United Kingdom
Butterfly Monitoring Scheme

ANNUAL REPORT 2010

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Tracking changes in the abundance of UK butterflies

ANNUAL REPORT 2010

Cover photograph of Adonis Blue, *Polyommatus bellargus*. Many of the blues did extremely well in 2010 with Adonis and Common Blues both producing their second highest index in the 35-year series. *Photograph by Peter Eeles*.

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Butterfly Conservation
Saving butterflies, moths and their habitats

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ACKNOWLEDGEMENTS (back cover)

About the UKBMS

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

Changes in the abundance of butterflies throughout the United Kingdom have been monitored using transects since 1976. Over the past 35 years, the huge network of recorders (~4,000) has collectively made around a quarter of a million weekly visits to almost 2,000 different sites, walking over half a million km and counting over 16 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 uniquely placed amongst British terrestrial insects and other invertebrate groups to act as indicators of the state of the environment, allowing us to assess the impacts of habitat change, climate change and the progress of government policy initiatives such as the UK Biodiversity Action Plan (BAP), agri-environment schemes and the condition of Sites of Special Scientific Interest (SSSIs). Not only are butterflies biologically suitable as indicator species, having rapid lifecycles and, in many cases, high sensitivity to environmental conditions, but the recording and monitoring volunteer networks and datasets built up by Butterfly Conservation (BC) and the Centre for Ecology & Hydrology (CEH) enable accurate assessment of their trends.

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 (FC) 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

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Meet the team

David Roy: is the Head of the Biological Records Centre (BRC) and manages the UKBMS at CEH. David's research focuses on the effects of climate change on butterfly populations.

Biren Rathod: web developer at CEH. Biren's role is to maintain and update the UKBMS website.

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

Zoë Randle: surveys officer at BC. Zoë coordinates the Wider Countryside Butterfly Survey (WCBS).

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. Steve collaborates on the development of analysis for the UKBMS.

Marc Botham: butterfly ecologist at CEH. Marc oversees the collation and analysis of the UKBMS dataset and is responsible for the production of the UKBMS reports.

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 criteria for weather, recording area and time of day. 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, timed counts and larval web counts 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 (log-linear regression) is needed to estimate missing values. The model takes into account 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 sixth year that data from a combined UKBMS dataset have been used to calculate trends in butterfly populations. In 2010 the number of UKBMS sites on which butterfly numbers were recorded was over 1,000 once again (910 transects and 117 larval web/timed counts), continuing the superb achievement of 2009. Figure 1 shows the UK coverage of these sites in 2010, once again demonstrating the immense support and dedication of UKBMS volunteers. This enabled Collated Indices to be calculated for 54 of the 59 species which regularly occur in the UK. This being one more than in 2009 following the inclusion of Black Hairstreak. As in previous years, trends were assessed for a number of canopy species: Purple, White-letter, Black 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 and because there are a small number of transects and timed counts directed specifically towards some of these species.

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 recent reports, we have produced a combined single index for all sites for each species rather than separate indices for double-brooded species.

Summary

HIGHLIGHTS

- For the second year running over a thousand sites were monitored. Trends were assessed for 54 of the 59 regularly occurring UK species, which is one more than ever before.
- Following a promising start, the season repeated the pattern of 2007-2009 and fell away with unsettled summer weather. The year was slightly above average, ranking 14th in the 35–year series.
- The composite index for Habitat Specialist species showed a welcome increase compared to recent years, whilst the Wider Countryside index showed a slight decline.
- Black Hairstreak and Large Heath had their best year on record, whilst Lulworth Skipper and Meadow Brown had their worst.
- Habitat Specialist species which had a good year included two threatened species: Wood White and Marsh Fritillary. In contrast, the Lulworth Skipper continued to decline rapidly, producing its worst index on record for the fourth year in succession.
- Two-thirds of Wider Countryside species were in lower numbers than in 2009 and the continued declines in Wall Brown, Small and Essex Skippers are a cause for concern. Species which had notable increases over 2009 included Common Blue and Brown Argus.
- Following the previous year's huge Painted Lady influx, 2010 was a very poor year for migrants with low numbers of all three regular immigrants.
- As a result of the bad weather of recent years a number of Wider Countryside species with expanding distributions and positive long-term trends attributable to climate change, show no overall trend over the last decade.
- Following an extremely cold start to the year, the majority of spring butterflies appeared later than in recent years. There was up to one week's delay in the date of mean abundance for species such as Orange-tip and Green Hairstreak. In contrast, warm spring temperatures generally enabled species flying later in the year to appear either earlier or at the same time as the previous year.

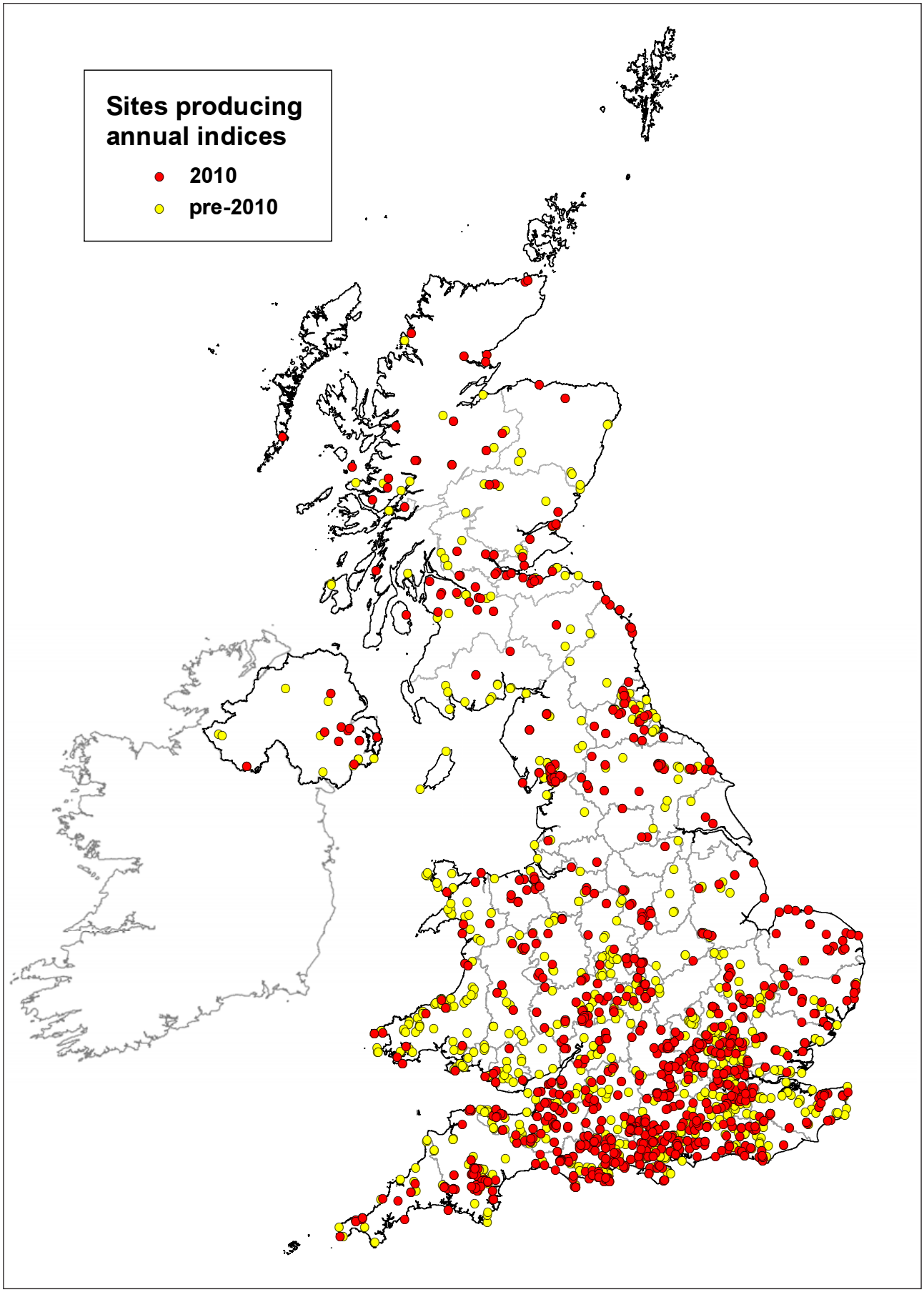


Figure 1. Location of UKBMS sites (Note: some sites are not shown where the location is private).

The cold winter of 2009/10 gave hope amongst UK Lepidopterists that 2010's butterfly numbers would show some improvement following three poor years. With temperatures as low as -22.3˚C in Altnaharra (Highland) in a very cold **January**, typified by heavy snowfall, it is hardly surprising that there were fewer records than usual of butterflies at the turn of the year. Small Tortoiseshell was the first to make an appearance, seeing in the New Year on 1st January in Wiltshire, closely followed by a Peacock on the Isle of Wight the day after. Whilst there was a single record of Red Admiral on 5th, again on the Isle of Wight, there were few other records until the latter half of the month. Brimstone also waited until 17th January to make its first appearance and Comma was not sighted until March! The cold weather and snowfall continued throughout **February** with 70 cm of lying snow recorded from Dalarossie in Inverness-shire. It was no surprise therefore that only one new species emerged in February, this being Speckled Wood on 19th.

March was a month of two halves, starting off much the same way as the preceding two months, cold, dry and sunny, but ending with temperatures close to the series average and a maximum temperature of 18˚C recorded in Weybourne in Norfolk on 18th. Coinciding with this change in the weather was a variety of first appearances including Small Copper, Holly Blue, Painted Lady, Comma and the three common whites (Large, Small and Green-veined), boding well for the start of the transect walking season. However, **April** started off with unsettled weather making it difficult to complete transects in the first week, with only half of transects successfully being walked. The second half of the month was much more settled with temperatures exceeding the series average and with a number of places in England experiencing several days of daily temperatures around 20˚C (maximum of 22.9˚C on 29th at Faversham in Kent!). It was also the fifth sunniest April since 1929 in England and Wales. As a result, the average number of butterflies recorded on transects in April was close to the average over the last 10 years (Figure 2). A number of specialist species were out early including Pearl-bordered Fritillary on 8th in Devon, Duke of Burgundy on 9th in Hampshire and Wood White on 24th in Surrey. However a number of other species were out a week later than normal, most likely due to the cold start to the year.

The first half of **May** saw cool weather across the UK caused by a north/north-easterly airstream. A very warm spell came in the second half of the month with a maximum temperature of 28.9˚C recorded in Oxford and new May temperature records set in Scotland. It was also the driest May since 1991 with below average rainfall across most of the UK. This weather continued into **June**, especially in the East of England with a

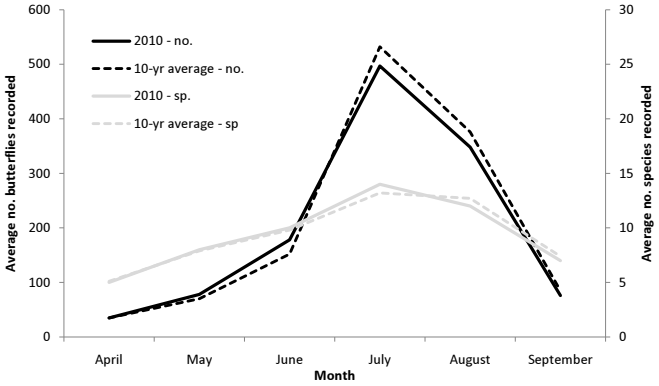


Figure 2. The average number of butterflies (on the left axis and denoted by black solid and dashed lines) and average number of species (on the right hand axis and denoted by grey solid and dashed lines) on transects each month in 2010 and averaged across the last 10 years.

maximum temperature of 30.9˚C recorded in Gravesend in Kent whilst daytime maxima were around 2.5˚C above average in western and central England. It was the third sunniest June since 1929, and the good weather led to above average butterfly numbers (Figure 2).

July started off in similar fashion to June with a maximum temperature of 31.7˚C recorded on 9th, again in Gravesend in Kent. Things were looking highly promising for a vintage butterfly year, with some weather forecasters predicting a barbecue summer. Unfortunately, for the third year in succession, the summer weather was a flop in many regions. July overall was typified by rather unsettled weather and much of the UK received greater than average rainfall. **August** saw a further deterioration in the weather with daily maximum temperatures generally a degree cooler than the series average (coolest August since 1993). Rainfall was well above the monthly average, particularly in the south and east of England where East Anglia endured the second wettest August on record with twice the normal amount of rainfall. There were bursts of heavy rain elsewhere, for example at Maerdy, mid-Glamorgan on 20th with 75.4 mm recorded in 24 hours! Consequently, July/August butterfly numbers on UKBMS transects were below average (Figure 2). This drop was evident in the indices of some of our most common species, including: Meadow Brown which produced its lowest index in the 35-year series; and Small Skipper which had its third worst year on record. Not all species that fly late in the season fared badly though, with Silver-spotted Skipper numbers, for example, showing a considerable increase over 2009. There was little improvement in the weather in **September** as the transect walking season drew to an end, with plenty of rain across the UK, especially in the north. Temperature and sunshine levels, though, were close to the series average for this month as were the average number of butterflies recorded (Figure 2).

Post-transect season weather improved in **October**, when temperatures were close to the series average and it was generally sunny and dry. **November**, though, brought with it plenty of rain and cool temperatures, resulting in the coldest November since 1993. The year ended with some meteorological records in **December**. The mean temperature was no less than 5˚C below the series average and it was the coldest December in over 100 years. There was heavy snowfall across most of the UK with over 40 cm in a number of places including 58 cm in Balmoral, Aberdeenshire, on 1st! It was also a very dry and sunny December, the third driest in the 100-year series. This is now the third cold winter in succession and it will be interesting to see what effect this has on butterfly numbers in 2011, given that these are the winter conditions widely regarded as optimal for overwintering survival of most butterfly species.

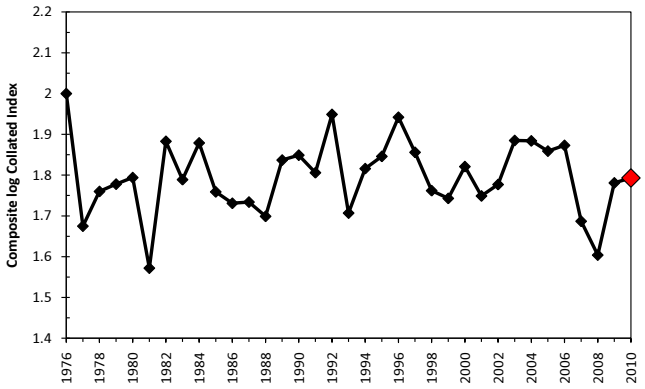


Figure 3. The combined Collated Index across all species for each year of monitoring. 2010 is highlighted in red.

Overall, 2010 was a relatively average year (Figure 3) ranking 14th in the 35-year series (Table 1). This is because, as in 2009, the July-August weather was relatively poor resulting in a disappointing end to the year following a promising start. July-August is when butterfly numbers are usually greatest both in terms of abundance and species richness (Figure 2) because the peak of the flight period for many of the most abundant wider countryside species is at this time of year. Many of these species are univoltine, for example Meadow Brown, Ringlet, Marbled White and Small and Essex Skippers, and so the detrimental effects of poor weather in July and August can be very pronounced on overall butterfly numbers for the current and following year.

For the second year running, habitat specialist species (n = 29) did well showing a mean abundance increase of 45% from 2009 (Figure 4). Given that habitat specialists are in significant long-term decline (by 25%) this was extremely welcome news. In contrast, wider countryside species (n = 25) did not fare as well in 2010, showing no improvement over the previous year (Figure 4). More worryingly, although the long-term trend is much lower for wider countryside species (-5%) they have shown a greater decline than habitat specialists over the last 10 years (-20% compared to -14%) suggesting that this decline is accelerating. Whilst the serious decline in some of our habitat specialists has resulted in UK BAP priority status and consequent conservation actions to try and halt this trend, a number of our 'common' wider countryside species are declining sharply. Small Skipper is a 'good' example, as this species has declined significantly by over 70% in the last 10 years and had another poor year in 2010. After the impressive Painted Lady migration in 2009 it was little surprise to see a huge drop (-89%) in migrant numbers in 2010 as good migrant years are regularly followed by poor ones (see Figure 4). The long-term trend for our three regular migrant species still remains a significant increase of more than 500%.

Table 1. UKBMS years ranked according to how good each year was relative to the others (1 = best, 35 = worst).

Year	Rank	Year	Rank
1976	6	**1994**	18
1977	33	**1995**	7
1978	24	**1996**	4
1979	17	**1997**	2
1980	22	**1998**	23
1981	35	**1999**	29
1982	5	**2000**	19
1983	16	**2001**	31
1984	3	**2002**	28
1985	20	**2003**	10
1986	26	**2004**	8
1987	25	**2005**	9
1988	30	**2006**	13
1989	15	**2007**	32
1990	11	**2008**	34
1991	12	**2009**	21
1992	1	**2010**	14
1993	27		

The twenty-one species listed as Biodiversity Action Plan (BAP) priority species are predominantly habitat specialists so it is no surprise (though none-the-less welcome for it) that as a group they showed an increase in 2010 over 2009 (by 28%). BAP priority species showed some recovery in 2009 after two particularly poor years likely due to a combination of better weather and targeted habitat management. As a group, these species have declined by 57% since 1976. The positive news is that the rate of decline has slowed in the last 10 years. Continued conservation work is important for the survival of these increasingly rare species, particularly in years when the climate is unfavourable, allowing

Table 2a. Summary of species abundance changes in the UK from 2009 to 2010 and long-term (over the entire time series; no. yrs max = 35) and short-term (last 10-years) changes. Significance of trends * P <0.05 (significant), **P < 0.01 (highly significant), ***P < 0.001 (very highly significant). Red text has been used to highlight those species that had their worst year of the series in 2010, and blue text for those species that had their best year of the series in 2010.

SPECIES	Start Year	No. sites with Index in 2010	No. years with Index	2010 rank	% change 2009-2010	Series trend	10-year trend
Small Skipper	1976	497	35	33	-17	-67***	-71***
Essex Skipper	1977	280	34	33	-33	-44	-90**
Lulworth Skipper	1992	14	19	19	-40	-86**	-93***
Silver-spotted Skipper	1979	25	32	8	78	>1,000***	-33
Large Skipper	1976	584	35	15	29	-16	-14
Dingy Skipper	1976	242	35	12	36	-39**	3
Grizzled Skipper	1976	169	35	25	-13	-42**	-11
Wood White	1976	43	35	12	600	-96***	-61
Clouded Yellow	1979	261	32	22	-90	806	-59
Brimstone	1976	431	35	17	-12	15	3
Large White	1976	588	35	19	-59	-22	54
Small White	1976	579	35	17	-28	-17	-5
Green-veined White	1976	580	35	8	-26	-4	21
Orange-tip	1976	432	35	3	20	19	19
Green Hairstreak	1976	256	35	20	20	-38*	-12
Brown Hairstreak	1983	37	28	19	20	58	-53
Purple Hairstreak	1976	245	35	14	-2	-2	-9
White-letter Hairstreak	1976	117	35	25	22	-83***	-26
Black Hairstreak	1995	10	15	1	195	86	334
Small Copper	1976	522	35	11	39	-21	42
Small Blue	1978	126	33	11	-15	9	37
Silver-studded Blue	1979	45	32	16	-8	5	-30
Brown Argus	1976	321	35	3	85	22	53
Northern Brown Argus	1979	32	32	27	11	-59*	-44
Common Blue	1976	584	35	2	146	2	16
Chalkhill Blue	1976	140	35	7	74	14	21
Adonis Blue	1979	73	32	2	74	172*	99
Holly Blue	1976	461	35	15	156	157	-29
Large Blue	1983	11	28	4	38	>1,000***	23
Duke of Burgundy	1979	84	31	30	18	-51**	-71**
White Admiral	1976	173	35	11	90	-54**	80
Purple Emperor	1979	47	32	10	13	21	-15
Red Admiral	1976	549	35	20	5	297**	-27
Painted Lady	1976	433	35	26	-99	474	-40
Small Tortoiseshell	1976	559	35	29	6	-66**	-72
Peacock	1976	556	35	18	-30	44	-9
Comma	1976	540	35	5	-31	300***	11
Small Pearl-bordered Fritillary	1976	122	35	18	38	-59***	16
Pearl-bordered Fritillary	1976	92	35	28	32	-74***	-41
High Brown Fritillary	1978	53	33	31	-18	-44	-69*
Dark Green Fritillary	1976	249	35	4	23	129**	99
Silver-washed Fritillary	1976	280	35	2	41	104**	137
Marsh Fritillary	1981	77	30	3	134	41	4
Heath Fritillary	1981	37	30	29	21	-76***	-72**
Speckled Wood	1976	530	35	8	-34	141***	33
Wall Brown	1976	279	35	33	-21	-81***	-57*
Scotch Argus	1979	17	32	17	5	137*	-50
Marbled White	1976	388	35	24	-9	63*	-17
Grayling	1976	122	35	9	32	-56***	26
Gatekeeper	1976	521	35	29	-3	-27	-37
Meadow Brown	1976	605	35	35	-20	7	-23
Small Heath	1976	428	35	19	59	-56***	5
Large Heath	1990	12	21	1	29	316***	171*
Ringlet	1976	561	35	2	-6	334***	51

Table 2b. Summary of species abundance changes for England, Scotland and Wales (where calculable) from 2009 to 2010 and long-term over the entire time series; no. yrs max = 35 for England and Wales, 33 for Scotland) and short-term (last 10-years) changes. Significance of trends: * P <0.05 (significant), **P < 0.01 (highly significant), ***P < 0.001 (very highly significant). *Note: some country-level changes are based on relatively small sample sizes and thus should be interpreted with caution*.

SPECIES	% Change in Collated Index 2009-2010			SERIES TREND			10-YEAR TREND		
	England	Scotland	Wales	England	Scotland	Wales	England	Scotland	Wales
Small Skipper	-19	-	58	-68***	-	-30	-71***	-	-63*
Essex Skipper	-33	-	-	-44	-	-	-90**	-	-
Lulworth Skipper	-40	-	-	-86**	-	-	-93***	-	-
Silver-spotted Skipper	78	-	-	>1,000***	-	-	-33	-	-
Large Skipper	32	-	-7	-14	-	-64***	-13	-	-8
Dingy Skipper	35	-	-	-34**	-	-	4	-	-
Grizzled Skipper	-13	-	-	-43**	-	-	-10	-	-
Wood White	600	-	-	-96***	-	-	-61	-	-
Clouded Yellow	-90	-	-	820	-	-98	-59	-	-100
Brimstone	-12	-	-74	14	-	58	4	-	56
Large White	-59	-5	-36	-21	133	-17	52	20	106*
Small White	-28	222	-31	-13	36	-63**	-7	11	103
Green-veined White	-26	-4	-37	-6	-12	89	18	-15	298*
Orange-tip	15	51	5	8	311***	362***	10	225**	84*
Green Hairstreak	20	29	-	-43**	78*	-	-16	46	-
Brown Hairstreak	20	-	-	59	-	-	-53	-	-
Purple Hairstreak	-2	-	-	-4	-	-	-11	-	-
White-letter Hairstreak	18	-	-	-83**	-	-	-31	-	-
Black Hairstreak	195	-	-	86	-	-	334	-	-
Small Copper	45	-2	55	-13	-23	-50	41	337	18
Small Blue	-15	20	-13	11	250	233*	37	250	104
Silver-studded Blue	0	-	-	-30	-	-	-42	-	-
Brown Argus	90	-	215	26	-	-3	53	-	38
Northern Brown Argus	7	-6	-	-73***	11	-	-46	0	-
Common Blue	157	-21	-5	3	28	31	16	16	22
Chalkhill Blue	74	-	-	14	-	-	21	-	-
Adonis Blue	74	-	-	172*	-	-	99	-	-
Holly Blue	164	-	-	167	-	-2	-28	-	228
Large Blue	38	-	-	>1,000***	-	-	23	-	-
Duke of Burgundy	18	-	-	-51**	-	-	-71**	-	-
White Admiral	90	-	-	-54**	-	-	80	-	-
Purple Emperor	13	-	-	21	-	-	-15	-	-
Red Admiral	8	-2	-40	303***	>1,000*	238*	-31	59	60
Painted Lady	-99	-98	-99	499*	-19	72	-43	157	-3
Small Tortoiseshell	-4	55	100	-66**	-41	-31	-74	-8	-73*
Peacock	-33	-4	5	45	387**	-20	-9	181	-10
Comma	-31	221	38	300***	-35	62	11	-35	223
Small Pearl-bordered Fritillary	39	29	-	-41*	-10	-39	6	36	41*
Pearl-bordered Fritillary	33	-	75	-55**	19	64	-55*	19	-17
High Brown Fritillary	-18	-	-	-44	-	-	-69*	-	-
Dark Green Fritillary	38	-24	52	331***	-30	-84***	88	162**	33
Silver-washed Fritillary	44	-	-	117*	-	-	140	-	-
Marsh Fritillary	140	-	30	-64	-	-77*	12	-	-77
Heath Fritillary	21	-	-	-76***	-	-	-72**	-	-
Speckled Wood	-36	-22	-7	141***	18	178***	31	18	63
Wall Brown	-29	-	139	-83***	60	-53*	-61*	215	-23
Scotch Argus	-	27	-	-	12	-	-	-44	-
Marbled White	-9	-	-	59*	-	-	-17	-	-
Grayling	29	20	-	-27	-60**	-90***	19	-19	162*
Gatekeeper	-4	-	-13	-33	-	120**	-37	-	20
Meadow Brown	-20	13	-37	5	31	52	-23	-8	-14
Small Heath	62	15	20	-62***	184**	20	2	149	10
Large Heath	-	-	-	61	-	-	4	-	-
Ringlet	-6	-17	-24	344***	110*	187***	49	44	74

them to hang on in suitable habitats. Appendix I shows a UKBMS site breakdown of the twenty-one BAP priority species.

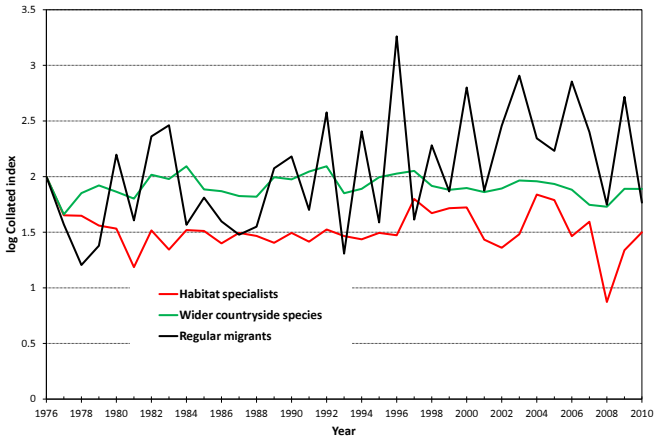


Figure 4. The Annual Collated Index for habitat specialists, wider countryside species and regular migrants.

Species accounts

In the following species accounts we present a summary of how each species (with sufficient data) fared on UKBMS sites in 2010. 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 (Botham et al 2008). Mean flight date is highly correlated to both first appearance and the peak flight date and is a good measure of how early or late the flight season is. The Collated Index plot is included for each species. Horizontal grey 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 2a for trend details). Where no trend lines are included the long-term trend is not statistically significant. The shaded area highlights the last ten years of indices, with the trends presented in Table 2a. Country-level statistics are presented for each species, where this is calculated (Table 2b). The significance of trends is highlighted using the same symbology as Tables 2a and 2b: * $P < 0.05$ (significant), ** $P < 0.01$ (highly significant), ***$P < 0.001$ (very highly significant).

denotes that the species is listed on the recent Butterfly Red List for Great Britain (Fox et al 2011) under one of the following categories: Critically Endangered, Endangered, Vulnerable or Near Threatened.

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

Skippers (Hesperiidae)

Small Skipper (*Thymelicus sylvestris*)			
No. years with Collated Index:	**35**	2010 Rank:	**33**
Change in Collated Index 2009-10 (%):	**-17**	Long-term trend (%):	**-67*** **
Mean flight date 2010:	**12-July**	Series mean flight date:	**21-July**

Collated Index plot:

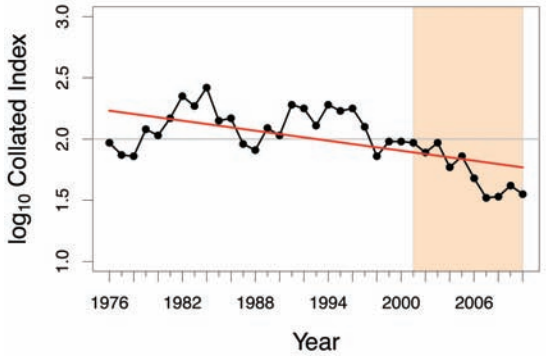
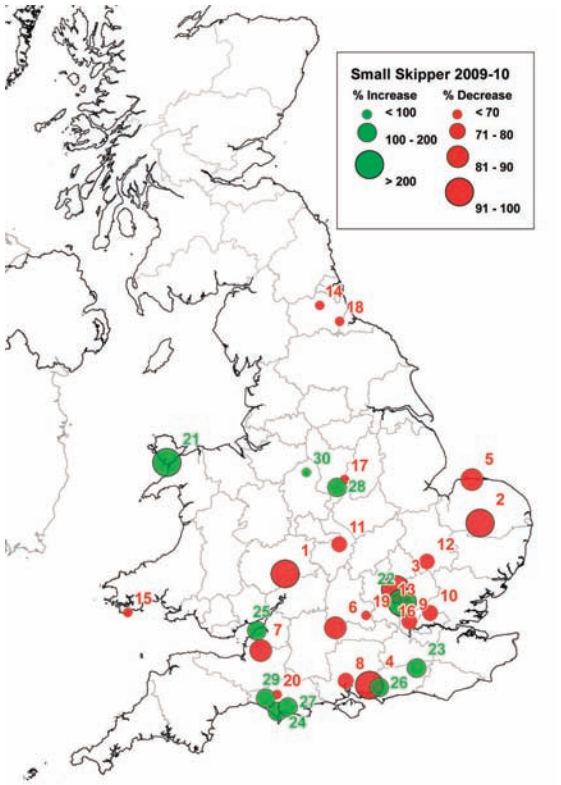


Figure 5. Sites where Small Skipper abundance changed substantially between 2009 and 2010.

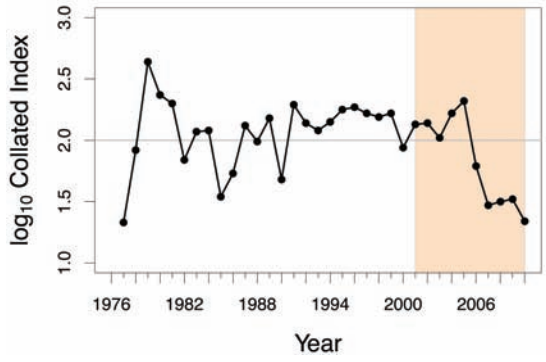


Sites: *1. Eastnor; 2. Stow Bedon Common; 3.Dunstable Downs; 4. The Holt – Soakfield Row and Broadwalk; 5. Holkham; 6. Watts Bank; 7. Draycott Sleights (2008); 8. Lakeside Eastleigh; 9. Horsenden Hill – East; 10. Woodford Golf Course; 11. Bubbenhall Meadow; 12. Orwell Clunch Pit; 13. Brickett Wood; 14. Hedleyhope Fell; 15. Stackpole Warren, Stackpole NNR; 16. Marshalls Heath; 17. Cinderhill, Shipley Country Park, Heanor; 18. Stillington Forest Park; 19. Swyncombe Downs; 20. Cerne Abbas Giant; 21. Newborough Warren; 22. Bunkers Park; 23. Blunts Wood & Paiges Meadows; 24. Lorton Meadows; 25. Weston Moor NR; 26. Kingley Vale; 27. Tadnoll; 28. Friargate Station; 29. Powerstock Bridleway; 30. Coombes Valley*

It was a poor year for the Small Skipper - the third worst on record. Figure 5 shows the sites at which the largest annual declines were recorded. Some of the sites with relatively large populations were particularly badly affected. For example the index at Pilot Hill in Hampshire decreased from 416 in 2009 to 197 in 2010 and at Hedleyhope Fell in County Durham from 242 to 73. On the positive side, a number of sites bucked the trend including Newborough Warren on Anglesey (20 in 2009 to 127 in 2010). Each of the last 14 years have been below average, whilst five of the lowest indices of the series have been in the last six years. Since 1976, the butterfly has declined significantly by 67%. Only six other UK butterflies have declined at a greater rate over the same period.

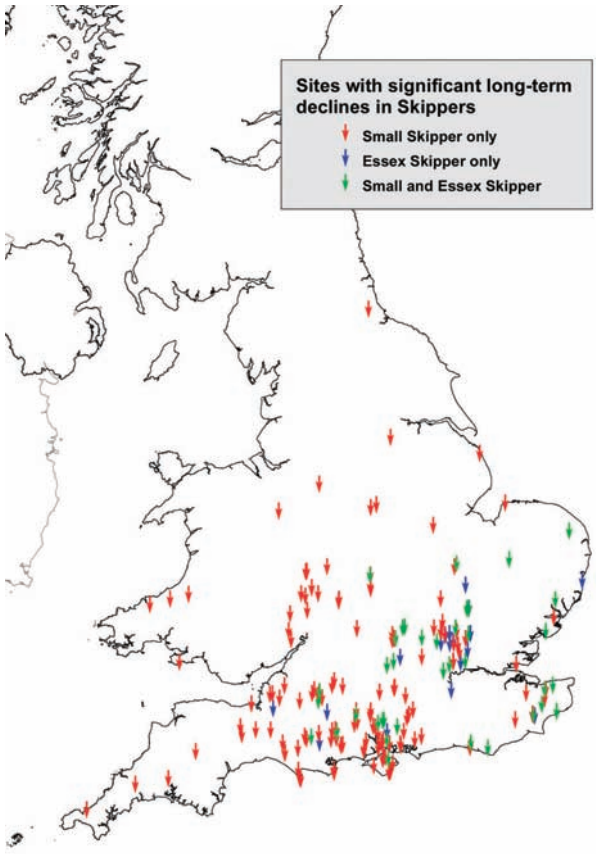
Essex Skipper (*Thymelicus lineola*)			
No. years with Collated Index:	**34**	2010 Rank:	**33**
Change in Collated Index 2009-10 (%):	**-33**	Long-term trend (%):	**-44**
Mean flight date 2010:	**15-July**	Series mean flight date:	**24-July**

Collated Index plot:



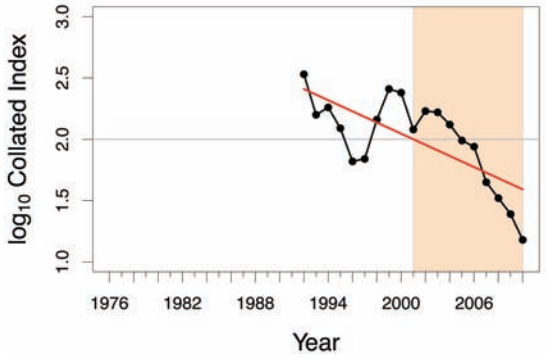
The Essex Skipper had a poor year in 2010, the second worst in the series, with abundance dropping by a third from 2009. Declines were apparent at all sites with indices in both 2009 and 2010. The long-term trend across the UK is of no overall change, though numbers have reduced significantly by 90% over the last decade. Figure 6 shows sites where the greatest long-term declines in Small and Essex Skippers have been recorded.

Figure 6. Sites where there have been significant long-term declines in Small and Essex Skippers.



Lulworth Skipper (*Thymelicus acteon*)			
No. years with Collated Index:	**19**	2010 Rank:	**19**
Change in Collated Index 2009-10 (%):	**-40**	Long-term trend (%):	**-86****
Mean flight date 2010:	**15-July**	Series mean flight date:	**28-July**

Collated Index plot:

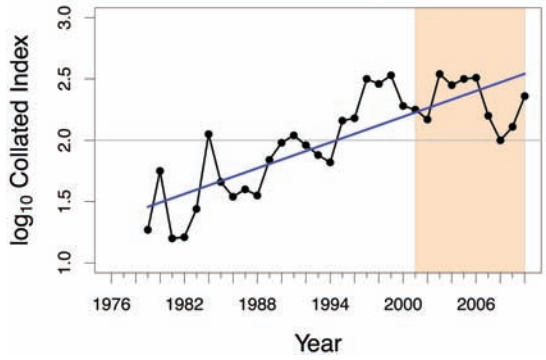


In 2010 the Lulworth Skipper produced its lowest index of the series for the fourth year in succession. Over the last decade the decline has been greater than for any other UK butterfly. The butterfly has been negatively impacted by conservation grazing at some sites, but weather factors may also be contributing to the demise. It was an early season with the mean flight date almost two weeks ahead of the series average.

Photo by Tim Melling

Silver-spotted Skipper (*Hesperia comma*)			
No. years with Collated Index:	**32**	2010 Rank:	**8**
Change in Collated Index 2009-10 (%):	**78**	Long-term trend (%):	**>1000*** **
Mean flight date 2010:	**12-Aug**	Series mean flight date:	**15-Aug**

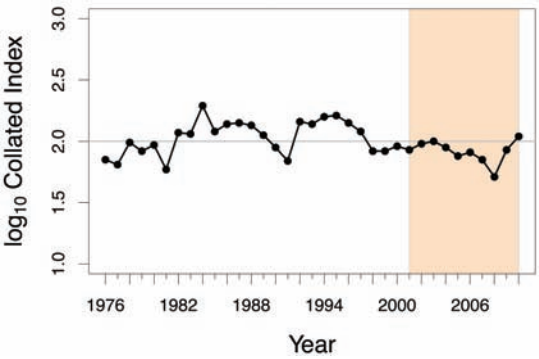
Collated Index plot:



2010 was an above average year for the Silver-spotted Skipper. For the last 15 years the Collated Index has been at or above the series average with abundance having increased significantly by more than 1000% since 1976. The highest site index of 318 was recorded at Swyncombe Downs in Oxfordshire. Malling Down in East Sussex also recorded high numbers with an index of 287, with both sites recording the same highest daily counts of 108 on the 1st and 13th August respectively.

Large Skipper (*Ochlodes sylvanus*)			
No. years with Collated Index:	**35**	2010 Rank:	**15**
Change in Collated Index 2009-10 (%):	**29**	Long-term trend (%):	**-16**
Mean flight date 2010:	**29-June**	Series mean flight date:	**06-July**

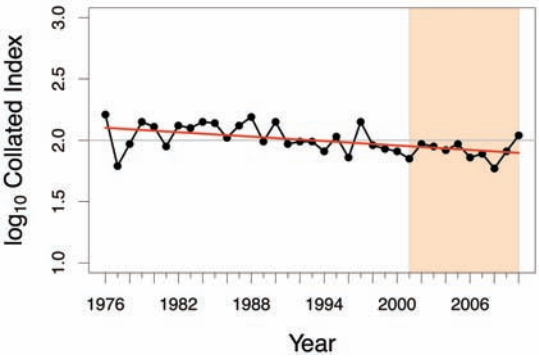
Collated Index plot:



Following a run of poor years over the last decade, Large Skipper has recovered over the last two years. The highest site index was recorded at Whippingham (fields) on the Isle of Wight, with the maximum count being 111 on 2nd July. In the same week, 129 were recorded at Abbotts Hall Farm in Essex. The long-term trend is of little or no overall change. The mean flight date was the same as in 2009, being a week earlier than the series average.

Dingy Skipper (*Erynnis tages*)			
No. years with Collated Index:	**35**	2010 Rank:	**12**
Change in Collated Index 2009-10 (%):	**36**	Long-term trend (%):	**-39****
Mean flight date 2010:	**28-May**	Series mean flight date:	**02-June**

Collated Index plot:

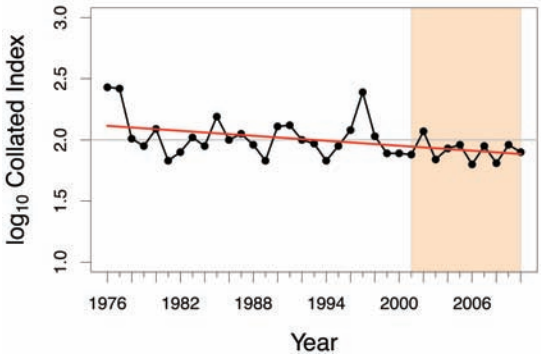


In 2008 Dingy Skipper numbers reached an all time low on UKBMS transects but showed a good recovery in 2009. There was a further 36% increase in 2010. The largest site index of 175 was recorded at West Yatton Down in Wiltshire. Maximum counts were 78 at Castle Hill in East Sussex and 70 at Pilot Hill in Hampshire on

23rd and 24th of May respectively. In spite of an improvement over the last two years, the butterfly remains in long-term decline with abundance significantly reduced by more than 40% since 1976.

Grizzled Skipper (*Pyrgus malvae*)			
No. years with Collated Index:	**35**	2010 Rank:	**25**
Change in Collated Index 2009-10 (%):	**-13**	Long-term trend (%):	**-42****
Mean flight date 2010:	**22-May**	Series mean flight date:	**30-May**

Collated Index plot:



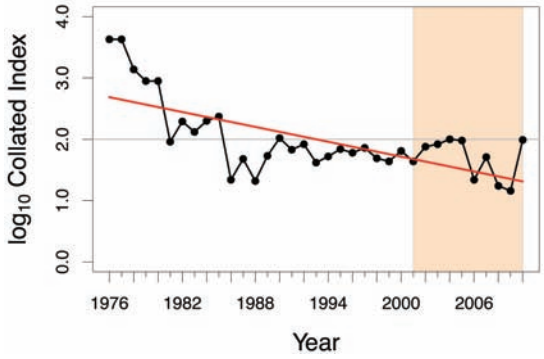
Following a modest recovery in 2009, Grizzled Skipper abundance was reduced in 2010. The biggest site change was at Cerne Giant in Dorset where the index decreased from 156 in 2009 to 50 in 2010. For the last eight years the Collated Index has been below the series average, whilst abundance has been reduced significantly by more than 40% since 1976. The largest site index of 68 at Porton Down in Wiltshire was the lowest site maximum in the scheme since 1990. Despite the cool start to the spring, the flight season was a week earlier than the long-term average.

Photo by Steve Covey

Whites (Pieridae)

Wood White (*Leptidea sinapis*)			
No. years with Collated Index:	**35**	2010 Rank:	**12**
Change in Collated Index 2009-10 (%):	**600**	Long-term trend (%):	**-96*****
Mean flight date 2010:	**15-June**	Series mean flight date:	**18-June**

Collated Index plot:

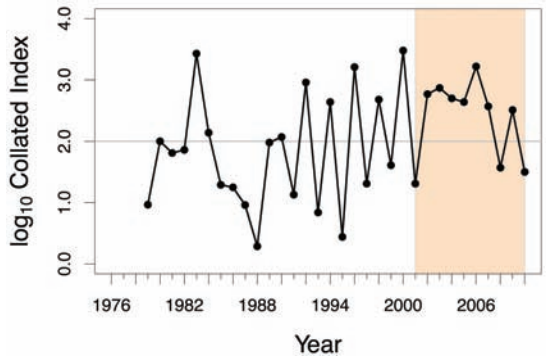


Following a series low index in 2009, Wood White abundance increased by 600% in 2010. However, this is still a butterfly in crisis with abundance reduced by more than 95% since 1976. The highest 2010 count was 157 at Wigmore Rolls in the West Midlands on 3rd June whilst the largest annual index of 583 was recorded at Haugh Wood South in Herefordshire where a peak count of 97 was recorded on 5th June. The latter is one of the only UKBMS sites where abundance is increasing in the long-term. For the second year in succession there were no records from Whitecross Green Wood in Oxfordshire, a former stronghold.

Photo by Susie Millbank

Clouded Yellow (*Colias croceus*)			
No. years with Collated Index:	**32**	2010 Rank:	**22**
Change in Collated Index 2009-10 (%):	**-90**	Long-term trend (%):	**806**
Mean flight date 2010:	**12-Aug**	Series mean flight date:	**09-Aug**

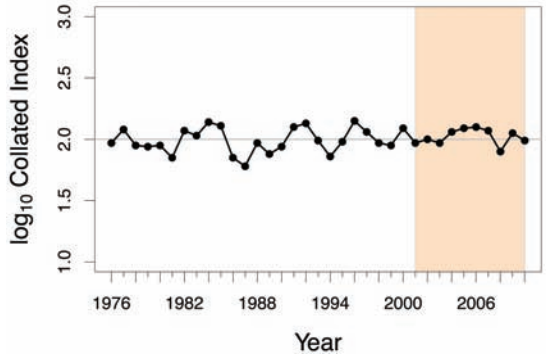
Collated Index plot:



The Clouded Yellow had a below average year in 2010, with numbers down 90% from 2009 levels. There were no substantial counts anywhere, the maximum index being eight at Wootton Coppice in Hampshire. Due to the sharp drop in numbers in 2010 and considerable fluctuations over the series, the apparent long-term increase is not statistically significant.

Brimstone (*Gonepteryx rhamni*)			
No. years with Collated Index:	**35**	2010 Rank:	**17**
Change in Collated Index 2009-10 (%):	**-12**	Long-term trend (%):	**15**
Mean flight date 2010:	**02-June**	Series mean flight date:	**09-June**

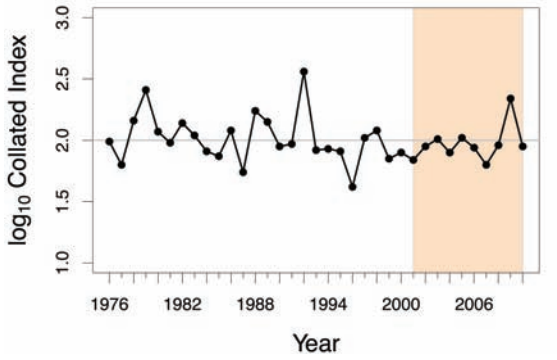
Collated Index plot:



Brimstone abundance was up by 12% in 2010. The largest site indices of the year were mainly recorded in the south of England, particularly Hampshire, which supported half of all the top 20 indices. Maximum counts of 46 and 43 were recorded on the same day (19th July) in the same county (Hampshire) at Danebury Hill Fort and Stockbridge Down respectively. The mean flight period in 2010 was about a week earlier than average. As the Collated Index plot shows, the Brimstone has a relatively stable population on monitored sites, with little or no overall change.

Large White (*Pieris brassicae*)			
No. years with Collated Index:	**35**	2010 Rank:	**19**
Change in Collated Index 2009-10 (%):	**-59**	Long-term trend (%):	**-22**
Mean flight date 2010:	**21-July**	Series mean flight date:	**21-July**

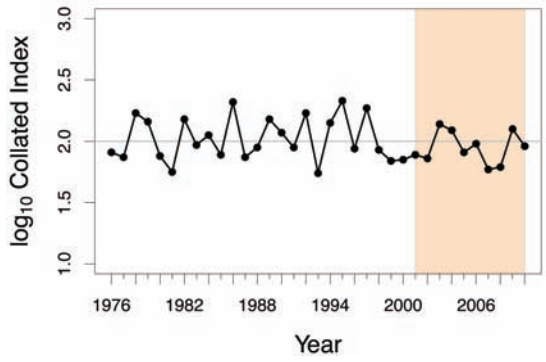
Collated Index plot:



Following a very good year in 2009, Large White had an average year in 2010 with numbers dropping by almost two-thirds. The Large White is well known to suffer high rates of parasitism from braconid wasps and it is not unusual to see population numbers fluctuate greatly from year to year. Consequently, the apparent decline since 1976 across the UK is not significant and the trend is classed as showing little or no overall change. However, there has been a significant increase of 106% over the last decade at Welsh sites. Whilst there were numerous counts of hundreds on transects in 2009, the largest counts in 2010 were all less than 100. Maximum counts (>80) were recorded at Holkham in Norfolk and Danebury Hill Fort in Hampshire, on 11th and 19th July respectively.

Small White (*Pieris rapae*)			
No. years with Collated Index:	**35**	2010 Rank:	**17**
Change in Collated Index 2009-10 (%):	**-28**	Long-term trend (%):	**-17**
Mean flight date 2010:	**21-July**	Series mean flight date:	**23-July**

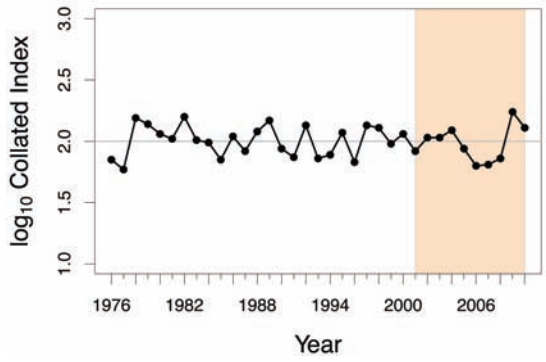
Collated Index plot:



Small White numbers were down by more than a quarter from 2009 levels, although 2010 was a fairly average year – ranked 17 out of 36. In Scotland, the butterfly fared better with a 222% annual increase. There were two sites with indices over 500; at Cliffside Drive/ Dumpton Walk in Kent (576) and Weston Moor Nature Reserve in Somerset (521). Cliffside Drive/Dumpton Walk also recorded the largest daily count, with 170 on 19th July. Over a hundred individuals were also recorded on transects in July at West Park Nature Reserve in County Durham and Boscombe Down O (Wiltshire County Council) in Wiltshire. The Small White long term trend is classed as showing little or no overall change at a UK level.

Green-veined White (*Pieris napi*)			
No. years with Collated Index:	**35**	2010 Rank:	**8**
Change in Collated Index 2009-10 (%):	**-26**	Long-term trend (%):	**-4**
Mean flight date 2010:	**05-July**	Series mean flight date:	**09-July**

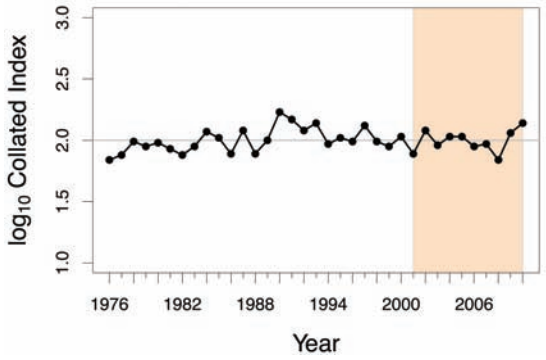
Collated Index plot:



Following a series high in 2009, Green-veined White abundance dropped by more than a quarter in 2010. However, it was still a relatively good year, ranked 8th in the series. The highest index of 928 was recorded at West Sedgemoor in Somerset. This site also had the highest daily count with 211 on 15th July. Bradfield Woods in Suffolk also recorded large numbers with a site index of 879 and counts exceeding 100 on three occasions in July and August. The long-term trend across the UK is classed as showing little or no overall change. As with the two other common white species, numbers have increased substantially at Welsh monitored sites over the last decade.

Orange-tip (*Anthocharis caradmines*)			
No. years with Collated Index:	**35**	2010 Rank:	**3**
Change in Collated Index 2009-10 (%):	**20**	Long-term trend (%):	**19**
Mean flight date 2010:	**13-May**	Series mean flight date:	**17-May**

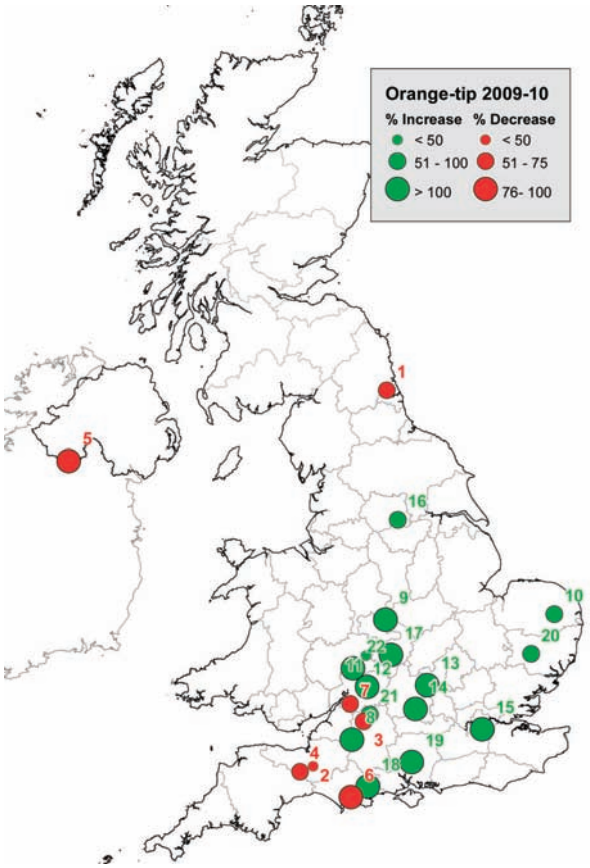
Collated Index plot:



The Orange-tip had an excellent year in 2010, producing its third highest Collated Index since 1976. Overall, numbers were up by 20% from 2009. Figure 7 shows that the most substantial annual increases were in central and eastern areas of southern England, whilst the most substantial decreases were in northern and western areas. It was a good year in Scotland, with annual abundance up by 50%.

Three-figure indices were produced at five sites for only the second time in the series (six sites topped 100 in 1990). In England, the highest site index was recorded at Grafton Wood in Worcestershire where the maximum counted was 45 on 23rd April, whilst in Scotland the maximum count was 38 at Insh Marshes in the Highland on 22nd May. The mean flight date was slightly earlier than the series average, but not as advanced as recent years.

Figure 7. Sites where Orange-tip abundance changed substantially between 2009 and 2010.



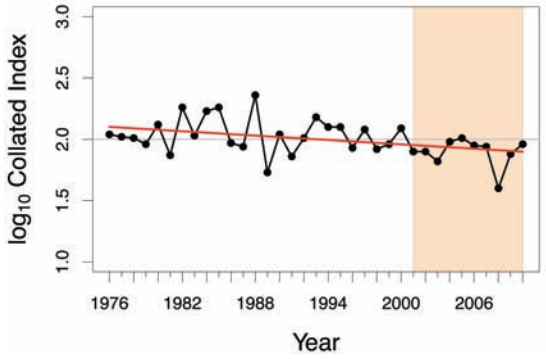
Sites: *1.Havannah LNR; 2. West Sedgemoor; 3. Sutton lane Meadows; 4. Buckland Wood; 5. Crom Estate; 6. Tadnoll; 7. Uley Bury; 8. Vagg's Hill; 9. RSPB Middleton Lakes 2; 10. Marston Marshes; 11. Lineover Wood; 12. Grafton Wood; 13. Grendon & Doddershall Woods; 14. Little Wittenham, Hill Farm; 15. South Norwood; 16. Walton Nature Park; 17. Horticulture research Int.; 18. Pamphill Moors (NT); 19. Magdalen Hill Down extension; 20. Bradfield Woods; 21. Somerford Common; 22. Melrose Farm Meadows.*

Photo by Dean Morley

Blues, Coppers and Hairstreaks (Lycaenidae)

Green Hairstreak (*Callophrys rubi*)			
No. years with Collated Index:	**35**	2010 Rank:	**20**
Change in Collated Index 2009-10 (%):	**20**	Long-term trend (%):	**-38***
Mean flight date 2010:	**27-May**	Series mean flight date:	**29-May**

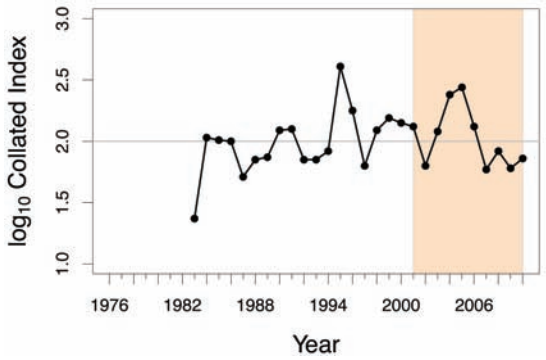
Collated Index plot:



Following a series low in 2008, Green Hairstreak abundance recovered further in 2010, with a 20% annual increase. However, numbers were still below average and this butterfly has declined significantly by almost 40% since 1976. In 2010, by far the largest numbers were recorded at Meathop Moss in Cumbria, with an extremely high April count of 248 on 24th and a peak of 625 on 7th May! Three-figure counts were not recorded on any other UK sites, though on 24th May over a hundred were counted on Les Landes transect in Jersey.

Brown Hairstreak (*Thecla betulae*)			
No. years with Collated Index:	**28**	2010 Rank:	**19**
Change in Collated Index 2009-10 (%):	**20**	Long-term trend (%):	**58**
Mean flight date 2010:	**26-Aug**	Series mean flight date:	**25-Aug**

Collated Index plot:

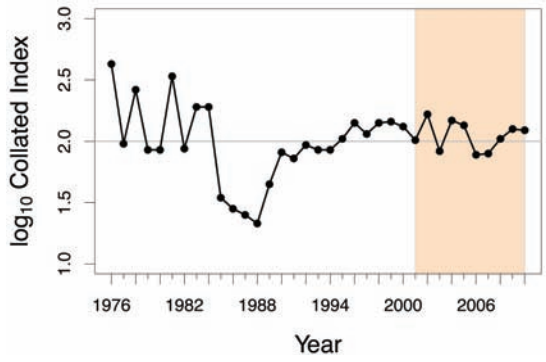


2010 was a below average year for the Brown Hairstreak, although numbers were up 20% from 2009 levels. The largest day count was recorded at West Sedgemoor in Somerset on 22nd September (four individuals), whilst

the highest annual site index of 10 was recorded at Noar Hill in Hampshire. Recent survey efforts by BC volunteers indicate that the Brown Hairstreak is spreading north and west in the UK, although the long-term abundance trend from UKBMS sites is of no overall change.

Purple Hairstreak (*Favonius quercus*)			
No. years with Collated Index:	**35**	2010 Rank:	**14**
Change in Collated Index 2009-10 (%):	**-2**	Long-term trend (%):	**-2**
Mean flight date 2010:	**23-July**	Series mean flight date:	**30-July**

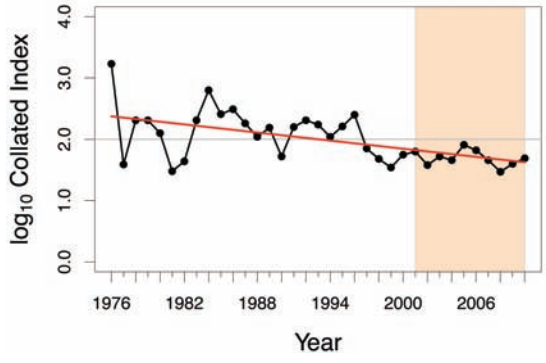
Collated Index plot:



The Purple Hairstreak had an above average year, although abundance was down slightly from 2009. The long-term trend is of little or no overall change, with recovery from a run of poor years in the early 1980s. In 2010, the mean flight date was a week earlier than the series average.

White-letter Hairstreak (*Satyrium w-album*)			
No. years with Collated Index:	**35**	2010 Rank:	**25**
Change in Collated Index 2009-10 (%):	**22**	Long-term trend (%):	**-83*** **
Mean flight date 2010:	**18-July**	Series mean flight date:	**26-July**

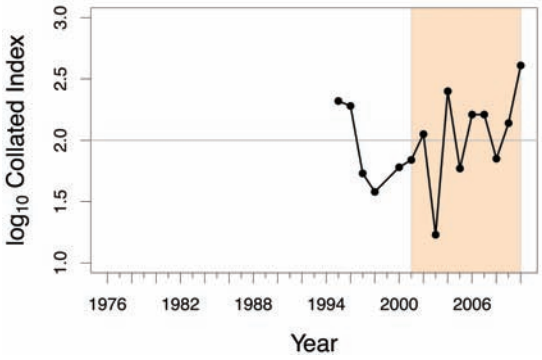
Collated Index plot:



There was a modest improvement in White-letter Hairstreak fortunes in 2010, although for the fourteenth year in a row numbers were below the series average. The butterfly is one of our most rapidly declining species, with abundance dropping significantly by more than 80% since 1976. White-letter Hairstreaks were recorded at over thirty sites in 2010, the third highest tally since 1976. Benfleet Downs in Essex recorded the highest site index of 50, with a maximum count of 22 on 28th June. 2010 was an early year, with the mean flight date advanced by eight days from the series average.

Black Hairstreak (*Satyrium pruni*)			
No. years with Collated Index:	**15**	2010 Rank:	**1**
Change in Collated Index 2009-10 (%):	**195**	Long-term trend (%):	**86**
Mean flight date 2010:	**21-June**	Series mean flight date:	**29-June**

Collated Index plot:

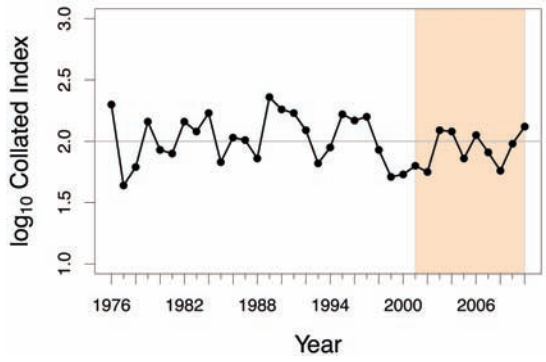


The Black Hairstreak produced its highest Collated Index of the series, and there was an impressive annual increase of almost 200%. Numbers vary considerably from year to year and the apparent long-term increase is not significant. The stand-out site of 2010 was the M40 Compensation Area in Buckinghamshire, where a maximum count of 39 was recorded on 17th June. It was an early year for the butterfly, with the mean flight date more than a week earlier than the series average.

Photo by Tim Melling

Small Copper (*Lycaena phlaeas*)			
No. years with Collated Index:	**35**	2010 Rank:	**11**
Change in Collated Index 2009-10 (%):	**39**	Long-term trend (%):	**-21**
Mean flight date 2010:	**31-July**	Series mean flight date:	**03-Aug**

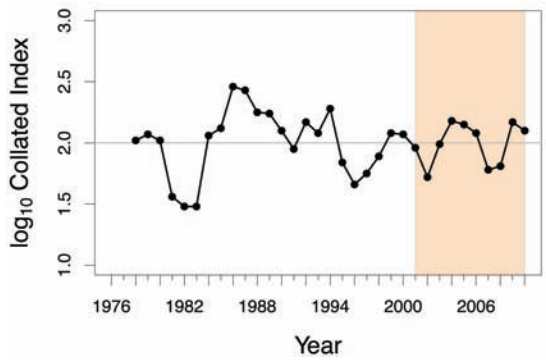
Collated Index plot:



2010 was an above average year for the Small Copper, with abundance nearly 40% higher than in 2009. Noteworthy annual increases included from 16 to 130 at Havannah in Northumberland and 19 to 114 at Westbury Beacon in Somerset. Twenty-two sites recorded three-figure indices - the second highest total in the 35 years of the scheme. The largest site index was 569 at Whippingham (fields) on the Isle of Wight, with the index being the fifth highest ever in the UKBMS. The maximum count was 91 at Tentsmuir Point South in Fife on 27th August. The Small Copper trend across the UK is classed as showing little or no overall change in the long-term. There has been an apparent increase in Scotland over the last decade, although this increase is not significant due to site variability

Small Blue (*Cupido minimus*)			
No. years with Collated Index:	**33**	2010 Rank:	**11**
Change in Collated Index 2009-10 (%):	**-15**	Long-term trend (%):	**9**
Mean flight date 2010:	**29-June**	Series mean flight date:	**30-June**

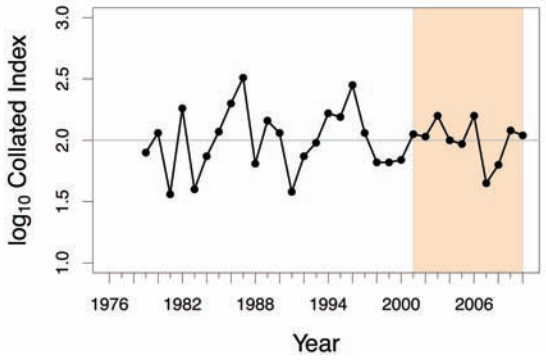
Collated Index plot:



Small Blue numbers were slightly down from 2009 levels, though it was still an above average year. This species fluctuates considerably from year to year and the long-term trend is of no overall change. The highest numbers were recorded at Swyncombe Downs in Oxfordshire with a maximum count of 105 on the 3rd June and an index of 356. On monitored sites it appears to be faring better in Scotland and Wales than in England (Table 2a). Dornoch Beach in Sutherland was the top Scottish site with an index of 255 and Oxwich in West Glamorgan was the top Welsh site with 207.

Silver-studded Blue (*Plebejus argus*)			
No. years with Collated Index:	**32**	2010 Rank:	**16**
Change in Collated Index 2009-10 (%):	**-8**	Long-term trend (%):	**5**
Mean flight date 2010:	**05-July**	Series mean flight date:	**17-July**

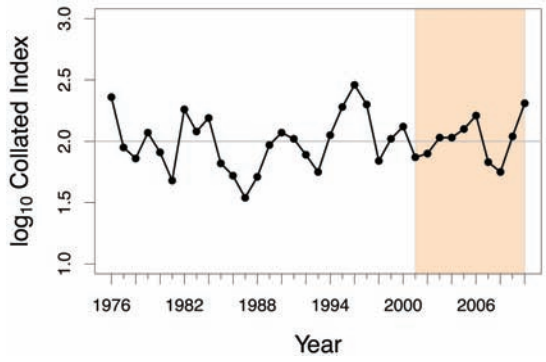
Collated Index plot:



It was an average year for the Silver-studded Blue, although some sites showed increases. For example, at Prees Heath Common Butterfly Conservation Reserve in Shropshire, the annual index rose from 389 to 806. The largest day count was 809 at Bramshott Common in Hampshire on 23rd June. Following a historical decline in status across the UK, it is encouraging to note that the long-term trend is now classed as stable. The mean flight date was almost two weeks ahead of the long-term average.

Brown Argus (*Aricia agestis*)			
No. years with Collated Index:	**35**	2010 Rank:	**3**
Change in Collated Index 2009-10 (%):	**85**	Long-term trend (%):	**22**
Mean flight date 2010:	**29-July**	Series mean flight date:	**01-Aug**

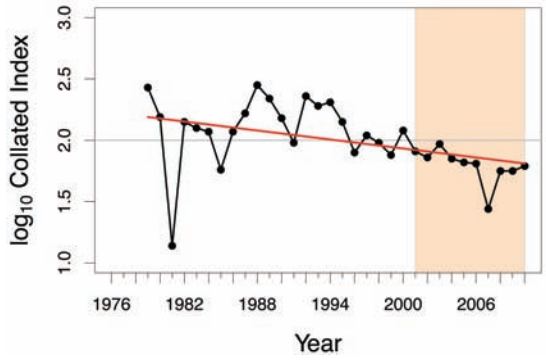
Collated Index plot:



Following poor years in 2007 and 2008, there has been improvement in the fortunes of the Brown Argus, with the 2010 Collated Index being the third highest in the series. The second generation was particularly strong. The largest site index was 497 at Magdalen Hill Down in Hampshire. This site also produced the only three-figure count, with 101 recorded on 25th May. Although the range of expansion in this species is well documented through distribution surveys, the apparent increase in abundance since 1976 is not significant.

Northern Brown Argus (*Aricia artaxerxes*)			
No. years with Collated Index:	**32**	2010 Rank:	**27**
Change in Collated Index 2009-10 (%):	**11**	Long-term trend (%):	**-59***
Mean flight date 2010:	**28-June**	Series mean flight date:	**12-July**

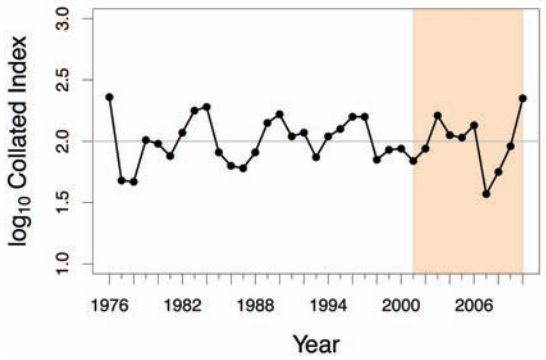
Collated Index plot:



For the tenth year in succession, Northern Brown Argus abundance was below the series average, with abundance only marginally up from 2008 and 2009. The butterfly has been struggling in recent years in a key stronghold, the limestone grasslands of Morecambe Bay, so it was encouraging to record a 157% increase at Gait Barrows National Nature Reserve and relatively stable numbers at Warton Crag. The latter site logged both the largest UKBMS index (157) and day count (47) in 2010. The Northern Brown Argus has been at a low ebb since the mid-1990s, with a significant long-term decline of more than 50% over the series. This was another summer butterfly species which was out earlier than normal, but then likely negatively impacted by unsettled summer weather.

Common Blue (*Polyommatus icarus*)			
No. years with Collated Index:	**35**	2010 Rank:	**2**
Change in Collated Index 2009-10 (%):	**146**	Long-term trend (%):	**2**
Mean flight date 2010:	**21-July**	Series mean flight date:	**26-July**

Collated Index plot:



The Common Blue had a superb year in 2010, producing its second highest Collated Index of the series. Whilst some of the UK's scarcer blue butterflies have been increasing in recent years, the Common Blue has been doing less well and although considerably more widespread than other blue species its abundance on monitored sites was dropping. Having reached extremely low numbers in 2007/8, there was some recovery in 2009, followed by an impressive increase of nearly 150% in 2010! Three-figured indices were obtained at 236 monitored sites, more than ever before, whilst four-figure indices were counted at 11 sites, almost twice as many as in any other year of monitoring (Figure 8). Blunts Wood & Paiges Meadows in Sussex and Blakehill Farm in Wiltshire both recorded indices exceeding 2,000 (2,669 and 2,439 respectively). The largest counts were associated with the second generation. These included 633 at Blakehill Farm in Wiltshire on 1st August, 598 on 3rd August at Grendon & Doddershall Woods in Buckinghamshire and 615 at Blunts Wood & Paiges Meadows almost two weeks later on the 15th. Due to considerable fluctuations over the series, the long-term trend across the UK is classed as showing no overall change.

Figure 8. Monitored sites in the UK recording large annual indices for Common Blue in 2010.

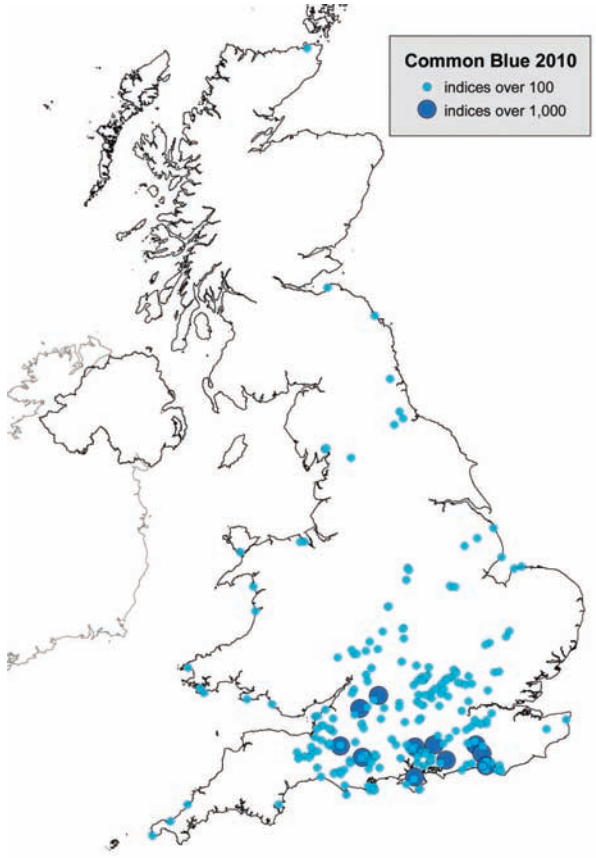
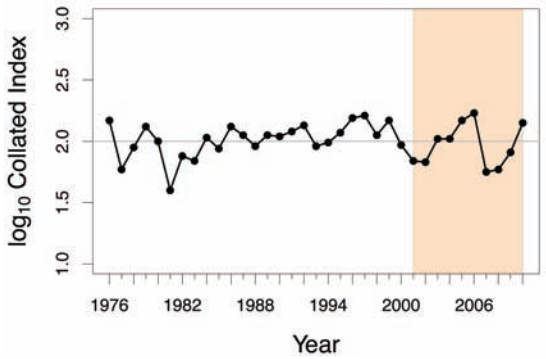


Photo by Tony Cox

Chalkhill Blue (*Polyommatus coridon*)			
No. years with Collated Index:	**35**	2010 Rank:	**7**
Change in Collated Index 2009-10 (%):	**74**	Long-term trend (%):	**14**
Mean flight date 2010:	**07-Aug**	Series mean flight date:	**09-Aug**

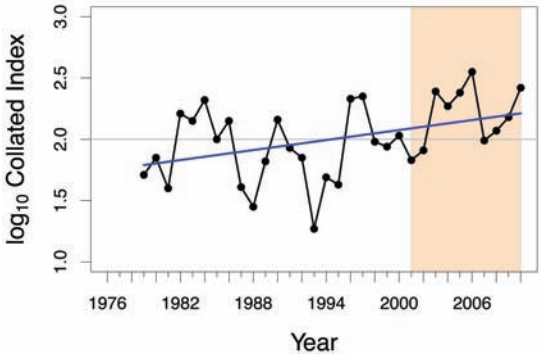
Collated Index plot:



Following three relatively poor years, Chalkhill Blue increased substantially in 2010 making it the seventh best year since 1976. It was a particularly good year on the Chilterns, with substantial increases recorded at Therfield Heath, Aston Rowant, Totternhoe Old Chalk Quarry and Dunstable Downs. The largest increase, however, was at Lullington Heath in Sussex where the index rose more than seven-fold from 76 in 2009 to 544 in 2010! Across southern England, three-figure indices were produced at almost 50% of sites. Four-figure counts were recorded on three sites in late July/early August; Friston Hill in Sussex, Coombe Hill in Gloucestershire and Devil's Dyke in Cambridgeshire. The largest annual index of 5,090 was produced at Coombe Hill, one of seven different sites recording four-figure indices in 2010. Although there has been a contraction in the range of this butterfly in recent decades, the abundance trend since 1976 is classed as showing no overall change.

Adonis Blue (*Polyommatus bellargus*)			
No. years with Collated Index:	**32**	2010 Rank:	**2**
Change in Collated Index 2009-10 (%):	**74**	Long-term trend (%):	**172***
Mean flight date 2010:	**30-July**	Series mean flight date:	**25-July**

Collated Index plot:



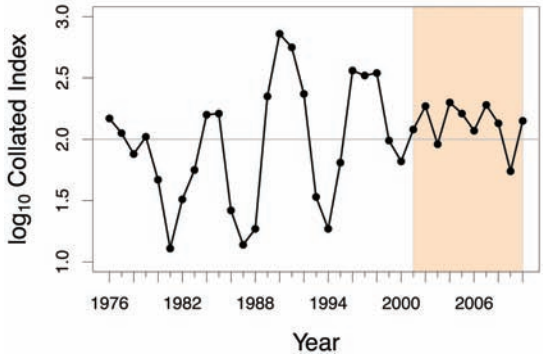
Another blue to do extremely well in 2010 was the Adonis Blue, which produced its second highest Collated Index of the series with almost a three-quarter increase over 2009. The largest annual increases were noted at Martin Down North in Hampshire (33 in 2009, 230 in 2010) and Pewsey Downs National Nature Reserve in Wiltshire (37 in 2009, 216 in 2010). Over a third of sites recorded annual indices of three-figures, whilst five recorded four-figure annual indices, with Malling Down in East Sussex topping the list with an index of 2,307. Dorset sites are well known for their large Adonis Blue populations, but perhaps less well known is Barbury Castle in Swindon where the third highest index was recorded (1,688). The maximum count was recorded at Malling Down with 601 on 30th May.

For the last eight years, abundance has been at or above the series average, and we are pleased to report that this stunning blue butterfly has changed trend category as a consequence. Following a historical decline in status, abundance has significantly increased since 1979. Being somewhat out of synchrony with the other grassland blues, the mean flight date was later than the series average.

Photo by Simon Bevan

Holly Blue (*Celastrina argiolus*)			
No. years with Collated Index:	**35**	2010 Rank:	**15**
Change in Collated Index 2009-10 (%):	**156**	Long-term trend (%):	**157**
Mean flight date 2010:	**16-July**	Series mean flight date:	**29-June**

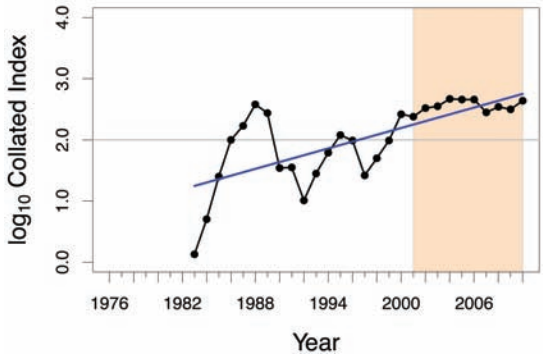
Collated Index plot:



The Holly Blue had a slightly above average year in 2010, making a strong recovery (up by more than 150%) from a poor year in 2009. The highest site index of 526 was made at Benfleet Downs in Essex, whilst two other sites recorded three-figure indices. The maximum number of individuals recorded on a single transect was also at Benfleet Downs with an impressive 112 recorded on 15th August! The Holly Blue had much larger second and third broods on monitored sites than in previous years, and the mean flight date was more than two weeks later than the series average. This butterfly fluctuates considerably from year to year and the apparent increase since 1976 is not significant.

Large Blue (*Phengaris arion*)			
No. years with Collated Index:	**28**	2010 Rank:	**4**
Change in Collated Index 2009-10 (%):	**38**	Long-term trend (%):	**>1000*** **
Mean flight date 2010:	**28-June**	Series mean flight date:	**23-June**

Collated Index plot:



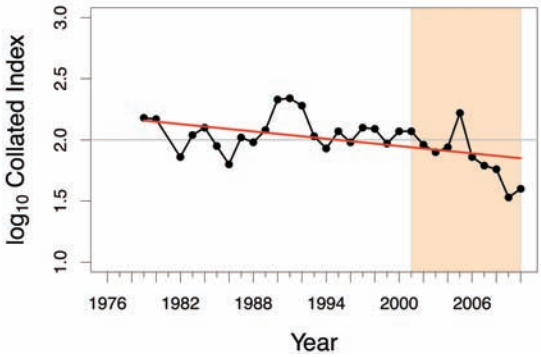
The Large Blue had a good year in 2010 - abundance increased by 38% and the year ranked fourth in the

series. After a couple of sharp declines in the late 1980s and 1990s Large Blue mean abundance has been stable over the last decade, although the long-term increase is significant and exceeds 1,000%!

Metalmarks (Riodinidae)

Duke of Burgundy (*Hamearis lucina*)			
No. years with Collated Index:	**31**	2010 Rank:	**30**
Change in Collated Index 2009-10 (%):	**18**	Long-term trend (%):	**-51****
Mean flight date 2010:	**27-May**	Series mean flight date:	**31-May**

Collated Index plot:

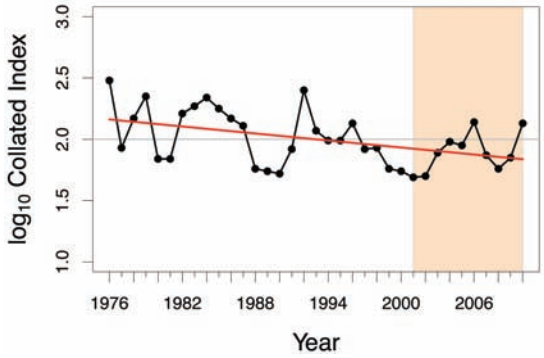


There was a modest increase in annual abundance of the Duke of Burgundy in 2010, though it was still a very poor year – the second worst in the 31-year series. The highest numbers were recorded at Noar Hill in Hampshire, where encouragingly annual abundance increased by 25%. This was the only site where the index reached three-figures (131), with the maximum count being 43 on 25th May. Whilst the Duke of Burgundy is increasing at three sites in northern England it is significantly declining at almost half of UKBMS sites. Since 1979, abundance has been significantly reduced by more than 50%. Worryingly, this decline has accelerated in the last ten years (Table 2a), which reflects a number of local extinctions.

Vanessids, Emperors and Admirals (Nymphalidae)

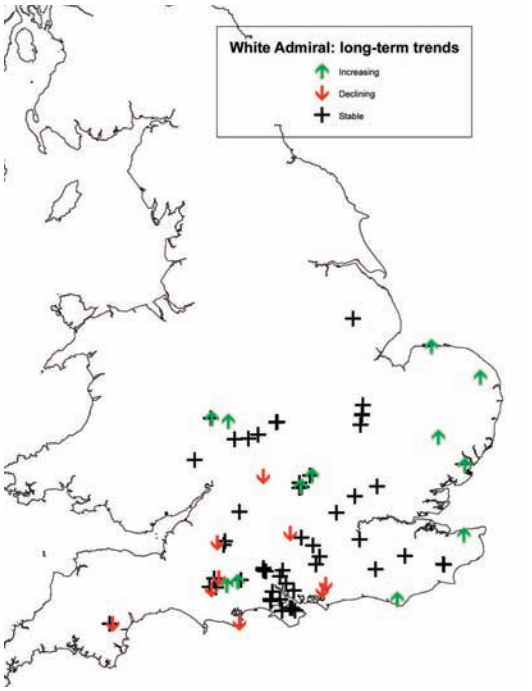
White Admiral (*Limenitis camilla*)			
No. years with Collated Index:	**35**	2010 Rank:	**11**
Change in Collated Index 2009-10 (%):	**90**	Long-term trend (%):	**-54****
Mean flight date 2010:	**13-July**	Series mean flight date:	**18-July**

Collated Index plot:



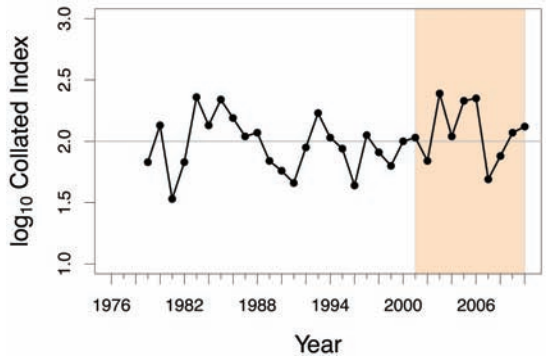
White Admiral numbers on monitored sites rose substantially with a 90% increase over 2009 levels. It was an excellent year at Pamber Forest in Hampshire, with an increase from 48 in 2009 to 181 in 2010. The butterfly also increased in annual abundance by more than 300% at Piddles Wood in Dorset and Bradfield Woods in Suffolk. Since the late 1990s, there have only been two years above the series average and abundance has been significantly reduced by more than 50% since 1976. Most of the declines appear to be occurring at sites in the south-west whilst the increases predominate at more northerly sites and in East Anglia (Figure 9).

Figure 9. Long-term trends for the White Admiral at monitored sites in the UK.



Purple Emperor (*Apatura iris*)			
No. years with Collated Index:	**32**	2010 Rank:	**10**
Change in Collated Index 2009-10 (%):	**13**	Long-term trend (%):	**21**
Mean flight date 2010:	**10-July**	Series mean flight date:	**22-July**

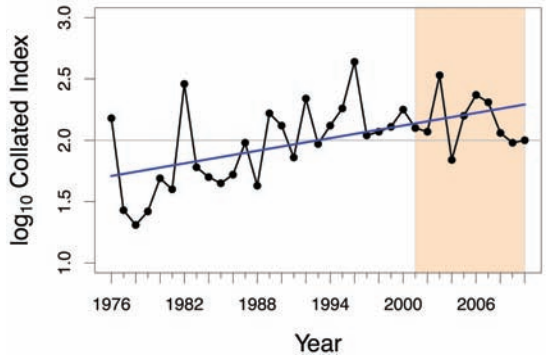
Collated Index plot:



For the third year in succession, Purple Emperor showed a modest increase in abundance, with 2010 qualifying as an above average year. Wappenbury Wood in Warwickshire recorded the highest annual index (of seven) in 2010 though the largest count of five was made at Graffham Down – Bowley's Field in Sussex on 10th July. The long-term trend is of little or no overall change. As has been the pattern in recent years, it was another early season with the mean flight period almost two weeks earlier than the long-term average.

Red Admiral (*Vanessa atalanta*)			
No. years with Collated Index:	**35**	2010 Rank:	**20**
Change in Collated Index 2009-10 (%):	**5**	Long-term trend (%):	**297*** **
Mean flight date 2010:	**30-July**	Series mean flight date:	**07-Aug**

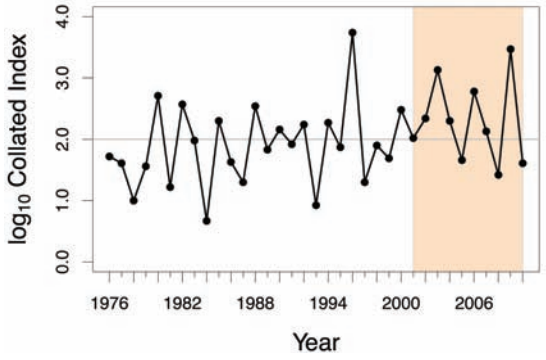
Collated Index plot:



There was little change in Red Admiral abundance in 2010, which was an average year for the species. However, numbers were far higher than over most of the years in the 1970s and 1980s and the butterfly has increased significantly by nearly 300% over the 35-year series. Five sites recorded three-figure indices in 2010. These were Martin Mere in Lancashire, Dodman in Cornwall, Friston Forest Project Area in Sussex, Greenfield Valley Nature Reserve in Clwyd and Whippingham (fields) on the Isle of Wight. The largest index (215) was recorded at Martin Mere where 51 were counted on 25th August.

Painted Lady (*Vanessa cardui*)			
No. years with Collated Index:	**35**	2010 Rank:	**26**
Change in Collated Index 2009-10 (%):	**-99**	Long-term trend (%):	**474**
Mean flight date 2010:	**21-July**	Series mean flight date:	**31-July**

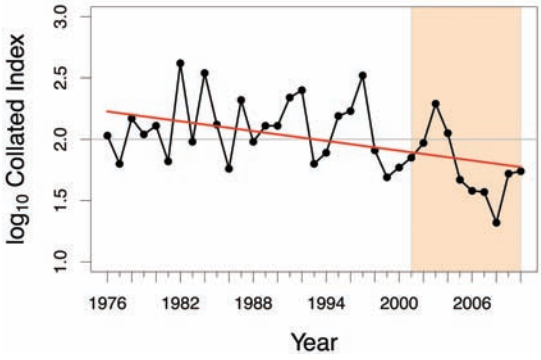
Collated Index plot:



Following a superb year in 2009, rather inevitably the Painted Lady declined sharply in 2010 with abundance down by 99%! Sightings were widespread though, with the butterfly detected on c.25% of transects. The largest annual index, a mere 37, was recorded at Wootton Coppice in Hampshire, whilst only eight other sites recorded indices in double-figures. The largest drop in numbers occurred at Magdalen Hill Down Extension in Hampshire, where the index went from 1,958 in 2009 to just one in 2010!

Small Tortoiseshell (*Aglais urticae*)			
No. years with Collated Index:	**35**	2010 Rank:	**29**
Change in Collated Index 2009-10 (%):	**6**	Long-term trend (%):	**-66****
Mean flight date 2010:	**27-June**	Series mean flight date:	**11-July**

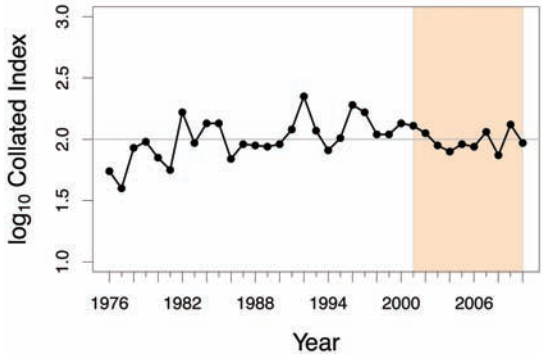
Collated Index plot:



There was no real improvement in Small Tortoiseshell numbers in 2010. The butterfly remains at a low ebb, with 2010 the seventh worst year since 1976. The decline across the UK has decelerated in the last ten years compared to the long-term trend, but whereas the declines have been most pronounced in England over the 35-year series they have been greatest in Wales over the last ten years (Table 2b). At the local level, the situation was also mixed. For example, in Somerset there were some substantial between-year gains and losses. At Carymoor Environmental Centre numbers dwindled from 309 in 2009 to 84 in 2010, yet only 15 miles away at Shapwick Heath numbers increased from 459 in 2009 to 669 in 2010. These results suggest parasitism and other local factors are having a significant impact on abundance. There were some impressive three-figure counts in 2010, with 213 on 27th June at Barbury Castle in Swindon and 109 on 11th August at Shapwick Heath. The run of poor years since the early 2000s has impacted on the long-term trend, with abundance dropping significantly by two-thirds since 1976. In 2010, the mean flight date was two weeks earlier than the series average.

Peacock (*Aglais io*)			
No. years with Collated Index:	**35**	2010 Rank:	**18**
Change in Collated Index 2009-10 (%):	**-30**	Long-term trend (%):	**44**
Mean flight date 2010:	**05-June**	Series mean flight date:	**03-July**

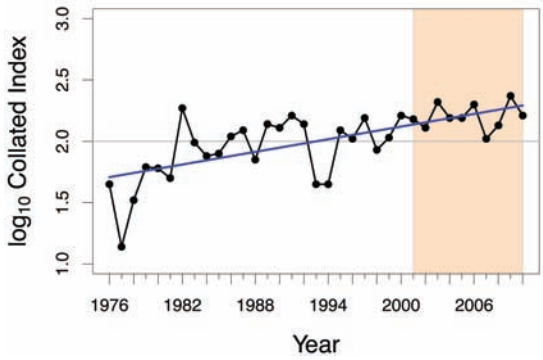
Collated Index plot:



The Peacock had a below average year in 2010 with numbers down by almost a third from 2009. Some of the more extreme declines at the site level included from 889 to 102 at Potton Wood in Bedfordshire and 545 to 63 at Minsmere in Suffolk. The highest counts were all in northern Britain, the maximum being 200 on 30th August at Crombie Country Park in Tayside. The increase of 40% across the UK since 1976 is not significant. Table 2b shows that for each time period, the Peacock has fared better in Scotland than other parts of the UK, with a 387% significant increase over the long-term. It was a very early season for the Peacock, with the mean flight date almost a month ahead of the series average!

Comma (*Polygonia c-album*)			
No. years with Collated Index:	**35**	2010 Rank:	**5**
Change in Collated Index 2009-10 (%):	**-31**	Long-term trend (%):	**300*****
Mean flight date 2010:	**11-July**	Series mean flight date:	**21-July**

Collated Index plot:

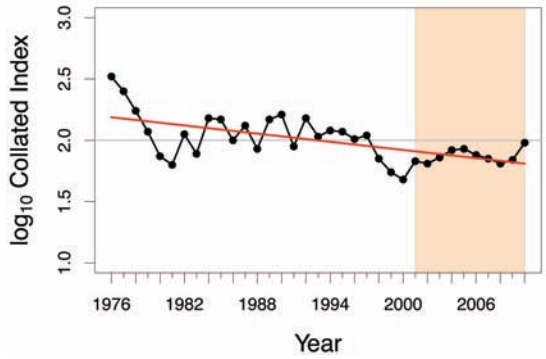


Although numbers were down by a third from 2009, it was still an excellent year for the Comma, ranked as the fifth best since 1976. For the last 13 years, the Collated Index has been above the series average and the butterfly has shown a three-fold significant increase in abundance since 1976. The largest annual index of 208 was recorded at Bradfield Woods in Suffolk where abundance peaked rather late on 18th September, perhaps reflecting the comparatively good early autumn weather.

Fritillaries (Nymphalidae)

Small Pearl-bordered Fritillary (*Boloria selene*)			
No. years with Collated Index:	**35**	2010 Rank:	**18**
Change in Collated Index 2009-10 (%):	**38**	Long-term trend (%):	**-59*****
Mean flight date 2010:	**18-June**	Series mean flight date:	**25-June**

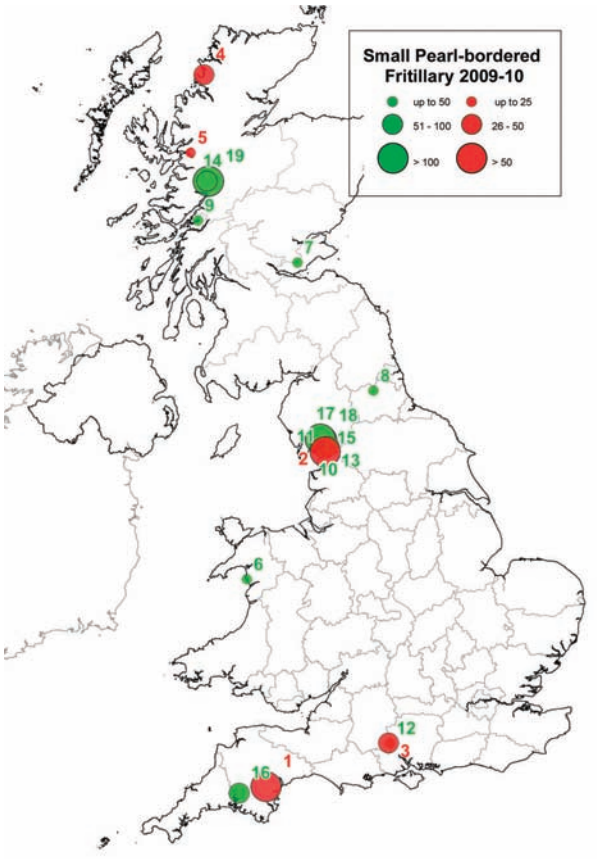
Collated Index plot:



There was a further welcome recovery in the Small Pearl-bordered Fritillary in 2009, with the Collated Index value close to the series average. Sites where numbers more than doubled to produce three-figure indices included Allt Mhuic, Loch Arkaig in the Highland Region, and Whitbarrow National Nature Reserve - Farrer's Allotment in Cumbria. Though these results are positive, the Small Pearl-bordered Fritillary is still in trouble, with abundance having declined by more than 50% since 1976. Figure 10 illustrates that local factors are likely to be playing an important part in influencing site trends, with substantial increases and decreases noted across the species range.

The highest annual index of 247 was recorded at West Down in Dartmoor. Three other sites recorded indices above 200; Hutton Roof Common in Cumbria, Glasdrum in Strathclyde and Burn Hill in Durham. The latter of these sites also recorded the highest single count of 2010 with 104 individuals counted on 26th June.

Figure 10. Sites where Small Pearl-bordered Fritillary abundance changed substantially between 2009 and 2010.



Sites: *1. Bovey Valley; 2. Warton Crag LNR; 3. Bentley Wood – Barnridge; 4. Pollymore; 5. Carr Brae, Dornie; 6. Morfa Dyffryn (Benar Dunes); 7. Clune; 8. Burn Hill; 9. Glasdrum; 10. Warton Crag RSPB; 11. Arnside Knott NT; 12. Bentley Wood – Eastern; 13. Holme Park Fell; 14. Allt cheanna Muir; 15. Yealand Hall Allotment; 16. West Down (Dartmoor); 17. Whitbarrow – Howe Ridding NNR; 18. Whitbarrow NNR – Farrer's Allotment; 19. Allt Mhuic – Loch Arkaig.*

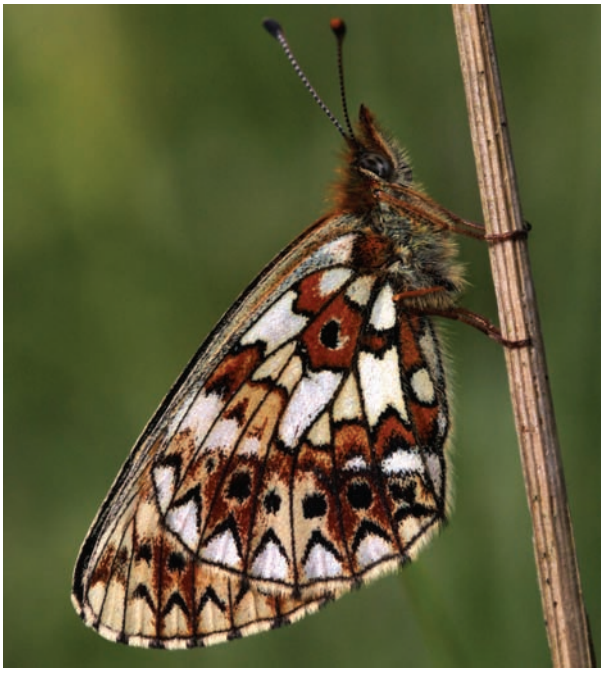
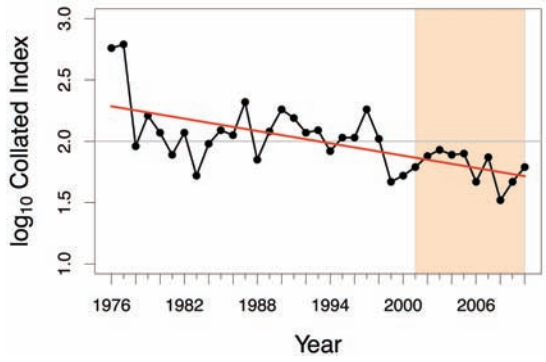


Photo by Steve Covey

Pearl-bordered Fritillary (*Boloria euphrosyne*)			
No. years with Collated Index:	**35**	2010 Rank:	**28**
Change in Collated Index 2009-10 (%):	**32**	Long-term trend (%):	**-74*** **
Mean flight date 2010:	**25-May**	Series mean flight date:	**03-June**

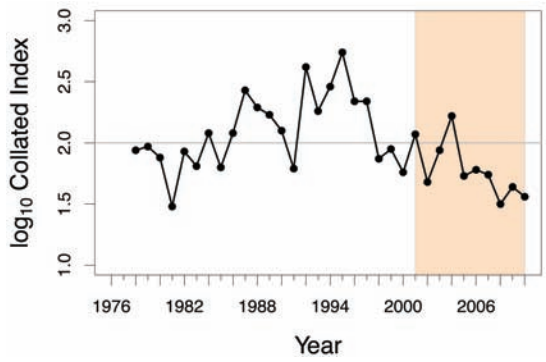
Collated Index plot:



The Pearl-bordered Fritillary increased in abundance by almost a third in 2010, but it was still a well below average year and it is worth noting that more sites showed decreases than increases. The most positive changes were at Eyarth Rocks BC Reserve in Clwyd (39 in 2009, 65 in 2010) and Castle Drogo, Piddledown Common in Devon (36 in 2009, 65 in 2010). Eyarth Rocks was one of only two sites to register a three-figure index (150) and also recorded (along with Aish Tor in Devon) the peak count of 51 on 3rd May. The Pearl-bordered Fritillary has not had a good year since 1997, whilst abundance has been significantly reduced by three-quarters since 1976. The warm weather in April contributed to advancing the mean flight date by more than a week ahead of the series average.

High Brown Fritillary (*Argynnis adippe*)			
No. years with Collated Index:	**33**	2010 Rank:	**31**
Change in Collated Index 2009-10 (%):	**-18**	Long-term trend (%):	**-44**
Mean flight date 2010:	**10-July**	Series mean flight date:	**16-July**

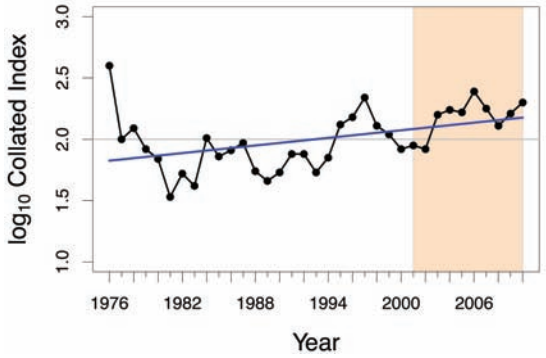
Collated Index plot:



The High Brown Fritillary had a poor year in 2010 – abundance dropped by nearly 20% and it was the third worst year in the series. Eight of the ten sites showing the largest annual declines were in Devon, and at three of these (Kings Lane Slope, Luckey Tor and Horrabridge & Roborough Down) numbers more than halved. Conversely, the top five sites showing annual increases were all in the Morecambe Bay area of North west England with Warton Crag (Lancashire Wildlife Trust) topping the list (92 in 2009, 254 in 2010). The maximum count was recorded at this site with 94 on 2nd July.

Dark Green Fritillary (*Argynnis aglaja*)			
No. years with Collated Index:	**35**	2010 Rank:	**4**
Change in Collated Index 2009-10 (%):	**23**	Long-term trend (%):	**129****
Mean flight date 2010:	**15-July**	Series mean flight date:	**22-July**

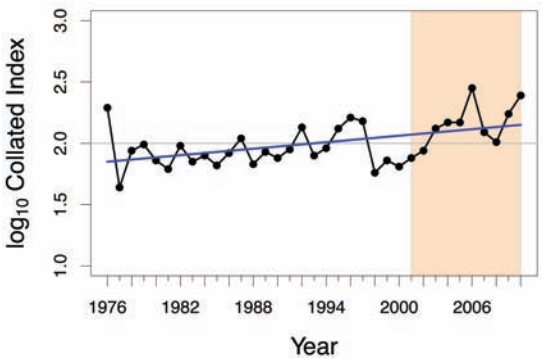
Collated Index plot:



The Dark Green Fritillary had an excellent year in 2010, the fourth best in the series, with abundance up by almost 25% over the previous year. Noteworthy annual increases included from 207 to 512 at Martin Down North in Hampshire and from 145 to 280 at Helsington Barrows in Cumbria. Twenty sites produced three-figure indices with two sites recording indices over 500; Porton Down – Tower Hill Wood in Wiltshire and Martin Down North. The former of these sites recorded the highest single count of 230 on 25th June. Since 1976, this butterfly has increased significantly in abundance by more than 100%. In 2010, the mean flight date was a week earlier than the series average.

Silver-washed Fritillary (*Argynnis paphia*)			
No. years with Collated Index:	**35**	2010 Rank:	**2**
Change in Collated Index 2009-10 (%):	**41**	Long-term trend (%):	**104****
Mean flight date 2010:	**25-July**	Series mean flight date:	**26-July**

Collated Index plot:



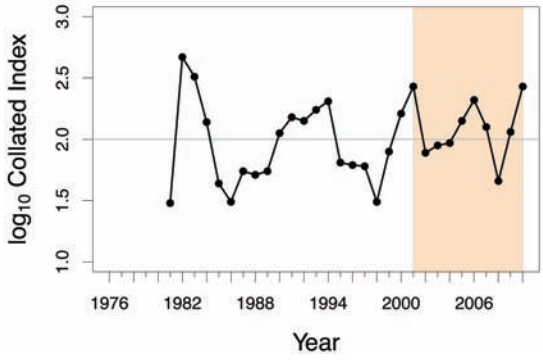
The Silver-washed Fritillary had a fabulous year, producing its second highest Collated Index of the series, increasing by 40% from 2009. There were a good number of noteworthy annual increases including from 23 to 124 at Rushbeds Wood in Buckinghamshire and 624 to a whopping 1,204 at Pamber Forest in Hampshire. It is interesting to note that in 1984, the index at Pamber Forest was a lowly 38! The 2010 total at this site is the largest index ever recorded in the UKBMS, exceeding the previous maximum of 650 at Bentley Wood – Hawksgrove in Wiltshire in 2009. Unsurprisingly the maximum count was also recorded at Pamber Forest with 269 on 19th July, whilst over a hundred were counted here for five consecutive weeks!

The Silver-washed Fritillary has been expanding its UK range northwards and eastwards in recent years, with roaming individuals frequently turning up on new transects, whilst there has been a significant increase in abundance of more than 100% since 1976.

Photo by John Vallender

Marsh Fritillary (*Euphydryas aurinia*)			
No. years with Collated Index:	**30**	2010 Rank:	**3**
Change in Collated Index 2009-10 (%):	**134**	Long-term trend (%):	**41**
Mean flight date 2010:	**31-May**	Series mean flight date:	**06-June**

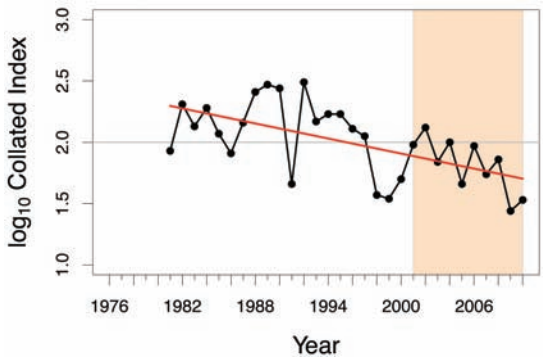
Collated Index plot:



The Marsh Fritillary produced its 3rd best Collated Index of the series in 2010, with abundance up by more than 100% from 2009. Maximum adult counts included 212 on 15th May at Southfield Hog Cliff in Dorset, 162 on 23rd May at Hod Hill National Trust, also in Dorset, and 86 on 27th May at Barbury Castle in Swindon. Populations of this butterfly fluctuate greatly from year to year due to parasitism, annual management (e.g. burning) and other factors. Due to variable trends between sites it is perhaps not surprising that the long-term increase in abundance is not significant. However, the apparent increase is highly encouraging given the historical large-scale decline in status across the UK. It was a relatively early year on monitored sites, with the mean flight date advanced by one week.

Heath Fritillary (*Melitaea athalia*)			
No. years with Collated Index:	**30**	2010 Rank:	**29**
Change in Collated Index 2009-10 (%):	**21**	Long-term trend (%):	**-76*****
Mean flight date 2010:	**19-June**	Series mean flight date:	**05-July**

Collated Index plot:

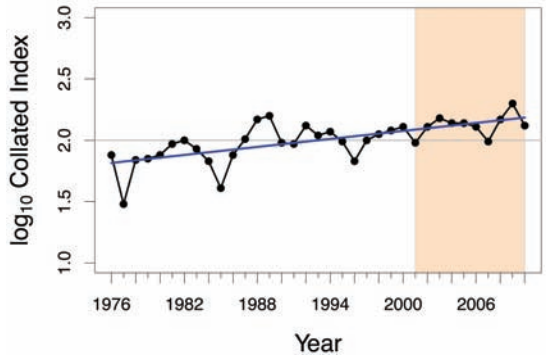


Heath Fritillary abundance was up by 21% in 2010. However, 2010 was still classed as an extremely poor year – the second worst since 1980. The site results were mixed. On the positive side, there were some substantial increases on Exmoor, whilst in Kent the majority of sites showed little change or only modest increases. Although conservation management since the 1980s has almost certainly prevented the extinction of this butterfly from the British countryside, there is a long way to recovery, with abundance having been reduced significantly by more than three-quarters since the start of monitoring in 1980. As has been the pattern in recent years, it was another early year for the butterfly with the flight season advanced by more than two weeks from the series average.

Browns (Satyrida)

Speckled Wood (*Pararge aegeria*)			
No. years with Collated Index:	**35**	2010 Rank:	**8**
Change in Collated Index 2009-10 (%):	**-34**	Long-term trend (%):	**141*** **
Mean flight date 2010:	**21-July**	Series mean flight date:	**27-July**

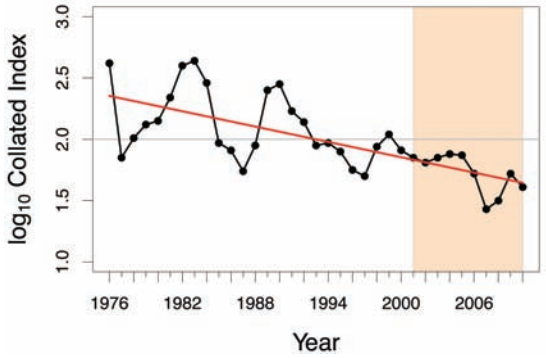
Collated Index plot:



Although Speckled Wood numbers were down by about a third from 2009 levels, it was another good year – the eighth best since 1976. Substantial declines included at Long Wood in Somerset (1316 in 2009, 529 in 2010) and North Warren in Suffolk (636 in 2009, 219 in 2010). The largest site index of 915 was recorded at Pamber Forest in Hampshire, whilst four other sites recorded indices of more than 500; Greenfield Valley Nature Reserve in Clwyd, Dodman in Cornwall, Long Wood in Somerset and Bradfield Woods in Suffolk. The Speckled Wood has been expanding its range in the UK and abundance on monitored sites has increased significantly by almost 150% since 1976.

Wall Brown (*Lasiommata megera*)			
No. years with Collated Index:	**35**	2010 Rank:	**33**
Change in Collated Index 2009-10 (%):	**-21**	Long-term trend (%):	**-81*** **
Mean flight date 2010:	**24-July**	Series mean flight date:	**28-July**

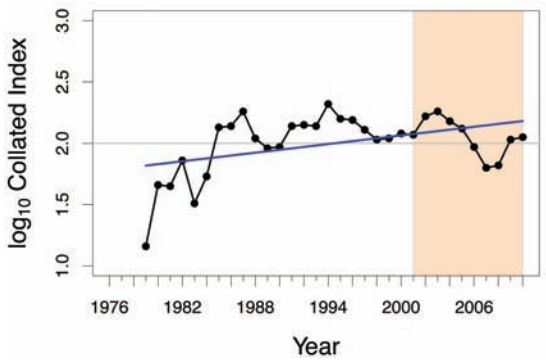
Collated Index plot:



Following two years of moderate recovery after a series low in 2007, the Wall Brown suffered another worrying drop in numbers with 2010 ranked the third worst since 1976. Only three sites logged three-figure indices; with 120 at Bindon Hill in Dorset, 116 at Havannah Local Nature Reserve in Northumberland and 111 at Bishop Middleham Quarry in Durham. The Bindon Hill index was the lowest maximum index since 1985, a year in which there were far fewer sites in the scheme. Bodmin Beacon Local Nature Reserve in Cornwall and Havannah Local Nature Reserve both recorded the maximum weekly count of 29 individuals on 11th June and 21st August respectively. At a UK level, abundance has been reduced significantly by more than four-fifths over the last 35 years. In Scotland however, the butterfly has fared rather better although the increase is not significant.

Scotch Argus (*Erebia aethiops*)			
No. years with Collated Index:	**32**	2010 Rank:	**17**
Change in Collated Index 2009-10 (%):	**5**	Long-term trend (%):	**137***
Mean flight date 2010:	**14-Aug**	Series mean flight date:	**10-Aug**

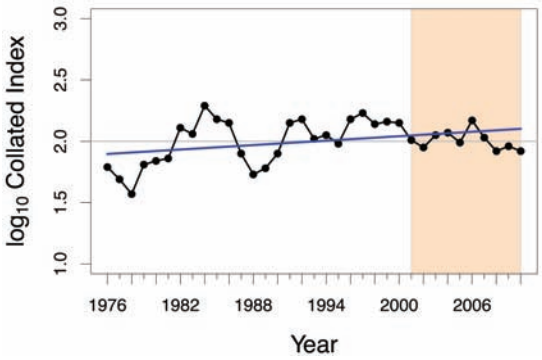
Collated Index plot:



For the third year in a row Scotch Argus abundance increased, with 2010 qualifying as an above average year. Six sites produced three-figure indices, the two largest both being in Highland, with 680 at Insh Marshes and 620 at Allt Cheanna Muir. Whilst there were impressive three-figure weekly counts at both these sites, the maximum count of 362 was recorded at Glasdrum in Strathclyde on 19th August. Due to a run of poor years in the late 1970s/early 1980s, the long-term trend shows a significant increase of more than 100%. However, no substantial change has occurred since the mid 1980s.

Marbled White (*Melanargia galathea*)			
No. years with Collated Index:	**35**	2010 Rank:	**24**
Change in Collated Index 2009-10 (%):	**-9**	Long-term trend (%):	**63***
Mean flight date 2010:	**08-July**	Series mean flight date:	**15-July**

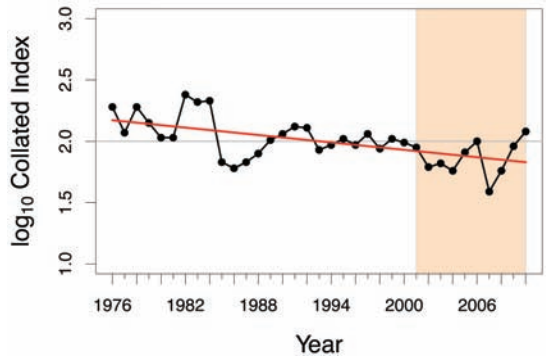
Collated Index plot:



For the third successive year, it was a below average year for the Marbled White. Most sites showed only modest changes from 2009, although there were some spectacular collapses and noteworthy increases. Declines included from 510 to 128 at Pewley Down in Surrey and 132 to 22 at Stoke Camp in Somerset. Increases included from 196 to 465 at Coombe Hill in Gloucestershire and 26 to 89 at Headley Warren in Surrey. The largest site index of 1,470 was recorded at Whippingham (fields) on the Isle of Wight, where on 2nd July an impressive 610 individuals were counted. Despite a run of poor years, the long-term situation is positive with abundance having increased significantly by almost two-thirds since 1976.

Grayling (*Hipparchia semele*)			
No. years with Collated Index:	**35**	2010 Rank:	**9**
Change in Collated Index 2009-10 (%):	**32**	Long-term trend (%):	**-56*****
Mean flight date 2010:	**31-July**	Series mean flight date:	**05-Aug**

Collated Index plot:

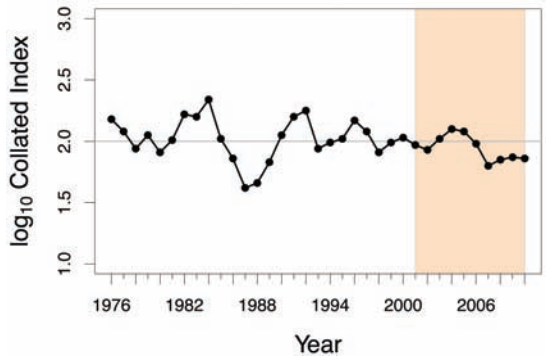


There was a further improvement in the fortunes of the Grayling, which increased by 32% from 2009, to produce an above average year – the ninth best since 1976. Sites where abundance more than doubled over the previous year included Arnside Knott in Lancashire, Tentsmuir Point North in Fife, St Abb's Head in Berwickshire and Ramsey Island in Pembrokeshire, whilst there was more than a six-fold increase at Holme Park Quarry Local Nature Reserve in Cumbria.

It was a poor year on some of the Norfolk coast sites with a 15% annual decrease at Scolt Head Island and an alarming 85% decrease at Blakeney Point. The highlight in 2010 was the impressive site index of 2,115 recorded at West Moors (RAOC) in Dorset. This is the fifth highest ever UKBMS index and the largest since 1997. Weekly counts at this site exceeded one hundred individuals on no less than six different weeks. Great Orme in Gwynedd also recorded a high index – 922. These impressive figures belie longer term problems, with abundance having decreased significantly by more than 50% since 1976. The mean flight date in 2010 was a week earlier than the series average.

Gatekeeper (*Pyronia tithonus*)			
No. years with Collated Index:	**35**	2010 Rank:	**29**
Change in Collated Index 2009-10 (%):	**-3**	Long-term trend (%):	**-27**
Mean flight date 2010:	**30-July**	Series mean flight date:	**02-Aug**

Collated Index plot:

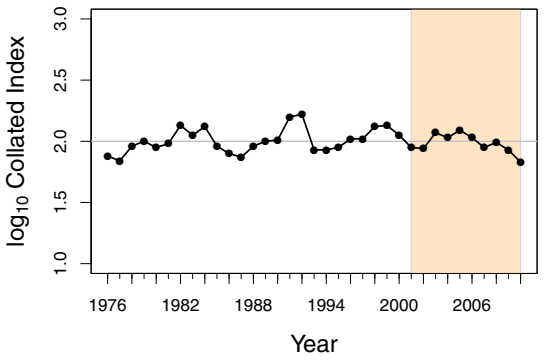


There was little change in Gatekeeper status in 2010 and, for the fourth year in succession, abundance was well below the series average. There were 26 sites where abundance more than halved, one of the most extreme declines being at Walton Hill in Somerset (206 in 2009, 45 in 2010).

More positively, annual abundance more than doubled at 30 sites, noteworthy increases being at Friston Forest Project Area in East Sussex (89 in 2009, 336 in 2010) and Ryton Wood & Pool in Warwickshire (27 in 2009, 108 in 2010). Four sites produced indices of over a thousand; with 2,071 at Bedelands Farm Nature Reserve in West Sussex, 1,824 at Whippingham (fields) on the Isle of Wight, 1,543 at Blunts Wood & Paiges Meadows in Sussex, and 1,171 at RSPB Blean Woods in Kent. Of these sites Bedelands Farm Nature Reserve recorded the highest weekly count, with 633 on 30th July. In spite of a recent decline, the long term trend is classed as showing no overall change.

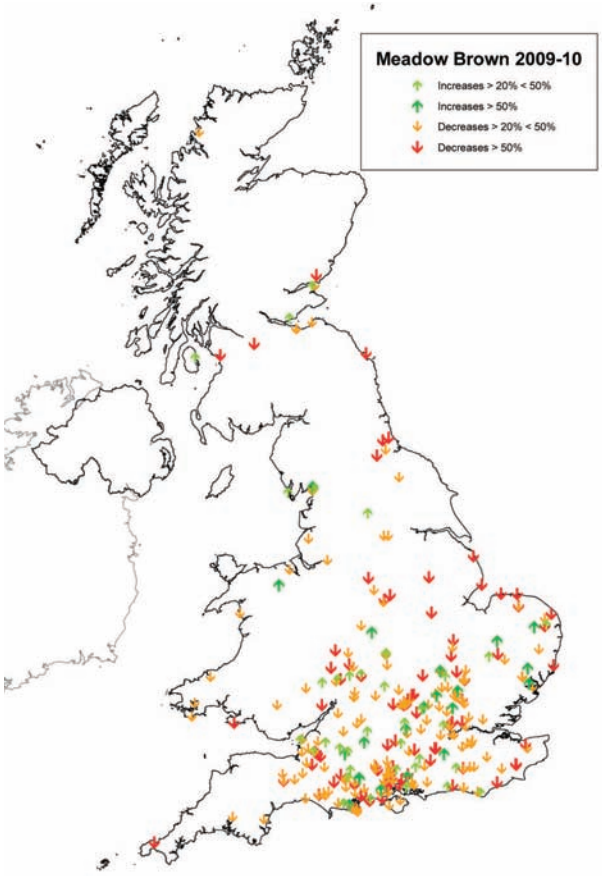
Meadow Brown (*Maniola jurtina*)			
No. years with Collated Index:	**35**	2010 Rank:	**35**
Change in Collated Index 2009-10 (%):	**-20**	Long-term trend (%):	**7**
Mean flight date 2010:	**19-July**	Series mean flight date:	**21-July**

Collated Index plot:



The Meadow Brown reduced in abundance by 20% in 2010, producing its lowest Collated Index of the series. Figure 11 shows where substantial changes occurred between 2009 and 2010, showing markedly more declines across the country.

Figure 11. Substantial changes in abundance of the Meadow Brown between 2009 and 2010.



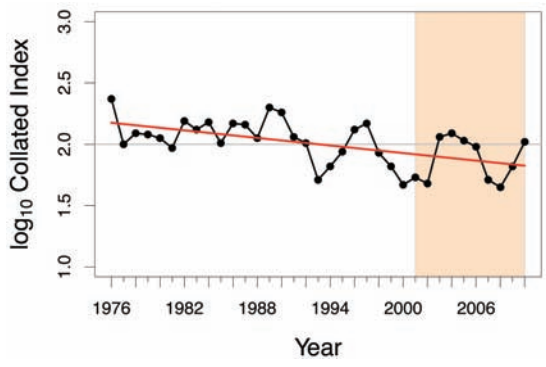
There were some substantial annual decreases along the east cost of Britain, including at North Warren in Suffolk (1,582 in 2009, 290 in 2010), Scolt Head Island in Norfolk (486 to 124) and Saltfleetby in Lincolnshire (786 to 187). The largest annual increase was recorded inland at Manor Farm, Coddenham in Suffolk (115 in 2009, 442 in 2010). The number of sites recording four-figure indices was less than half of that in 2009 and less than a quarter of that in 2005 when fewer sites were monitored! The largest annual indices were 7,577 at Whippingham (fields) on the Isle of Wight and 7,258 at Blunts Wood & Paiges Meadows in Sussex.

The long-term trend in the Meadow Brown since 1976 is of little or no overall change.

Photo by Tim Melling

Small Heath (*Coenonympha pamphilus*)			
No. years with Collated Index:	**35**	2010 Rank:	**19**
Change in Collated Index 2009-10 (%):	**59**	Long-term trend (%):	**-56*** **
Mean flight date 2010:	**14-July**	Series mean flight date:	**09-July**

Collated Index plot:

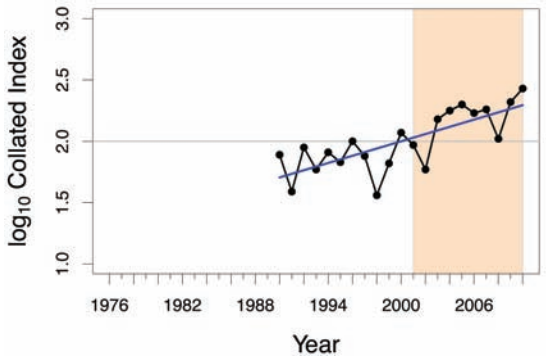


Small Heath recovered further from a series low in 2008, with a 59% increase in abundance, making 2010 an average year. There were someimpressive annual increases including at Hartslock extension in Oxfordshire (from 11 in 2009 to 103 in 2010) and at Upton Cow Down (MOD) in Wiltshire (from 31 to 293). The largest index of 2,114 was produced at Friston Hill in Sussex, this being the second highest index ever recorded in the UKBMS following 3,351 at Denbies Landbarn in Surrey in 2006. Although there has been a recent improvement in the fortunes of this species, the long-term trend remains a cause of concern with a more than 50% decline since 1976.

Photo by Matthew Berry

Large Heath (*Coenonympha tullia*)			
No. years with Collated Index:	**21**	2010 Rank:	**1**
Change in Collated Index 2009-10 (%):	**29**	Long-term trend (%):	**316*** **
Mean flight date 2010:	**27-June**	Series mean flight date:	**09-July**

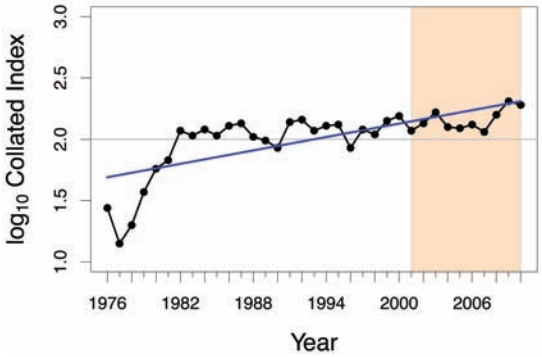
Collated Index plot:



For the second year running the Large Heath produced its highest Collated Index of the series. In eight of the last ten years it has produced an above average index. The trend since 1990 shows a significant increase of more than 300%. However, with relatively few sites monitored these results should be treated with caution. Three-figure indices were obtained at two sites, with 605 at Meathop Moss in Cumbria and 173 at Cors Fochno in Ceredigion. It was an early year, with the mean flight date advanced by 12 days from the series average.

Ringlet (*Aphantopus hyperantus*)			
No. years with Collated Index:	**35**	2010 Rank:	**2**
Change in Collated Index 2009-10 (%):	**-6**	Long-term trend (%):	**316*** **
Mean flight date 2010:	**11-July**	Series mean flight date:	**15-July**

Collated Index plot:



Ringlet abundance decreased by 6% between 2009 and 2010. However, abundance has been above average for each of the last fourteen years and there has been more than a three-fold significant increase since 1976. Four sites recorded indices over a thousand, topped by Pamber Forest in Hampshire with a site index of 1,675. The following sites all recorded weekly counts of more than 400 individuals in July, all within a week of each other: Pamber Forest, Bradfield Woods in Suffolk, Somerford Common in Wiltshire and Whitecross Green Wood in Oxfordshire.

Future plans for the UKBMS

In the 2009 annual report we provided details of the new development plan for the future of the UKBMS. It is with great pleasure we can now report that as of April 2011 the UKBMS project led by CEH and BC has acquired a further three years of funding from a consortium of government agencies led by the Joint Nature Conservation Committee (JNCC). The programme of work for the new phase of the UKBMS project consists of six main workstreams as follows:

1. Maintenance of the core scheme: over the three-year period the major component to the project will be to support the existing transect network of over 1,000 sites which are currently monitored by over 1,500 recorders. This includes core activities such as the maintenance of current databases, collation of the transect data, analysis and production of annual butterfly trends at UK and country level and by habitat type (Farmland and Woodland), dissemination of these trends at the annual National Recorder's Meeting and in the annual report to recorders. The data will continue to contribute to governmental indicators and to the Butterflies for the New Millennium project.

2. Operation of the Wider Countryside Butterfly Scheme (WCBS). It is great news that this important project will now have extra funding to support the annual sampling at over 600 sites and to conduct analysis to test for differences in butterfly trends between randomly selected WCBS squares and UKBMS transect sites (which predominantly sample semi-natural habitats). As part of the WCBS there will be an annual update in the annual report to recorders.

3. Regional development of the UKBMS: to develop and promote standards for more systematic monitoring of target species

4. Update of butterfly biodiversity indicators: over the three-year period we will continue to update existing UK, England and Scotland indicators described in the UKBMS Annual Report 2007 (Botham et al 2007) and on the UKBMS website **(http://www.ukbms.org/butterflies_as_indicators.htm)**.

5. Analytical development: we will develop and test alternative methods for measuring trends in butterfly populations. Initially, we will focus on improved trend estimates incorporating section-level daily counts in order to make better use of data collected where multiple weeks are missed. In addition, there will be developments to enable national collated indices to be produced using both WCBS and full transect data.

6. Development and implementation of online recording for the UKBMS. Ian Middlebrook led a discussion at the 2011 National Recorders' Meeting on the future of recording. This feedback has contributed to the proposed design for an online recording system for the UKBMS, to be tested in 2012. The online system will aim to reduce costs of data collation and facilitate improved feedback to recorders, enabling the status of butterfly populations to be reported more rapidly. Online recording will encompass both full transect data and the WCBS, and key features of the Transect Walker software will be retained where possible. Transect Walker will also remain as an alternative option for submitting data.

Once again, the continuation of the UKBMS project not only highlights how valuably the dataset is regarded, but further secures the UKBMS as one of the most important insect monitoring schemes in the world. At this point therefore it seems fitting to reiterate our enormous gratitude to the network of volunteers and regional co-ordinators who contribute to the project year after year and without whom the UKBMS could never have developed the importance and recognition it has acquired.

Local Transect Co-ordinators – Acknowledgements and Vacancies

With over 1,000 sites contributing to the UKBMS in recent years, we would struggle to support all our volunteers and collate all that data if it were not for the sterling efforts of our local co-ordinators who help (and cajole) transect recorders across their county or BC branch.

There have been a few changes to our co-ordinators over the last couple of years, and we would like to pay tribute to the services of those who have stood down or moved on in that time.

Neil Gregory has relinquished the mammoth task of looking after all Scottish transects, although he is still co-ordinating things for the vice-counties of Ayrshire and Renfrewshire. He had previously undertaken the co-ordinators role in the West Midlands and was featured in the 2006 UKBMS report.

Another co-ordinator featured in a previous UKBMS report (2008) was **Catherine Betrand**, who covered the role as a volunteer in Northern Ireland. Catherine is now employed by Butterfly Conservation as their Regional

Officer in Northern Ireland, so she will still be on hand to provide support and advice to her successor.

Paul Parmenter (Cambs & Essex) is another who has stood down after moving to the West Country, and his role is now being shared by the two county recorders. And finally great thanks must go to **Roy Neeve** (Sussex), **Allan Binding** (Lincolnshire) and **Mark Ogden** (Devon) – all long-standing branch co-ordinators who have stood down in the last two years.

Vacancies

Most of these outgoing co-ordinators have now been replaced, but you will see from the list in this report that there are still a few vacancies. There is currently no overall co-ordinator for Scotland, although there is now a team of volunteers covering more manageable areas. In Wales, by contrast, although there is national co-ordination by Clare Williams at Butterfly Conservation's Wales office, she could be helped by co-ordinators in more of the vice-counties.

There are also vacancies in Cumbria and Lincolnshire. Neither of these counties currently has large numbers of transects to support, so the co-ordination task is modest, but some development work would certainly benefit the scheme.

To some extent the role of co-ordinator is what you want to make of it. The fundamental part of the job is to keep track of the active transects in your area and to assist with data collection at the end of the season. Beyond that you have scope to promote the scheme and assist in the setting up of new transects as well as providing support and feedback for existing transect walkers – all depending on how much time you have available.

If you are interested in discussing the co-ordinator's role in one of the vacant areas please contact Ian Middlebrook at Butterfly Conservation who can provide more details.

Current research using the UKBMS data

The value of long-term standardised datasets has been demonstrated time and again through the large number of scientific research papers in peer-reviewed journals that use the UKBMS data. Recent publications using UKBMS data include work by Owen Lewis's group at the University of Oxford investigating the role of the parasitoid, *Sturmia bella*, in Small Tortoiseshell declines (Gripenberg et al, 2011), publication of a Butterfly Red List (Fox et al, 2011), development of the Wider Countryside Butterfly Survey (Brereton et al,2011a) and UK butterfly indicators (Brereton et al, 2011b) as well as research into the factors affecting butterfly abundance in a warming climate (Isaac et al, 2011). A full list of recent and past publications using UKBMS data are listed on the UKBMS website in the 'Reports & Publications' section (**http://www.ukbms.org/reportsAndPublications.htm**). The UKBMS team receive a large number of data requests each year from various research groups not just in the UK but globally. Numerous under- and post-graduate students also use UKBMS data to investigate patterns in butterfly abundance, phenology and distribution in the face of environmental change.

Some recent projects using UKBMS data include:

- Determining the factors limiting restoration success for grassland invertebrates. Using long-term data from grassland restoration sites that were monitored as part of the UKBMS, Ben Woodcock has shown that the establishment of larval host plants and nectar sources by seed is crucial to achieving rapid butterfly restoration success within the first five years of restoration. As expected, butterfly species with low mobility take longer to colonise restored grassland sites with a range of other factors such as rarity and host-plant specialisation also being important. Ben's work has important implications on how habitats such as reverted arable land are restored to benefit invertebrate communities.

Mobile species such as the Peacock, pictured, are quickest to colonise restored grassland sites in the UK. *Photo by Tim Melling*

- Tom Oliver and colleagues have been exploring how butterfly populations respond to extreme climatic events such as droughts, and whether the site and the structure of the surrounding landscape can modify these responses. Tom is also exploring ways to measure the resilience of populations to environmental change by assessing population stability over time, a purpose to which the long-term UKBMS time series is particularly suited.

- Modelling migration in the Painted Lady across the western Palearctic and West African regions. In this pan-European collaboration led by Constanti Stefanecsu (co-ordinator of the Catalan Butterfly Monitoring Scheme), the migratory routes of Painted Lady butterflies have been investigated in great detail, determining the number of sequential broods involved and documenting evidence of return migrations and the mechanisms by which these butterflies complete their amazing long-distance journeys.

- Professor Chris Thomas' group have a number of projects currently utilising UKBMS data: Javier Illan is working on a Spanish government fellowship to look at the impacts of extreme climate events on butterfly growth rates and how this affects geographic range dynamics. Andrew Suggitt recently completed his PhD during which he used UK and Catalan butterfly data to consider how butterfly associations with open or closed habitats depends on the broader climate of each country. A second PhD student, Rachel Pateman, is now in her final year and is investigating habitat associations in the Speckled Wood and Brown Argus butterflies. Rachel presented some of her findings on the Brown Argus at the 2011 National Recorders Meeting earlier in the year.

Photo by Tim Melling

- Dr Mike Bonsall, a mathematical biologist at Oxford University is using the UKBMS data to explore fritillary population dynamics when population sizes are small.

The wider countryside butterfly survey in 2010

Tom Brereton, Katie Cruickshanks, David Roy & Zoë Randle

Introduction

Following a successful launch in 2009, the Wider Countryside Butterfly Survey (WCBS) ran for a second year in 2010. As in 2009, the scheme was operated on minimal resources, but thankfully there was plenty of interest amongst volunteer recorders in taking part. In total, 558 recorders made 1,438 visits to 686 squares walking 3,000km of trackline and counting 82,224 butterflies of 46 species. A solid achievement, although a 10% drop in effort from 2009, which likely reflected the lack of resources available to encourage and recruit new recorders in the light of natural turnover.

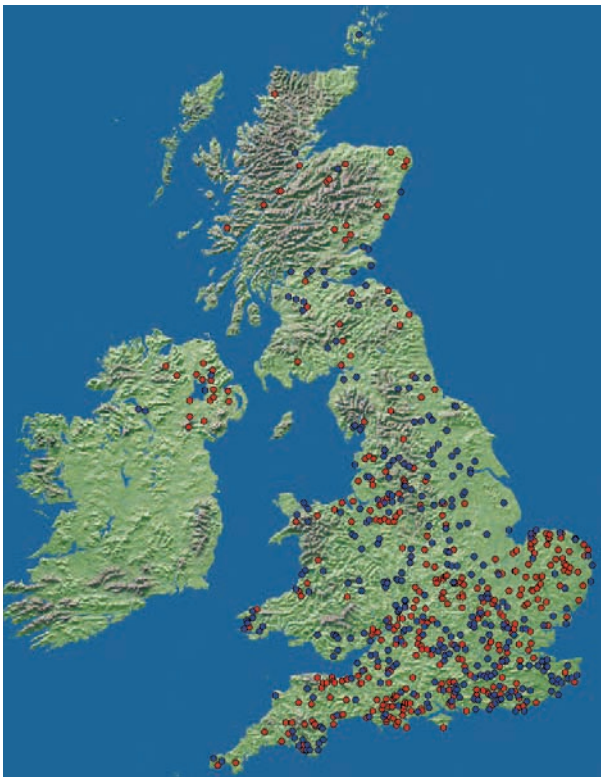
Scheme organisation and participation

The WCBS is a partnership between Butterfly Conservation (BC), the British Trust for Ornithology (BTO) and the Centre for Ecology & Hydrology (CEH). Participants included recorders from the BTO/JNCC/RSPB Breeding Bird Survey (BBS) and BC volunteers. BC recorders were co-ordinated at the local level within BC branches through a network of WCBS Champions. National co-ordination was undertaken by Katie Cruickshanks (under contract at Footprint Ecology) for BC with support for BBS recorders provided by Kate Risely at BTO HQ.

Survey coverage comprised 330 BBS squares sampled by BTO recorders and a further 356 squares sampled by BC recorders (Figure 12). The split was almost the same as in 2009, with 47% coverage by BTO recorders (up 1%) and 53% by BC (down 1%). The best BC branch coverage (excluding any additional BBS squares) was achieved in Norfolk with 29 squares, followed by Dorset with 27, and Gloucestershire and Somerset & Bristol with 19 each. BTO coverage was strongest in Sussex (19 squares), Kent (19), Devon (16) and Hampshire (14). The best improvement in coverage was in Northern Ireland where a small team of volunteers covered 16 squares compared with 6 squares in 2009. At the country-level, the main gap in coverage was in Scotland, which extends over ca.32% of the UK land surface yet accounted for less than 10% of squares sampled.

A time series of re-sampled squares is now beginning to develop, with 506 squares surveyed in both 2009 and 2010 and 89 squares with four years of data (i.e. including pilot surveys in 2007 and 2008). A total of 153 new squares were sampled in 2010. During the core July to August survey period, 1,264 surveys were completed with 81% of squares (557 in total) receiving the required

Figure 12. Location of the WCBS squares covered by BC (red circles) and BTO (blue) recorders in 2010.



two visits (3% more than in 2009). Additional visits to squares included 148 in spring and 110 in the core period. Optional spring visits again proved valuable, providing records for species with spring flight periods. For example, Orange-tip was recorded in 44 squares.

The majority of recorders (82%) sampled single squares, the maximum being an impressive 13 by Rita Cid in Northern Ireland. The most visits to a single square was 6 by David Warren in Radnorshire, Wales. The busiest survey day was Sunday 15th August, when 79 visits were made (5.4% of the year total), followed by Sunday 8th August, with 58 visits. The latter date was coincidentally the second busiest survey day in 2009, when 60 visits were made. The most surveyed week day was Tuesday 31st August, which might be due to a last-minute rush to get a second visit in before the end of the month deadline!

Recording standards and data quality were thought to be very high, with less than 0.2% of records being obvious misidentifications based on known species distributions and flight times – a figure comparable with 2009. There were welcome improvements in the efficiency of data collation, with 80% of data being entered online, compared with 70% in 2009.

Butterfly sightings

More than three-quarters of the UK's regularly occurring butterfly species were recorded, with the tally

of 46 being one less than in 2009. Marsh Fritillary and Real's Wood White were recorded for the first time in the survey, whilst absences included Pearl-bordered Fritillary, Wood White and Silver-studded Blue. Twenty-five butterfly species were recorded in 30 or more squares, whilst 18 of these were recorded in more than 100 squares (see Table 3).

The WCBS continues to contribute data to the Butterflies for the New Millennium (BNM) database, with 50 new 10-km square records generated for 30 species and a total of 10,114 additional records. Discoveries included new 10-km square records for Dark Green Fritillary and Large Heath in Dumfriesshire, Silver-washed Fritillary in Kent, Grayling in Surrey and White-letter Hairstreak in Cheshire.

The most widespread and abundant species over the core July and August period was the Meadow Brown, occurring in over 80% of squares with 11,698 individuals counted (Table 3). Four species of Brown – Gatekeeper, Meadow Brown, Ringlet and Speckled Wood comprised 44% of all butterflies counted, whilst three species of white comprised 35%. These statistics indicate that in 2010 around four-fifths of butterflies present in the countryside during the summer were likely to be from a pool of just seven species!

Meadow Brown and Small White on Ragwort - seven common Brown and White species accounted for 80% of all butterflies counted in summer 2010. *Photo by Phil McIver*

As in 2009, the Silver-washed Fritillary was the most frequently seen habitat specialist species, ranking just outside the top 20, being almost as widespread as the Wall Brown and more so than five other wider countryside species.

The most species-rich square was in Somerset with 23 species recorded over four visits whilst the most butterflies counted over a two visit summer survey was in Lincolnshire with the tally being 941 chiefly comprised of whites. The highest day count for a species was 359 Small Whites near Boston, Lincolnshire on the 22nd August. Maximum counts for other species at individual squares included 301 Ringlets on 10th July near Holt, Norfolk, 276 Scotch Argus on 14th August on the edge of the Sound of Mull, Western Highlands and 262 Small Whites on 19th August near Stanford-le-Hope, Essex.

There were 20 single visits where no butterflies were seen. Two squares failed to produce butterflies over the required two summer visits, including an upland square on Dartmoor and a heavily urbanised square in Surrey. We are extremely grateful to the recorders for continuing their sampling of these squares because negative records are extremely valuable in helping us to understand what factors influence butterfly diversity.

Comparisons with 2009

On average, recorders counted ca.60 butterflies of 7 species per survey made over the July and August period. These figures were comparable to 2008, but represent a reduction in numbers of 30% and one less species compared with 2009. The figures from the WCBS concur with those from UKBMS transect sites and indicate that it was a relatively poor year for wider countryside butterflies.

The majority of wider countryside species were 'non movers' having a similar distribution and abundance ranking in 2010 to what they had in 2009. There was no evidence of a drop in Meadow Brown numbers like that observed at UKBMS transect sites. The results for this species were mixed from other surveys, with no change in occurrence at sites monitored in Butterfly Conservation's Garden Butterfly Survey, but relatively few seen on Butterfly Conservation's Big Butterfly Count **www.bigbutterflycount.org** – where it was ranked a lowly fourth in abundance.

There was a welcome increase in the Holly Blue in 2010. *Photo by Tim Melling*

Table 3. Occurrence and abundance data for butterflies recorded during repeat summer visits with the data for 2009 in brackets

Species	Occupancy			Abundance		
	No. Squares	2010 % (2009)	2010 Rank (2009)	2010 Total counted	2010 % of all counted (2009)	2010 Rank (2009 Rank)
Meadow Brown	456	81.3 (87.3)	1 (2)	1,1698	17.0 (16.2)	1 (1)
Small White	452	80.6 (86.8	2 (3)	1,1112	16.2 (14.3)	2 (3)
Large White	447	79.6 (89.4)	3 (1)	6424	9.4 (15.7)	5 (2)
Gatekeeper	403	71.9 (75.4)	4 (5)	9451	13.8 (11.2)	3 (4)
Green-veined White	390	69.6 (71.9)	5 (7)	6196	9.0 (9.02)	6 (5)
Speckled Wood	354	63.1 (73.9)	6 (6)	2536	3.692 (5.2)	8 (8)
Small Tortoiseshell	319	56.8 (60)	7 (9)	2085	3.035 (2.8)	9 (9)
Common Blue	314	56.0 (39)	8 (13)	3545	5.16 (1.7)	7 (11)
Ringlet	301	53.7 (46.6)	9 (12)	6466	9.4 (5.8)	4 (7)
Peacock	301	53.6 (68.3)	10 (8)	1,486	2.2(2.8)	10 (10)
Red Admiral	259	46.1 (50.8)	11 (11)	835	1.2 (0.97)	11 (14)
Comma	256	45.7 (53.4)	12 (10)	713	1.0 (1.1)	13 (12)
Small Copper	189	33.7 (26.1)	13 (14)	593	0.9 (0.4)	14 (20)
Holly Blue	159	28.4 (10.7)	14 (21)	439	0.6 (0.1)	18 (27)
Small Skipper	121	21.6 (23.3)	15 (15)	825	1.2 (0.95)	12 (15)
Large Skipper	108	19.2 (17.8)	16 (17)	458	0.7 (0.43)	17 (19)
Brimstone	93	16.5 (18.9)	17 (16)	212	0.3 (0.3)	24 (22)
Small Heath	85	15.1 (13.6)	18 (19)	526	0.8 (0.45)	15 (17)
Brown Argus	75	13.4 (9.7)	19 (23)	424	0.6 (0.21)	19 (24)
Small/Essex Skipper	71	12.6 (16.4)	20 (18)	520	0.8 (1.02)	16 (13)
Marbled White	64	11.4 (8.5)	21 (24)	406	0.6 (0.5)	20 (16)
Painted Lady	59	10.5 (82.6)	22 (4)	102	0.1 (7.2)	27 (6)
Wall Brown	50	9.0 (11.1)	23 (20)	259	0.4 (0.43)	23 (18)
Silver-washed Fritillary	45	8.0 (6.9)	24 (25)	348	0.5 (0.15)	21 (26)
Essex Skipper	41	7.3 (10.4)	25 (22)	131	0.2 (0.3)	26 (23)
Purple Hairstreak	21	3.7 (3.2)	26 (27)	60	0.1 (0.05)	30 (29)
Dark Green Fritillary	13	2.4 (1.5)	27 (30)	48	0.1 (0.02)	33 (33)
White Admiral	12	2.2 (1.7)	28 (29)	68	0.1 (0.05)	29 (30)
Grayling	11	2.0 (1.5)	29 (30)	149	0.2 (0.2)	25 (25)
Clouded Yellow	8	1.5 (5.2)	30 (26)	86	0.1 (0.09)	28 (28)
Scotch Argus	8	1.4 (1.5)	31 (30)	300	0.4 (0.4)	22 (20)
Small Pearl-bordered Fritillary	5	0.9 (0.5)	32 (34)	36	0.1 (0.02)	34 (34)
Brown Hairstreak	4	0.7 (0.3)	33 (37)	6	0.01 (<0.01)	37 (38)
Chalk-hill Blue	4	0.7 (1.2)	33 (33)	53	0.1 (0.02)	32 (32)
Orange-tip	4	0.7 (1.8)	33 (28)	19	0.02 (0.01)	35 (35)
White-letter Hairstreak	4	0.7 (0.5)	33 (34)	4	0.01 (<0.01)	38 (38)
Large Heath	2	0.3 (0.2)	37 (41)	3	0.004 (0.01)	39 (36)
Adonis Blue	1	0.2 (0.3)	38 (37)	57	0.083 (0.03)	31 (31)
Dingy Skipper	1	0.2 (0.2)	38 (41)	1	<0.01 (<0.01)	42 (42)
Lulworth Skipper	1	0.2 (0.2)	38 (41)	13	0.02 (<0.01)	36 (38)
Small Blue	1	0.2 (0.5)	38 (34)	2	<0.01 (<0.01)	41 (36)
Wood White	1	0.2 (0.2)	38 (41)	3	<0.01 (<0.01)	39 (44)
Green Hairstreak	0	(0.3)	(37)	0	(<0.01)	(38)
Pearl-bordered Fritillary	0	(0.2)	(41)	0	(<0.01)	(44)
Purple Emperor	0	(0.2)	(41)	0	(<0.01)	(44)
Silver-studded Blue	0	(0.3)	(37)	0	(<0.01)	(42)

It was a better year for the Holly Blue, up nine places in rank abundance on WCBS squares. Other species which had improved fortunes in 2010 included Brown Argus and Common Blue, the latter moving into the top ten of most widespread and abundant species. Rather unsurprisingly, it was a poor year for the Painted Lady, down 18 places in distribution and 21 places in abundance. Similar trends for Common Blue, Holly Blue and Painted Lady were detected through Butterfly Conservation's Garden Butterfly Survey, based on returns from 1,100 back gardens across the UK.

Other species which dropped in numbers (albeit at a more moderate level) across WCBS squares included Essex Skipper, Small Skipper and Wall Brown. Numbers also dropped for these three species on transect sites in 2010 and their recent rapid declines are a cause of conservation concern.

Other insects

Moth records were collected across 196 squares, with 1,570 individuals counted of 44 species. There was a four-fold increase in moth numbers over 2009, although eight fewer species were seen. A migrant, the Silver Y, was the most widespread and abundant species for the second year running, with 547 counted in 115 squares - a three-fold increase in abundance over 2009. It was also a good year for the Six-spot Burnet, with an eight-fold increase in numbers.

There were 28 species of dragonfly recorded, with 3,239 individuals counted across 243 squares (139 BTO, 104 BC). Dragonfly numbers were up by a third over 2009 levels, even though they were recorded in 40 fewer squares. Common Darter was the most widespread species for the second year running (detected in 25% of squares with dragonfly records), closely followed by Southern Hawker (21%). The most abundant species was the Common Blue Damselfly which accounted for 18% of all individuals seen (compared with 31% in 2009).

Unfortunately, there were insufficient resources to enable the optional insect flower survey to be repeated in 2010, so no data were collected on other insect species.

Conservation value

The WCBS is an important new dataset that will help to underpin our conservation efforts in the coming years. It will enable us to better assess the changing status of widespread butterfly species, provide data for conservation research and act as a new indicator of the health of the wider countryside.

WCBS data is already being used in a number of research projects. Dan Chapman (CEH) has used data from the first year's survey to look at the effects of climate, land use and geology on the diversity, trait composition (e.g. species mobility and degree of habitat specialism) and community structure of butterflies across the UK. Sarah Eglington of the BTO is looking at relationships between species richness of birds and butterflies at BBS squares. Over the course of the third phase of the UKBMS project, David Roy and his team at CEH will be testing whether abundance indices and trends for wider countryside species are similar across UKBMS transect sites and WCBS squares. Furthermore, over the next three years, new analytical techniques will be developed to improved trend estimates for wider countryside species by combining WCBS and transect data on an annual basis. To this end it was welcome news to receive funding from the statutory agencies led by JNCC to run the WCBS for a third year in 2011.

Table 4. Top ten most widespread and abundant day-flying moths and dragonflies

Species	Squares	Total counted
Silver Y	115	547
Six-spot Burnet	23	396
Cinnabar, The	20	47
Yellow Shell	16	35
Five-spot Burnet	12	24
Silver-ground Carpet	12	24
Humming-bird Hawk-moth	11	13
Chimney Sweeper	10	94
Shaded Broad-bar	9	29
Dusky Sallow	8	25
Common Darter	61	338
Southern Hawker	52	107
Brown Hawker	49	206
Common Blue Damselfly	45	589
Golden-ringed Dragonfly	26	49
Banded Demoiselle	25	519
Emperor Dragonfly	25	66
Migrant Hawker	23	54
Blue-tailed Damselfly	22	74
Common Hawker	19	65

2011 plans

The scheme will be organised in a broadly similar way to 2010, though Zoë Randle will be co-ordinating the scheme for Butterfly Conservation. Some news hot off the press is that in summer 2011 we received some last-minute funding from Scottish Natural Heritage (SNH) to boost WCBS coverage in Scotland. Subject to the weather, we hope that at least 50 additional squares will be sampled. This will give us a far clearer picture of the diversity of butterflies found throughout Scotland.

Spotlight on a transect walker – Roy Leverton

Roy Leverton has been a member of Butterfly Conservation for over 40 years, and very few volunteers can boast counting more butterflies on transects since he began in 1978. Roy is also very keen on moths – recording, photographing and writing about them – having authored the award-winning book 'Enjoying Moths'. His achievements are too many to list here, but in 2010 he was presented with The Marsh Award for Lifetime Achievement in Lepidoptera Conservation in recognition of all that he does.

Roy Leverton sets up to photograph a mating pair of Buff-tips. *Photo by Tom Prescott*

The article below was written by Roy in 2003 and first published in the Winter Newsletter of BC's Highland Branch that year (reproduced by kind permission) and Roy has kindly added a postscript to bring it up-to-date.

Twenty-five years, and still counting …
I was first introduced to butterfly transect counts in 1978, two years after Ernie Pollard at Monks Wood set up the national scheme. The concept seemed ludicrous to me at the time. Butterflies are such capricious, unpredictable insects, so strongly influenced by temperature, sunshine, wind and nectar sources. How could it be possible to monitor them accurately just by walking along a set route once a week from April to September? Would the data be reliable, would the results actually mean anything? I was very sceptical!

However, I was also in awe of the person asking me to take part. This was Richard, son of Henry Williamson of *Tarka the Otter* fame. As warden of Kingley Vale, a National Nature Reserve in Sussex, Richard was already doing a transect there. Now he wanted me to do one at Castle Hill. This was an area I knew well, having hunted butterflies on its downland slopes in my misspent youth - before it was designated a reserve and before I gave up collecting. Certainly it was an excellent site. Flattered to have been chosen, I agreed to do the counts for an initial year in spite of my misgivings.

My first task was to set out the transect route. I did this in March, before any butterflies were on the wing to sway my judgement. This helped to make the route a fair reflection of the different habitats on the reserve, taking in scrubby bits, former arable fields and less-favoured hillsides as well as prime, south-facing chalk grassland. My transect was roughly 3km long, divided into 12 different sections. Only butterflies seen within two and a half metres either side of the set route qualified for inclusion.

The first counts were relatively easy and enjoyable. After the post-hibernation Peacocks and Small Tortoiseshells came Dingy Skipper, Small Heath, Small Copper, Common Blue and – the speciality of the reserve – Adonis Blue. Fresh males were an unmistakably pure shade of blue, making Common Blues look dull in comparison. Separating females glimpsed only in flight was trickier, with the added complication of the occasional Brown Argus and Small Blue. My identification skills improved rapidly – they had to!

Counts were now taking longer to complete. The level of concentration required was enormous, due to the sheer numbers and variety of butterflies. By early August, skippers and browns were at their peak and the Chalkhill Blues were out. I was almost ready to give up. It was impossible! There were simply too many butterflies to count. Hot, flustered and frustrated, I stopped in the middle of the best section, surrounded by a kaleidoscope of flickering wings, and tried to regain my composure.

Sheer stubbornness took over. It could be done, though it needed a slight change of method. Speaking into a portable tape recorder would be quicker than fumbling with pencil and paper, with no need to stop or take my eyes off the butterflies. And I would walk the most densely populated sections twice, counting only the blues on the first pass and the rest of the species on the second. That would reduce the task to more manageable proportions. Even then, there were too many Chalkhill Blues and Meadow Browns to count individually. Well, birders have similar problems, so I'd borrow their technique. I started counting Chalkhills in tens, and estimating Meadow Browns as flocks, 30 or 40 at a time. Sorry if this sounds far-fetched, but in good summers the numbers of butterflies on prime downland are almost incredible. At the height of the season it was not unusual to record over a thousand butterflies of up to 20 different species on my 3km transect.

Somehow I got through the first year. By now I was a convert. The method really did work! Several times I'd tested it for myself, trying to catch it out, by doing

counts on consecutive days in slightly different weather conditions, though still within the stipulated limits. The agreement between these duplicated counts was remarkable: even the section counts tallied better than I'd thought possible. And the graphs or histograms plotted from the year's results looked convincing: species emerged and reached a peak, then tailed off before repeating the process with a second brood if they had one. Few or no anomalous counts disrupted the expected curves.

Initially I'd taken on the transect for one year only. Now I was hooked, and keen to continue. The weekly count was a huge commitment, especially when the weather was unfavourable. Many times I had to drop everything and dash along to Castle Hill to take advantage of a brief window of sunshine, rather than risk missing a week. Sometimes - inevitably - by the time I got there it was raining again!

Overall, the effort was worth it. Every year was different, every year brought something of interest. Species waxed and waned, emerged early or late. Colonies shifted their ground. This was influenced by the weather and also by the management. Contrary to expectations, heavy summer grazing by sheep did not help the Adonis Blue, or any other species. The sheep ate everything, especially the foodplants. Yet insufficient grazing was even worse, for if the turf became long and rank the foodplants were shaded out. The information from my transect counts was proving genuinely useful, a valuable management tool.

In the end, I did 12 consecutive years of transects at Castle Hill. Some of the memories will remain with me forever: the population explosion of Adonis Blue in June 1984, when I recorded 224 on one count (compared with just a single first-brood male in 1979). Marbled Whites like miniature chessboards, clustered on purple knapweed. Or 18th June 1983, with Clouded Yellows streaming up the coomb straight from the sea; that year I logged 31 in total.

It was a wrench, coupled only slightly with relief, to give up the Castle Hill transect when we moved to Banffshire at the end of 1989. Summer 1990 seemed incomplete without my weekly butterfly walk. There was much promising habitat on my doorstep, but officially the national scheme was now closed to new sites. I mentioned my withdrawal pangs in a Christmas card to Ernie Pollard and received an immediate response: Scotland was under-represented, so a new transect here would be most welcome. I was back in business!

My thirteenth season at Culvie Wood, and 25th in all, has just ended. It has been a fine summer and I have not missed a single one of the 26 counts, a rare event. It helps that my transect begins literally on the doorstep, so I can take advantage of even one hour of suitable conditions in any week. That doesn't sound much to ask, but in a cold late Scottish spring the April counts are often missed. Not that it really matters, as there are no butterflies out anyway. Some years it is hard to find a suitable day even in midsummer. Worst is when a big black cloud parks itself permanently over my transect, yet the countryside all around is bathed in sunshine. Conversely, there have been days when a moving gap in the blanket of cloud has miraculously allowed the sun to accompany me along the route, as if by divine intervention.

Needless to say, there are far fewer butterflies on my present transect. At Castle Hill I recorded 28 species, at Culvie Wood only 16. (It should have been 17, but the Peacock that spent three days on my buddleia last September was nowhere to be seen during the actual count.) As for numbers, I'm never forced to count any species in tens. My best week's count at Castle Hill was 1,746 butterflies, which included 1,061 Chalkhill Blues. My best count at Culvie Wood was 170 on 28th May 2001 – 166 Green-veined Whites and 4 Orange-tips. The best annual total at Castle Hill was 11,437, compared with 1,128 here (in 2002). In dismal 1993 I only recorded 351 butterflies all year. Admittedly, Castle Hill is a Grade 1 SSSI and nothing can match chalk downland for abundance of butterflies. Mixed farmland and a boggy Scottish hillside is not in that league.

Yet the transect has been a constant source of interest. Since it began, Speckled Wood and Ringlet have colonised. Stray females were seen in 1995, and both species are now well-established. Maybe it is coincidence, but Meadow Brown and Small Heath numbers have been very low ever since. Might there be some interaction through shared parasitoids? Dark Green Fritillary colonised briefly, but then died out, though two were seen again in 2003. Perhaps it is back. Small Pearl-bordered Fritillary, always in very low numbers, is feared lost. Small Copper and Common Blue are down, as the rough hillside is no longer grazed hard enough by livestock or by rabbits, which themselves are at a low ebb. Scotch Argus, Orange-tip and Green-veined White (easily the commonest species) are thriving.

One surprise is the number of Red Admirals here, far more than I ever saw in Sussex. During 12 years at Castle Hill, their annual index (sum of the weekly transect counts) averaged under 8, and the highest week's count was only 10. At Culvie Wood, the annual index for the last 13 years has averaged 36 and the best week's count has been 37. For a migrant from the south,

this seems incongruous. My guess is that the few immigrants that do reach northern Scotland in early summer breed very successfully, perhaps because their parasitoids are absent. Similarly, 2003 was my best-ever year for Painted Lady with a total of 25, including 12 on one count, easily beating anything at Castle Hill.

Over the 25 years I have done 592 transect counts. On some I have been encumbered by a toddler in a backpack, on others I have struggled round with hamstring and Achilles tendon injuries, or with tubes still dangling from my innards after surgery. I have walked roughly a thousand miles and logged 96,084 butterflies of 32 different species. Surely the novelty wore off long ago? Yet when I play back the tape to transcribe the latest count, there is still that unfeigned note of wonder and delight in my voice as I record the first Orange-tip of a new spring, or a sultry Scotch Argus nectaring on a violet-blue scabious.

Postscript

Since this article was written in 2003 I've done a further eight years of monitoring, making a total of 783 transect counts in 33 years. Peacock was duly added to the Culvie Wood list the following spring; now it is often the commonest autumn nymphalid. Our last good summer was as long ago as 2006, when both Red Admiral and Painted Lady produced record annual totals – 316 and 41 respectively. Since then, a run of cool and cloudy summers has dampened expectations and perhaps delayed the arrival of Comma. And I still await a Camberwell Beauty, surely long overdue.

Age is also catching up with me. The transect takes me half as long again as once it did. A wonky hip is no help on this rough and boggy hillside. Perhaps it is nearly time to analyse the results, the 21 years of data from Culvie Hill. It should prove interesting. In 1991 there were only three species of satyrid on the site. Now there are five, yet the total number of individual browns has fallen. Scotch Argus crashed in 2008 and has never recovered – is there any connection with the explosion in Ringlet numbers? Has Green-veined White become more bivoltine as the climate warms? In 2009 the second brood exceeded the first. How far has insidious habitat succession influenced the results? Management is unchanged, but the sward has definitely coarsened after the unexplained loss of rabbits. Have my attempts to manage our pasture fields organically had any beneficial effect on butterfly numbers? Alas, statistics were never my forte. Maybe I should carry on with the counts for a bit longer instead ...

Photo by Tim Melling

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References

Botham, M.S., Brereton, T.M., Middlebrook, I., Cruikshanks, K.L. & Roy, D.B. (2008). United Kingdom Butterfly Monitoring Scheme Annual report 2007. CEH Wallingford.

Brereton, T.M., Cruikshanks, K.L., Risely, K., Noble, D.G. & Roy, D.B. (2011a). Developing and launching a wider countryside butterfly survey across the United Kingdom. *Journal of Insect Conservation* **15**: 279-290.

Brereton, T., Roy, D.B., Middlebrook, I., Botham, M. & Warren, M. (2011b). The development of butterfly indicators in the United Kingdom and assessments in 2010. *Journal of Insect Conservation* **15**: 139-151.

Fox, R., Warren, M.S., Brereton, T.M., Roy, D.B. & Robinson, A. (2011). A new Red List of British butterflies. *Insect Conservation and Diversity* **4**: 159-172.

Gripenberg, S., Hamer, N., Brereton, T., Roy, D.B. & Lewis, O.T. (2011). A novel parasitoid and a declining butterfly: cause or coincidence? *Ecological Entomology* **36**: 271-281.

Isaac, N., Girardello, M., Brereton, T.M. & Roy, D.B. (2011). Butterfly abundance in a warming climate: patterns in space and time are not congruent. *Journal of Insect Conservation* **15**: 233-240.

Lewis, O.T., and Hurford, C. (1997). Assessing the status of the Marsh Fritillary (*Eurodryas aurinia* Rott.) – an example from Glamorgan (UK). *Journal of Insect Conservation* **1**:159-161.

Pollard, E., and Yates, T.J. (1993). *Monitoring Butterflies for Ecology and Conservation*. Chapman and Hall, London.

Rothery, P., and Roy, D.B. (2001). Application of generalized additive models to butterfly transect count data. *Journal of Applied Statistics* **28**:897-909.

Warren, M., Thomas, C.D., and Thomas, J.A. (1981). *The Heath Fritillary*. Survey and conservation report. Unpublished report to the Joint Committee for the Conservation of British Insects. Butterfly Conservation, Wareham.

Appendix I

Appendix 1: 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 2009-10 (10%)
Brown Hairstreak	4	3	10	72	20
Dingy Skipper	15	38	134	537	36
Duke of Burgundy	4	28	23	134	18
Grayling	5	26	57	296	32
Grizzled Skipper	18	31	98	410	-13
Heath Fritillary	2	14	15	52	21
High Brown Fritillary	4	17	37	119	-18
Large Blue	4	0	7	23	38
Large Heath	2	1	7	36	29
Lulworth Skipper	1	3	1	19	-40
Marsh Fritillary	7	18	47	219	134
Northern Brown Argus	0	9	16	64	11
Pearl-bordered Fritillary	5	29	44	212	32
Silver-studded Blue	2	5	17	100	-8
Small Blue	13	13	47	256	-15
Small Heath	23	120	257	1155	59
Small Pearl-bordered Fritillary	11	28	54	274	38
Wall Brown	7	92	121	722	-21
White Admiral	17	17	81	315	90
White-letter Hairstreak	5	8	19	229	22
Wood White	1	7	12	75	600

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.faunaeir.org, accessed on 27-09-2010).

Common name	Scientific name	Authority	Page no. for species account
Adonis Blue	*Polyommatus bellargus*	(Rottemburg, 1775)	20
Black Hairstreak	*Satyrium pruni*	(Linnaeus, 1758)	16
Brimstone	*Gonepteryx rhamni*	(Linnaeus, 1758)	13
Brown Argus	*Aricia agestis*	(Denis & Schiffermuller, 1775)	18
Brown Hairstreak	*Thecla betulae*	(Linnaeus, 1758)	15
Chalk-hill Blue	*Polyommatus coridon*	(Poda, 1761)	19
Clouded Yellow	*Colias croceus*	(Fourcroy, 1785)	13
Comma	*Polygonia c-album*	(Linnaeus, 1758)	23
Common Blue	*Polyommatus icarus*	(Rottemburg, 1775)	18
Dark Green Fritillary	*Argynnis aglaja*	(Linnaeus, 1758)	25
Dingy Skipper	*Erynnis tages*	(Linnaeus, 1758)	11
Duke of Burgundy	*Hamearis lucina*	(Linnaeus, 1758)	21
Essex Skipper	*Thymelicus lineola*	(Ochsenheimer, 1808)	10
Gatekeeper	*Pyronia tithonus*	(Linnaeus, 1767)	29
Grayling	*Hipparchia semele*	(Linnaeus, 1758)	28
Green Hairstreak	*Callophrys rubi*	(Linnaeus, 1758)	15
Green-veined White	*Pieris napi*	(Linnaeus, 1758)	14
Grizzled Skipper	*Pyrgus malvae*	(Linnaeus, 1758)	12
Heath Fritillary	*Melitaea athalia*	(Rottemburg, 1775)	26
High Brown Fritillary	*Argynnis adippe*	(Denis & Schiffermuller, 1775)	25
Holly Blue	*Celastrina argiolus*	(Linnaeus, 1758)	20
Large Blue	*Phengaris arion*	(Linnaeus, 1758)	20
Large Heath	*Coenonympha tullia*	(Muller, 1764)	30
Large Skipper	*Ochlodes sylvanus*	(Esper, 1777)	11
Large White	*Pieris brassicae*	(Linnaeus, 1758)	13
Lulworth Skipper	*Thymelicus acteon*	(Rottemburg, 1775)	10
Marbled White	*Melanargia galathea*	(Linnaeus, 1758)	28
Marsh Fritillary	*Euphydryas aurinia*	(Rottemburg, 1775)	26
Meadow Brown	*Maniola jurtina*	(Linnaeus, 1758)	29
Northern Brown Argus	*Aricia artaxerxes*	(Fabricius, 1793)	18
Orange-tip	*Anthocharis cardamines*	(Linnaeus, 1758)	14
Painted Lady	*Vanessa cardui*	(Linnaeus, 1758)	22
Peacock	*Aglais io*	(Linnaeus, 1758)	23
Pearl-bordered Fritillary	*Boloria euphrosyne*	(Linnaeus, 1758)	25
Purple Emperor	*Apatura iris*	(Linnaeus, 1758)	22
Purple Hairstreak	*Favonius quercus*	(Linnaeus, 1758)	16
Red Admiral	*Vanessa atalanta*	(Linnaeus, 1758)	22
Ringlet	*Aphantopus hyperantus*	(Linnaeus, 1758)	31
Scotch Argus	*Erebia aethiops*	(Esper, 1777)	27
Silver-spotted Skipper	*Hesperia comma*	(Linnaeus, 1758)	11
Silver-studded Blue	*Plebejus argus*	(Linnaeus, 1758)	17
Silver-washed Fritillary	*Argynnis paphia*	(Linnaeus, 1758)	26
Small Blue	*Cupido minimus*	(Fuessly, 1775)	17
Small Copper	*Lycaena phlaeas*	(Linnaeus, 1758)	17
Small Heath	*Coenonympha pamphilus*	(Linnaeus, 1758)	30
Small Pearl-bordered Fritillary	*Boloria selene*	(Denis & Schiffermuller, 1775)	24
Small Skipper	*Thymelicus sylvestris*	(Poda, 1761)	9
Small Tortoiseshell	*Aglais urticae*	(Linnaeus, 1758)	23
Small White	*Pieris rapae*	(Linnaeus, 1758)	14
Speckled Wood	*Pararge aegeria*	(Linnaeus, 1758)	27
Wall Brown	*Lasiommata megera*	(Linnaeus, 1767)	27
White Admiral	*Limenitis camilla*	(Linnaeus, 1764)	21
White-letter Hairstreak	*Satyrium w-album*	(Knoch, 1782)	16
Wood White	*Leptidea sinapis*	(Linnaeus, 1758)	12

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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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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.

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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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