



United Kingdom Butterfly Monitoring Scheme

ANNUAL REPORT 2009





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Tracking changes in the abundance of UK butterflies

ANNUAL REPORT 2009

Cover photograph of a Painted Lady, *Vanessa cardui*. One of the major highlights of 2009 was the mass immigration of Painted Ladies in Spring. Photograph by *Alexander Henderson*.

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ACKNOWLEDGEMENTS (back cover)



About the UKBMS

Welcome to the fifth report of the United Kingdom Butterfly Monitoring Scheme (UKBMS).

Changes in the abundance of butterflies throughout the United Kingdom have been monitored chiefly using transects since 1976. Over the past 34 years the huge network of recorders (~4,000) has collectively made almost a quarter of a million weekly visits to over 1,800 different sites, walking almost half a million km and counting over 14 million butterflies.

The UKBMS is based on a well-established and enjoyable recording method and has produced important insights into almost all aspects of butterfly ecology.

Butterflies are well placed amongst British terrestrial invertebrates to act as indicators of the state of the environment. Not only are they biologically suitable as indicator species, having rapid lifecycles and high sensitivity to environmental conditions, but they are, and have been, well recorded for a long time due to their popular appeal, visual conspicuousness and relative ease of identification. Thanks to the huge volunteer network of butterfly recorders and the subsequent databases built up by Butterfly Conservation (BC) and the Centre for Ecology and Hydrology (CEH) trends in British butterfly populations can be accurately assessed and used to help us to assess the impacts of habitat change, climate change, and the progress of government policy initiatives such as the UK Biodiversity Action Plan (UKBAP), agri-environment schemes and the management of Sites of Special Scientific Interest (SSSIs).

The UKBMS is run as a partnership between BC and CEH. The scheme also benefits from the active involvement of the National Trust (NT), the Royal Society for the Protection of Birds (RSPB), the Forestry Commission and several wildlife trusts and local authorities and is funded by a multi-agency consortium (see Acknowledgements on back cover).

UKBMS Objectives

The UKBMS mission is to assess the status and trends of UK butterfly populations for conservation, research and quality of life. The objectives of the scheme are:

- To maintain and develop a network of transect and other monitored sites in order to assess and interpret changes in the abundance and status of UK butterflies.
- To encourage participation in scientific butterfly monitoring by supporting volunteer recording networks.
- To ensure a high level of quality assurance for butterfly monitoring data by development and promotion of standards, and by applying rigorous data validation and verification procedures.
- To secure and manage butterfly monitoring data and provide access to academia, governments, industry and the public.
- To advance knowledge in butterfly ecology through interpretation of butterfly monitoring data.
- To provide scientific underpinning for solutions to butterfly conservation issues arising from habitat and climate change.
- To provide a knowledge base, including indicators of change, for government policies addressing environmental issues.
- To promote public awareness and understanding of butterflies through communication of the results of the scheme.

Further information on the UKBMS can be found at www.ukbms.org

Contacts

For general enquiries:

Ian Middlebrook, Butterfly Conservation, Manor Yard, East Lulworth, Dorset, BH20 5QP.

Tel: 01929 400209, email: transect@butterfly-conservation.org

For data requests:

Dr David Roy, CEH Wallingford, Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxfordshire OX10 8BB.

Tel 01491 692517, email: ukbms@ceh.ac.uk

Dr Marc Botham, CEH Wallingford, Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxfordshire OX10 8BB.

Tel 01491 692517, email: ukbms@ceh.ac.uk

Dr Tom Brereton, Butterfly Conservation, Manor Yard, East Lulworth, Dorset, BH20 5QP.

Tel: 01929 400209, email: tbrereton@butterfly-conservation.org



Meet the team



David Roy: David has recently become Head of the Biological Records Centre at CEH Wallingford. He oversees the management of the UKBMS project for CEH. David's research focuses on the effects of climate change on butterfly populations.



Biren Rathod: Web Developer at CEH Wallingford. Biren's role with the UKBMS is to maintain and update the UKBMS website



Tom Brereton: Head of Monitoring at BC, Tom project manages the UKBMS for BC. Tom is particularly involved in developing butterfly indicators and farmland research, management and policy.



Katie Cruickshanks: Katie recently left BC but is still heavily involved with the Wider Countryside Butterfly Survey which she was responsible for planning and co-ordinating.



Ian Middlebrook: Butterfly Monitoring Coordinator at BC. Ian is the first point of contact for UKBMS recorders and local transect co-ordinators.



Stephen Freeman: Statistician/Modeller at CEH Wallingford. Steve collaborates on the development of analysis for the UKBMS data.



Marc Botham: Butterfly Ecologist at CEH Wallingford. Marc oversees the collation and analysis of the UKBMS dataset and is responsible for the production of the UKBMS reports



Audrey Zannese: Data Assistant on UKBMS project at CEH Wallingford. Since joining CEH in January 2010 Audrey has helped with the collation, analysis and general maintenance of UKBMS data.



Survey methods

In the UKBMS, data on the population status of UK butterflies is derived from a wide-scale program of site-based monitoring. The majority of sites are monitored by butterfly transects (Pollard & Yates 1993). The transect method, which was established in 1976, involves weekly butterfly counts along fixed routes through the season made under strict weather, recording area and time of day criteria. Weekly counts for each species are summed to generate annual abundance indices. For sites with missing weekly counts, a statistical model (a Generalised Additive Model, 'GAM') is used to impute the missing values and to calculate the index (Rothery & Roy 2001).

For a number of specialist species (especially the fritillaries) two 'reduced effort' scientific methods; adult timed counts (Warren et al. 1981) and larval web counts (Lewis & Hurford 1997), are also used to monitor annual abundance, especially in more remote parts of the UK. In both methods, systematic recording is made on single days in suitable weather (when UKBMS recording criteria are met), with the counts converted to a robust index that accounts for both the size of the colony and the time in the season when the count was made.

Data from all past and present transects and timed counts/larval webs monitored sites is combined each year to derive regional and national 'Collated' Indices (CI) and to estimate trends over time. Because not all sites are monitored each year, a statistical model (using log-linear regression) is needed to estimate missing values and to produce indices and trends. The model takes into account the fact that for a particular butterfly species, some years are better than others (a year effect), typically due to the weather, and some sites support larger populations than others (a site effect). The precision of indices and trends is estimated by a further statistical technique called 'bootstrapping'.

This is now the fifth year that data from a combined UKBMS dataset have been used to calculate trends in butterfly populations. In 2009, a major milestone was reached. Over 1,000 UKBMS sites were monitored (895 transects and 128 larval web/timed counts) which is a huge achievement and once again demonstrates the immense support and dedication of volunteers and increases the coverage of butterfly monitoring throughout the UK (see Figure 1). This enabled Collated Indices to be calculated for 53 of 59 species of butterfly occurring in the UK. As in previous years, trends were assessed for four canopy species; Purple, White-letter and Brown Hairstreaks and the Purple Emperor, even though transects are generally not considered the best

monitoring method for them. However, they are included because 'extreme' high or low years in the abundance of these species can be determined from transect monitoring.

The Collated Index for each species is updated each year with the inclusion of additional monitoring data and therefore indices may differ to those presented in earlier reports. Similarly, the rank order used to show those years in which butterflies fared better or worse compared to other years, may be modified by these additional data (see Table 1). As in the 2008 report, we have produced a combined single index for all sites for each species rather than separate indices for double-brooded species. We are currently working on splitting our analyses for those species with more than one brood in a year and aim to present indices for different broods in the future.

Summary

HIGHLIGHTS

- A major milestone was made as the number of sites monitored in 2009 exceeded a thousand, whilst trends were assessed for 53 of the 59 regularly occurring UK species.
- Following two of the poorest years on record for butterflies in the UK, most species made some recovery in what turned out to be a mixed year, still ranking below average (23) in the 34-year series.
- The year ranked as the second best on record for Painted Lady migration with a huge influx in May/June.
- Many expanding species continued to do well, whilst five species produced their highest index of the series – Comma, Green-veined White, Ringlet, Speckled Wood and the habitat specialist, Large Heath.
- However, despite a warm, sunny start to the year, much of the butterfly season in July and August was once again characterised by wet weather having an adverse effect on a number of species.
- Four species had their worst year with continued declines for some of our most threatened species – Duke of Burgundy, Heath Fritillary, Lulworth Skipper and Wood White.
- Other threatened species, as well as some of our commoner species, still produced low indices despite the slight recovery from 2008.
- For 47 of the 53 species assessed (89%), the mean flight date was advanced compared with the series average, and for the majority of species which fared better than in 2008, the mean flight date was advanced by 1-2 weeks.

The end of 2008 brought a cold, dry start to winter unlike in 2007. 2009 started in the same manner with **January** temperatures below the 1971-2000 average across the UK making it the coldest January since 1997 in England and Wales. As a result there were fewer butterfly sightings than in 2008 where a host of species were seen on New Year's Day with the earliest 2009 record being a Peacock on the 5th January closely



followed by Red Admiral on the 11th. First sightings for Small Tortoiseshell and Brimstone were later in the month and Comma was not seen until the 20th February when the temperature had increased.

Whilst **February** brought some mixed weather and was the duller for over fifteen years, temperatures were above average in **March** with rainfall close to or below average. With this came first sightings of a host of butterfly species such as Large and Green-veined Whites, Orange-tip, Small Copper, Holly Blue and Wall Brown. **April** was the start of rather dichotomous weather across the UK (in which the east and west seemed to suffer rather different fortunes), which characterised much of 2009, with the east of England receiving well below average rainfall and above average sunshine for that time of year whilst other areas either endured close to or above average rainfall. Overall, the UK recorded the third warmest April in the series (since 1914) marking the start of a warm spring and huge optimism for an improved butterfly season following the horrendous weather of 2007 and 2008. Indeed, the temperature in **May** was 0.5-1.5°C above the May average with the east of England continuing to enjoy the greatest temperatures. Whilst rainfall was about average for the UK, the dichotomy of weather was again evident with Scotland receiving 150% of the average rainfall for May whilst the south and east of England only received 75%. During May the UK (and Europe) was treated to a butterfly spectacle with a huge immigration of Painted Ladies prompting a national count and much press coverage (see feature article). Unfortunately, despite this warmer weather, many of our threatened resident species, such as Pearl-bordered and High Brown-Fritillaries, were not recorded in great numbers and though an improvement on 2008 where many reached their lowest levels since 1976, their Collated Index for 2009 remained worryingly low.

The weather continued to improve into **June** with a maximum temperature of 31.8°C recorded in Wisley (Surrey) on the 30th. June rainfall was below average, sunshine above average, and the mean maximum temperature was the highest since 1992 in western Scotland. **July**, a prime time of year for butterfly diversity and abundance, dulled the spirits of Lepidopterists across the UK as the temperature dropped below the average for that time of year and mirrored that of July in 2008. Characterised by heavy rainfall, July 2009 was the wettest July on record since 1914 across the UK. South western England and Wales endured the most rainfall with 94mm recorded in 24 hours on the 17th July in Cornwall. Consequently, these parts of the UK also received below average levels of sunshine, though it was sunnier in the east bringing the UK average close to the series average. As a result there

were high numbers of missing weeks throughout July as conditions for walking butterfly transects were rarely achieved and butterfly numbers suffered greatly. The anticipated second generation of Painted Ladies following the continuous records of thistle fields infested with their larvae in May and June was disappointing in some areas' and despite the May influx rivalling and even promising to better that of the last major immigration of this species in 1997, the annual index for Painted Lady ended up being only the second best of the 34 year series. Poor weather continued in the western parts of the UK whilst the east once again enjoyed better weather, with temperatures above average and **August** rainfall less than 50% of the average, compared to other areas, where in some cases twice the average rainfall was recorded.

By **September** the weather had improved throughout the UK and **October** and **November** were also warmer than average (7th warmest November since 1914). After a season which, apart from Painted Ladies, was relatively poor for migrants, records for Clouded Yellow and Red Admiral started to increase with this run of good weather, huge numbers of whites were recorded (particularly Large White) and excitement stirred with news of breeding Queen of Spain Fritillaries in southern England. The year ended with an icy cold **December**, the coldest in the UK since 1995 with temperatures ranging from 2°C below the December average in England and Wales and up to 3.5°C below the average in Scotland, where -18.4°C was recorded in Braemar in Aberdeenshire! December 2009 was also dry and sunny, conditions more reminiscent of winters in the past and thought to be better for over-wintering survival of many of our resident butterflies.

The poor weather in July contributed to 2009 ranking well below average for the series (34 years) at 23 (see Table 1). Whilst most species (> 80%) increased compared to 2008, these increases were small for many species and four species produced their lowest Collated Index of the series (Table 2), including the threatened Duke of Burgundy and Wood White as well as the Heath Fritillary, which despite huge numbers in Blean Woods and a recorded second generation, did poorly at other sites throughout its limited range in the UK. Other threatened species such as the Pearl-bordered fritillary also remained at worryingly low numbers. Not all was doom and gloom though, with some species doing extremely well in 2009 and five species producing their highest Collated Index of the series (Table 2). In addition, Large Blue data has been incorporated into the UKBMS for the first time and we now have a Collated Index for this endangered species showing the great success of the recent reintroduction to the UK.

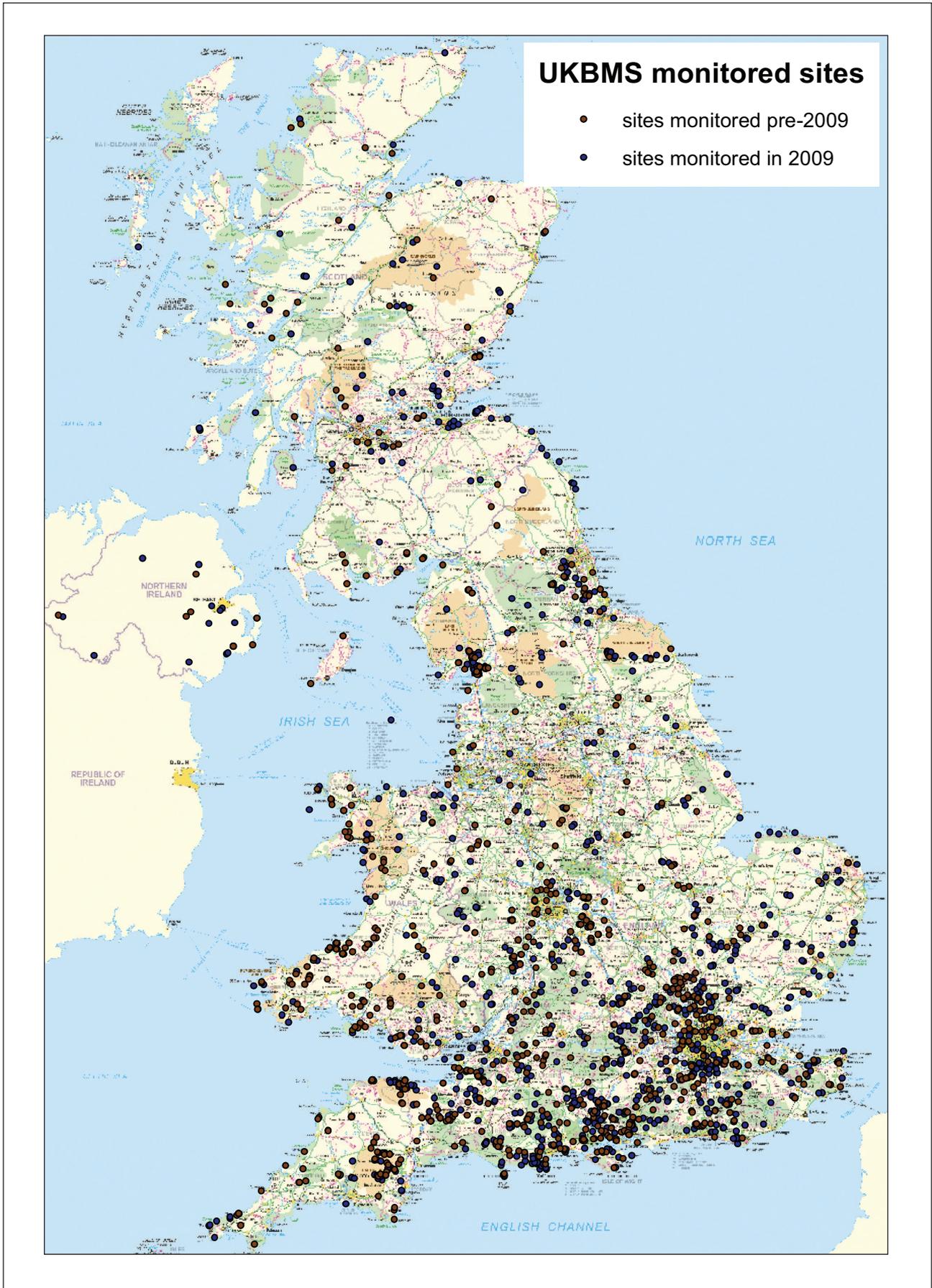


Figure 1: UKBMS sites monitored (denoted by red symbols) in 2009 throughout the UK (Note: some sites may not be shown where the location is private).



Table 1. UKBMS years ranked according to how good each year was relative to the others (1 = best, 34 = worst).

Year	Rank	Year	Rank
1976	5	1993	29
1977	32	1994	15
1978	26	1995	8
1979	18	1996	4
1980	21	1997	2
1981	34	1998	19
1982	6	1999	25
1983	17	2000	16
1984	3	2001	30
1985	20	2002	22
1986	27	2003	10
1987	24	2004	7
1988	28	2005	12
1989	13	2006	14
1990	9	2007	31
1991	11	2008	33
1992	1	2009	23

Both habitat specialists (n = 28 species) and wider countryside species (n = 25) showed an increase in their composite index compared to 2008 (Figure 2). However, habitat specialists only showed a small increase (9%) compared to wider countryside species (50%) and it was the regular migrants (n = 3) that showed the largest increase (833%) thanks mostly to the incredible Painted Lady immigration.

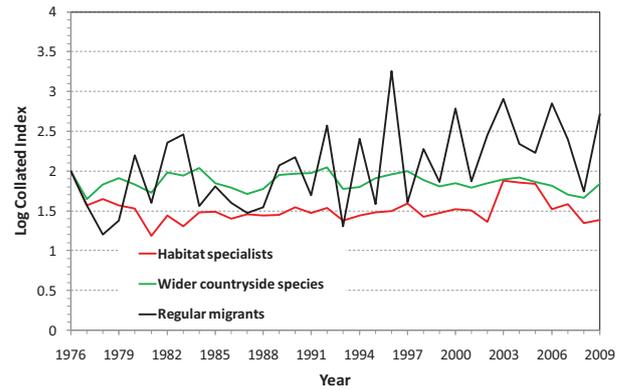


Figure 2. The Annual Collated Index for habitat specialists, wider countryside species and regular migrants.

The multi-species index for Biodiversity Action Plan (BAP) priority species (n=21) has declined significantly by 58% since 1976. However, the annual index was 27% higher than in 2008 with fifteen species showing increases. Sadly, the four species that produced their worst Collated Index in 2009 are all BAP priority species. Nevertheless, it is a welcome recovery following a couple of particularly atrocious years. Appendix I shows a UKBMS site breakdown of the 21 BAP priority species.



BUTTERFLY ABUNDANCE IN 2009

Table 2. Summary of species abundance changes. **P < 0.05 (significant), **P < 0.01 (highly significant), ***P < 0.001 (very highly significant). Red text refers to those species which produced their worst index in 2009 at a UK-level, blue text to those which produced their best index in 2009. Country-level changes where data is insufficient (either too few sites or too few years) to calculate accurate trends have been omitted. Given that fewer years may have been used in the analysis for Wales and Scotland, and the start year may be different to the UK/England, country-level comparisons should be made with caution.

SPECIES	no sites with index-UK	No. years with index-UK	2009 rank UK	% Change in Collated Index 2008-9				Long-term trend (% change)			
				UK	England	Wales	Scotland	UK	England	Wales	Scotland
Small Skipper	441	34	32	28	28	49		-62**	-63**	-52*	
Essex Skipper	238	34	31	7	7			-23	-23		
Lulworth Skipper	11	18	18	-26	-26			-78**	-78**		
Silver-spotted Skipper	37	31	14	26	26			1187***	1187***		
Large Skipper	541	34	22	70	74	62		-19	-17	-58***	
Dingy Skipper	190	34	26	37	-41			-42***	-38**		
Grizzled Skipper	142	34	17	40	37			-42*	-44**		
Wood White	28	34	34	-18	-18			-97***	-97***		
Clouded Yellow	233	31	13	778	769			1224*	1297*		
Brimstone	843	34	17	29	42	225		17	15	58**	
Large White	577	34	6	135	135	45	95	-21	-20	-34	134
Small White	564	34	14	94	103	70	-24	-16	-12	-60	14
Green-veined White	543	34	1	114	130	367	158	-6	-8	41	-18
Orange Tip	458	34	9	70	81	17	35	14	3	222***	154**
Green Hairstreak	204	34	29	86	95		-9	-38*	-41*		70*
Brown Hairstreak	31	27	23	-22	-22			81	81		
Purple Hairstreak	204	34	13	21	21			-2	-5		
White-letter Hairstreak	94	34	29	39	42			-83***	-83***		
Small Copper	488	34	24	66	63	114	67	-25	-17	-45	-28
Small Blue	97	31	8	134	134			-1	-1		
Silver-studded Blue	36	31	10	83				4			
Brown Argus	291	34	18	93	98	-63		8	11		
Northern Brown Argus	33	31	27	2	9		-69	-58*	-78***		23
Common Blue	564	34	21	64	70	78	73	-12	-11	-22	31
Chalkhill Blue	148	34	25	35	35			13	13		
Adonis Blue	66	31	16	29	29			122	122		
Holly Blue	362	34	26	-60	-58			156	166	-24	
Large Blue	16	27	8	-9	-9			3258***	3258***		
Duke of Burgundy	73	30	30	-54	-54			-47*	-47*		
White Admiral	138	34	24	22	22			-58**	-58**		
Purple Emperor	35	31	10	85	85			15	15		
Red Admiral	560	34	20	-17	-19	29	-11	332***	335***	90	>100***
Painted Lady	594	34	2	10992	10992	16445	6444	649*	683*	129	
Small Tortoiseshell	512	34	29	155	160	45	32	-64*	-64*	-32	-45
Peacock	581	34	6	59	78	47	74	51	53	-6	385**
Comma	524	34	1	74	74	70	-49	293***	300***	35	
Small Pearl-bordered Fritillary	90	34	28	5	35		-33	-60***	-75**	-34*	-13
Pearl-bordered Fritillary	72	34	33	41	27	66		-74***	-73***	33	38
High Brown Fritillary	53	32	30	40	38			-40	-44		
Dark Green Fritillary	212	34	6	35	26	58	58	115*	302***	-70***	-35
Silver-washed Fritillary	229	34	3	65	69			82*	95**		
Marsh Fritillary	62	27	12	154	173			41	-47	-53	
Heath Fritillary	33	29	29	-62	-62			-72**	-72**		
Speckled Wood	527	34	1	35	35	42	42	140***	139***	74**	9
Wall Brown	195	34	32	54	73	-14		-80***	-81***	-48**	
Scotch Argus	11	31	18	67				98**			
Marbled White	355	34	22	10	12			73*	72*		
Grayling	110	34	21	62	66		54	-59***	-33*	-89***	-64**
Gatekeeper	521	34	28	4	4	29		-24	-30	102**	
Meadow Brown	618	34	27	-13	-15	5	-49	15	13	58*	40
Small Heath	403	34	28	48	55	56	17	-60***	-65***	5	175**
Large Heath	13	13	1	1				145***			
Ringlet	545	34	1	29	32	66	-9	325***	339***	181***	124*



Species accounts

In the following species accounts we present a summary of how each species fared on UKBMS sites (transects, timed counts and larval web/egg counts) in 2009 for those species with sufficient data to calculate a Collated Index. The mean flight date is calculated as the weighted mean date of counts as described in the Phenology article in the 2008 UKBMS annual report. This is highly correlated to both first appearance and the peak flight date. The Collated Index plot is included with each species. Horizontal dashed lines show the average index value for the series. Red lines show significant negative long-term trends, and blue lines show significant positive long-term trends (see Table 1 for trend details). Where neither of these lines are present the long-term trend is not statistically significant at the P = 0.05 level.



denotes that the species is listed on the recent Butterfly Red List for Great Britain (Fox et al 2010) under one of the following categories: Critically Endangered, Endangered, Vulnerable or Near Threatened. (see UKBMS News article).

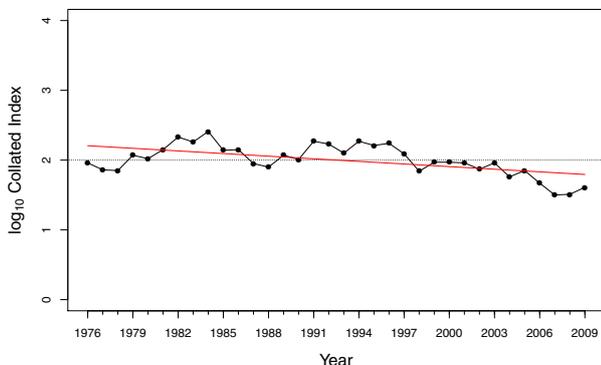


denotes that the species is listed as a UK BAP priority species (<http://www.ukbap.org.uk>)

Skippers (*Hesperiidae*)

Small Skipper (<i>Thymelicus sylvestris</i>)			
No. years with Collated Index:	34	2009 Rank:	32
Change in Collated Index 2008-9 (%):	28	Long-term trend (%):	-62**
Mean flight date 2009:	14-July	Series mean flight date:	21-July

Collated Index plot:

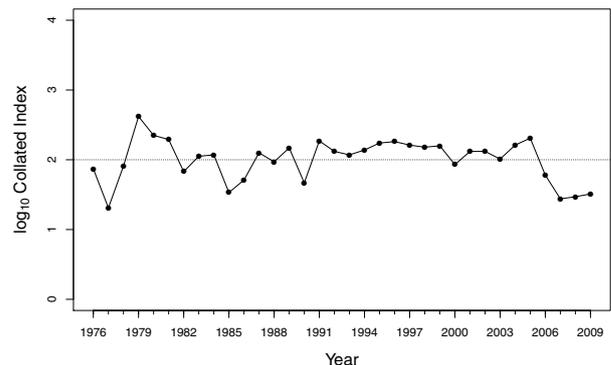


Following its three worst years of the series, the Small Skipper made a modest recovery in 2009. However, 2009 was still the third worst year in 34 years and this common and widespread species seems to have been particularly badly affected by the run of poor weather in

recent years. The highest site index of 296 was at Walton Nature Park, West Yorkshire. The butterfly has declined significantly in abundance on monitored sites since 1976.

Essex Skipper (<i>Thymelicus lineola</i>)			
No. years with Collated Index:	34	2009 Rank:	31
Change in Collated Index 2008-9 (%):	7	Long-term trend (%):	23
Mean flight date 2009:	17-July	Series mean flight date:	25-July

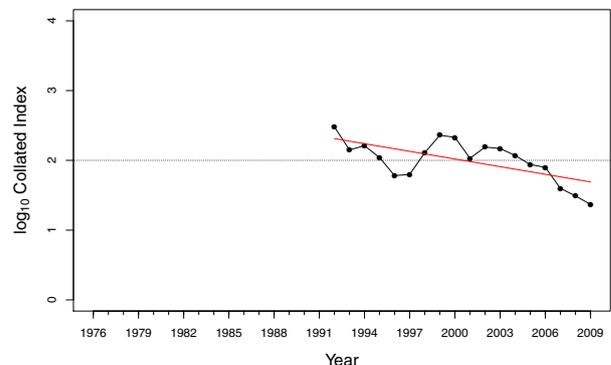
Collated Index plot:



2009 was a relatively poor year for the Essex Skipper. The mean flight date was slightly later than the Small Skipper, and about a week earlier for both species compared to the long-term average. Although the butterfly is expanding in range in the UK, there has been no significant change in abundance since 1976.

Lulworth Skipper (<i>Thymelicus acteon</i>)			
No. years with Collated Index:	18	2009 Rank:	18
Change in Collated Index 2008-9 (%):	-26	Long-term trend (%):	-78**
Mean flight date 2009:	23-July	Series mean flight date:	29-July

Collated Index plot:



For the eighth year in succession the Lulworth Skipper declined, to produce the lowest Collated Index of the series. Whilst far more widespread in continental



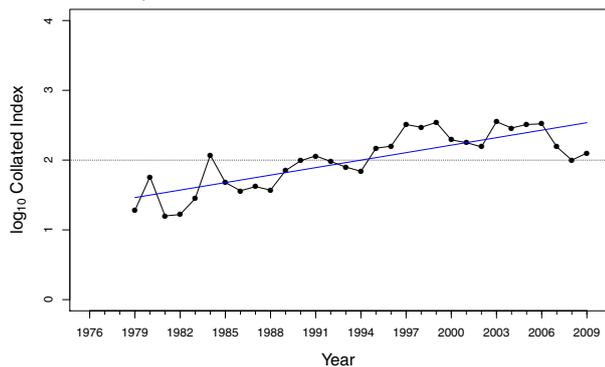
Europe, the Lulworth Skipper is restricted to tall grassland habitats on the south coast of England (Dorset). Heavy grazing for other conservation objectives may have been a factor in the decline, along with poor weather over the flight season. Of the six sites which produced a positive index two showed an increase over the previous year (Swanage and Durlston Country Park East). However, numbers at Swanage were very low in both years and the increase at Durlston East was small (3%). On the site in which the greatest numbers are recorded, Durlston Country Park West, there was a 42% decline and other declines ranged from 35-57%.



Photo by Charlotte Barwick

Silver-spotted Skipper (<i>Hesperia comma</i>) 			
No. years with Collated Index:	31	2009 Rank:	14
Change in Collated Index 2008-9 (%):	26	Long-term trend (%):	>1000**
Mean flight date 2009:	17-Aug	Series mean flight date:	14-Aug

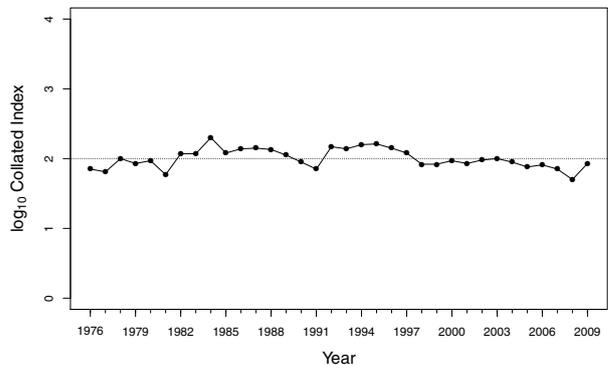
Collated Index plot:



The Silver-spotted Skipper showed a modest recovery in 2009 following two poor years. It is the only skipper to have increased significantly in abundance in recent decades, and as a consequence is no longer a UK BAP priority species. Recent research by John Bennie, from the University of Exeter presented at the 2010 Annual Recorder's meeting in Birmingham shows that the butterfly has benefited from recent warmer summers, with abundance closely linked to summer temperature in the previous year.

Large Skipper (<i>Ochlodes sylvanus</i>)			
No. years with Collated Index:	34	2009 Rank:	22
Change in Collated Index 2008-9 (%):	70	Long-term trend (%):	-19
Mean flight date 2009:	29-June	Series mean flight date:	06-July

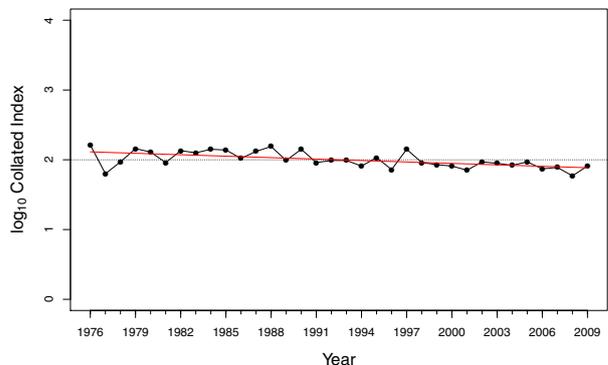
Collated Index plot:



Following a poor year, the Large Skipper increased by 70% in 2009. Increases at the site level, included from 110 in 2008 to 250 in 2009 at Bradfield Woods, Suffolk. In spite of the recovery, it was still a relatively poor year, ranking below average for the sixth year in succession. The long-term trend is of little or no overall change across the UK, although there is an apparent decline on monitored sites in Wales.

Dingy Skipper (<i>Erynnis tages</i>)  			
No. years with Collated Index:	34	2009 Rank:	18
Change in Collated Index 2008-9 (%):	37	Long-term trend (%):	-78**
Mean flight date 2009:	26-May	Series mean flight date:	02-June

Collated Index plot:

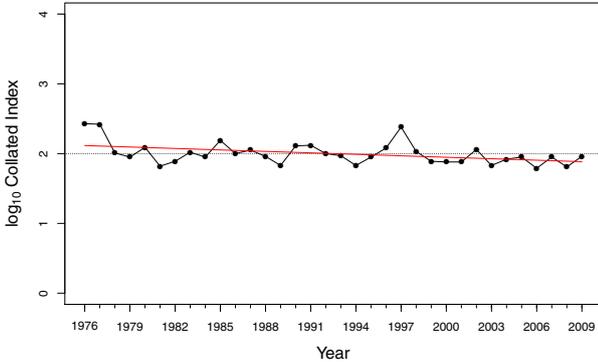


Dingy Skipper numbers were up by more than a third from 2008 levels. Noteworthy increases included from 38 to 136 at Giant Hill (Cerne Abbas), Dorset. However it was still a below average year and the butterfly remains in long-term decline, with a drop of 78% since 1976.



Grizzled Skipper (<i>Pyrgus malvae</i>)			
No. years with Collated Index:	34	2009 Rank:	17
Change in Collated Index 2008-9 (%):	40	Long-term trend (%):	-42*
Mean flight date 2009:	15-May	Series mean flight date:	30-May

Collated Index plot:

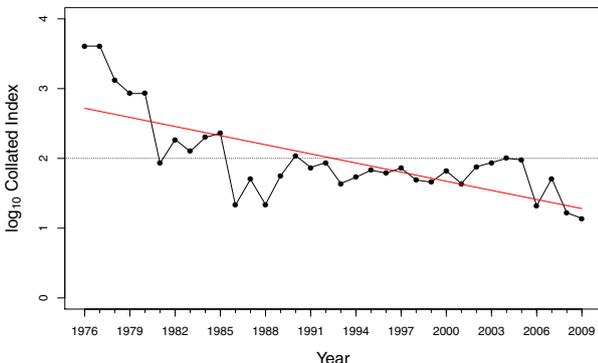


2009 was an average year for the Grizzled Skipper, with no improvement in the long-term trend, which shows a 42% decline since 1976. The only three-figure index was recorded at Giant Hill (Cerme Abbas), Dorset, with 156 recorded compared to 83 in 2008. The mean flight date in 2009 was two weeks earlier than the series average.

Whites (*Pieridae*)

Wood White (<i>Leptidea sinapis</i>)			
No. years with Collated Index:	34	2009 Rank:	34
Change in Collated Index 2008-9 (%):	-18	Long-term trend (%):	-97***
Mean flight date 2009:	16-June	Series mean flight date:	18-June

Collated Index plot:



The Wood White has declined substantially in the UK, now occupying only a fraction of the sites it was once recorded on and found at a smaller and smaller percentage of monitored sites over time (see Figure 3). Formerly locally common, abundances on monitored sites also reached an all time low in 2009.

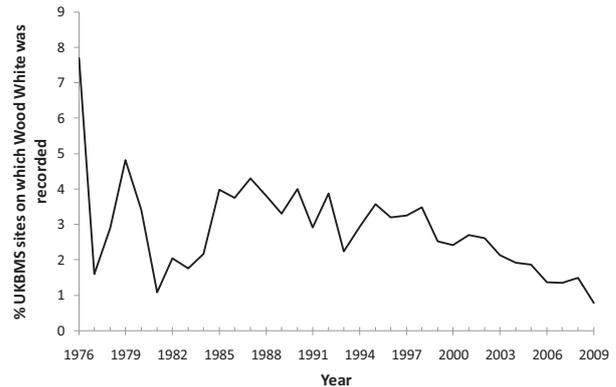


Figure 3. The percentage of UKBMS sites on which Wood White produced a positive Collated Index since monitoring began in 1976.



Photo by Nigel Kendall

Females are thought to oviposit only in sunny weather, something distinctly lacking in 2007 and 2008 during the main flight period of this species. With few opportunities for oviposition and numbers already suffering from the poor run of weather perhaps it is not so surprising that 2009 numbers were low. Weather is not the only cause of the Wood White's decline, however. Lack of appropriate habitat management is also likely to be a major factor with many woodland rides becoming too shady and overgrown. Figure 4 shows the sites at which Wood White showed its greatest declines and increases from between 2008 and 2009.

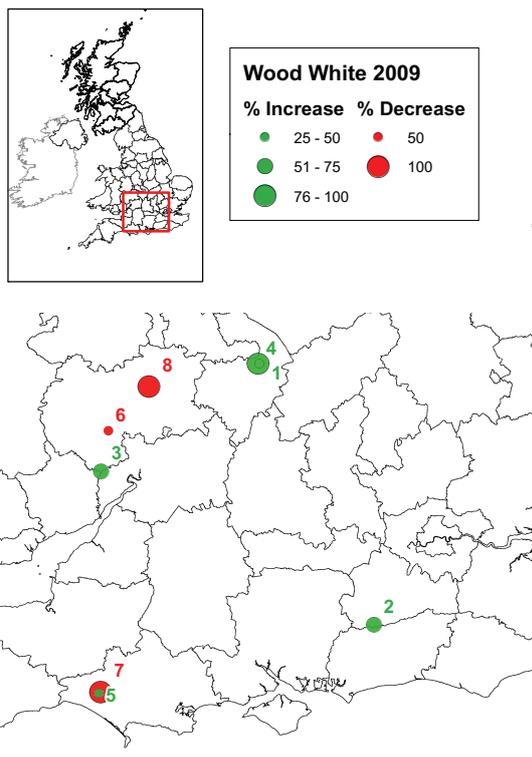
At Haugh Woods, where Wood Whites used to be recorded in the hundreds, the site index of 46 represented a further 50% reduction from 2008.

Long-term declines have been marked at most sites, with some of the largest changes at sites such as Buckland Wood in Somerset where the butterfly has not been recorded on the transect since 2004 with numbers in the twenties and thirties only earlier in the decade. Similarly there were no transect records for Wood White at



Whitecross Green Wood in Oxfordshire in 2009 and only four recorded in 2008 signifying a huge drop compared to previous years. Research is in progress to determine the exact ecological requirements and consequent applications to conservation of the Wood White, a butterfly that seems to be far less restricted in the habitat types in which it is found on the continent.

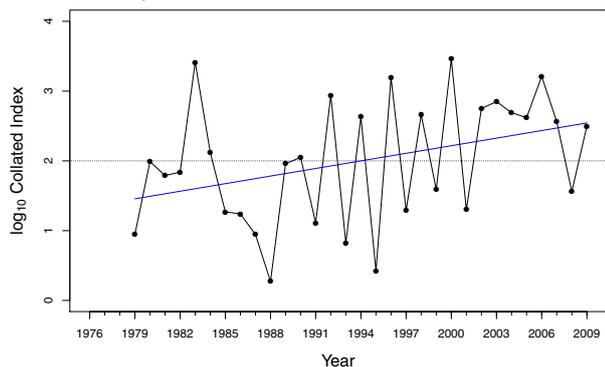
Figure 4. Sites where Wood White abundance changed substantially between 2008 and 2009.



Sites: 1 Ryton Wood & Pool; 2 Oaken Wood; 3 Lord's Wood; 4 Ryton Wood East; 5 Powerstock Railway; 6 Haugh Woods North (2007); 7 Kingcombe Stones 'C' (DTNC); 8 Monk Wood 1

Clouded Yellow (<i>Colias croceus</i>)			
No. years with Collated Index:	31	2009 Rank:	13
Change in Collated Index 2008-9 (%):	778	Long-term trend (%):	>1000*
Mean flight date 2009:	13-Aug	Series mean flight date:	09-Aug

Collated Index plot:



Few Clouded Yellow's were seen in the early part of the season. However, a late surge in migrant activity in late August through September (see Figure 5) brought a recovery, to what in the end proved a reasonably good year. Like the other regular migrants, Clouded Yellow has increased significantly in abundance in the UK since 1976.

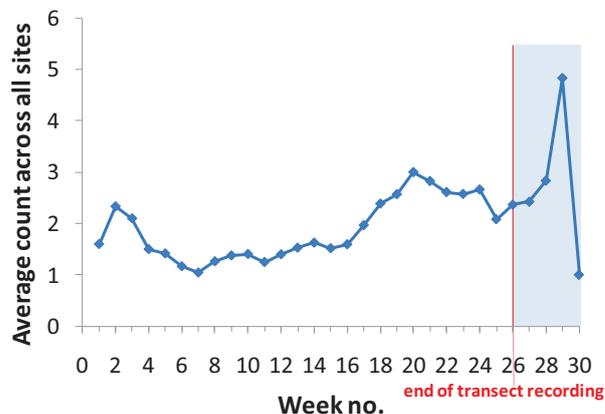
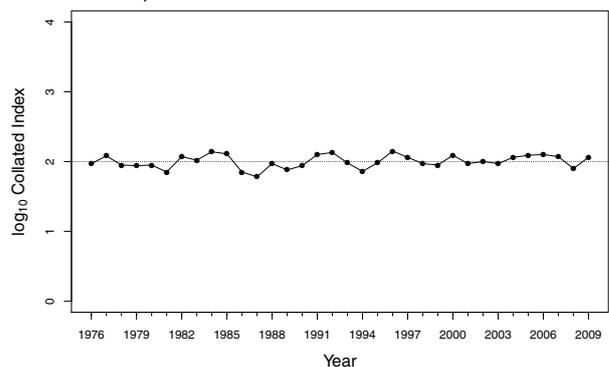


Figure 5. Average counts of Clouded Yellows across UK transects sites throughout 2009.

Brimstone (<i>Gonepteryx rhamni</i>)			
No. years with Collated Index:	34	2009 Rank:	17
Change in Collated Index 2008-9 (%):	29	Long-term trend (%):	17
Mean flight date 2009:	11-June	Series mean flight date:	09-June

Collated Index plot:

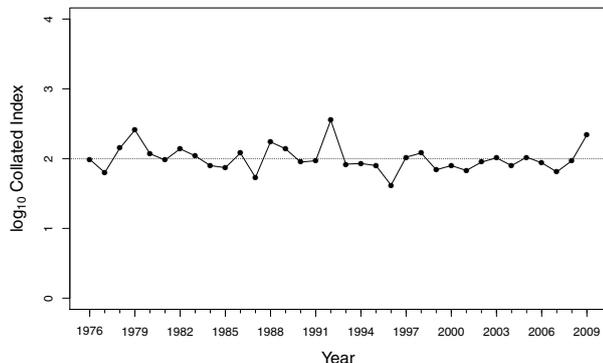


Though 209 ranked as an average year, there was a marked improvement over numbers in 2008. For example, at Moors Valley in Dorset, the index increased from 32 in 2008 to 291 in 2009. This species has been expanding its range in the UK although the apparent increase in abundance, on transect sites since 1976, is not significant. Available data suggests an apparent long-term increase in Wales, although the trend is based on a small number of sites and may not fully represent the national picture.



Large White (<i>Pieris brassicae</i>)			
No. years with Collated Index:	34	2009 Rank:	6
Change in Collated Index 2008-9 (%):	135	Long-term trend (%):	-21
Mean flight date 2009:	05-July	Series mean flight date:	21-July

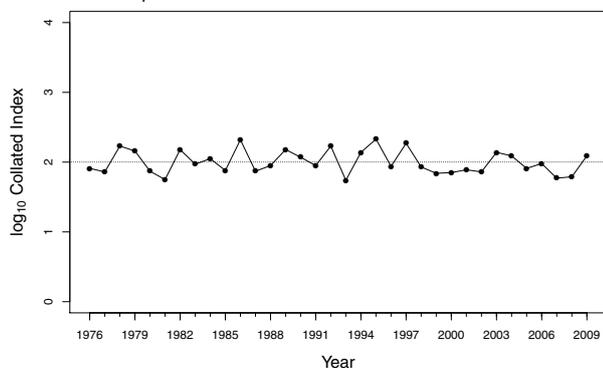
Collated Index plot:



The Large White recovered further from a low in 2007, with a 135% annual increase to produce the sixth highest index of the series. Resident populations were augmented by good numbers of migrant Large Whites with a flurry of over-sea sightings from south and east coast localities in August and September. In spite of this, the mean flight date was more than two weeks earlier than the series average. The largest index was 828 at Little Linford Wood, Bucks – the eighth highest index for a UK site in the 34 year series. The long-term trend is of little or no overall change.

Small White (<i>Pieris rapae</i>)			
No. years with Collated Index:	34	2009 Rank:	14
Change in Collated Index 2008-9 (%):	94	Long-term trend (%):	-16
Mean flight date 2009:	04-July	Series mean flight date:	23-July

Collated Index plot:

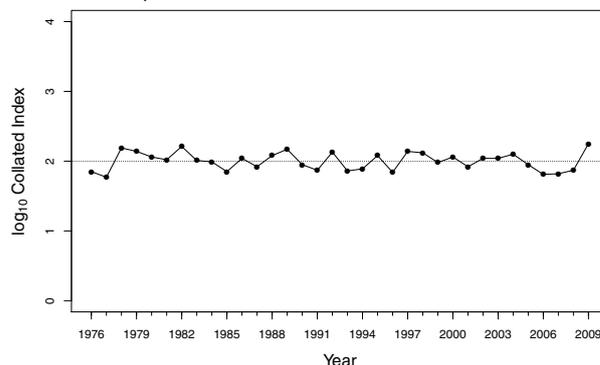


Small White showed a marked annual increase in 2009 of nearly 100%. Although considerably better, 2009 still ranked as only just above average in the 34-year series.

The mean flight date was nearly three weeks earlier than the series average. The long-term trend is of no significant overall change. The highest site index of 640 was recorded at Greenfield Valley Nature Reserve, North Wales.

Green-veined White (<i>Pieris napi</i>)			
No. years with Collated Index:	34	2009 Rank:	1
Change in Collated Index 2008-9 (%):	114	Long-term trend (%):	-6
Mean flight date 2009:	26-June	Series mean flight date:	09-July

Collated Index plot:



Following three poor years, the Green-veined White bounced back to produce its highest Collated Index of the series with an impressive 114% annual increase. Spells of good weather in the spring and early summer period may have helped, with the mean flight date two weeks earlier than the series average.

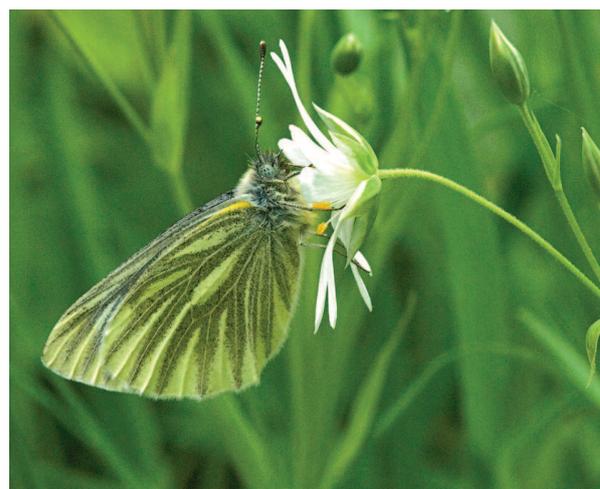


Photo by Les Binns

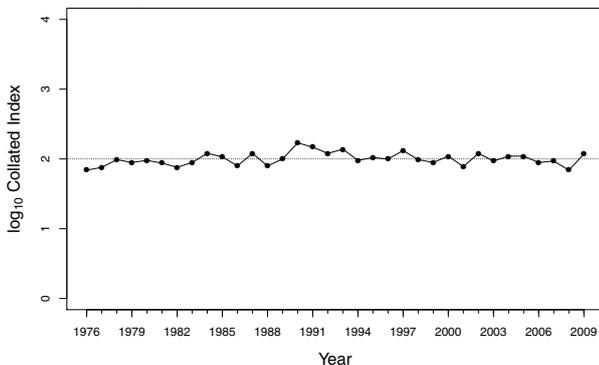
Three figure indices were recorded at 170 sites, with strong recoveries at some of these including Lineover Wood (Gloucestershire), Pamber Forest (Hampshire) and Chaddesley Wood (Herefordshire). Four figure indices were recorded at three sites, with the maximum being 1,632 at Newport Wetlands, Gwent.



Green-veined and Small Whites 'puddling' in 2009. Photo by Marc Botham

Orange-tip (<i>Anthocharis caradmines</i>)			
No. years with Collated Index:	34	2009 Rank:	9
Change in Collated Index 2008-9 (%):	70	Long-term trend (%):	14
Mean flight date 2009:	03-May	Series mean flight date:	17-May

Collated Index plot:

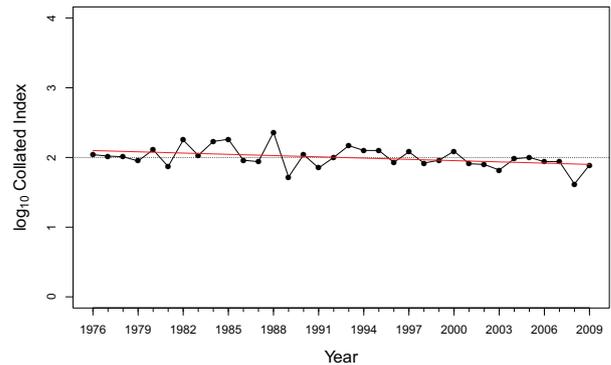


Following on from the worst year in the series, the Orange-tip fared better in 2009, with the year ranked ninth in the 34-year series. At West Sedgemoor, Somerset, the index nearly tripled in 2009 to 145 – the largest index anywhere in the UK. The cold winter and warm start to spring probably benefited this spring flying species, with the mean flight date two weeks earlier than average. The long-term trend across the UK is classed as stable, although there has been an apparent significant increase on monitored sites in both Scotland and Wales.

Blues, Coppers and Hairstreaks (*Lycaenidae*)

Green Hairstreak (<i>Callophrys rubi</i>)			
No. years with Collated Index:	34	2009 Rank:	29
Change in Collated Index 2008-9 (%):	86	Long-term trend (%):	-38*
Mean flight date 2009:	19-May	Series mean flight date:	29-May

Collated Index plot:

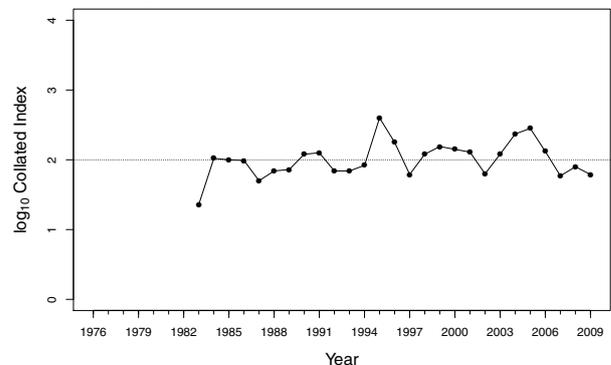


Having had its worst year on record in 2008, it was encouraging to see Green Hairstreak numbers increase in 2009. However, this is a species in long-term decline in the UK and 2009 still ranked well below average. The largest site index of 137 (and the only one in three figures) was recorded at Warton Crag LNR, Lancashire. Available data suggest the butterfly is doing better in Scotland than other parts of the UK.

Brown Hairstreak (<i>Thecla betulae</i>)			
No. years with Collated Index:	27	2009 Rank:	23
Change in Collated Index 2008-9 (%):	-22	Long-term trend (%):	81
Mean flight date 2009:	31-Aug	Series mean flight date:	25-Aug



Collated Index plot:



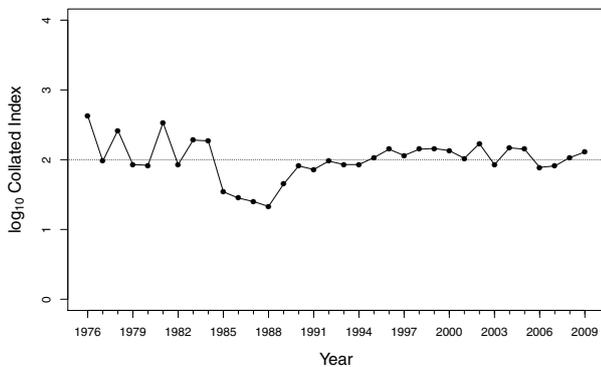
As with other arboreal hairstreaks, the Brown Hairstreak is only recorded in very small numbers on day-time transects. However, more recently the UKBMS has incorporated egg counts as a more effective method of recording the species. Whilst there is no doubt that the



Brown Hairstreak has become better recorded than previously, the site indices are relative and where there have been several years of egg counts there is strong evidence of temporal increases in both area occupied and abundance. With weather poor over much of the flight period, not surprisingly 2009 proved to be a below average year with a 22% decrease from 2008. The long-term trend is of little or no overall change on monitored sites.

Purple Hairstreak (<i>Favonius quercus</i>)			
No. years with Collated Index:	34	2009 Rank:	13
Change in Collated Index 2008-9 (%):	21	Long-term trend (%):	-2
Mean flight date 2009:	23-July	Series mean flight date:	31-July

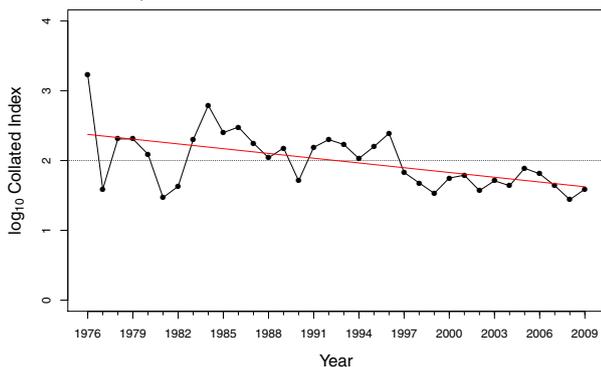
Collated Index plot:



2009 proved to be an above average year for the Purple Hairstreak, with the late June and early July hot spell probably helping to boost numbers and advance the mean flight date by more than a week. The long-term trend is classed as stable.

White-letter Hairstreak (<i>Satyrrium w-album</i>)			
No. years with Collated Index:	34	2009 Rank:	29
Change in Collated Index 2008-9 (%):	39	Long-term trend (%):	-83**
Mean flight date 2009:	16-July	Series mean flight date:	26-July

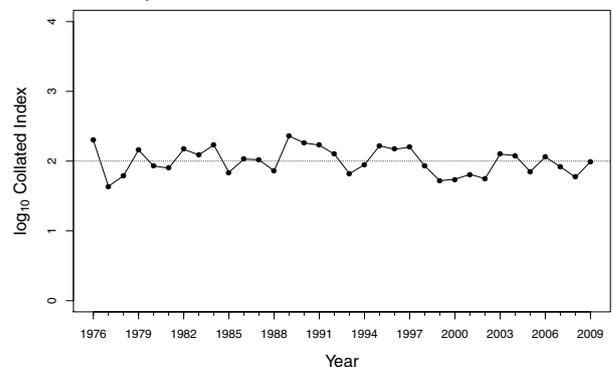
Collated Index plot:



Despite being relatively widespread throughout the UK, White-letter Hairstreak numbers on UKBMS sites have been significantly reduced by more than four-fifths since 1976. In 2008 the butterfly produced its lowest Collated Index of the series and whilst it was better news in 2009, with an increase of 39%, the Collated Index was still considerably below average. This butterfly rarely attains large numbers on any transect, with the largest, consistent site indices in recent years, ranging from 10-22 at Worley Hill in Somerset.

Small Copper (<i>Lycaena phlaeas</i>)			
No. years with Collated Index:	34	2009 Rank:	24
Change in Collated Index 2008-9 (%):	66	Long-term trend (%):	-25
Mean flight date 2009:	24-July	Series mean flight date:	03-Aug

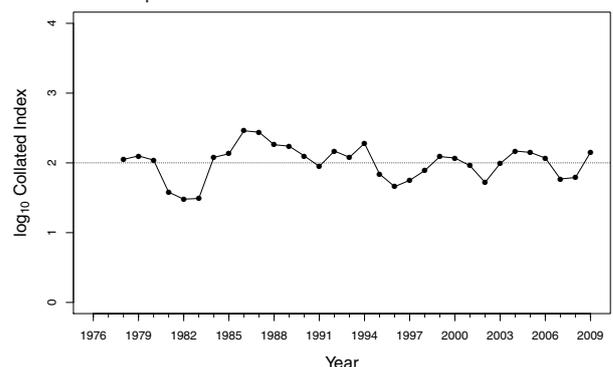
Collated Index plot:



The Small Copper had a considerably better year than 2008, with numbers up by two-thirds. However, across the UK it was still a below average year. Although the long-term trend is negative, the apparent decline is not statistically significant. Noteworthy site changes included at Lullington Heath NNR, East Sussex where there was an increase from 104 in 2008 to 472 in 2009.

Small Blue (<i>Cupido minimus</i>)			
No. years with Collated Index:	31	2009 Rank:	8
Change in Collated Index 2008-9 (%):	134	Long-term trend (%):	-1
Mean flight date 2009:	26-June	Series mean flight date:	29-June

Collated Index plot:

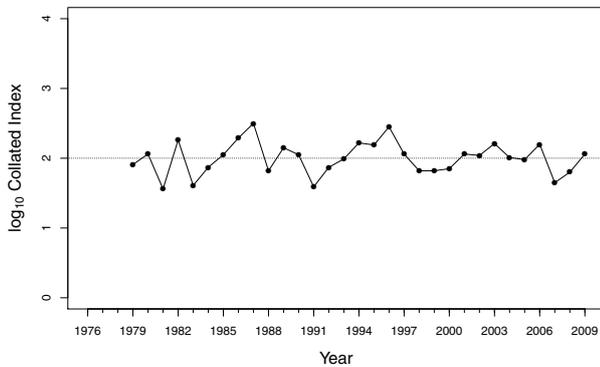




Following two particularly poor years, 2009 was the best year for the Small Blue since 2005. Numbers fluctuate considerably from year to year and the species shows little or no overall abundance change since 1976. The largest index was recorded at Anchor Bottom, West Sussex where there was an increase from 139 in 2008 to 499 in 2009. Other substantial increases between 2008 and 2009 included 71 to 272 at Oxwich, Swansea and 104 to 280 at Swyncombe Downs, Oxfordshire.

Silver-studded Blue (<i>Plebejus argus</i>)  			
No. years with Collated Index:	31	2009 Rank:	10
Change in Collated Index 2008-9 (%):	83	Long-term trend (%):	4
Mean flight date 2009:	02-July	Series mean flight date:	19-July

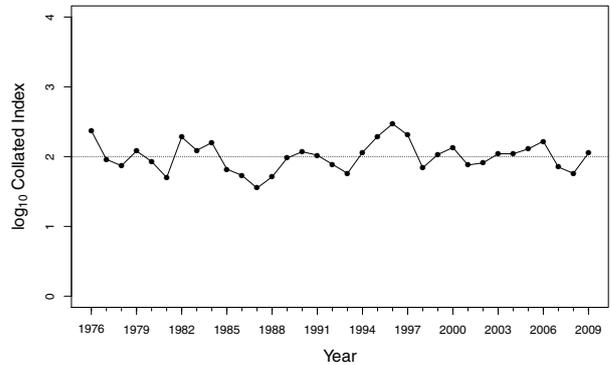
Collated Index plot:



The Silver-studded Blue showed a marked increase in its Collated Index in 2009 compared with 2008, increasing by 83% across the UK. Spells of good weather in early summer may have helped, evidenced by the mean flight date being more than two weeks earlier than average. It was a good year on some Dorset heathland sites, including at Stoborough Heath with an increase from 421 in 2008 to 865 in 2009 and at Studland Heath from 42 to 83. The long-term abundance trend across the UK is classed as stable.

Brown Argus (<i>Aricia agestis</i>)			
No. years with Collated Index:	34	2009 Rank:	18
Change in Collated Index 2008-9 (%):	93	Long-term trend (%):	8
Mean flight date 2009:	22-July	Series mean flight date:	01-Aug

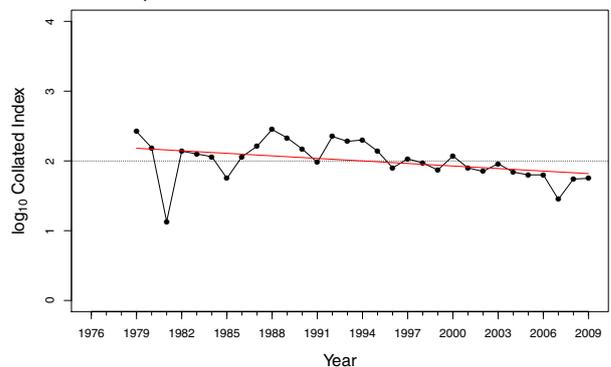
Collated Index plot:



Following two poor years, Brown Argus numbers recovered to average levels in 2009, with the year ranked 18th in the 34-year series. Thirteen sites recorded three-figure indices, the maximum being 372 at Magdalen Hill Down. This is a species that has been expanding in range in contrast to its close relation, the Northern Brown Argus. However, the apparent increase in abundance since 1976 is not statistically significant.

Northern Brown Argus (<i>Aricia artaxerxes</i>)  			
No. years with Collated Index:	31	2009 Rank:	27
Change in Collated Index 2008-9 (%):	2	Long-term trend (%):	-58*
Mean flight date 2009:	28-June	Series mean flight date:	12-July

Collated Index plot:

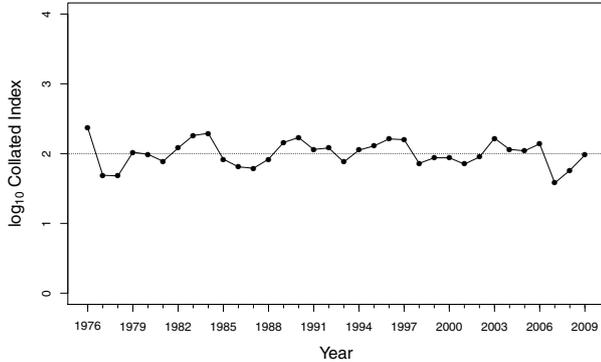


2009 was a poor year for the Northern Brown Argus. The last ten years have all been below average, with numbers reduced significantly by more than 50% since 1979. On the positive side at the local level, numbers at both the Warton Crag transects in Lancashire were up in 2009, from 87 to 130 on the LNR and 79 to 191 on the RSPB reserve. Across the UK, the mean flight date was approximately two weeks earlier than the series average.



Common Blue (<i>Polyommatus icarus</i>)			
No. years with Collated Index:	34	2009 Rank:	21
Change in Collated Index 2008-9 (%):	64	Long-term trend (%):	-12
Mean flight date 2009:	16-July	Series mean flight date:	26-July

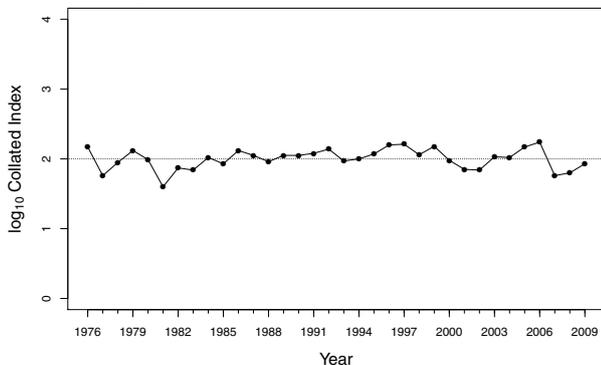
Collated Index plot:



Following two poor years, Common Blue numbers recovered in 2008, with the Collated Index close to the series average. 150 sites logged three-figure indices. Among these, substantial increases were noted at a good number of sites, including at Blunts Wood & Paiges Meadow, West Sussex (58 in 2008, 510 in 2009) Newport Wetlands, Gwent (from 34 to 430) and Whippingham (fields), Isle of Wight (252 to 933), with the latter site supporting the largest site index in the UK. Although the long-term trend for the UK is negative, the apparent decline is not statistically significant.

Chalkhill Blue (<i>Polyommatus coridon</i>)			
No. years with Collated Index:	34	2009 Rank:	25
Change in Collated Index 2008-9 (%):	35	Long-term trend (%):	13
Mean flight date 2009:	07-Aug	Series mean flight date:	09-Aug

Collated Index plot:



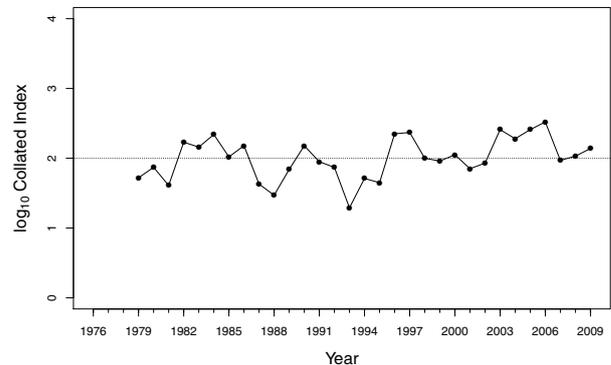
The Chalkhill Blue showed a modest increase in 2009 following two poor years, although it was still a well below average year. The smaller increase compared with

the other grassland blues in 2009, is likely to be due to relatively poor weather over the main flight period. None the less, there were still some impressive totals, including a site index of 5,716 at Devil's Dyke, Cambridgeshire. The long-term national trend is classed as stable.

Adonis Blue (<i>Polyommatus bellargus</i>)			
No. years with Collated Index:	31	2009 Rank:	16
Change in Collated Index 2008-9 (%):	29	Long-term trend (%):	122
Mean flight date 2009:	20-July	Series mean flight date:	25-July



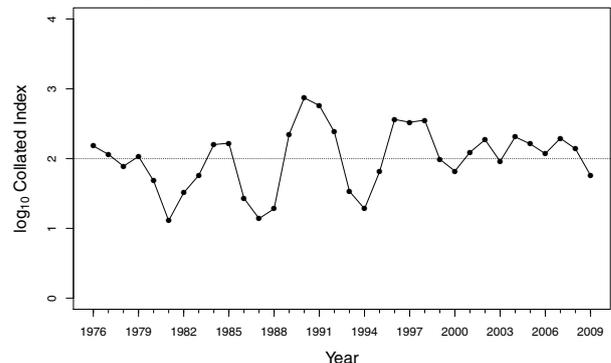
Collated Index plot:



Adonis Blue numbers were up by nearly a third in 2009, but it was still only an average year, with numbers well below the good years from 2003 to 2006. Sites where the butterfly bounced back included Clubmens Down (NT), Dorset (25 in 2008, 230 in 2009) and Malling Down, East Sussex (661 to 2,694). Long-term data suggest an increase, although the trend is not significantly significant.

Holly Blue (<i>Celastrina argiolus</i>)			
No. years with Collated Index:	34	2009 Rank:	26
Change in Collated Index 2008-9 (%):	-60	Long-term trend (%):	156
Mean flight date 2009:	19-June	Series mean flight date:	28-June

Collated Index plot:

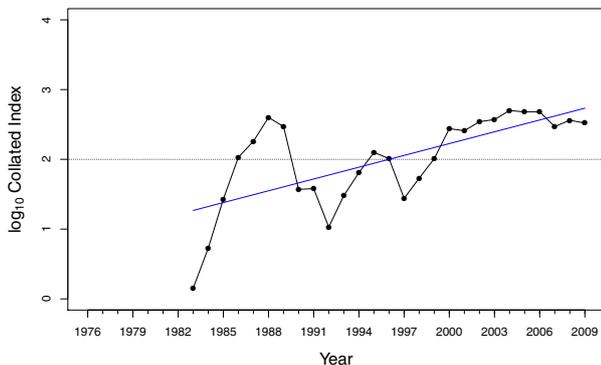




2009 marked a substantial (60%) drop in Holly Blue numbers compared with 2008, and the Collated Index was well below average. Only 23 sites achieved an index in double figures with the maximum being 68 at Tower Hamlets Cemetery Park in London’s East End – the latter count demonstrating that urban greenspace is an important habitat for this species. The Holly Blue is well known for showing cyclical patterns in abundance, a phenomenon potentially linked to parasite load. In spite of these fluctuations, the long-term trend is of little or no overall change.

Large Blue (<i>Phengaris arion</i>)			
No. years with Collated Index:	27	2009 Rank:	8
Change in Collated Index 2008-9 (%):	-9	Long-term trend (%):	>1000***
Mean flight date 2009:	27-June	Series mean flight date:	01-July

Collated Index plot:



This is the first year in which we have been able to present a Collated Index for the Large Blue. This species was reintroduced in 1983 on a site on the edge of Dartmoor after much dedicated research by Jeremy Thomas and colleagues. Following further reintroductions and natural expansion into suitable neighbouring habitats the Large Blue has significantly increased in abundance since its reintroduction although the Collated Index was slightly lower in 2009 than 2008.

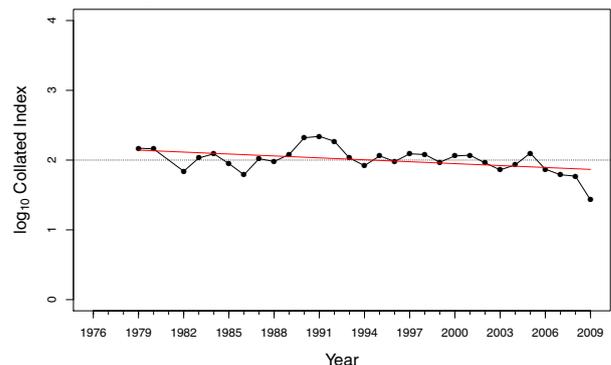


Photo by Nigel Kendall

Metalmarks (Riodinidae)

Duke of Burgundy (<i>Hamearis lucina</i>)			
No. years with Collated Index:	30	2009 Rank:	30
Change in Collated Index 2008-9 (%):	-54	Long-term trend (%):	-47*
Mean flight date 2009:	21-May	Series mean flight date:	31-May

Collated Index plot:



Whilst most species showed some recovery from the poor weather in 2007 and 2008, the Duke of Burgundy was amongst a handful of species that did not. 2009 produced the lowest index of the series for the third year in a row, with abundance reduced by almost and this species continues to do badly in the UK. Abundance has been reduced by almost 50% over the last 30 years.

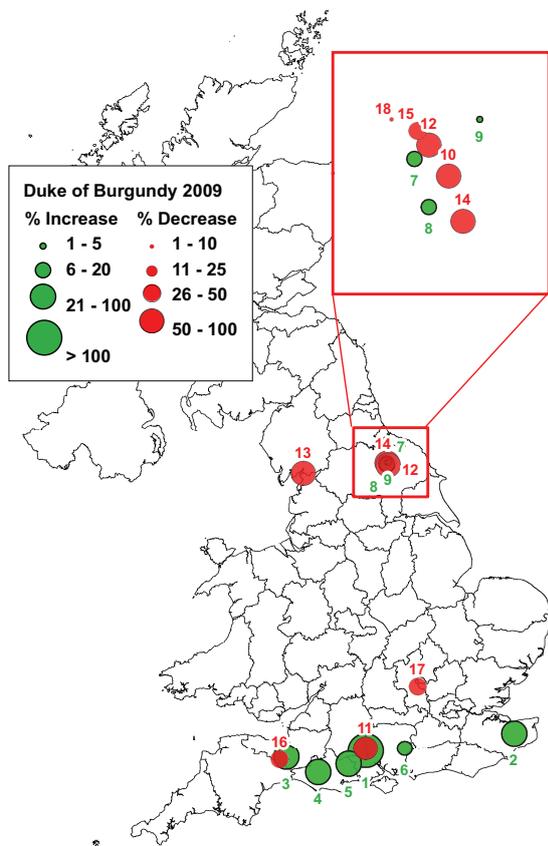


Photo by Andrew Burns

Figure 6 shows where the largest percentage changes occurred in Duke of Burgundy site indices across the UK between 2008 and 2009. Northern populations experienced more declines than increases. However, many of these are already very small populations and the absolute change in numbers, rather than the percentage change, was quite small. On sites where numbers are greater, such as Hawnby Hill in North Yorkshire, numbers remained similar in 2009 and/or showed small increases compared with 2008. Noar Hill, a superb site for Duke of Burgundy, in Hampshire showed a 17% increase with a site index that exceeded 100 in 2009. At Denge Wood, Kent, numbers almost doubled over 2008. Unfortunately, a number of sites that have recorded low abundances in the past did not record Duke of Burgundy in 2009.



Figure 6. Sites where Duke of Burgundy abundance changed substantially between 2008 and 2009.

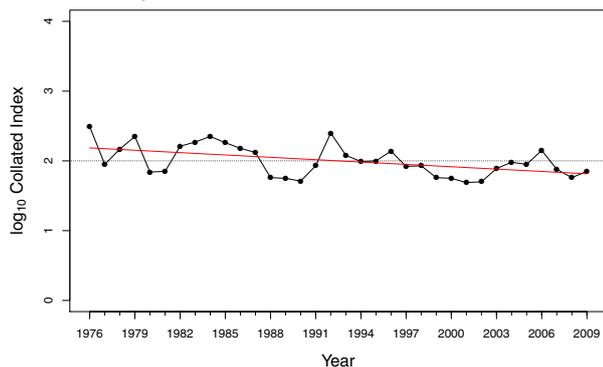


Sites: 1 Bentley Wood - Eastern; 2 Denge Wood; 3 Thurlbear Quarrylands; 4 Cerne Abbas Giant; 5 Wimborne St Giles; 6 Noar Hill; 7 Sunny Bank Wood West; 8 Moor Ings Bank; 9 Hawaby Hill; 10 Noddle End; 11 Bentley Wood – Compartment Four; 12 Fairy Bank; 13 Gait Barrows; 14 Caydale Quarry; 15 Arden Bank; 16 Buckland Wood; 17 Dancersand; 18; Thorodale Wood

Vanessids, Emperors and Admirals (Nymphalidae)

White Admiral (<i>Limenitis camilla</i>)			
No. years with Collated Index:	34	2009 Rank:	24
Change in Collated Index 2008-9 (%):	22	Long-term trend (%):	-58**
Mean flight date 2009:	09-July	Series mean flight date:	18-July

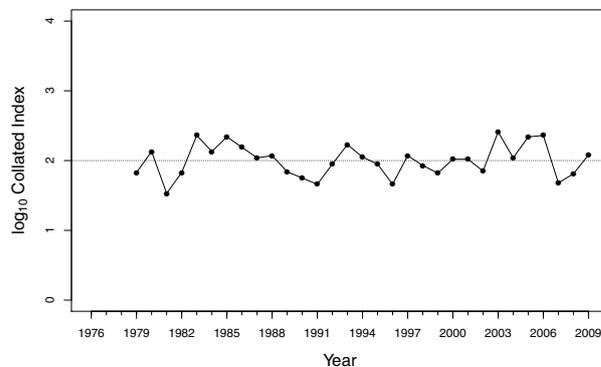
Collated Index plot:



There was a modest increase of 22% in the White Admiral Collated Index in 2009, although it was still a below-average year. Encouragingly two sites recorded three figure indices, the maximum being 115 at Southrey Wood, Lincolnshire. The butterfly remains in long-term decline, with a significant decrease of nearly 60% across the UK since 1976.

Purple Emperor (<i>Apatura iris</i>)			
No. years with Collated Index:	31	2009 Rank:	10
Change in Collated Index 2008-9 (%):	85	Long-term trend (%):	15
Mean flight date 2009:	12-July	Series mean flight date:	24-July

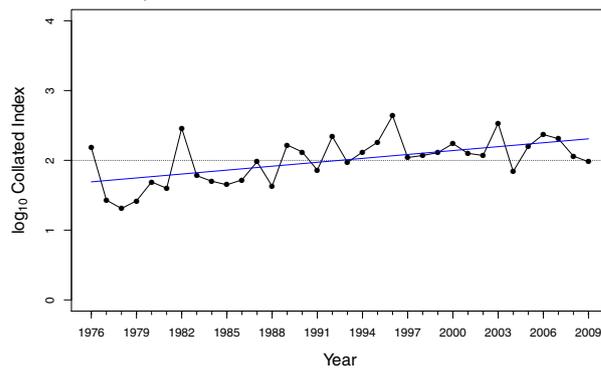
Collated Index plot:



There was a substantial increase in the Purple Emperor Collated Index in 2009, to produce an above average year. This is one of many species flying earlier than at the start of the scheme, with the mean flight date advanced by nearly two weeks over the series average. As in previous years, site indices were extremely small. The long-term trend is classed as stable.

Red Admiral (<i>Vanessa atalanta</i>)			
No. years with Collated Index:	34	2009 Rank:	20
Change in Collated Index 2008-9 (%):	-17	Long-term trend (%):	332***
Mean flight date 2009:	02-Aug	Series mean flight date:	07-Aug

Collated Index plot:

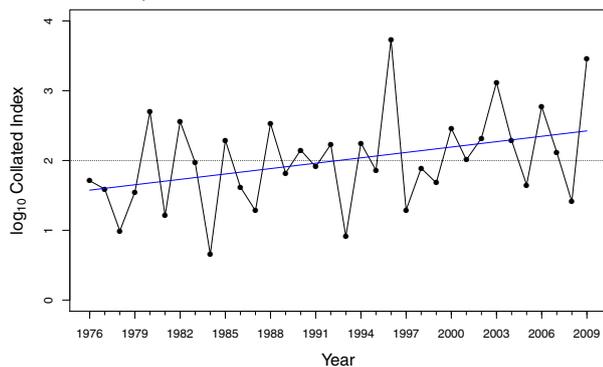




In an excellent year for other migrant species, one might have expected something similar for the Red Admiral. However, 2009 was a little below average with numbers dropping by nearly a fifth from 2008 levels. Spring/summer numbers were poor which may in part reflect the cold winter since spring numbers have in recent years been augmented by individuals that have found winters warm enough to hibernate in the UK. Few individuals are likely to have survived the winter of 2008-9. None the less, the butterfly has increased significantly since 1976. As in 2008, the largest site index was recorded at Martin Mere WWT Reserve with the 2009 total being 336.

Painted Lady (<i>Vanessa cardui</i>)			
No. years with Collated Index:	34	2009 Rank:	2
Change in Collated Index 2008-9 (%):	>1000	Long-term trend (%):	649*
Mean flight date 2009:	16-July	Series mean flight date:	31-July

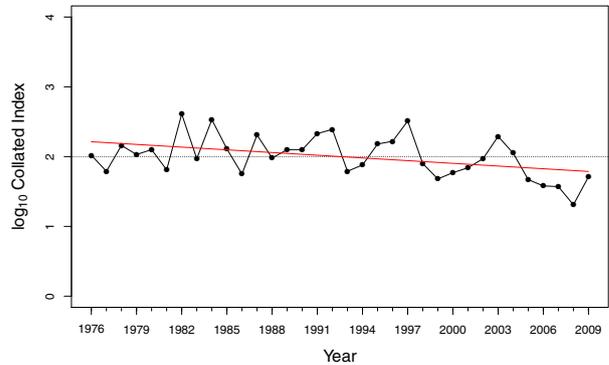
Collated Index plot:



It was a superb year for the Painted Lady in 2009 – the second best of the series. Migrant numbers flooded into the south of UK in May prompting a UK wide count organised by Butterfly Conservation. The Painted Lady has shown a significant long-term increase in the UK since 1976, but unlike the Red Admiral and Clouded Yellow, has not yet been proved to regularly overwinter here.

Small Tortoiseshell (<i>Aglais urticae</i>)			
No. years with Collated Index:	34	2009 Rank:	29
Change in Collated Index 2008-9 (%):	155	Long-term trend (%):	-64*
Mean flight date 2009:	12-July	Series mean flight date:	10-July

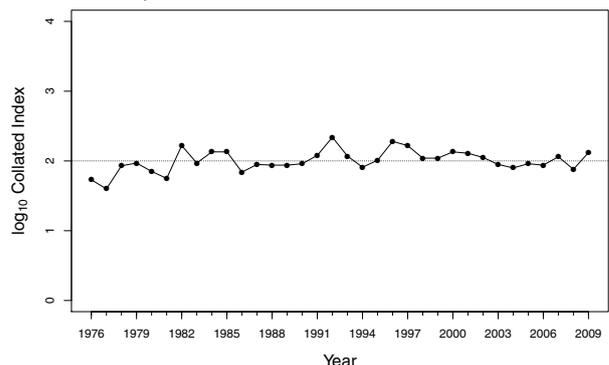
Collated Index plot:



Following the four worst years in a row, it was encouraging that 2009 was a better year for the Small Tortoiseshell, with a 100% increase over the previous year. The recovery coincides with a late flurry of migrants in the previous autumn. However, despite this modest recovery, numbers still remain considerably lower than they used to be, with a significant decline of nearly two-thirds since 1976. Due to this decline, the Small Tortoiseshell has been the subject of much discussion, concern and scientific research in recent years. The significant decline has been linked to parasitism and droughts. Given that numbers may be boosted by migration, declines on the continent could also possibly be a factor.

Peacock (<i>Aglais io</i>)			
No. years with Collated Index:	34	2009 Rank:	6
Change in Collated Index 2008-9 (%):	59	Long-term trend (%):	51
Mean flight date 2009:	20-June	Series mean flight date:	03-July

Collated Index plot:

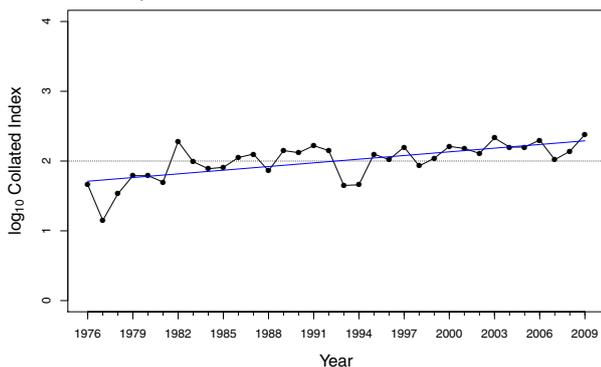




2009 was an above average year for the Peacock, with the Collated Index up by 59% from 2008. Substantial increases between 2008 and 2009 included from 52 to 274 at Magdalen Hill Down Extension, Hampshire, 165 to 638 at Bradfield Woods, Suffolk and 270 to 889 at Potton Wood, Bedfordshire - the latter site supporting the largest index in the UK. As with many other species which had a good year, the mean flight date in 2009 was substantially earlier than the series average. Although the UK abundance trend shows no overall change since the 1970s, there has been a significant increase in Scotland attributable to climate warming.

Comma (<i>Polygonia c-album</i>)			
No. years with Collated Index:	34	2009 Rank:	1
Change in Collated Index 2008-9 (%):	74	Long-term trend (%):	293***
Mean flight date 2009:	16-July	Series mean flight date:	20-July

Collated Index plot:

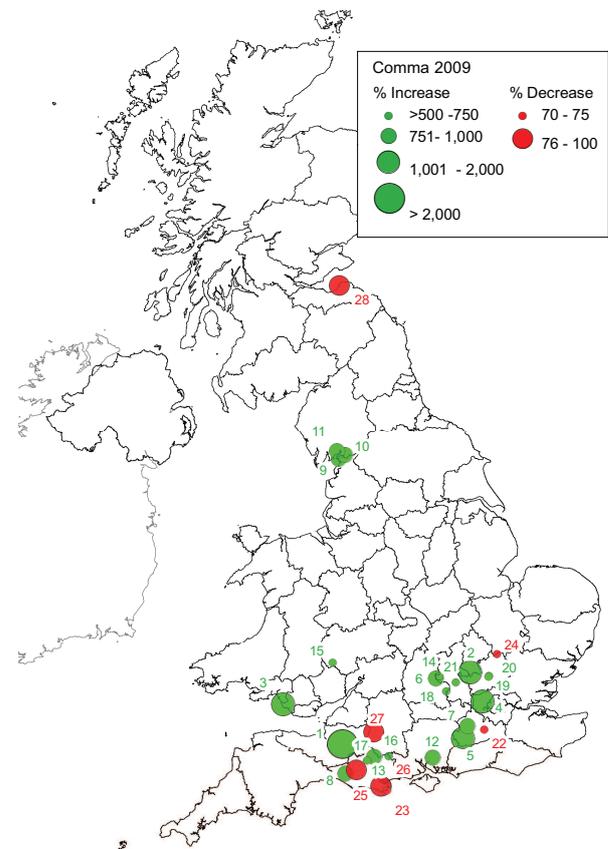


The Comma produced its highest Collated Index of the series in 2009 and there has been a significant long-term increase on monitored sites in the UK. An expanding species, the Comma is now regularly recorded in Scotland. Figure 7 shows where the greatest changes in Comma numbers occurred in the UK between 2008 and 2009. Most of the largest changes occurred in the south of England, particularly in Buckinghamshire and Oxfordshire.



Photo by Ben Woodward

Figure 7. Sites where Comma abundance changed substantially between 2008 and 2009.



- Sites:** 1 Long Wood; 2 Whipsnade Downs; 3 Kenfig; 4 Horsenden Hill – East; 5 Witley; 6 Oakley Woods; 7 Smarts Heath Trial; 8 Powerstock Bridleway; 9 Jack Scout NT; 10 Holme Park Quarry Reserve; 11 Latterbarrow CWT; 12 Swanmore Village; 13 Fontmell Down (new); 14 Brill Common; 15 Ewyas Harold Common; 16 Martin Down; 17 Piddle’s Wood (DTNC); 18 Aston Rowant (N); 19 Templewood (new); 20 Sherrards Park Reddings; 21 Coombe Hill; 22 Box Hill, Viewpoint; 23 Durlston Country Park East; 24 Therfield Heath, Church Hill (3); 25 Cerne Abbas Giant; 26 Corfe Castle Mound; 27 Upton Cow Down (MOD); 28 Aberlady bay; 29 Corfe, West Hill

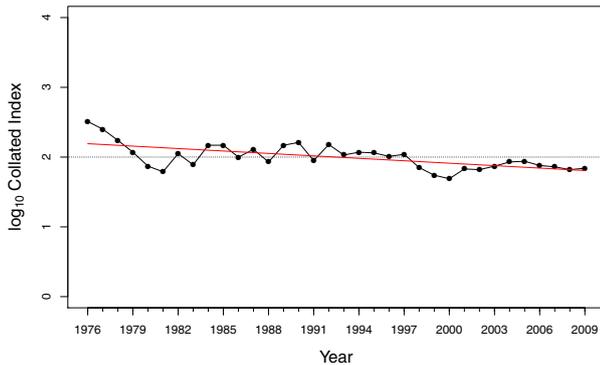
Three figure indices were produced at 18 sites in 2009 compared with only 3 in 2008. Bradfield Woods, Suffolk, recorded a series high of 373, with the maximum day count being 78 on the 12th September. Substantial increases from 2008 were noted at Oakley Woods, Buckinghamshire (from 14 to 146), Noar Hill, Hampshire (20 to 97) and Aston Upton Down, Oxfordshire (12 to 63)



Fritillaries (Nymphalidae)

Small Pearl-bordered Fritillary <i>(Boloria selene)</i>			
No. years with Collated Index:	34	2009 Rank:	28
Change in Collated Index 2008-9 (%):	5	Long-term trend (%):	-60***
Mean flight date 2009:	22-June	Series mean flight date:	25-June

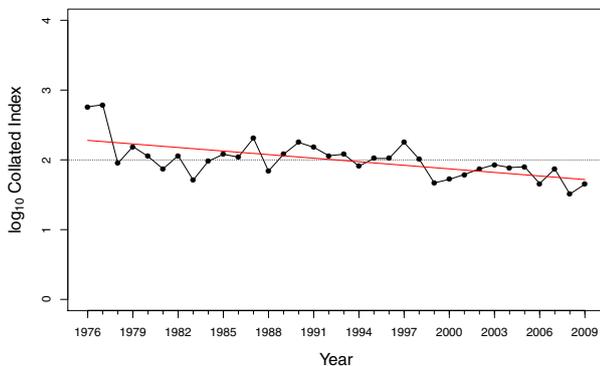
Collated Index plot:



The Small Pearl-bordered Fritillary showed little overall change in numbers in 2009 and remains at a low ebb, with a substantial long-term decline since 1976. Although sample sizes are small, available data indicates the butterfly is doing better in Scotland than other parts of the UK. The largest site index of 165 was at Burn Hill, County Durham.

Pearl-bordered Fritillary <i>(Boloria euphrosyne)</i>			
No. years with Collated Index:	34	2009 Rank:	23
Change in Collated Index 2008-9 (%):	41	Long-term trend (%):	-74***
Mean flight date 2009:	20-May	Series mean flight date:	02-June

Collated Index plot:

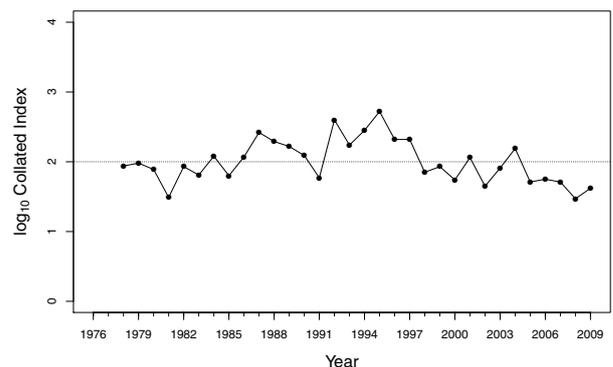


Although the Pearl-bordered Fritillary showed some recovery in 2009 following its worst year in the series in 2008, numbers remain critically low for this species with 2009 ranked as the second worst year on record. Abundance has dropped significantly by nearly three quarters since 1976. Available data indicates that the

butterfly is doing better in Scotland, where the long-term trend is classed as stable. Across the UK, the mean flight date was almost two weeks earlier than the long-term average.

High Brown Fritillary (<i>Argynnis adippe</i>)			
No. years with Collated Index:	32	2009 Rank:	30
Change in Collated Index 2008-9 (%):	40	Long-term trend (%):	-40
Mean flight date 2009:	12-July	Series mean flight date:	16-July

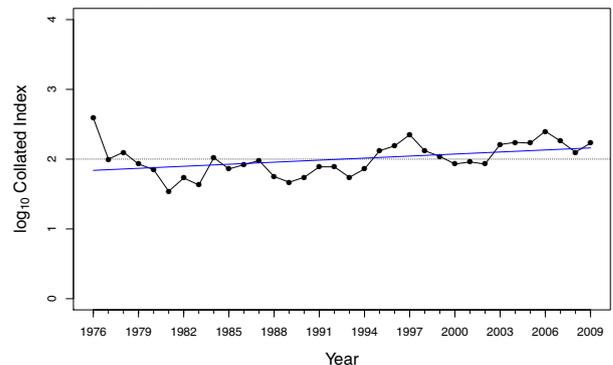
Collated Index plot:



High Brown Fritillary abundance was the second lowest on record in 2008 and despite a substantial recovery of 40%, 2009 was the third worst year in the series. Although this is one of our rarest and most threatened species that has been lost from many sites, the long-term abundance trend on UKBMS sites shows no overall change, largely due to successful conservation efforts in north-west England.

Dark Green Fritillary (<i>Argynnis aglaja</i>)			
No. years with Collated Index:	34	2009 Rank:	6
Change in Collated Index 2008-9 (%):	35	Long-term trend (%):	115*
Mean flight date 2009:	13-July	Series mean flight date:	22-July

Collated Index plot:



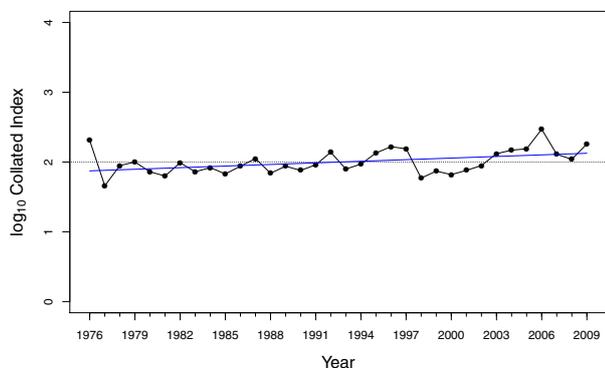
2009 was the sixth best year on record for the Dark Green Fritillary with numbers increasing by over a third



compared to the previous year. Sixteen sites recorded three figure indices, the maximum being 575 at Sands of Forvie, Aberdeenshire. Unlike most of the other UK fritillaries, the Dark Green Fritillary has increased significantly in abundance since 1976 - by more than 100%. However, there is an apparent decrease on monitored sites in Wales.

Silver-washed Fritillary (<i>Argynnis paphia</i>)			
No. years with Collated Index:	34	2009 Rank:	3
Change in Collated Index 2008-9 (%):	65	Long-term trend (%):	82*
Mean flight date 2009:	22-July	Series mean flight date:	26-July

Collated Index plot:



2009 was another excellent year for the Silver-washed Fritillary, the third best in the series, with a 65% increase from 2008. The largest site index of 650 was recorded at Bentley Wood – Hawksgrove, Wiltshire with the combined index for this woodland complex being in excess of 1,150. The butterfly has increased significantly in the UK since 1976, with the last seven years all being above average.

Marsh Fritillary (<i>Euphydryas aurinia</i>)			
No. years with Collated Index:	27	2009 Rank:	12
Change in Collated Index 2008-9 (%):	154	Long-term trend (%):	41
Mean flight date 2009:	01-June	Series mean flight date:	06-June

Collated Index plot:

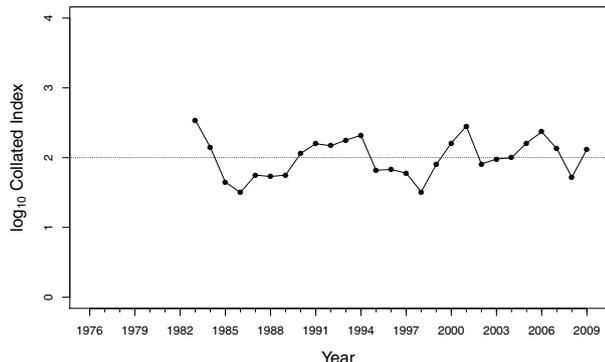
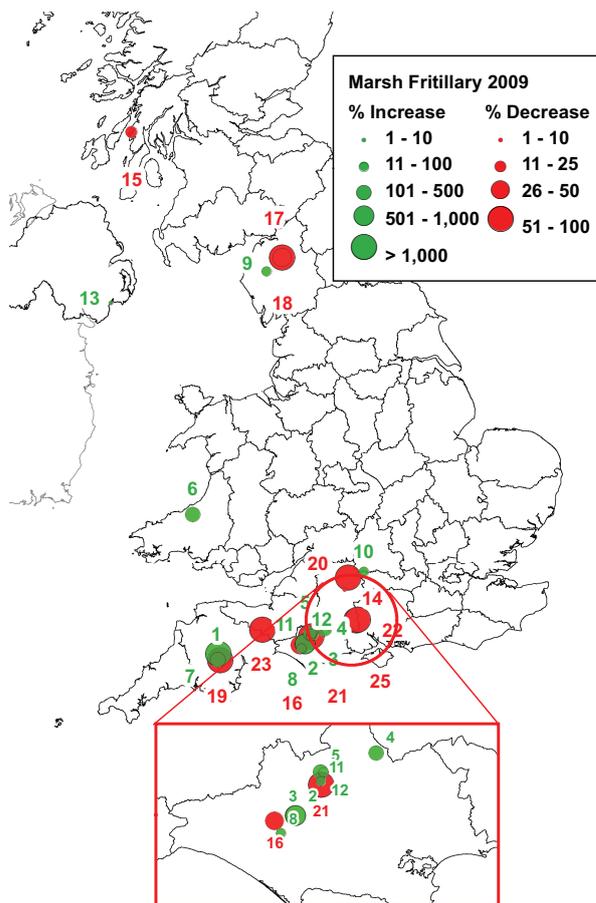


Photo by Matthew Berry

Figure 8. Sites where Marsh Fritillary abundance changed substantially between 2008 and 2009.



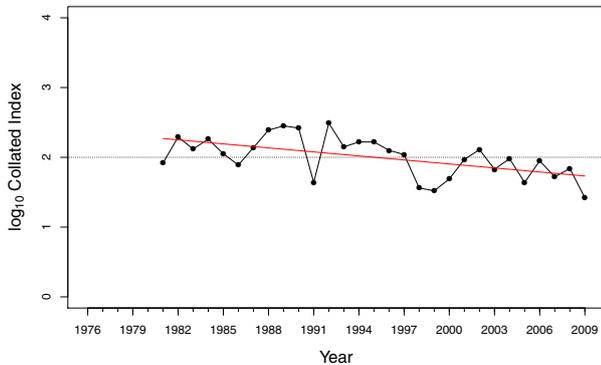
Sites: 1 Venton Farm; 2 Cerne Giant; 3 Cerne Abbas Giant; 4 Clubmens Down (NT); 5 Lydlinch Common (New); 6 Rhos Llaur Cwrt; 7 Lower Hurston; 8 Southfield Hog Cliff; 9 Braithwaite Moss (Larval webs); 10 Severn Barrows; 11 Rooksmoor; 12 Lydlinch; 13 Murlough; 14 Pewsey Down; 15 Taynish; 16 Lankham Bottom; 17 Middlesceugh (Larvae); 18 Middlesceugh (Adult); 19 Shapley Farm; 20 Barbury Castle; 21 Alners Gorse; 22 Bentley Wood Hawksgrove; 23 Buckland Wood; 25 Bentley Wood Eastern



The Marsh Fritillary had an above average year in 2009, with an overall increase from 2008 of more than 150%. There was considerable variation between sites. Figure 8 shows that a similar number of sites showed an increase to those showing an annual decrease in 2009 – though the declines were generally smaller than the increases. In spite of considerable annual fluctuations, there is little or no overall change in Marsh Fritillary abundance in the long-term on UKBMS sites, contrasting with losses from many other sites detected through distribution surveys.

Heath Fritillary (<i>Melitaea athalia</i>)			
No. years with Collated Index:	29	2009 Rank:	29
Change in Collated Index 2008-9 (%):	-62	Long-term trend (%):	-72**
Mean flight date 2009:	18-June	Series mean flight date:	07-July

Collated Index plot:



2009 was the worst year for the Heath Fritillary in the 29-year series. In spite of this gloomy headline result, there were some positives with a welcome increase in numbers in some parts of the Blean Woods complex, Kent including at Cole Wood and Blean Woods RSPB Reserve. At the latter site, extraordinary numbers were present in some areas and a second brood occurred. However, the long-term picture is worrying with a decline in abundance of nearly three quarters since the start of monitoring in 1981. There has been a remarkable advancement in the phenology of this species in recent years, and once again the mean flight date in 2009 was much earlier than the series average.

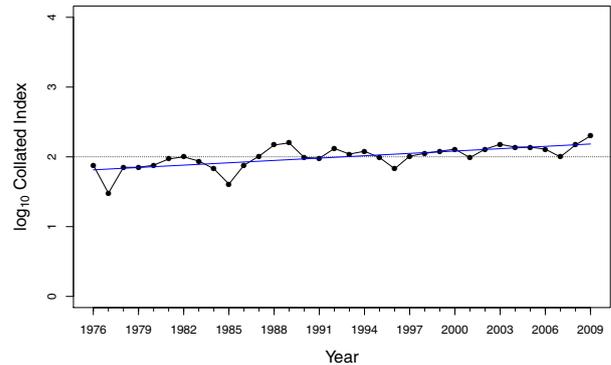


Photo by Jim Higham

Browns (*Satyrina*)

Speckled Wood (<i>Pararge aegeria</i>)			
No. years with Collated Index:	34	2009 Rank:	1
Change in Collated Index 2008-9 (%):	35	Long-term trend (%):	140***
Mean flight date 2009:	18-July	Series mean flight date:	27-July

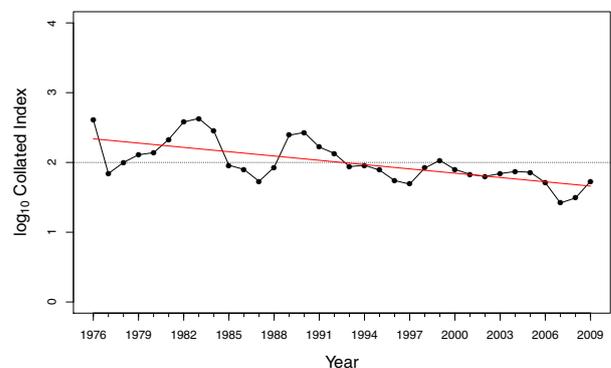
Collated Index plot:



The Speckled Wood had another superb year, producing its highest Collated Index in the series and increasing by over a third from 2008, which was also a good year. In common with most of the other species that produced high indices in 2009 the Speckled Wood has also been expanding its range and has significantly increased in abundance on monitored sites since 1976. The largest site index in 2009 was 1,316 at Long Wood, Sussex, representing the 18th highest UKBMS site index in the 34 year series.

Wall Brown (<i>Lasiommata megera</i>)			
No. years with Collated Index:	34	2009 Rank:	32
Change in Collated Index 2008-9 (%):	54	Long-term trend (%):	-80***
Mean flight date 2009:	16-July	Series mean flight date:	28-July

Collated Index plot:



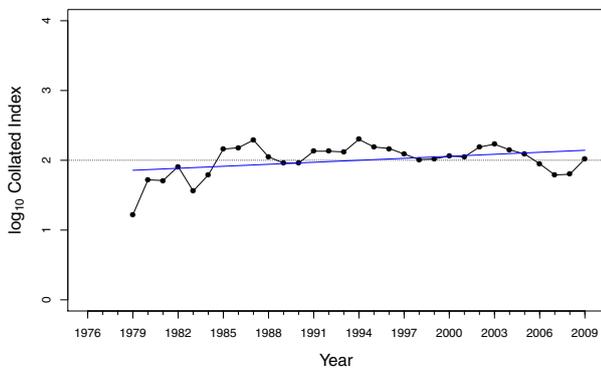
Although the Wall Brown showed a modest recovery in 2009, numbers were below average for the eleventh year in succession. It was a relatively early year for the species,



with the mean flight date being advanced by nearly two weeks over the series average. Six sites achieved indices in three figures, the largest being at Havannah, a brownfield site in Northumberland, where the index increased from 82 in 2008 to 211 in 2009. Other noteworthy increases included at Bindon Hill, Dorset with 23 in 2008 and 132 in 2009. At a UK level, abundance has been reduced significantly by 80% since 1976.

Scotch Argus (<i>Erebia aethiops</i>)			
No. years with Collated Index:	31	2009 Rank:	18
Change in Collated Index 2008-9 (%):	67	Long-term trend (%):	98*
Mean flight date 2009:	07-Aug	Series mean flight date:	10-Aug

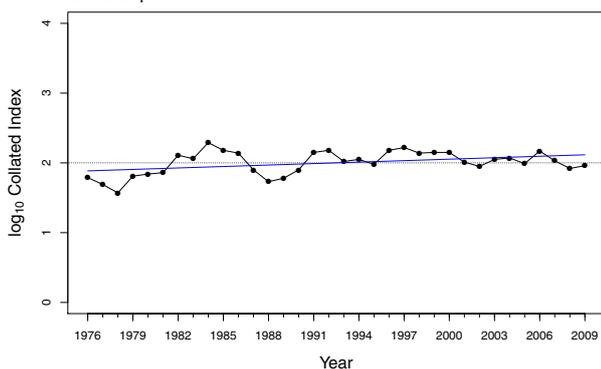
Collated Index plot:



Despite the range contraction of the Scotch Argus, numbers on monitored sites have significantly increased since the late 1970s. After a run of poor years between 2004 and 2008, the butterfly produced an average Collated Index in 2009 resulting from a 67% increase over 2008.

Marbled White (<i>Melanargia galathea</i>)			
No. years with Collated Index:	34	2009 Rank:	22
Change in Collated Index 2008-9 (%):	10	Long-term trend (%):	73*
Mean flight date 2009:	06-July	Series mean flight date:	16-July

Collated Index plot:

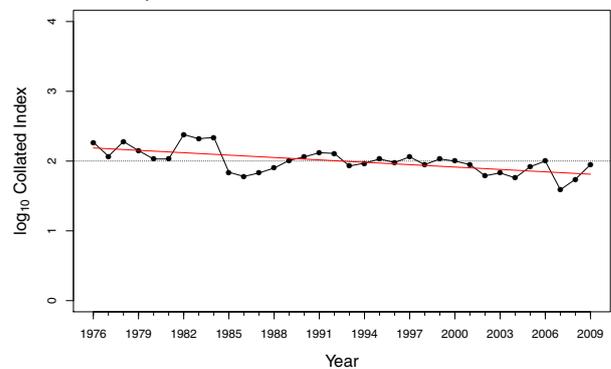


For the second year in a row it was relatively poor year for the Marbled White. Given that much of the flight period was hit by the poor July/August weather in 2009 this is hardly surprising. Across the UK, the butterfly has increased significantly since 1976. The largest site index was recorded at Whippingham (fields), Isle of Wight – the index of 1,888 being the 4th highest for any UK site since 1976. In recent years this site and Durlston Country Park West have invariably recorded the largest site indices in the UK.

Grayling (<i>Hipparchia semele</i>)			
No. years with Collated Index:	34	2009 Rank:	21
Change in Collated Index 2008-9 (%):	62	Long-term trend (%):	-59***
Mean flight date 2009:	29-July	Series mean flight date:	05-Aug



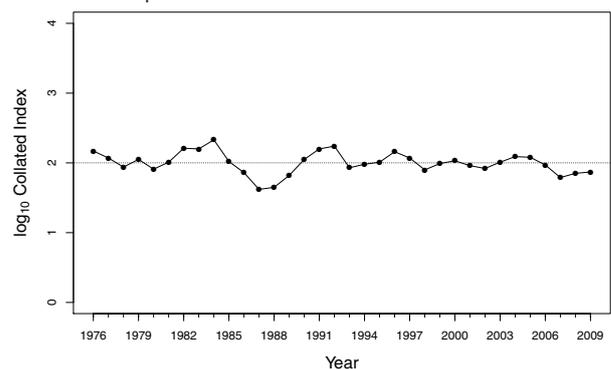
Collated Index plot:



Although abundance was up from 2008, it was still a below average year for the Grayling. Twelve sites recorded three-figure indices, the largest being 482 at North Warren RSPB Reserve, Suffolk. The butterfly has declined significantly in abundance since 1976.

Gatekeeper (<i>Pyronia tithonus</i>)			
No. years with Collated Index:	34	2009 Rank:	28
Change in Collated Index 2008-9 (%):	4	Long-term trend (%):	-24
Mean flight date 2009:	29-July	Series mean flight date:	02-Aug

Collated Index plot:

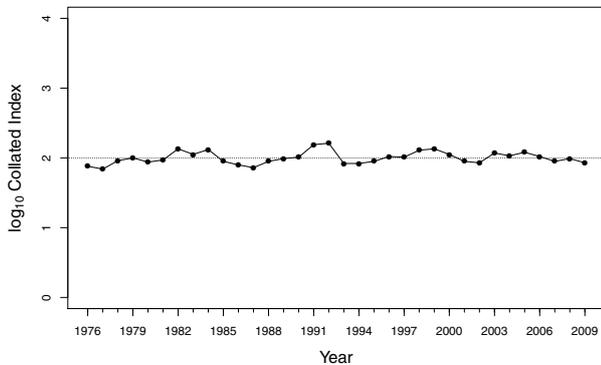




2009 was a below average year for the Gatekeeper, and only a very slight improvement on the poor years of 2007 and 2008. The largest site index of 2,269 at Whippingham (fields), Isle of Wight was the 20th highest index for any UK site since 1976. The long-term trend is classed as stable at a UK level, although there is an apparent increase on monitored sites in Wales.

Meadow Brown (<i>Maniola jurtina</i>)			
No. years with Collated Index:	34	2009 Rank:	27
Change in Collated Index 2008-9 (%):	-13	Long-term trend (%):	15
Mean flight date 2009:	17-July	Series mean flight date:	21-July

Collated Index plot:



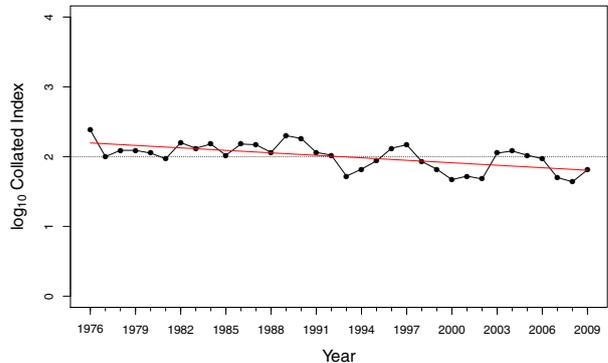
Like the Gatekeeper, the Meadow Brown has shown a relatively stable Collated Index since 1976 across the UK, although there is an apparent increase in Wales. Unlike most other UK butterflies, the Meadow Brown fared worse in 2009 than 2008 with a 10% reduction, that yielded a below average Collated Index. Whippingham (fields), Isle of Wight is the premier UK monitored site for this species, recording an index of 8,472 in 2009. Of more than 10,000 site indices recorded for Meadow Brown in the 34-year UKBMS series, this site has six of the ten highest indices.



Photo by John Vallender

Small Heath (<i>Coenonympha pamphilus</i>)			
No. years with Collated Index:	34	2009 Rank:	28
Change in Collated Index 2008-9 (%):	48	Long-term trend (%):	-60***
Mean flight date 2009:	48	Series mean flight date:	09-July

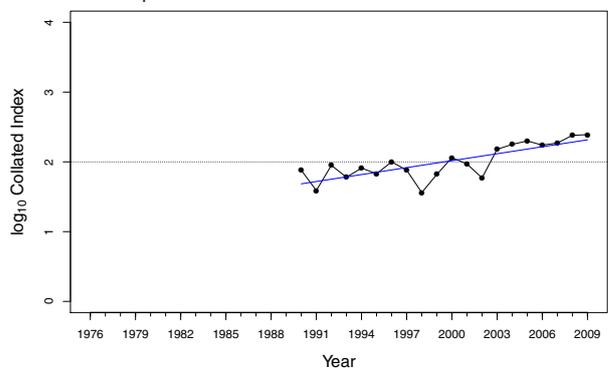
Collated Index plot:



After two very poor years, the Small heath showed some recovery in 2009, though the Collated Index was still well below average for the series and there is continued concern for this widespread but significantly declining species. On a more positive note, the butterfly is apparently doing better in Scotland than other parts of the UK. Small Heath was the only butterfly to record the exact same mean flight date in 2009 as the series average.

Large Heath (<i>Coenonympha tullia</i>)			
No. years with Collated Index:	13	2009 Rank:	1
Change in Collated Index 2008-9 (%):	1	Long-term trend (%):	145***
Mean flight date 2009:	01-July	Series mean flight date:	09-July

Collated Index plot:

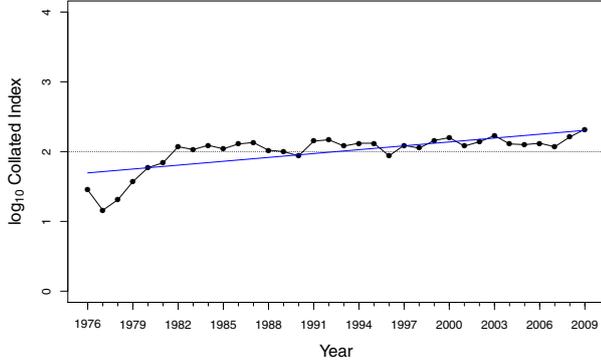


For the second year running the Large Heath produced its highest Collated Index of the series, making it seven above average years in a row. The butterfly has increased significantly on monitored sites since the late 1980s. However, with small sample sizes, this increase may not fully reflect the wider national picture.



Ringlet (<i>Aphantopus hyperantus</i>)			
No. years with Collated Index:	34	2009 Rank:	1
Change in Collated Index 2008-9 (%):	29	Long-term trend (%):	325***
Mean flight date 2009:	07-July	Series mean flight date:	16-July

Collated Index plot:



Whilst many UK butterflies suffered in 2008 due to the particularly wet weather, the Ringlet had a good year. This continued in 2009 during which it produced its highest Collated Index of the series. The largest index of 1,913 recorded at Webbs Wood, Wiltshire was the second highest index ever recorded on a UKBMS site in the 34-year series. The Ringlet has been expanding its range throughout the UK simultaneously with a significant increase in abundance on monitored sites since 1976.



Future plans for the UKBMS

Tom Brereton and David Roy

A new development plan for the future of the UKBMS has recently been published, providing an update to the last strategy for UK butterfly monitoring published more than a decade ago (Pollard & Greatorex-Davies, 1997). The report reviews the current structure and main functions of the UKBMS and the relationship with other butterfly monitoring activity, including repeat regional/national surveys for rare species. The strengths and weaknesses of the main field methods for assessing status changes in butterflies and suggests future work to improve methodologies are identified as are the current and potential policy uses of butterfly monitoring data. The report provides a critical assessment of the current level of butterfly sampling and concludes with a set of costed proposals for the future development of the UKBMS.

Currently, the UKBMS chiefly comprises 'Pollard walk' butterfly transects (approximately 90% of monitored sites in 2009). The report confirms that this is the most appropriate method for the annual monitoring of populations of multi-species butterfly assemblages on semi-natural sites. Reassuringly, UKBMS data is viewed as important by conservation advisers and policy makers within Government because it has a wide range of current and potential conservation and policy applications. These include UK BAP and Habitats Directive reporting, site condition monitoring of SSSIs, compilation of biodiversity indicators, assessment of the impacts of climate change, and management of protected areas and land in agri-environment schemes.

The transect method works less well for (1) high-flying, canopy dwelling species, (2) mobile habitat specialist species which have shifting distributions over time (e.g. Pearl-bordered Fritillary in woodland), (3) habitat specialist species living in remote upland habitats (e.g. Large Heath), where a combination of remoteness, marginal climate and challenging terrain make weekly visits impractical on a wide scale and (4) wider countryside species which occur at low density across the general countryside, including in intensive farmland and plantation woodland habitats where low returns may not justify weekly recording effort. For these species types alternative methods and sampling strategies are recommended.

Further research is recommended to fully validate and peer-review methods for assessing the abundance of canopy dwelling species, though funding for this work through the UKBMS is likely to be a low priority. Reduced effort methods, including timed counts and

single species transects, are recommended as the most efficient way of improving coverage of specialist species falling into categories (2) and (3) above. There is considerable potential to achieve this by better utilising existing volunteer efforts. Our estimates suggest that approximately 250-300 volunteers carry out annual surveys for rare species at 550-600 sites. With improved training and co-ordination, many of these surveys could be converted into timed counts that could make a direct contribution to the UKBMS. A more co-ordinated approach to priority species surveys was also identified as important to make efficiency savings and improve data use, though this is likely to remain outside of the UKBMS. The Wider Countryside Butterfly Survey (WCBS) is considered the most appropriate method for the annual monitoring of populations of multi-species butterfly assemblages across the general countryside, including intensive farmland and upland landscapes (see feature article). The WCBS could be extremely important in policy terms, in assessing the future impacts of land-use change on biodiversity in the wider countryside.

The report proposes three priority work areas for the UKBMS in the future (1) maintenance of the core network of transect and other annually monitored sites (2) enhancement of the efficiency of the existing transect network through development of the volunteer network, combined with analytical and statistical developments and (3) establishment of the WCBS as an annual component within the UKBMS. These proposals form the basis of a new funding package being developed by BC/CEH/BTO and the current consortium of Government funding bodies led by JNCC, to take the UKBMS forward for another three years from spring 2011.

The report will be made available on the UKBMS website at a later date.

A new red list of UK butterflies

In 2010, a new red list for UK butterflies produced by BC was published by JNCC using new IUCN criteria (IUCN, 2001). Red Lists use specific criteria to evaluate the extinction risk of species both to convey the urgency of conservation issues to the public and policy makers, and to help identify priorities for future conservation action. Butterflies are known to be one of the most rapidly declining groups of plants or animals (Thomas et al, 2004) so the report is both important and timely.

The report follows on from the first Red List assessment of butterflies in Britain produced by Shirt (1987) using the original IUCN criteria and a second assessment by Warren et al (1997) using revised IUCN criteria. The



new red list is an improvement because for the first time, assessment was made using both UKBMS abundance data (rate of population decline) and BNM distribution data (area of occupancy). Warren et al. (1997) compiled the previous Red List solely from distribution data.

The latest assessment indicates that four species are 'Regionally Extinct' (excluding the Large Blue, which became extinct in Great Britain in 1979 but has since been reintroduced), 19 species are 'Threatened' (Critically Endangered, Endangered or Vulnerable) and 11 species are 'Near Threatened'. Only 28 species or 45% of British butterflies are classified as 'Least Concern'. The two species that are 'Critically Endangered' are Large Blue and High Brown Fritillary. The eight 'Endangered' species are Chequered Skipper, Wood White, White-letter Hairstreak, Black Hairstreak, Duke of Burgundy, Pearl-bordered Fritillary, Glanville Fritillary and Heath Fritillary, whilst the nine 'Vulnerable' species are Dingy Skipper, Grizzled Skipper, Brown Hairstreak, Silver-studded Blue, Northern Brown Argus, White Admiral, Marsh Fritillary, Grayling and Large Heath.

A comparison with previous assessments shows that the number of species considered to be threatened has grown steadily, highlighting the serious extinction risk facing butterflies in Great Britain.

The report can be downloaded from www.butterfly-conservation.org/.../S0713NewRedListofBritishbutterflies.pdf

Current research using UKBMS data

The UKBMS continues to provide a valuable resource for scientific research. A number of studies have recently been published in peer-reviewed journals. This includes some high profile work in *Ecology Letters* by Tom Oliver and David Roy of CEH, Tom Brereton of BC and Jane Hill and Chris Thomas of the University of York. The paper demonstrates the importance of habitat heterogeneity for promoting stability in butterfly populations. These findings have important implications for management of habitats across the UK and suggest the need to maximise habitat and topographic heterogeneity, especially in fragmented landscapes under changing climates, in order to promote the stability and persistence of our butterfly populations.

A number of other projects are using data from the UKBMS. Examples include:

- Extending the work on habitat heterogeneity mentioned above, investigating whether the

configuration (e.g. degree of fragmentation in the surrounding landscape) of different land cover types also affects population stability. The long-term goal of this work is to provide an evidence-based approach to maximise the biodiversity value of our landscapes.

- Revealing the factors associated with commonness and rarity. Nick Isaac has shown that most butterfly species occur at higher abundance on cold sites. Extrapolating these findings under climate change, in a recently published study, suggests the dominance of UKBMS sites by a few common species, such as the Meadow Brown, and the loss of many of our rarer specialist species. Robin Curtis, a PhD student, is investigating the role of host plant availability in regulating abundance.
- The effects of climate change on butterfly phenology in space and time (David Roy) and species differences in phenological responses (Marc Botham). UKBMS data also contributed to a recent meta-analysis of phenology trends across terrestrial, freshwater and marine environments. This study, led by Stephen Thackeray (CEH Lancaster) and published in *Global Change Biology*, shows that lower trophic levels (e.g. plankton, aphids) have advanced the timing of their appearance each year by a greater extent than higher trophic levels (e.g. birds and mammals).
- Investigating population synchrony in the Speckled Wood, PhD student Gary Powney has found that populations show more similar dynamics when the habitat between them is more suitable. This suggests that individuals can more readily disperse through less fragmented landscapes.



Speckled Wood populations have more similar dynamics over time when the habitat between them is better quality. Photo by Ben Woodward

Recent and past publications using UKBMS data are listed on the UKBMS website in the 'Reports & Publications' section (<http://www.ukbms.org/reportsAndPublications.htm>).



Launching the wider countryside butterfly survey

Tom Brereton and Katie Cruickshanks

Introduction

Following four years of pilot studies, the Wider Countryside Butterfly Survey (WCBS) was rolled out across the UK in 2009. The WCBS, organised by BC, CEH and the British Trust for Ornithology (BTO), represents the first nationwide survey of butterfly abundance using a network of randomly selected sites. The aim of the survey is to generate unbiased estimates of changes in abundance for wider countryside species, complementing species monitoring through the UKBMS transect network which tends to focus on high quality semi-natural habitats. In spite of a limited budget for organisation and publicity, there was a fantastic response to the survey from volunteer recorders. In total 1,642 visits were made to 763 1-km squares by 611 recorders, who collectively walked 3,300 km of survey line, counting 119,000 butterflies. In addition, 12,382 butterfly records were generated for the BNM database, including 90 new 10-km square records, and a rapid method to monitor other insect groups was completed on 40% of squares thanks to funding provided by JNCC.



Common Blue butterflies were found in nearly 40% of squares.
Photo by Tim Melling

Participation

360 Breeding Bird Survey (BBS) squares (47% of the total) were surveyed by BTO recorders, whilst BC volunteers covered 403 squares (53%) (Figure 9). Coverage stretched from the Orkney Islands in the north to the Channel Islands in the south and from south-east Kent to western Fermanagh, Northern Ireland. During the core July and August survey period nearly 80% of squares received the required two visits. Additional visits to squares included approximately 200 in the spring and 300 in the core period. BC Branch target coverage levels were exceeded in Somerset and Bristol, Norfolk, and Dorset, whilst BTO coverage was strongest in Yorkshire, Sussex and Kent. Fortuitously, poor coverage in some BC Branches was compensated

for by good coverage by the BTO (e.g. West Midlands) and vice-versa (e.g. Dorset), highlighting one of a number of the benefits of the partnership. Sampling coverage in some regions of north and west Britain, as feared, was low and part of a wider recording problem.

Recording standards and data quality were thought to be high, with only 0.2% of records being obvious misidentifications based on known species distributions and flight times. Data came in swiftly at the end of the year, with over 70% of recorders using the online data entry system devised by CEH.

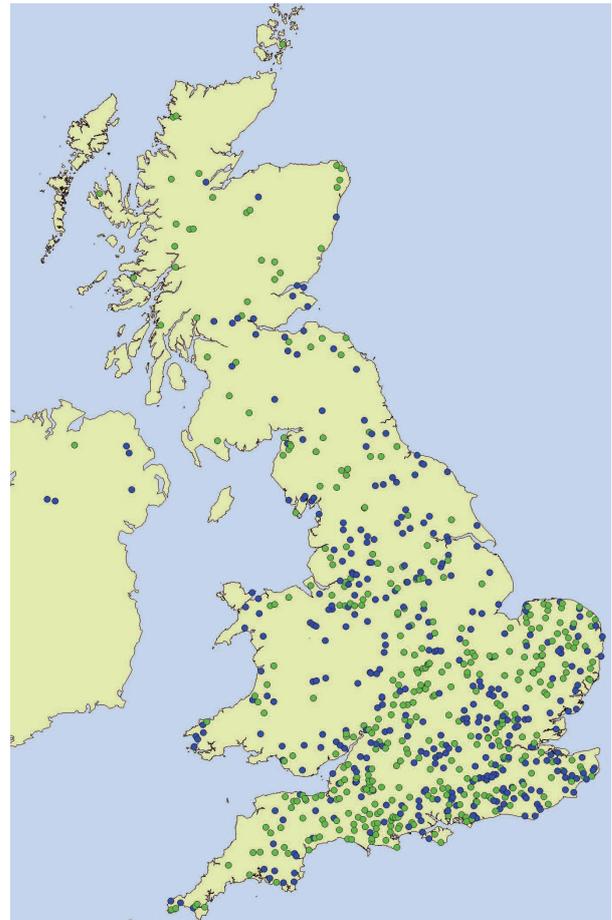


Figure 9. Location of the WCBS squares covered by BC (green circles) and BTO (blue circles) recorders in 2009

Butterfly sightings

More than three-quarters (47 of 59) of the UK's regularly occurring butterfly species were recorded during the survey. Good coverage (i.e. present in more than 30 squares) was achieved for all of the target wider countryside species, with the exception of Scotch Argus (found in 17 squares). Optional spring visits boosted coverage for several species including Brown Argus and Wall Brown, with the main bonus being good coverage for the Orange-tip (found in 65 squares). The most widely recorded species over the core July and August period was the Large White, occurring in nearly 90% of



Table 3. Occurrence and abundance data for butterflies recorded during repeat summer visits to 593 WCBS squares

Species	Occupancy		Abundance		
	% squares	Rank	Total counted	% of all counted	Rank
Large White	89.4	1	14817	15.71	2
Meadow Brown	87.3	2	15281	16.20	1
Small White	86.8	3	13489	14.30	3
Painted Lady	82.6	4	6803	7.21	6
Gatekeeper	75.4	5	10520	11.15	4
Speckled Wood	73.9	6	4825	5.11	8
Green-veined White	71.9	7	8505	9.02	5
Peacock	68.3	8	2632	2.79	10
Small Tortoiseshell	60.0	9	2642	2.80	9
Comma	53.4	10	1058	1.12	12
Red Admiral	50.8	11	910	0.96	14
Ringlet	46.6	12	5446	5.77	7
Common Blue	39.0	13	1643	1.74	11
Small Copper	26.1	14	379	0.40	20
Small Skipper	23.3	15	897	0.95	15
Brimstone	18.3	16	277	0.29	22
Large Skipper	17.8	17	403	0.43	19
Small/Essex Skipper	16.4	18	960	1.02	13
Small Heath	13.6	19	422	0.45	17
Wall Brown	11.1	20	405	0.43	18
Holly Blue	10.7	21	95	0.10	27
Essex Skipper	10.4	22	261	0.28	23
Brown Argus	9.7	23	194	0.21	24
Marbled White	8.5	24	476	0.50	16
Silver-washed Fritillary	6.9	25	139	0.15	26
Clouded Yellow	5.2	26	88	0.09	28
Purple Hairstreak	3.2	27	50	0.05	29
Orange Tip	1.8	28	13	0.01	35
White Admiral	1.7	29	49	0.05	30
Scotch Argus	1.5	30	379	0.40	20
Grayling	1.5	30	169	0.18	25
Dark Green Fritillary	1.5	30	18	0.02	33
Chalkhill Blue	1.2	33	21	0.02	32
Small Pearl-bordered Fritillary	0.5	34	16	0.02	34
Small Blue	0.5	34	6	0.01	36
White-letter Hairstreak	0.5	34	3	<0.01	38
Adonis Blue	0.3	37	25	0.03	31
Brown Hairstreak	0.3	37	3	<0.01	38
Green Hairstreak	0.3	37	3	<0.01	38
Silver-studded Blue	0.3	37	2	<0.01	42
Large Heath	0.2	41	6	0.01	36
Lulworth Skipper	0.2	41	3	<0.01	38
Dingy Skipper	0.2	41	2	<0.01	42
Pearl-bordered Fritillary	0.2	41	1	<0.01	44
Purple Emperor	0.2	41	1	<0.01	44
Wood White	0.2	41	1	<0.01	44



squares, whilst the most abundant species was the Meadow Brown (Table 3). Two Browns (Meadow Brown and Gatekeeper) and three Whites (Large White, Small White and Green-veined White) accounted for two thirds of all butterflies counted.

As expected, coverage of the majority of habitat specialists was low, due to these species having highly restricted distributions and a strong association with semi-natural habitats. Although habitat specialists comprise more than half of UK butterfly species, they accounted for less than 0.5% of the total number of butterflies counted on WCBS squares in July and August.



Figure 10. Butterfly species richness on WCBS squares (larger circles have more species)

On average, recorders counted around 80 individual butterflies of 8 species per survey made over the July and August period, confirming that an ‘average’ WCBS visit is likely to yield a reasonable butterfly return. Over the same period, on average 130 individual butterflies of 9-10 species were seen on UKBMS butterfly transects (of mean length ~2km). This analysis indicates that the diversity of butterflies seen on WCBS squares compares favourably with that on UKBMS butterfly transects, especially so given that most butterfly transects are located on high quality habitat. In general, species

richness of wider countryside species was highest and most uniform in southern Britain, east of an imaginary line enclosing the Severn Estuary and Plymouth and south of the Wash (Figure 10). The most species rich square was in Suffolk with 21 species recorded, whilst the squares with greatest butterfly abundance were in Northants and Hampshire, with more than 1,000 individuals counted in each year over the two summer visits combined. Maximum day counts for selected species at individual squares included: 895 Painted Ladies near Horncastle, Lincs on the 29th May; 288 Ringlets on 4th July near Fakenham, Norfolk; 263 Meadow Browns on 4th July near Wincanton, Somerset; 247 Gatekeepers on 25th July near Hastings, East Sussex; and 226 Green-veined Whites on 19th August near Corby, Northants.

Other insects

WCBS surveyors were encouraged to count dragonflies and day-flying moths whilst recording butterflies, and there was an excellent response with records generated in 50% of squares. 439 moths of 52 species were counted in 233 squares (131 BC, 120 BTO). A migrant, the Silver-Y, *Autographa gamma*, was the most widespread and abundant species, with 194 counted in 152 squares. 2,370 dragonflies of 28 species (plus 3 ‘Unidentified’ groups) were counted in 285 squares (161 BTO, 122 BC). Common Darter, *Sympetrum striolatum*, was the most widespread species (24% of squares), closely followed by Brown Hawker, *Aeshna grandis*, (21%) and Southern Hawker, *Aeshna cyanea*, (21%). The most abundant species was the Common Blue Damselfly, *Enallagma cyathigerum*, accounting for 31% of all individuals seen.

The optional insect flower search proved popular amongst recorders with about a third of recorders taking part. All 12 target species were detected, including Common Carder Bumblebee (*Bombus pascorum*), Marmalade Hoverfly (*Episyrphus balteatus*), Common Red Soldier Beetle (*Rhagonycha fulva*), Red-tailed Bumblebee (*Bombus lapidarius*), a hoverfly *Sericomyia silentis*, a hoverfly *Chrysotoxum bicinctum*, Great Pied Hoverfly (*Scaeva pyrastris*), Thick-legged Flower Beetle (*Oedemera nobilis*), Duck-billed Hoverfly (*Rhingia campestris*), Common Malachite Beetle (*Malachius bipustulatus*), Black and Yellow Longhorn Beetle (*Rutpela Maculata*) and Wasp Beetle (*Clytus arietis*). Five of the species were found in more than half of the sampled squares, with Common Carder Bumblebee the most widespread species (71% of squares) and Marmalade Hoverfly the most abundant species (2,170 counted).

Value of the survey

Through the combined efforts of BC and BTO volunteers the WCBS has successfully established a



robust baseline dataset of the abundance of common and widespread butterflies across the UK countryside from which to track future changes. Given that butterflies are valued indicator species, the data will be important in assessing changes in the overall condition of the countryside. The data also has a number of potential policy applications, for example, to identify core regions, habitats and landscapes for wider countryside butterflies to inform future targeting, evaluation and refinement of land management policies. With a sufficient time series (five or more years) the scheme could also be used to test whether butterfly trends for common and widespread species on WCBS sites are similar to those on UKBMS sites to help streamline the UKBMS in the future. Sampling of other insect groups has shown that the WCBS has considerable potential to involve volunteer recorders in collecting abundance data on other common insects.

Plans for 2010

Given the momentum established in 2009 and the importance of the data BC, BTO and CEH have committed to run the scheme again in 2010. A grant from JNCC will complement internal funds provided by the partners to help operate the scheme. The scheme will be organised in a broadly similar way to 2009, though Katie Cruickshanks (now an ecological consultant) will be employed under sub-contract as co-ordinator. BTO have actively promoted the scheme amongst their recorders and we hope participation by their volunteers will again be substantial. Some of the poor coverage areas where BC response was low have also been addressed, so we may also see improvements in BC uptake – at least in some areas. Weather permitting, the aim is to reach or exceed coverage levels achieved in 2009.

Painted Lady migration in 2009

Tom Brereton, Marc Botham, Richard Fox and Chris Thomas

One of the undoubted highlights of 2009 was the spectacular immigration of Painted Lady butterflies. Fortuitously BC had organised an online ‘citizen science’ survey for the Painted Lady (along with the Hummingbird Hawk-moth) attracting records from more than 9000 volunteers (Fox, 2010). The resulting dataset combined with scientific counts from UKBMS and WCBS monitored sites and other data sources provided us with a fabulous resource to describe the migration.

Anticipation of a large-scale immigration was high early in the year following a report from Constantí Stefanescu (co-ordinator of the BMS in Catalonia, Spain) whilst

undertaking an expedition to Morocco specifically to look for Painted Lady wintering areas. In the Souss Valley, in the foothills of the Atlas Mountains, Constantí and colleagues found an estimated 150,000 pupae in a single patch of fallow land, with many similar habitat patches all along the valley! It was thought to be a bumper winter for the butterfly in this key region due to plentiful winter rain and snowfall and many millions were suspected to have emerged.



Painted Lady. Photo by Dean Morley



Painted Lady breeding habitat in the Souss Valley, Morocco, March 2010. Photo by Constantí Stefanescu

Over the following weeks thousands to hundreds of thousands of Painted Ladies were noted by numerous recorders moving north in pulses across the Mediterranean and through southern Europe. In fact this was a global phenomenon, with vast numbers observed migrating at scattered sites in Mexico east to Kazakhstan! By April the first wanderers had already begun to appear in southern Britain – a journey of at least 1,000 miles. The first record at a UKBMS transect was at Lydlinch Common, Dorset on the 3rd, followed by further records in Devon and Hampshire in week the second week of monitoring.

In northern Europe a mass arrival occurred in the middle of May, with large numbers reported in northern France (including through Paris), Germany and the Netherlands.



The major arrival in the UK occurred over the 24th and 25th May Bank Holiday weekend, when sightings were commonplace and the phenomenon made national headlines. During this period weather conditions were highly conducive to migration, with low pressure present over northern France feeding warm and sunny weather to southern/eastern England and an easterly/south-easterly air flow giving favourable tail winds. The migration was on a broad front, though the apparent epicentre was in East Anglia. Typically, sightings were of butterflies flying fast and low, invariably in a northerly direction, in streams of between one and a hundred butterflies per minute. There were some spectacular counts including 18,000 past Scolt Head Island, Norfolk on the 24th. Over the two days 1,532 were counted at 117 UKBMS transect sites, the maximum being 115 at Whippingham Fields, Isle of Wight on the 25th. A number of experts made ‘guestimates’ as to how many Painted Ladies may have entered the country over the period, based on sighting rates across the country - these being in the region of 10-100 million individuals!

To get a better handle on the migration, BC organised a UK-wide timed count (the first of its kind anywhere in Europe) on the 30th May. Recorders were asked to note the number and flight direction of migrating Painted Ladies seen under UKBMS weather criteria over a fixed area (small garden or 20m wide box) for two hours between 11:00 and 13:00. In total, nearly 20,000 butterflies were counted at approximately 200 sites with widespread geographical coverage achieved (Lands End to northern Scotland: Figure 11). Painted Ladies were recorded at 90% of sample sites, with migration (fast, direct flight) noted at 97% of these. Butterflies were seen migrating in a predominantly north-westerly direction (82% of sightings). Using this sample Professor Chris Thomas of the University of York estimated that there were probably approximately 15 million Painted Ladies migrating through England and Wales alone in just two hours on that Saturday. The co-ordinated count took place after the first wave of migration had occurred in southern Britain, and by then some individuals had already reached the Faroes and Iceland! However, there were still some large counts on/near the coast especially in south-west Wales, including 5,000 near Haverfordwest, Pembrokeshire and 2,868 at Llangranog between Cardigan and New Quay, Ceredigion. Curiously, the larger counts in Wales were of butterflies flying south-west in contrast to the general north-westerly movement of butterflies elsewhere. This suggests a southbound ‘coasting’ movement in which large numbers of butterflies which had travelled north-west through southern Britain arrived in west Wales and were subsequently reluctant to cross the Irish Sea due to unfavourable winds and

cloudy weather (the latter preventing a ‘sun compass’ for orientation).



Figure 11. Painted Lady migration counts made on 30th May over a 2 hour period

At UKBMS transect sites, peak migration counts were noted on 28th and 29th May with 4,904 counted at 282 sites, including 228 at Whippingham Fields, Isle of Wight on the 29th. However, the maximum spring count at a UKBMS site was 352 at Kenidjack, Cornwall on 3rd June. During the WCBS, the highest day count was of 895 Painted Ladies near Horncastle, Lincolnshire on the 29th May, made over a 50 minute count period. By the end of the first week in June the surge of migration through Britain was largely over, with counts on UKBMS transect sites and records received to the BC Painted Lady survey website greatly reduced.

Numbers at UKBMS sites and sightings reports started to rise again in mid-July, as the progeny from those that arrived in the spring began to emerge. Both numbers and sightings peaked in the last week in July and the first week in August. A comparison with 1996 shows that the butterfly peaked one to two weeks earlier in 2009 in both the spring and mid-summer periods (Figure 12) with the summer emergence peaking nine weeks after the spring peak.

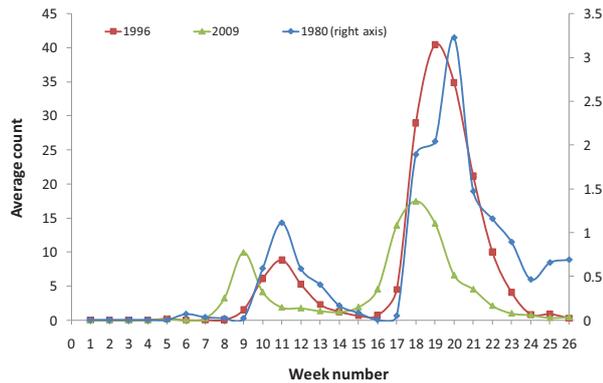


Figure 12. Average numbers of Painted Ladies per transect through the season in three good years – 1980 (rank 5), 1996 (1) and 2009 (2).

The peak day on UKBMS sites was the 25th July with 5,605 counted. Maximum transect counts over the period included 925 at Magdalen Hill Down (Extension), Hampshire, on 31st July and 596 at the Northmoor Trust Farming Project, Oxfordshire on the 30th July. Large numbers of Painted Ladies were also detected during the WCBS, with the butterfly being the fourth most widespread and sixth most abundant species seen on squares during the July and August period. Four of the five largest day counts for butterflies on WCBS squares were of the Painted Lady, with maximum counts including 377 near Horncastle, Lincs, on 9th August, 313 near Kempford, Gloucestershire, on 28th July and 307 near Milborne St Andrew, Dorset, on 25th July. Data from the WCBS indicates that the majority of migrants stayed to breed in the lowland areas of southern Britain, with most of the larger counts south and east of an imaginary line between the Severn and the Humber (Figure 13).

In spite of these impressive site counts and casual records of ‘swarms’ in some weedy fields (including an estimated 250,000 in a single field near Ditchling, Sussex) the distribution of sightings was patchy even within southern Britain. Inspection of UKBMS data shows that the average number seen per site over the peak mid-summer period was less than half that made in 1996 (Figure 11), which remains the best year for Painted Ladies over the 34-year series. In contrast, the peak mean count per site during the spring was very similar in both 1996 and 2009. Similar to 1996, the numbers seen in 1980 (another good year, ranked fifth) in the summer were more substantial than those seen in the spring (Figure 12), providing further evidence that overall the 2009 summer emergence flopped somewhat.

Lower numbers than expected was certainly my own (Tom) experience, through casual observations made whilst cycling hundreds of miles across the pleasant countryside of Devon and West Dorset on available sunny days during July and August. On these forays no

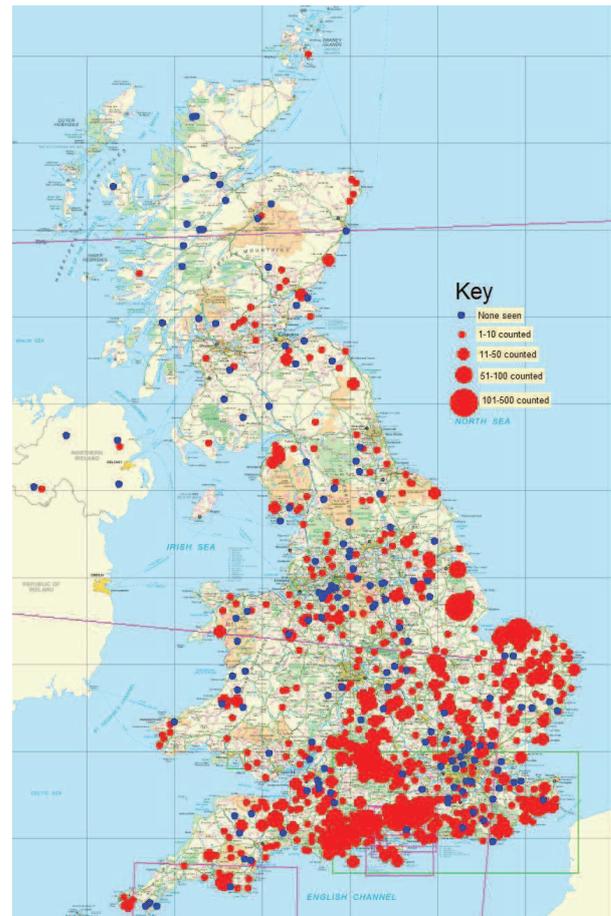


Figure 13. Peak Painted Lady counts in July and August from the WCBS

large concentrations were observed and Painted Ladies were usually towards the bottom of the table of the ten most abundant and widespread species seen on each day, with the butterfly often being surprisingly scarce.

The weather was likely to be a factor here, with the south-east having a much warmer and drier summer than other parts of Britain, including south-west England which was wet and windy for much of the time, logging three times more rainfall than average. As mentioned earlier in this report, July was the wettest for over 80 years, which likely impacted on larval survival rates preventing a potentially record-breaking emergence.

Numbers reported to the BC migrant website were also well down compared to the spring, although ‘recorder fatigue’ in submitting sightings may also have been a factor here. Further immigration was thought to have occurred especially in coastal areas of eastern Britain, whilst a small number of sightings suggested a southerly ‘return migration’ was also underway, as was the case in the Netherlands.

Numbers gradually dropped off in the latter half of August and by September generally only small numbers



were counted on UKBMS sites. Over this period records of caterpillars from the summer generation were widely reported. In October, with the transect walking season finished, there was an upsurge in casual sightings reported (more than in June, July and August). The peak number of sightings was made in mid-October some two months after the mid-summer peak suggesting emergence of a substantial second brood, though numbers may have been boosted by immigration, this time from the north rather than the south. There were five confirmed sightings of a southerly return migration (individuals exiting along the South Coast) totalling 14 butterflies (Fox, 2010), but many more were likely to have been undetected. These results are consistent with other observations in the Western Palearctic, which indicate that local emergences in north and central Europe during late July - early August did not engage in southward flights all the way back to Africa but gave rise to a second smaller European generation in late September - October. An unknown proportion of

individuals from this autumn generation undertook a southerly migration back to Africa, evidenced by a dramatic increase in sightings from mid-October onwards (Constantí Stefanescu pers. comm.). This migration was on a broad front and detected far out to sea, with for example, ca40 seen flying south west on 3rd November by researchers from the charity Marinelife on a whale watching cruise in the Atlantic Ocean between the Canary Islands and Cape Verde! It is impossible to know if any of the British insects which attempted the return migration made it all the way back to Africa, though with ongoing improvements in satellite tagging technology, hopefully we will be able to investigate this in future years.

Sightings of Painted Ladies continued to be submitted to BC's online survey throughout November with the last record on the 6th December, confirming occurrence in every month in a year that will long be remembered for some memorable sightings of this fascinating butterfly.

Spotlight on a local co-ordinator – Ken Orpe

Ken Orpe's record of transect walking stands proudly amongst those of our most experienced volunteers. He has now walked over 2,000 miles and recorded nearly 100,000 butterflies in the course of tallying up more transect visits than any other recorder. Yet he still finds time to co-ordinate transects for the East Midlands branch of Butterfly Conservation.

In this article Ken explains how he became involved in monitoring butterflies and describes the current developments in his part of the country.



Ken Orpe

“Dr Beeching's axe to the railway system in the early 1960's resulted in thousands of miles of abandoned railway lines, some of which to this day survive as important wildlife and recreational trails. So, it was on a hot sunny day in the early 1970's that I found myself cycling on the High Peak Trail in Derbyshire, my interest then being ornithology. A brief stop for liquid refreshment, and out of the corner of my eye I was attracted to a small bright blue butterfly flying around some wild flowers along one side of the limestone track, which, to be honest, was probably the first time that I had ever seen one. It was at that point that I became hooked on the world of butterflies – I needed to know what species it was, whether or not it was rare and how many types of butterflies there were in both Derbyshire and the UK as a whole.

The hot summers of 1975 and 1976 meant that there seemed to be an abundance of the local lepidoptera to keep my new interest alive. However, it wasn't until 1980 that I bought a leaflet from the local museum in Derby which informed me of a nearby abandoned railway station (Friargate) which was a haven for wildlife – again, as a result of the actions of the same Dr Beeching. As I was working nearby, I decided to take a look at the site and sure enough there was a large area of platforms with buddleia bushes growing nearby together with limestone tracks (without the rails) and a huge sidings which was colonised by wild flowers. So in 1981 I decided to do a regular walk around the site and started noting the butterfly species and also the numbers of them.

That was the start of my 'Transect World'. Believe it or not, some 30 years later I am still carrying out a transect



at the site, now ably assisted by my wife, Pat, and the contrast in both the numbers and species is quite amazing.

Then followed additional transects in an abandoned (Dr Beeching again!) railway cutting (Breadsall Cutting LNR) in 1982, at an old ash tip (West Hallam) in 1987, an abandoned brickworks in 2000 (Aston Brickyard), and now that I have just retired, at a newly created grassland/woodland site (Eyes Meadow LNR) started in 2010.

During the early 1990's, I joined the local branch of Butterfly Conservation (East Midlands) and have been the Transect Co-ordinator for a number of years now, together with Butterfly Conservation Recorder for Derbyshire (including the part which is covered by the Cheshire/Peak District branch) and the Co-ordinator for the Wider Countryside Butterfly Survey for Derbyshire. Being a retired Chartered Quantity Surveyor, it is a natural thing for me to be interested in facts, figures and data and its great to combine this with walking in a variety of habitats here in Derbyshire, ranging from the brownfield industrial sites in the south and east of the county (where our branch carries out annual surveys of both Dingy and Grizzled Skippers) to the picturesque Dales in the Peak District, where the Dark Green Fritillary and even the Wall Brown survives. As well as completing our 5 weekly transects, Pat and I organise a rota for volunteers who walk two transects around a large reservoir, which is at an important location at the junction of lowland and upland Derbyshire, so this enables us to monitor the spread of the species that are moving north in this part of the UK which is currently the Essex Skipper and Brown Argus.

We also assist members and others with advice on how to get started on a transect. In addition we have provided the raw data to Natural England who, combined with the Peak District National Park, have installed computer technology along the main footpath in Lathkill Dale National Nature Reserve (where we also carry out Butterfly Transects), so that the many visitors can use Bluetooth on mobile phones to access information on the wildlife, including butterflies, in that particular part of the dale where they are standing. Now that is a long way from my early days of paper and pencil noting butterflies during my lunch hour at an old railway station!!

Another concept that I actually started many years ago, is the creation of an e-mail group called 'Derbyshire Butterfly Line' which provides up to date information to members on emergences, unusual sightings, migrants etc as it happens, so that the members can look out on their own patch and send me records which I might not otherwise have had. It also allows me to respond and maybe visit sites to validate the information that is received – another important part of recording.

Finally, I must say that I am heartened by the change in attitude in recent years towards butterfly monitoring and the useful data that is produced by the 'foot soldiers' and the fact that many young people are taking up the gauntlet and hopefully will become the next generation of transect walkers and carry on the good work to enable Butterfly Conservation to go from strength to strength and maintain and improve the current interest and conservation of all of our butterflies.....It makes it all worthwhile!!"



Contact details for local co-ordinators

RECORDING AREAS	NAME & ADDRESS OF MONITORING OFFICER	TELEPHONE	EMAIL
UK	Ian Middlebrook Butterfly Conservation, Manor Yard, East Lulworth, Wareham, Dorset, BH20 5QP.	01929 400209	transect@butterfly-conservation.org
SCOTLAND (overall)	Vacant		
NORTHERN IRELAND	Catherine Bertrand Butterfly Conservation, Slemish Complex, Knockbracken, Healthcare Park, Saintfield Road, Belfast, BT8 8BH	07584 597690	cbertrand@butterfly-conservation.org
WALES (overall)	Clare Williams Butterfly Conservation (Wales), 10 Calvert Terrace, Swansea, SA1 6AR	01792 642972	cwilliams@butterfly-conservation.org
ENGLAND			
NORTHERN ENGLAND	Dave Wainwright Butterfly Conservation, Low Barns Visitor Centre, Witton-le-Wear, Bishop Auckland, DL14 0AG	01388 488428	dwainwright@butterfly-conservation.org
Bedfordshire & Northamptonshire	Greg Herbert 3 Candale Close, Dunstable, Bedfordshire LU6 3PE	01582 663784	
Bedfordshire & Northamptonshire	Data co-ordinator Keith Balmer 6 Salcombe Close, Bedford, Bedfordshire MK40 3BA	01234 355435	keith@balmer.co.uk
Cambridgeshire	Louise Bacon 236 Wimpole Road, Barton, Cambridge, CB23 7AE	Not available	recorder@cambs-essex-butterflies.org.uk
Cheshire & Peak District	Stu Burnet 17 Alderdale Road, Cheadle Hulme, Cheadle, Cheshire, SK8 5PP	0161 4855107	stuburnet@ntlworld.com
Cornwall	Jim Barker An Arth, Alexandra Road, St Ives, Cornwall, TR26 1BX	01736 794134	jimfrances@talktalk.net
Devon	John Randall 112 Peters Park Lane, St Budeaux, Plymouth, Devon PL5 1PT	01752 309857	jmrandall@blueyonder.co.uk
Dorset	Bill Shreeves Little Garth, 5 Butt's Mead, Shaftesbury Dorset. SP7 8NS	01747 852587	w.shreeves@btinternet.com
East Midlands	Ken Orpe 34 Derwent Avenue, Allestree, DERBY, DE22 2DQ	01332 730524	ken@malaga.plus.com
Essex	Robert Smith 165a Warley Hill, Great Warley, Brentwood, Essex, CM13 3AG	Not available	recorder@cambs-essex-butterflies.org.uk
Gloucestershire	Chris Wiltshire The Brambles, Stinchcombe Hill, Dursley, Gloucestershire GL11 6AQ	01453 545509	chriswiltshire164@o2.co.uk
Hampshire & I.O.W.	Andy Barker 13 Ashdown Close, Chandlers Ford, Eastleigh, Hants. SO53 5QF.	02380 270042	aj3barker@btinternet.com
Herts & Middlesex	Dr John Murray Field End, Marshalls Heath, Wheathampstead, Herts. AL4 8HS.	01582 833544	j.b.murray@open.ac.uk
	Andrew Wood 93 Bengo Street, Hertford, SG14 3EZ	01992 503571	zoothorn@ntlworld.com
Isle of Man	Vacant		
Kent	Mike Brown 29 Eynswood Drive, Sidcup, Kent, DA14 6JQ	0208 3001875	mikeh.brown@ntlworld.com
Lancashire	Laura Sivell 22 Beaumont Place, Lancaster, LA1 2EY	01524 69248	laura.sivell@mypostoffice.co.uk



RECORDING AREAS	NAME & ADDRESS OF MONITORING OFFICER	TELEPHONE	EMAIL
Lincolnshire	Vacant		
Norfolk	Dr Chris Dawson 395 Unthank Road, Norwich, Norfolk. NR4 7QG	01603 454092	aandcdawson@talktalk.net
North West England	Vacant		
North East England	Brian Denham 1 Swaledale Avenue, Darlington, DL3 9AJ	01325 263449	brian.denham@ntlworld.com
Suffolk	Rob Parker 66 Cornfield Road, Bury St Edmunds, Suffolk. IP33 3BN	01284 705476	robparker@waitrose.com
Surrey	Richard Donovan 65 Stoughton Avenue, Cheam, Surrey SM3 8PH	0208 6441563	Richard.Donovan@Reichhold.com
Sussex	Peter Atkinson 55 Furze Road, Worthing, W. Sussex, BN13 3BH	01903 690943	patkinson55@tiscali.co.uk
Upper Thames (Berks, Bucks & Oxon)	Mike Wilkins 65, The Causeway, Steventon, Abingdon, Oxfordshire. OX13 6SE	01235 831300	mikeawilkins@googlemail.com
Warwickshire	Keith Warmington 30 New Street, Baddesley Ensor, Atherstone, Warwickshire, CV9 2DW	01827 715873	keith@warmies.co.uk
Somerset & Bristol	Mike Ridge 9 Bath Road, Bridgwater, Somerset, TA6 4PH	01278 450793	
	Data co-ordinator Marjorie Brunt Kea House, Chapel Lane, Butleigh, Glastonbury, SSomerset BA6 8TB	01458 850919	marjorie.brunt@virgin.net
West Midlands	John Tilt 9 Meadow Close, Flyford Flavell, Worcs WR7 4DE	01386 792458	John.Tilt2@btopenworld.com
Wiltshire	Geoff Hobson 30 Leigh Road, Westbury, Wiltshire, BA13 3QL	01373 823820	m5eay.geoff@btinternet.com
Yorkshire	Jean Murray 'High Up', Binns Lane, Holmfirth, West Yorkshire, HD9 3BJ	01484 685286	eeh_oop@yahoo.co.uk
WALES			
Ceredigion	TBA		
Denbigh, Flintshire & Wrexham	TBA		
Glamorgan	TBA		
Gwynedd & Anglesey	Andrew Graham 'Trawscoed', Llanuwchllyn, Bala, Gwynedd. LL23 7TD	01678 540370	anrghm@globalnet.co.uk
Monmouthshire	TBA		
Montgomeryshire	TBA		
Pembrokeshire	Bob Haycock 1 Rushmoor Cottages, Martletwy, Narberth, SA67 8BB	01834 891667	rushmoor1@tiscali.co.uk
Powys & Brecon Beacons National Park	Julian Jones Radnorshire Wildlife Trust, Warwick House, High Street, Llandrindod Wells, Powys, LD1 6AG	01597 823298	julian@rwtwales.org



RECORDING AREAS	NAME & ADDRESS OF MONITORING OFFICER	TELEPHONE	EMAIL
SCOTLAND			
Ayrshire & Renfrewshire	Neil Gregory 32 Oldhall Drive, Kilmacolm, Renfrewshire PA13 4RF	01505 874 275	droitwich@btinternet.com
Borders	Vacant		
Dumfries & Galloway	Andy Riches		Slioch69@aol.com
East Lothian	Nick Morgan East Lothian Council, Landscape & Countryside Division, Block C, Haddington, East Lothian, EH41 3HA	01620 827671	nmorgan@eastlothian.gov.uk
Fife	Duncan Davidson 140 Pitcorthie Drive, Dunfermline KY11 8BJ	01383 730 446	duncan.davidson@calnexsol.com
Highlands	Hilary Quick Scottish Orienteering Association, National Orienteering Centre, Glenmore Lodge, Aviemore, PH22 1QU	01479 861374	hilary@scottish-orienteeing.org
Lanarkshire	Louisa Hancock Countryside & Greenspace Service, Calderglen Country Park, East Kilbride, G75 0QZ	01355 236 644	Louisa.Hancock@southlanarkshire.gsx.gov.uk
Stirlingshire, Argyllshire & Bute	Andrew Masterman Flat 1/3, 214 Calder Street, Glasgow, G42 7PE	0141 4231336	andrewmasterman@hotmail.com



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Appendix I

Appendix I: Trends in UK BAP Priority species

BAP priority species	No. sites where increasing	No. sites where declining	No. sites where stable	Total sites recorded at	Change in Collated Index 2008-9
Brown Hairstreak	4	2	11	65	-22
Dingy Skipper	13	43	121	504	37
Duke of Burgundy	3	26	24	132	-54
Grayling	2	23	62	276	62
Grizzled Skipper	17	31	91	394	40
Heath Fritillary	1	14	16	49	-62
High Brown Fritillary	3	16	38	118	40
Large Blue	3	0	4	23	-9
Large Heath	2	1	7	34	2
Lulworth Skipper	1	3	1	18	-26
Marsh Fritillary	4	17	47	217	154
Northern Brown Argus	0	7	16	63	2
Pearl-bordered Fritillary	3	28	44	202	41
Silver-studded Blue	2	5	16	88	83
Small Blue	11	14	44	235	124
Small Heath	17	122	244	1096	48
Small Pearl-bordered Fritillary	8	25	54	263	5
Wall Brown	6	89	116	693	54
White Admiral	12	17	78	287	22
White-letter Hairstreak	4	8	16	216	39
Wood White	1	6	13	76	-18



Appendix II

Appendix II - Vernacular & scientific names of butterfly species referred to in this report (vernacular names follow Emmet and Heath (1990) *The Moths and Butterflies of great Britain and Ireland Volume 7 Part 1*, Harley Books, Colchester. The scientific names follow the Fauna Europaea website (version 2.2) www.fauna-europea.org, accessed on 27-09-2010).

Common name	Scientific name	Authority	Page no. for species account
Adonis Blue	<i>Polyommatus bellargus</i>	(Rottemburg, 1775)	17
Brimstone	<i>Gonepteryx rhamni</i>	(Linnaeus, 1758)	12
Brown Argus	<i>Aricia agestis</i>	(Denis & Schiffmuller, 1775)	15
Brown Hairstreak	<i>Thecla betulae</i>	(Linnaeus, 1758)	14
Chalkhill Blue	<i>Polyommatus coridon</i>	(Poda, 1761)	16
Clouded Yellow	<i>Colias croceus</i>	(Fourcroy, 1785)	11
Comma	<i>Polygonia c-album</i>	(Linnaeus, 1758)	20
Common Blue	<i>Polyommatus icarus</i>	(Rottemburg, 1775)	16
Dark Green Fritillary	<i>Argynnis aglaja</i>	(Linnaeus, 1758)	22
Dingy Skipper	<i>Erynnis tages</i>	(Linnaeus, 1758)	9
Duke of Burgundy Fritillary	<i>Hamearis lucina</i>	(Linnaeus, 1758)	18
Essex Skipper	<i>Thymelicus lineola</i>	(Ochsenheimer, 1808)	8
Gatekeeper	<i>Pyronia tithonus</i>	(Linnaeus, 1767)	26
Grayling	<i>Hipparchia semele</i>	(Linnaeus, 1758)	25
Green Hairstreak	<i>Callophrys rubi</i>	(Linnaeus, 1758)	13
Green-veined White	<i>Pieris napi</i>	(Linnaeus, 1758)	12
Grizzled Skipper	<i>Pyrgus malvae</i>	(Linnaeus, 1758)	10
Heath Fritillary	<i>Melitaea athalia</i>	(Rottemburg, 1775)	24
High Brown Fritillary	<i>Argynnis adippe</i>	(Denis & Schiffmuller, 1775)	22
Holly Blue	<i>Celastrina argiolus</i>	(Linnaeus, 1758)	17
Large Blue	<i>Phengaris arion</i>	(Linnaeus, 1758)	17
Large Heath	<i>Coenonympha tullia</i>	(Muller, 1764)	27
Large Skipper	<i>Ochlodes sylvanus</i>	(Esper, 1777)	9
Large White	<i>Pieris brassicae</i>	(Linnaeus, 1758)	12
Lulworth Skipper	<i>Thymelicus acteon</i>	(Rottemburg, 1775)	8
Marbled White	<i>Melanargia galathea</i>	(Linnaeus, 1758)	25
Marsh Fritillary	<i>Euphydryas aurinia</i>	(Rottemburg, 1775)	23
Meadow Brown	<i>Maniola jurtina</i>	(Linnaeus, 1758)	26
Northern Brown Argus	<i>Aricia artaxerxes</i>	(Fabricius, 1793)	16
Orange Tip	<i>Anthocharis cardamines</i>	(Linnaeus, 1758)	13
Painted Lady	<i>Vanessa cardui</i>	(Linnaeus, 1758)	19
Peacock	<i>Aglais io</i>	(Linnaeus, 1758)	20
Pearl-bordered Fritillary	<i>Boloria euphrosyne</i>	(Linnaeus, 1758)	22
Purple Emperor	<i>Apatura iris</i>	(Linnaeus, 1758)	19
Purple Hairstreak	<i>Favonius quercus</i>	(Linnaeus, 1758)	14
Red Admiral	<i>Vanessa atalanta</i>	(Linnaeus, 1758)	19
Ringlet	<i>Aphantopus hyperantus</i>	(Linnaeus, 1758)	27
Scotch Argus	<i>Erebia aethiops</i>	(Esper, 1777)	25
Silver-spotted Skipper	<i>Hesperia comma</i>	(Linnaeus, 1758)	9
Silver-studded Blue	<i>Plebejus argus</i>	(Linnaeus, 1758)	15
Silver-washed Fritillary	<i>Argynnis paphia</i>	(Linnaeus, 1758)	22
Small Blue	<i>Cupido minimus</i>	(Fuessly, 1775)	15
Small Copper	<i>Lycaena phlaeas</i>	(Linnaeus, 1758)	15
Small Heath	<i>Coenonympha pamphilus</i>	(Linnaeus, 1758)	26
Small Pearl-bordered Fritillary	<i>Boloria selene</i>	(Denis & Schiffmuller, 1775)	21
Small Skipper	<i>Thymelicus sylvestris</i>	(Poda, 1761)	8
Small Tortoiseshell	<i>Aglais urticae</i>	(Linnaeus, 1758)	20
Small White	<i>Pieris rapae</i>	(Linnaeus, 1758)	12
Speckled Wood	<i>Pararge aegeria</i>	(Linnaeus, 1758)	24
Wall Brown	<i>Lasiommata megera</i>	(Linnaeus, 1767)	24
White Admiral	<i>Limnitis camilla</i>	(Linnaeus, 1764)	19
White-letter Hairstreak	<i>Satyrrium w-album</i>	(Knoch, 1782)	14
Wood White	<i>Leptidea sinapis</i>	(Linnaeus, 1758)	10

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Butterfly Conservation is the charity aimed at securing a lasting future for butterflies, moths and their habitats. It works in partnership with thousands of volunteers and a wide range of organisations in the UK and Europe to secure a healthy environment where we all can live.



The Centre for Ecology & Hydrology (CEH) is the UK's Centre of Excellence for integrated research in terrestrial and freshwater ecosystems and their interaction with the atmosphere. As part of the Natural Environment Research Council (NERC) CEH works in partnership with the research community, policymakers, industry and society, to deliver world-class solutions to the most complex environmental challenges facing humankind.



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The Joint Nature Conservation Committee (JNCC) is the statutory adviser to Government on UK and international nature conservation. Its work contributes to maintaining and enriching biological diversity, conserving geological features and sustaining natural systems. JNCC delivers the UK and international responsibilities of the four country nature conservation agencies - Council for Nature Conservation and the Countryside, the Countryside Council for Wales, Natural England and Scottish Natural Heritage.



Natural England is an independent public body whose purpose is to protect and improve England's natural environment, for its intrinsic value, the wellbeing and enjoyment of people and the economic prosperity that it brings.



Scottish Natural Heritage is the government body that looks after all of Scotland's nature and landscapes, across all of Scotland, for everyone.



The Countryside Council for Wales is the Government's statutory advisor on sustaining natural beauty, wildlife and the opportunity for outdoor enjoyment in Wales and its inshore waters. It champions the environment and landscapes of Wales and its coastal waters as sources of natural and cultural riches, as a foundation for economic and social activity, and as a place for leisure and learning opportunities.



The Northern Ireland Environment Agency takes the lead in advising on, and in implementing, the Government's environmental policy and strategy in Northern Ireland. It aims to protect and conserve Northern Ireland's natural heritage and built environment, control pollution, and promote the wider appreciation of the environment and best environmental practices.



The Forestry Commission is the government department for forestry in Great Britain. It works to improve people's lives through the many benefits provided by sustainably managed woods and forests, including timber production, public recreation, nature conservation, and rural and community development. It does this by supporting woodland managers with grants, tree felling licences, regulation and advice, and advising Ministers in the UK, Scottish and Welsh Assembly Governments on forestry policy. It manages more than 1 million hectares (2.5 million acres) of public forest land owned or leased by Ministers to provide the above benefits, and through its Forest Research agency, it conducts world-class scientific research and technical development relevant to forestry.

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