak species we should not read too much into any trends that are apparent from general county-wide recording efforts. The number of sites

the species has been recorded from (1995-2022) is shown in brown in Figure 94 and suggests that the species is stable and well established.

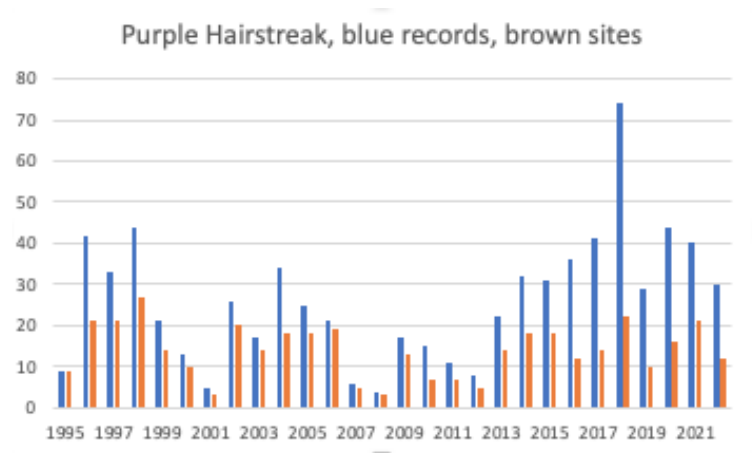


Figure 94. Purple Hairstreak records and sites 1995-2022.

The distribution of records (Figure 95) corresponds well with the presence, and former presence, of deciduous-mixed woodland and parkland with oaks across the County.

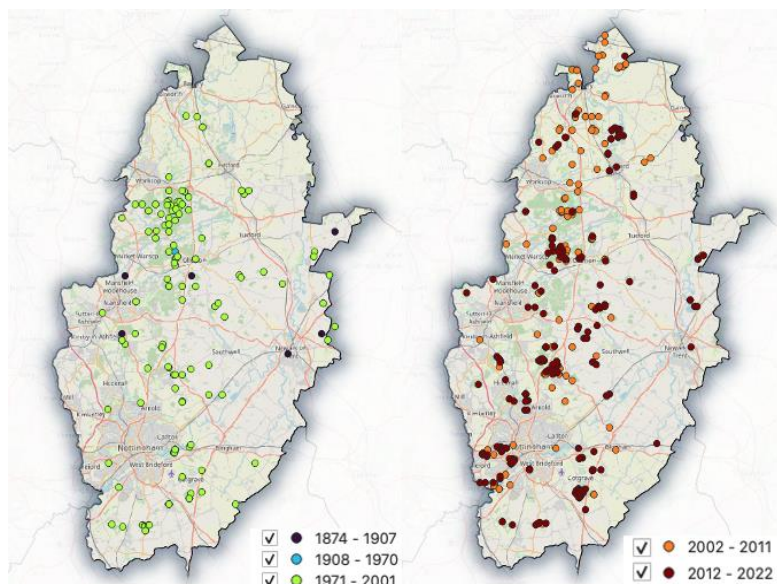


Figure 95. Purple Hairstreak records for various time intervals. Base map Copyright Open StreetMap contributors.

## White-letter Hairstreak *Satyrion w-album*

### Description and Status

The smallest of our Hairstreaks with wingspans in the 25-36mm range, the upper wings are uniformly brown. Named for the white letter W of the white line seen towards the base of the hindwing underside (Figure 96). This is another hairstreak that spends much of the time flying high in the tree canopy, especially around Elms, the main host plant. Believed to have always been present in Notts it is however sparsely recorded. Known for at least the first half of the 19<sup>th</sup> Century as the 'black hairstreak' care is needed in interpreting records of both species from that period.



*Figure 96. White-letter Hairstreak (left), egg laid adjacent to an Elm girdle scar ©Nicholas Brownley (right).*

### *Annual cycle*

White-letter Hairstreak is single brooded (univoltine) and flies from mid-June to mid-August. It lays eggs that have been described as flying-saucer shape on the branches of Elm often on the girdle scar (Figure 96) that denotes the start of the new-year's growth (Eeles, 2019). The larvae hatch from March onwards and have 4 instars before pupating on the Elm leaves attached by a silk pad and girdle. The adults emerge after a few weeks.

### *Habitat*

Deciduous and mixed woodland with Elms.

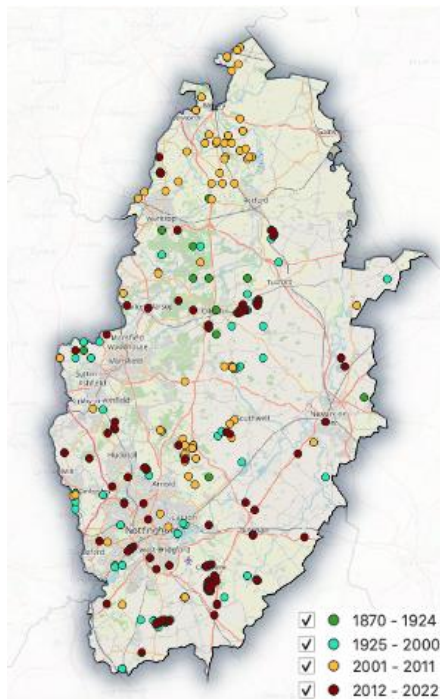
### *Larval Food plants*

Elm is the main larval food plant, the loss of Elms due to Dutch Elm disease in the late 20<sup>th</sup> Century can hopefully be now reversed by the planting of new disease-resistant variants.

### *Recorded Distribution*

There are almost 500 records of the species in Notts with 13 from the 19<sup>th</sup> Century. The recent pattern of White-letter Hairstreak records reflects the distribution of woodland and parkland with Elms that survived the Dutch Elm disease outbreak (Figure 97). It will be interesting to monitor the distribution of the species now that disease-resistant Elm varieties are being planted widely on nature reserves, public land and estates. The impression, at present though, is that the species is stable and widespread. The extensive mapping of the species between 2001-11 in the very north of the County mainly relates to the efforts of Barry Prater and colleagues.





*Figure 97. White-letter Hairstreak records for various time intervals. Base map Copyright OpenStreetMap contributors.*

## Thanks

The author wishes to thank Dr Zoë Randle (Butterfly Conservation) for the provision of an all-time butterfly data download for Notts up to 2019 and my predecessor Suzanne Halfacre for copies of her Notts master record lists for 2019 and 2020. Another major source of data was a download from iRecord of all Notts butterfly records, these records are mainly from 2010 onwards, but some useful older data was discovered that was not found in the other datasets. Rob Johnson at the Notts Biological and Geological Records Centre provided data on all the pre-1970 butterfly records for the County which yielded a small number of significant additional records. Data for 2021-23 is from my own compilations.

I thank Karen Purdy (Butterfly Conservation) for enhancing my rusty GIS skills through an excellent online course in Spring 2022, this was developed from initial materials by Patrick Cook. Dr Richard Fox (Butterfly Conservation) has provided helpful discussions and advice whilst Dr Jamie Wildman supplied data on the Chequered Skipper from his recent PhD Thesis. Dr Will Langdon (University of Oxford) offered his thoughts on recent sightings of Large Tortoiseshell in the County. Dr Sheila Wright (Nottingham City Council) arranged access to the butterfly collections held at Wollaton Hall Nottingham, whilst Jane Broomhead enabled viewing of the Pegler Collection at the Bassetlaw Museum in Retford.

I also thank colleagues Bill Bacon, Mark Searle, Trevor Pendleton, Dennis Dell and Richard Jeffery (Butterfly Recorder for Leicestershire & Rutland) for useful discussions about recording butterflies in the East Midlands. Helpful comments on a final draft of this work were received from Brian Johnson, Neil Pinder, Nicholas and Samantha Brownley, Mark Searle, Phil Cadman, Jennie and David Harrison, Michael Walker and Roger Freestone.

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## Recommended Reading

For a detailed description of life cycles and especially early stages of British butterflies I recommend Eeles (2019), this is up to date, extensively illustrated, and well designed.

For British Butterflies in general I recommend Thomas & Lewington (2016). Make sure you get the 2016 revised edition as this title first appeared in 1990. A good read and nicely illustrated by the incomparable Richard Lewington.

For full titles of these two works see the References below.

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## Appendix A: List of naturally occurring Butterflies in Nottinghamshire 1850-2023

Large White  
Small White  
Green-veined White  
**Black-veined White**  
Orange-tip  
Brimstone  
Clouded Yellow *migrant*  
Pale Clouded Yellow *former rare migrant*  
**Marsh Fritillary**  
Silver-washed Fritillary  
Dark Green Fritillary  
**High Brown Fritillary**  
**Pearl-bordered Fritillary**  
**Small Pearl-bordered Fritillary**  
Comma  
Small Tortoiseshell  
**Large Tortoiseshell**  
Peacock  
Red Admiral *migrant now part resident*  
Painted Lady *migrant*  
Purple Emperor  
Camberwell Beauty *rare migrant*  
Marbled White  
Speckled Wood  
**Wall**  
**Grayling**  
Meadow Brown  
Gatekeeper  
Ringlelet  
Small Heath  
Green Hairstreak  
Purple Hairstreak  
White-letter Hairstreak  
Small Copper  
**Large Copper**  
**Silver-studded Blue**  
Chalk Hill Blue *rare regional migrant?*  
Brown Argus  
Common Blue  
Holly Blue  
Dingy Skipper  
Grizzled Skipper  
Large Skipper  
Small Skipper  
Essex Skipper  
**Chequered Skipper**

46 Species in Total, 11 now Extinct in Notts (in bold type).

*Also reported but very doubtful that they ever occurred naturally in Notts*

Black Hairstreak  
Brown Hairstreak  
Monarch  
Small Blue  
White Admiral  
Large Heath  
Swallowtail  
Wood White

54 Species in Total.

*Species on the current 'British list' but never reported from Notts*

Silver-spotted Skipper  
Lulworth Skipper  
Glanville Fritillary  
Heath Fritillary  
Duke of Burgundy  
Adonis Blue  
Large Blue  
Northern Brown (Mountain) Argus  
Scotch Argus  
Mountain Ringlet

## **Appendix B: Brameld's List of butterflies recorded in Sherwood Forest and surrounding area 1859-74.**

Large White *Common*  
Green-veined White *Common*  
Small White *Common*  
Orange-tip *Common*  
Brimstone *Occasional*  
Clouded Yellow *Rare*  
Silver-washed Fritillary *Rare*  
Dark Green Fritillary *Formerly Common*  
High Brown Fritillary *Very Common at Clumber*  
Pearl-bordered Fritillary *Very Common*  
Small Pearl-bordered Fritillary *Very Common*  
Comma *Occasional*  
Small Tortoiseshell *Common*  
Large Tortoiseshell *Occasional*  
Peacock *Occasional*  
Red Admiral *Common*  
Painted Lady *Common some years*  
Purple Emperor *Rare*  
Marbled White *Occasional*  
Speckled Wood *Local*  
Wall *Common*  
Grayling *Formerly Common near Mansfield*  
Meadow Brown *Common*  
Gatekeeper *Common*  
Ringlet *Common*  
Small Heath *Common*  
Green Hairstreak *Common near Mansfield*  
Purple Hairstreak *Common*  
White-letter Hairstreak *Rare*  
Small Copper *Common*  
Silver-studded Blue *Common*  
Common Blue *Common*  
Dingy Skipper *Rare*  
Large Skipper *Common*  
Small Skipper *Common*

35 in Total

## **Appendix C: List of Species known to have been introduced or re-introduced at sites in Nottinghamshire and immediate environs.**

Purple Emperor (Cotgrave Forest, Wellow)  
White Admiral (Eaton-Gamston Woods)  
Silver-studded Blue (Lindrick)  
Mazarine Blue (Poulter) as described by White (2020)  
Small Blue (Pleasley, Newstead-Annesley CP)  
Brown Hairstreak (Pleasley, Cotgrave Forest, Freckland Wood?)  
Black Hairstreak (Cotgrave Forest)  
Dark Green Fritillary (Cotgrave Forest, Clumber)  
Silver-washed Fritillary (Cotgrave Forest, Sherwood Forest, Eaton-Gamston Woods)  
Large Copper (Sherwood Forest, Carr Vale)  
Dingy Skipper  
Grizzled Skipper (Ticknall)  
Swallowtail (Blidworth)  
Black-veined White  
Marsh Fritillary  
Marbled White (Portland Park)  
Wood White  
Large Tortoiseshell (Loscoe, West Leake Hills?)

## Appendix D: Notable former Butterfly recorders in Nottinghamshire.

Genealogical research by Anne Mathers.

### Miss E.M. Alderson – Lady Robinson (1869-1944)

Eveline Maude Alderson was born in Worksop in 1869 and grew up at Park House on Park Street (now a listed building). Her father was a brewer. Together with her slightly elder brother the **Rev Ellerton. G. Alderson** she recorded butterflies and other insect groups in the Sherwood Forest area for many years. Both she and her brother provided much useful information for Carr's 1916 account. In 1911 aged 42 she married the then owner of Worksop Manor, Sir John Robinson who was a 71-year-old widower, Sir John was an industrialist who amongst other activities founded the Home Brewery in Nottingham and was very keen on country sports including hunting and racehorses. Sir John died in 1929 and is buried in an alabaster canopied tomb in St Anne's Church in Worksop, the church that he had built in 1911. There is also a plaque to Lady Robinson in the church, she outlived her husband moving to Kirklington Hall. She died in 1944 and is buried in Redhill Cemetery.

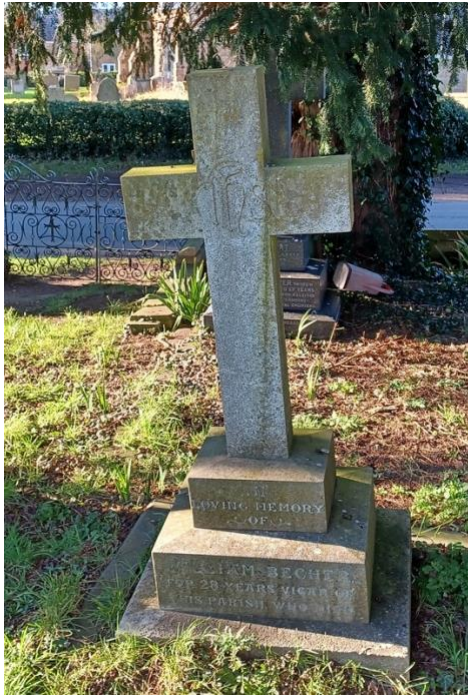


*Marriage of Sir John Robinson and Eveline Alderson in 1911.*

### Rev W. Becher (1852-1914)

Born In Southwell, the son of a vicar, he studied at Trinity College Cambridge. He started recording butterflies in the 1870s, including useful observations and collecting during the Clouded Yellow - Pale Clouded Yellow influxes of 1877 and 1881. He married at Southwell Minster aged 26 and then lived for a time on the Isle of Wight but became a widower in 1880 age 29. His short marriage had produced a daughter in 1879, he never re-married. He returned to Notts living at Ollerton and Wellow where was the Vicar for 28 years. He continued to record butterflies and supplied many of the records cited by Carr (1916). He died at Wellow in 1914 and is buried in the churchyard.





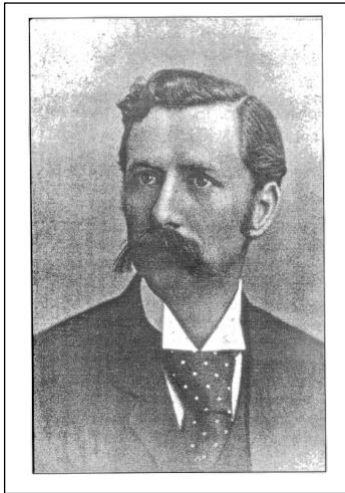
*The grave of William Becher at Wellow Church. ©Jane Broomhead.*

### **R.E. Brameld (1844-1905)**

Richard Edwardes Brameld was born in London in 1844 and by 1859 he and his family had moved to Mansfield. Aged 23 he married in 1867 and moved to Retford where he became a Bank Manager. By 1901 he had returned to the south living in Brockenhurst in the New Forest where he died in 1905 aged 61. From age 15 Brameld recorded the butterflies of Sherwood Forest and surrounding area until at least 1874. His list of species forms an attachment to the chapter of zoology of that area by Sterland (1875). Brameld's list is regarded as more reliable than Sterland's own account (he was primarily a bird watcher) which seems to have been based largely on the collections of John Trueman of Edwinstowe. Many of the species Sterland cites from Sherwood are almost certainly specimens taken by Trueman elsewhere in the country e.g., Adonis Blue as Carr (1916) and others have stated.

### **Professor John Wesley Carr (1862-1939)**

Born in Wetherby, his family then moved to Cambridge where he was educated at Emmanuel College. Shortly after obtaining his degree, he moved to Nottingham where he was attached to the University College for seven years as Lecturer in Natural Sciences and then for 34 years as Professor of Pure Biology. He also acted as Director of the Nottingham Natural History Museum at Wollaton Hall. He was responsible for building up the collections and establishing the Museum's reputation. Carr was a keen botanist and entomologist. His greatest claim to fame is as the compiler of *The Invertebrate Fauna of Nottinghamshire*, containing 618 pages, it was published in 1916, and a supplement containing 287 pages in 1935. In producing these works he was assisted by many members of the Nottingham Naturalist's Society, of which he was at one time Honorary Secretary, and at another, President.



*John Wesley Carr.*

**A.R. Leivers (1873-1958)**

Abraham Roberts Leivers was born in Nottingham in 1873 where he lived most of his life. He married aged 33 in 1907. He was a chartered account and keen butterfly enthusiast his observations are extensively referenced by Carr (1916). He visited Argentina for 3 months in 1920-21. He resides for a time in London before retiring back to Nottinghamshire, he died in Southwell in 1958 leaving the then substantial sum of almost £130,000.

**Rev. A. Thornley (1855-1947)**

Rev. Alfred Thornley was born near Preston in 1855; educated at Manchester Grammar School, and Merton College, Oxford. President of the Nottingham Naturalists' Society, 1897-99; President of the Lincolnshire Naturalists' Union, 1900-1901. His records are widely cited by Carr (1916), he wrote an obituary for Carr in 1939. Formerly Curate of Kimberley, Notts, and St. Anne's, Nottingham; Vicar of South Leverton from 1885 and a member of the Southwell Diocesan Conference. He later moved to Cornwall where he died in 1947.

**Rear Admiral Arthur David Torlesse CB, DSO. (1902-1995)**

Born in 1902 in Bognor Regis Arthur David Torlesse was the son of a naval officer and served in the First and Second World Wars and the Korean War. In 1952, he commanded the task force that supported Operation Hurricane, the first British nuclear weapons test off NW Australia. He retired in 1954 and became a well-known butterfly enthusiast in Hampshire. He visited his daughter in Nottingham in 1960, she was then living in Burton Joyce, and whilst there he recorded several butterflies.



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*Rear Admiral Torlesse*

## Appendix E: Common and scientific names of Larval Foodplants mentioned in the text.

Agrimony *Agimonia eupatoria*  
Alder Buckthorn *Frangula alnus*  
Annual Meadow Grass *Poa annua*  
Bilberry *Vaccinium myrtillus*  
Blackthorn *Prunus spinosa*  
Black Medick *Medicago lupulina*  
Broom *Cytisus scoparius*  
Buckthorn *Rhamnus cathartica*  
Cabbages *Brassica spp.*  
Charlock *Sinapis arvensis*  
Clovers *Trifolium spp.*  
Cock's-foot *Dactylis glomerata*  
Common Bird's Foot Trefoil *Lotus corniculatus*  
Common Mallow *Malva spp.*  
Common Rock-rose *Helianthemum nummularium*  
Common Sorrel *Rumex acetosa*  
Common Stork's-bill *Erodium cicutarium*  
Couch Grasses *Elymus spp.*  
Creeping Cinquefoil *Potentilla reptans*  
Cuckooflower *Cardamine pratensis*  
Devil's bit Scabious *Succisa pratensis*  
Dove's-foot Crane's-bill *Geranium molle*  
Elm *Ulmus spp.*  
False Brome Grass *Brachypodium sylvaticum*  
Fennel *Foeniculum vulgare*  
Fescue Grasses *Festuca spp.*  
Foxglove *Digitalis purpurea*  
Garlic Mustard *Alliaria petiolata*  
Goat Willow *Salix caprea*  
Gorse *Ulex europeaus*  
Grey Willow *Salix cinerea*  
Hairy Brome Grass *Bromopsis ramosa*  
Hare's-tail Cottongrass *Eriophorum vaginatum*  
Hawthorn *Crataegus spp.*  
Heathers *Calluna* and *Erica spp.*  
Hedge Mustard *Sisymbrium officinale*  
Holly *Ilex spp.*  
Honesty *Lunaria annua*  
Honeysuckle *Lonicera periclymenum*

Hop *Humulus lupulus*  
 Horseshoe Vetch *Hippocrepis comosa*  
 Ivy *Hedera spp.*  
 Kidney Vetch *Anthyllis vulneraria*  
 Lucerne (alfalfa) *Medicago sativa sativa*  
 Meadow Foxtail *Alopecurus pratensis*  
 Meadow Grasses *Poa spp.*  
 Meadow Vetchling *Lathyrus pratensis*  
 Milkweed *Asclepias spp.*  
 Milk Parsley *Thysselinum palustre*  
 Nasturtium *Tropaeolum majus*  
 Oak *Quercus spp.*  
 Pansies *Viola spp.*  
 Plantains *Plantago spp.*  
 Primroses *Primula spp.*  
 Radishes *Raphanus spp.*  
 Restharrow *Ononis spp.*  
 Sallows *Salix spp.*  
 Sheep's Fescue Grass *Festuca ovina*  
 Sheep's Sorrel *Rumex acetosella*  
 Stinging Nettle *Urtica dioica*  
 Thistles mainly *Carduus* and *Cirsium spp.*  
 Timothy *Phleum pratense*  
 Tuberous Pea *Lathyrus tuberosus*  
 Tufted Vetch *Vicia cracca*  
 Turnips *Brassica rapa*  
 Violets *Viola spp.*  
 Viper's Bugloss *Echium vulgare*  
 Water Dock *Rumex hydrolapathum*  
 Wild Carrot *Daucus carota*  
 Wild Strawberry *Fragaria vesca*  
 Winter Cresses *Barbarea spp.*  
 Wood Sage *Teucrium scorodonia*  
 Wych Elm *Ulmus glabra*  
 Yorkshire Fog *Holcus lanatus*

## **Appendix F: Brief Glossary of some technical terms mentioned in the text.**

**Apex:** The corner of a butterfly wing between the costa and the termen.

**Costa:** The leading edge of the wing.

**Cremaster:** one or more hooks structures on the tip of a pupa by which it can be attached to a substrate.

**Hibernaculum:** A protective shroud formed from a folded leaf in which a larva can spend the winter, usually closed and attached by silk threads.

**Instar:** a developmental stage of a larva between moults, most species progress through several of these before pupating.

**Larva, plural Larvae:** The caterpillar stage of the butterfly lifecycle.

**Pupa, plural Pupae:** The chrysalis stage of the butterfly lifecycle.

**Sexual Dimorphism:** A difference between the sexes, this may be pronounced or subtle.

**Termen:** The outer border of a wing.

**Univoltine:** Describes a species that has a single brood each year.