



**United Kingdom
Butterfly Monitoring Scheme**

Annual Report 2014

UKBMS Annual Report 2014

The UKBMS

The UK Butterfly Monitoring Scheme (UKBMS) is run by Butterfly Conservation (BC), the Centre for Ecology and Hydrology (CEH), and the British Trust for Ornithology (BTO), in partnership with the Joint Nature Conservation Committee (JNCC), and supported and steered by Forestry Commission (FC), Natural England (NE), Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA) and Scottish Natural Heritage. (SNH)

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This report can be downloaded from
<http://www.ukbms.org/reportsAndPublications.aspx>

Cover photograph of Marbled White *Melanargia galathea*.
This attractive grassland butterfly had its best year in the 39-year series. Photograph by Simone Noll

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www.doeni.gov.uk/niea/



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www.naturalresourceswales.gov.uk



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www.forestry.gov.uk



Head Office, Natural England, Foundry House, 3 Millsands, Riverside Exchange, Sheffield, S3 8NH
www.naturalengland.org.uk



Scottish Natural Heritage, Great Glen House, Leachkin Road, Inverness, IV3 8NW
www.snh.gov.uk

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A remarkable Scarce Tortoiseshell immigration occurred in eastern England in the summer, though none were recorded at monitored sites. *Photograph by Keith Heaven*

Online resources

Further information on the UK Butterfly Monitoring Scheme, including individual species and site trends, and how to take part in butterfly monitoring can be found at:

<http://www.ukbms.org/>

For the Wider Countryside Butterfly Survey go to

<http://www.ukbms.org/wcbs.aspx>

For online data entry go to

<http://www.ukbms.org/mydata/>

For information on taking part in the WCBS on your BBS route email:

bbs@bto.org

For information on Biodiversity Indicators go to

<http://jncc.defra.gov.uk/page-1824>

The following links provide more information on the UKBMS delivery partner organisations:

Butterfly Conservation:

<http://butterfly-conservation.org/>

Centre for Ecology & Hydrology:

<http://www.ceh.ac.uk/>

British Trust for Ornithology:

<http://www.bto.org/>



Red Admiral had a good year in 2015. *Photograph by Iain Leach*



News and research

UKBMS ONLINE

The online data entry system at www.ukbms.org/mydata ran for the second year in 2014 and we received over 80% of data via that route. That was very nearly 1,000 transect sites, with 10 of the local Butterfly Conservation (BC) branches submitting 100% of their data online. We believe the ease of setting up new transects on the system is also helping the current growth of the monitoring scheme.

A new feature which will go online in late summer/autumn of 2015 is a data entry page for timed-counts. This will enable volunteers to officially record much of the additional monitoring work that is undertaken for key species around the country. Recorders will be able to draw the boundary of a specific flight area that they are monitoring, while the system automatically calculates the area (ha) and central grid reference. Data entry is then very similar to that for transects – entering weather details and recording times along with counts of the target species (and possible confusion species).

Timed Count Data Entry

View Edit

Site Name:

The Year field is read-only, and is calculated automatically from the date(s) of the Counts.

Year:

Recorder Name:

County:

Estimated Flight Area: ha

Now draw the flight area for the timed count on the map below. The Grid Reference is filled in automatically when the site is drawn.

Grid Reference:

Search for Place on Map:

For the 2016 field season, data entry for the Wider Countryside Butterfly Survey (WCBS) will also be fully integrated with the online UKBMS system. This will allow recorders to review and edit their data, which is not possible with the existing WCBS system. This should help to reduce errors and will speed up the validation process. Looking further ahead, we still have a wish-list for further developments on the live website, based largely on feedback received from many of the 1,200 users. These will be progressed as and when funding is available.

UKBMS GUIDANCE ON GAPS IN MONITORING COVERAGE OF PRIORITY SPECIES 2015-2017

Butterfly Conservation has recently completed an updated analysis of monitoring coverage of Priority Species¹ by multi-species transects, single species transects, timed counts and larval web searches through the UKBMS. Common and widespread species and habitats were excluded as these are best sampled by the Wider Countryside Butterfly Survey (WCBS) and are the focus of additional efforts to improve coverage. Habitat specialists that are not Priority Species were also excluded. This exercise has highlighted a number of coverage gaps, at UK, Country and BC Branch scales to inform the establishment of new monitoring for the period 2015-2017.

By improving coverage we will be able to produce more accurate trends in butterfly populations and to break down the data in more ways e.g. carry out analysis of trends by habitat, region or landscape conservation project.

Butterflies for the New Millennium (BNM) 1-km square data from 2009-2013 was used to assess the proportion of squares monitored, using UKBMS site data from 2012-14. Turnover in UKBMS sites (balance of new versus lost) was compared between two periods: 2009-2011 versus 2012-2014. At the BC Branch level, the number of WCBS squares for Small Heath and Wall Brown was also used to assess coverage and to determine whether additional monitoring was required for these species. Monitored sites not currently recorded, but with long data runs (>10 years), were also highlighted, as they were considered worthy of re-starting.

One of the headline messages from the report was that although the total number of monitored sites increased over the period 2012-14, especially through the establishment of new transects supporting a general mixture of species, for almost half of Priority/rare species (45% of the 29) coverage declined from 2009-2011 levels. This is partly a data flow problem, which is being addressed and will be greatly improved once the online Timed Count data entry component is available. However, it also highlights the need to improve targeting of new monitoring towards the Priority Species which are in trouble and where most resource is being put into conservation effort.

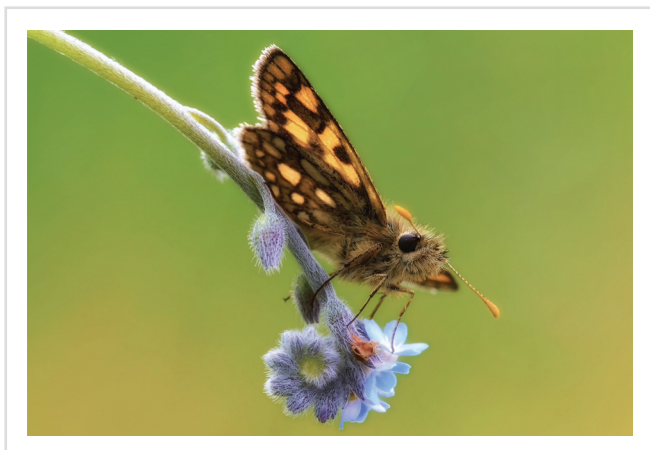
For more details on coverage gaps or for a copy of the lists for your area contact your Branch transect co-ordinator or Ian Middlebrook at BC HQ.

MONITORING CHEQUERED SKIPPER AND PEARL-BORDERED FRITILLARY IN SCOTLAND

Chequered Skipper and Pearl-bordered Fritillary are Priority Species for conservation action in Scotland and appropriate management of forest land is crucial to their future survival. In 2011, monitoring coverage of both species in Scotland was at a low ebb, with just two Chequered Skipper and six Pearl-bordered Fritillary sites producing indices; with this coverage level sampling only around 1% of both species national ranges, measured at 1-km square resolution.

In 2012, a partnership project was established between Forestry Commission Scotland (FCS) and Butterfly Conservation Scotland (BCS) to substantially increase monitoring coverage of the Chequered Skipper and Pearl-bordered Fritillary on the national forest estate (NFE) and more widely across Scotland, to enable comparisons.

¹ Species on the country biodiversity lists; this includes species listed under the Natural Environment and Rural Communities Act 2006, Section 41 (England), and Section 42 (Wales), species on the 'Scottish Biodiversity List', and 'Northern Ireland Priority Species'



Chequered Skipper Photograph by Simone Noll

The project has been a big success, with a huge upturn in coverage for both species since 2012 and further year-on-year increases. In 2014, there were 34 Chequered Skipper and 57 Pearl-bordered Fritillary monitored sites, representing coverage increases from 2011 levels respectively of 1,350% and 850%!

Looking at the collated indices over the last three years for both species on NFE and non NFE land in Scotland there are some highly encouraging results. There was an apparent increase in Chequered Skipper abundance across Scotland from 2012-2014 at a mean rate of 11% per annum. The rate of increase was similar on NFE and non NFE land. For Pearl-bordered Fritillary, there was a strong increase in abundance across Scotland at a mean rate of 26% per annum. The rate of increase appeared more rapid on NFE land (with the index in 2014 twice the size of the non NFE land index).

Given historical declines in both species at a UK level, these results are highly encouraging and support the need for continued monitoring and evaluation both to assess conservation efforts and to ensure sufficient data is available to enable assessment of long-term trends.

POPULATION TRENDS OF COMMON AND WIDESPREAD BUTTERFLIES ON WCBS SQUARES

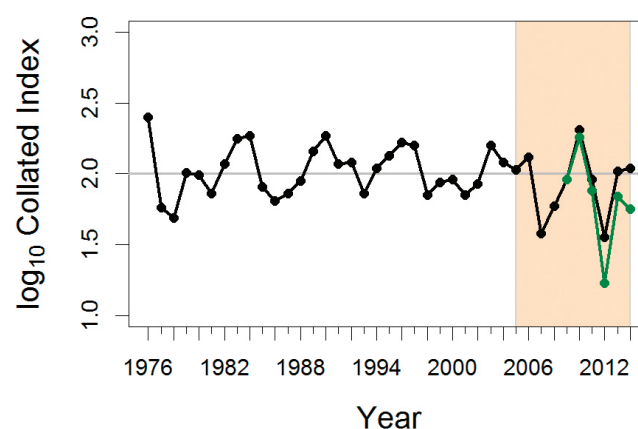
There is considerable interest in knowing how butterflies are faring in the intensively managed general countryside compared with special sites such as nature reserves and other protected areas, and this was one of the main reasons why the Wider Countryside Butterfly Survey (WCBS) was established. The survey has been running since 2009, and the count data now forms an important role (in combination with conventional UKBMS transect data) in compiling UK and country-level collated indices and trends for wider countryside species. Now, for the first time, we have produced collated index and trend plots to show how wider countryside species are faring on WCBS squares compared with on conventional transect sites, the latter of which chiefly sample good quality semi-natural habitat.

In general, the plots show that over the six-year assessment period wider countryside species have similar trends on WCBS squares and transects. This is not surprising, as short-term

trends are strongly influenced by annual weather patterns. However, there is likely to be divergence for some species over time, if, for example, there is further intensification of farmland or substantial change to land use in the uplands.

However, some short-term differences are already apparent, with the plots tending to indicate that when there are declines following good years these declines are more extreme on WCBS squares, perhaps highlighting the increased vulnerability of insect populations in more intensively managed landscapes. However, some differences may be sampling artefacts, especially for multi-brooded species where annual abundance on transects may be substantially impacted by events in the spring, which is outside the main period of the WCBS.

The full set of wider countryside species plots is available online from the 'News' section on the Home Page of the UKBMS website <http://www.ukbms.org/>



Common Blue slumped on WCBS squares in 2014, but increased on conventional transects.

ANNIVERSARIES FOR THE BIOLOGICAL RECORDS CENTRE (BRC) AND THE UKBMS

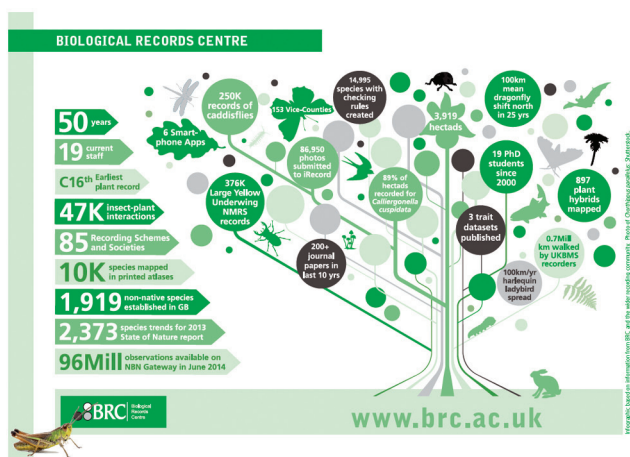
BRC reaching 50

In 2014, the Biological Records Centre celebrated its 50th anniversary. Part of the Centre for Ecology & Hydrology, BRC is the national focus in the UK for terrestrial and freshwater species recording, working closely with the voluntary recording community, principally through support of national recording schemes. CEH's contribution to the UKBMS is part of BRC's work, as are many other collaborations with BC on analysing and understanding the status of butterflies and moths in the UK.

The anniversary celebrations culminated in a special issue of the Biological Journal of the Linnean Society (volume 115, part 3), comprising 22 papers. Papers on Lepidoptera included the effects of air pollution on bryophytes; lichens and lichen-feeding Lepidoptera; recent trends in the insects of early successional habitats; interactions between insects and their foodplants; the impact of climate change on the northern range margins of selected invertebrate groups and the effectiveness of protected areas in conserving species with changing ranges.



Papers are free to access for a limited period at:
<http://onlinelibrary.wiley.com/doi/10.1111/bij.2015.115.issue-3/issuetoc>



A diagram to illustrate the work of the Biological Records Centre since 1964.

The UKBMS celebrating its 40th year

2015 marks the 40th year of data collection for the UKBMS. This remarkable achievement is testimony to the dedication of thousands of skilled recorders, who collectively have counted over 23 million individual butterflies. To celebrate, we are planning an event to review the achievements of the scheme over four decades, acknowledge the people who have made it possible and to consider priorities for the future. We hope that many recorders and co-ordinators will be able to attend. This will be in 2016, once the results from 2015 have been analysed. Further details will be circulated nearer the time.

STATISTICAL SUPPORT AT BUTTERFLY CONSERVATION

Dr Emily Dennis joined the BC monitoring team in April 2015 as a Post-Doctoral Research Associate from the University of Kent. Based at BC's Head Office, Emily has an 18-month contract to undertake a number of analytical works and help BC develop capacity in data analysis. Emily will be



Emily Dennis Photograph by the University of Kent

familiar to those who closely follow UKBMS developments, having developed the current analytical methods used to derive collated indices for wider countryside species (see Backgrounds and Methods section). Emily has also worked on a number of newer models, including a “generalised abundance index” method which produces very efficient indices of abundance that potentially could be used to produce faster outputs from the large volume of UKBMS data produced by recorders. Furthermore, new dynamic models could be used to estimate productivities for each brood, as well as phenology and survival information

Specific activities Emily will undertake relevant to the UKBMS include: (1) publishing new analysis methods to analyse population trends and associated life history parameters from UKBMS data (2) subsequently developing a procedure (in collaboration with CEH analysts) to automate collated index and trend calculation of abundance data from raw UKBMS at BC HQ and (3) producing an Urban Butterfly Indicator, to measure the changing fortunes of butterflies in towns and cities compared to rural areas.

STATE OF NATURE PROJECT UPDATE

In 2013, a coalition of 25 wildlife organisations spearheaded by the RSPB joined forces to produce a ground-breaking *State of Nature* (SoN) report for UK wildlife. The report showed it was not only butterflies that are in trouble, with 60% of wildlife species studied having declined in recent decades. From this initiative, a number of exciting aftermath projects have developed, whilst the State of Nature partnership continues to grow in number.

A Response for Nature Project has focussed on what needs to be done to reverse the trends highlighted in the State of Nature report. Country-level advocacy reports were launched in October 2015. A Drivers of Species Change Review has been completed, looking at the causes of change in a subset of the species assessed through SoN. Scientific papers have been prepared and will be submitted for publication in the autumn 2015 on SoN results and drivers of change. The National Trust, with the help of others have been discussing ideas for a potential citizen science project as part of future reporting.

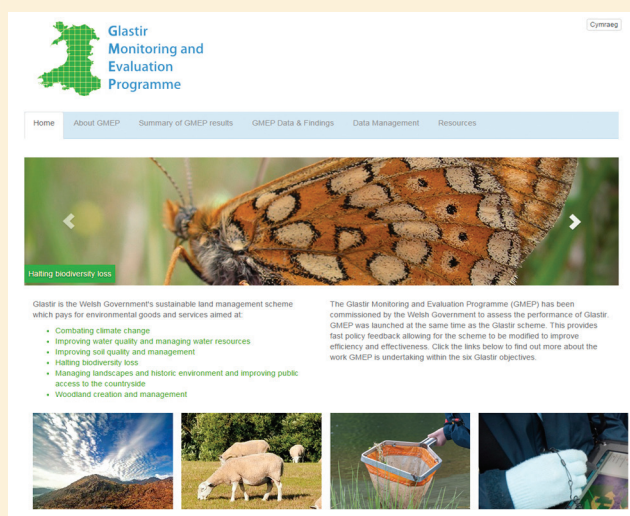
Finally, a new State of Nature report will be published in June 2016. The report will contain updated information on species status, summarise causes of change and describe an ambitious set of actions required by partner organisations and devolved Governments to reverse the declines.

Ongoing projects

UKBMS data continues to be used for a wide range of research projects. The following is a brief description of some of the larger projects using UKBMS data in 2014.

Long-term trends of Welsh butterflies as part of the Glastir Monitoring and Evaluation Programme (GMEP)

The Glastir Monitoring and Evaluation Programme (GMEP) has been commissioned by the Welsh Government to assess the performance of Glastir agri-environment scheme. It was launched at the same time as the scheme to provide fast policy feedback allowing for the scheme to be modified to improve efficiency and effectiveness.



The Glastir environmental monitoring portal

Glastir is the Welsh Government's sustainable land management scheme which pays for environmental goods and services, one of which is aimed at halting biodiversity loss across Wales. As part of the Monitoring and Evaluation Programme pollinator transects utilising standard Pollard Walks and a modified Wider Countryside Butterfly Survey methodology are being carried out on 300 randomised 1-km squares throughout Wales over a four-year period.

Research publications in 2014

Bonsall, M.B., Dooley C.A., Kasparson A. Brereton T.M., Roy D.B., Thomas J.A. (2014). Allee effects and the spatial dynamics of a locally endangered butterfly, the High Brown Fritillary (*Argynnis adippe*). *Ecological Applications*. 24, 108–120. Doi: 10.1890/13-0155.1.

Carter, C.E. (2014). *Assessing the interaction between landscape characteristics and biodiversity*. PhD thesis, University of Warwick.

Curtis, R. J., Botham, M. S., Brereton, T. M., Isaac N. J. B. (2014). The Rise and Demise of the Glanville Fritillary on the Isle of Wight. *Journal of Insect Conservation*. Online first. Doi: 10.1007/s10841-014-9737-2

Hardy, P.B., Sparks, T.H. and Dennis, R.L.H. (2014). The impact of climatic change on butterfly geography: does climatic change produce coincident trends in populations, distributions and ranges? *Biodiversity and Conservation* 23: 855-876 (doi: 10.1007/s10531-014-0637-2)

Mair, L, Hill, J.K., Fox, R., Botham, M., Brereton, T.M., Thomas, C.D. (2014). Abundance changes and habitat availability drive species' responses to climate change. *Nature Climate Change*. 4 (2), 127-131. Doi: 10.1038/nclimate2086

These squares will be revisited over a second four-year period. Butterfly species, bee groups and hoverfly groups are all recorded on these transects, each of which is conducted twice, once in July and once in August like the WCBS surveys.

In addition to the ongoing field surveys, UKBMS data is being used to look at long-term trends in butterflies across Wales and populations of Priority Species listed under Section 42 of the Natural Environment & Rural Communities Act 2006. More details, including preliminary results, are available on the recently launched GMEP web portal: <https://gmep.wales/>.

Wessex BESS – the role of biodiversity in ecosystem services

The Wessex BESS (Biodiversity and Ecosystem Services for Sustainability) project is a NERC-funded consortium trying to understand how biodiversity underpins various ecosystem services <http://www.brc.ac.uk/wessexbess/>.

The project is focussed on grasslands in Wiltshire and we are working with a range of local stakeholders. One of these is the Wiltshire Wildlife Trust and, as part of the project, we are assisting them with their next county-level State of Nature report by reporting on historic trends in biodiversity, using UKBMS data for butterfly trends, as well as mapping various ecosystem services in the region (e.g. water quality, pollination etc.).



Matechou, E., Dennis, E.B., Freeman, S.N., Brereton, T. 2014. Monitoring abundance and phenology in (multivoltine) butterfly species: a novel mixture model. *Journal of Applied Ecology*. 51 (3), 766-775. Doi: 10.1111/1365-2664.12208

Oliver, T.H., Stefanescu, C.P.F. Brereton, T.M., Roy, D.B. (2014) Latitudinal gradients in butterfly population variability are influenced by landscape heterogeneity. *Ecography*, 37 (9). doi: 863-871. 10.1111/ecog.00608

Pagel, J., Anderson, B.J., O'Hara, R.B. Cramer, W. Fox, R., Jeltsch, Roy, D.B., Thomas, C.D., Schurr, F.M. 2014. Quantifying range-wide variation in population trends from local abundance surveys and widespread opportunistic occurrence records. *Methods in Ecology and Evolution*, 5 (8). 751-760. Doi 10.1111/2041-210X.12221



Background and methods

Trends in butterfly populations were compiled from a network of 2,240 sample locations in 2014 and 4,212 locations across all years.

Species indices and trends

In the UKBMS, data on the population status of UK butterflies is derived from a wide-scale program of **site**-based monitoring and sampling in randomly selected 1km **squares**.

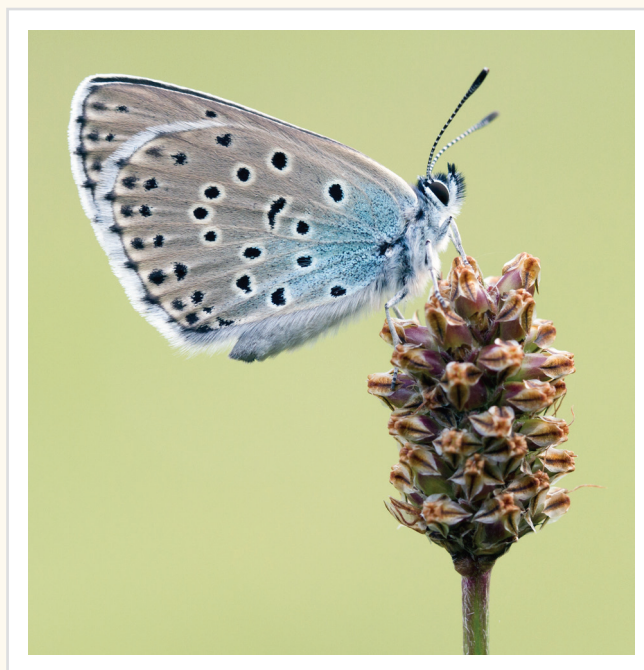
The majority of **sites** are monitored by butterfly transects. The 'traditional' transect method, which was developed from 1973-75 and launched in 1976, involves weekly butterfly counts along fixed routes through the season made under strict weather, recording area and time of day criteria (Pollard & Yates 1993). Weekly counts for each species are summed to generate site 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 a site index (Rothery & Roy 2001).

For a number of habitat-specialist species (especially the fritillaries) 'reduced effort' methods are also used to monitor annual abundance at the site level, especially in more remote parts of the UK, for example; adult timed counts for violet-feeding and Heath Fritillaries (Warren et al. 1981), larval web counts for Marsh Fritillary (Lewis & Hurford 1997) and egg counts for Large Blue (Thomas et al. 2009). For timed count and larval search methods, systematic recording is made on single days in suitable weather (when UKBMS recording criteria are met), with the counts converted to a site index that accounts for both the size of the colony and the time in the season when the count was made.

The Wider Countryside Butterfly Survey (WCBS) was established in 2009 to improve knowledge on the national population status of butterflies across the countryside as a whole. This is important given that most site-based monitoring is biased towards good quality semi-natural habitat relatively rich in butterflies. In the WCBS, BC recorders are allocated randomly selected 1km squares within the county in which they live, whilst BTO recorders are given the opportunity to survey their existing Breeding Bird Survey squares. Both sets of surveyors are asked to survey these squares at least twice over the July and August period with visits spaced ten days apart. Optional visits are encouraged, especially in the spring to sample Orange-tip and for the first generation of bivoltine species. On each visit, recorders survey two parallel 1km survey lines evenly spaced ca300m apart. Along the survey lines, recorders count butterflies, day-flying moths and dragonflies using the same time of day, recording width and weather condition criteria used in transect monitoring. Due to the low level of sampling effort (and unlike conventional transects), WCBS data is not used to derive local measures of butterfly abundance.

In 2013 we implemented a new analysis method for 25 wider countryside species, to make better use of available transect data, and incorporating WCBS data in order to compile more representative national and UK indices. Briefly, the new method (Dennis et al. 2012) uses a two-stage model. Firstly, all butterfly counts in a season from both traditional UKBMS transects and wider countryside squares are used to estimate the seasonal pattern of butterfly counts for that year. This stage relies heavily on the traditional UKBMS data with good coverage throughout the season. A second stage of the model is then applied to the full set of annual counts, accounting for where the counts occur within the flight season, to then calculate annual population indices and trends.

Work to apply this method to habitat specialist species has not yet been completed, because not all required raw data (weekly counts) are available from earlier in the time series. Hence, for habitat specialists, the old method continues to be used. In this method, site index data from all past and present transects and timed counts/larval webs at monitored sites is combined each year to derive national and UK 'Collated' Indices (CI) and to estimate trends over time. Because not all sites are monitored each year, a statistical model (using log-linear regression) is needed to estimate missing values and to produce national indices and trends. The model takes into account the fact that for a particular butterfly species, some years are better than others (a year effect), typically due to the weather, and some sites support larger populations than others (a site effect). The precision of indices and trends is estimated by a further statistical technique called 'bootstrapping'.



Large Blue is chiefly monitored by egg counts. Photograph by Gillian Thompson

Butterfly indicators

Multi-species (composite) indices of butterfly abundance are calculated using a generalised linear model accounting for species and year. Grouped measures have been compiled for species of the wider countryside and habitat specialists and categorised by broad habitat groupings (farmland and woodland) in England (Brereton et al. 2011).

To identify underlying patterns in population trends in butterfly indicators, the assessment of change is based on smoothed indices. Trends and confidence intervals in smoothed indices are assessed by structural time-series analysis and the Kalman Filter using the program TrendSpotter (Soldaat et al. 2007). A statistical test is performed using the software TrendSpotter to compare the difference in the smoothed index in the latest year versus other years in the series. Within the measures, each individual species trend is given equal weight, and the annual figure is the geometric mean of the component species indices for that year. Populations of individual species within each measure may be increasing or decreasing, irrespective of the overall trends.

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

Lewis, O.T., & 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., & Yates, T.J. (1993). *Monitoring Butterflies for Ecology and Conservation*. Chapman and Hall, London 2.

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

Soldaat, L.L., Visser, P., van Roomen, M., & van Strien, A. (2007). Smoothing and trend detection in waterbird monitoring data using structural time-series analysis and the Kalman filter. *Journal of Ornithology* Vol. 148 suppl. 2: Dec. 2007.

Warren, M., Thomas, C.D., & 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.

“More than 2000 recorders took part in the UKBMS in 2014”

Sample coverage

UKBMS sites

Since 1976, an overall total of 2,542 sites have contributed data to the scheme. In 2014, 1,223 transects, and 199 non-transect sites were monitored, with the total of 1,422 sites representing a rise of 17% over the previous best ever total in 2013. Of these, 95% of sites produced indices for at least one species.

At the Country-level there were 1,148 monitored sites in England, 81 sites in Wales, 153 sites in Scotland and 38 sites in Northern Ireland. No data was received from the Channel Islands.

There is considerable turnover in monitoring. For example, in 2014, 175 new sites were established, 132 sites stopped/did not supply data, whilst 99 sites re-started/supplied data for the first time. Of the new sites, there were 19 in Scotland, seven in Wales, 12 in Northern Ireland, whilst the remainder were in England. Of particular note, 23 new transect sites were established in Derbyshire.

Wider Countryside Butterfly Survey (WCBS)

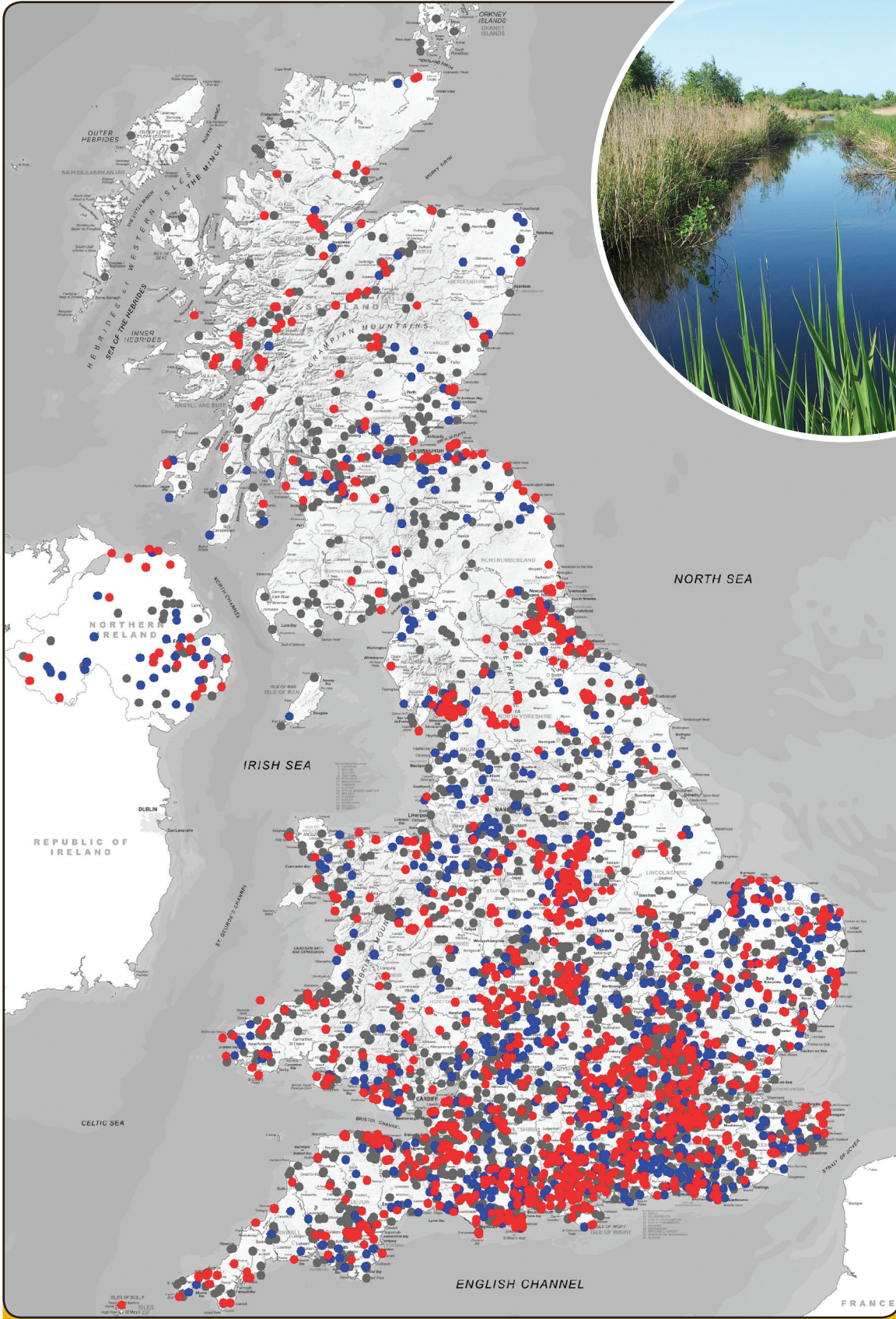
The WCBS ran for a sixth year in 2014. In total, over 3,000km of survey line was walked by more than 700 recorders who made 1,738 visits to 831 squares (464 BC, 367 BTO BBS). In 2014, although 113 new squares were established (58 by BC and 55 by BTO BBS recorders), 208 squares recorded in 2013 were stopped (126 BC and 82 BTO BBS), with a net loss of 44 squares (5%). Since the start of the WCBS, approximately 2,000 recorders have participated, sampling 1,716 squares.



James O'Neill searching for Marsh Fritillary larval webs at a site in Northern Ireland. Photograph by Tom Brereton



Catfield Fen BC Reserve transect
Photograph by Tom Brereton



Location of monitored sites in 2014. UKBMS sites producing a site index (red circles), WCBS squares walked (blue circles), sites and squares not walked in 2014 (grey circles)



The 2014 season

"2014 was a rather average year for butterflies, ranking 24th in the 39-year series"

SUMMARY

- Following the disaster year of 2012 and a subsequent rallying in 2013, there was a further modest improvement in butterfly numbers in 2014, with the majority of species (59%) having a better year.
- 33 of the 56 species assessed showed an annual increase, 23 declined, whilst the Heath Fritillary showed no change.
- The season got off to a good start, with warmer than average spring weather boosting numbers for several species, with Orange-tip having its fourth best year on record.
- Continued warm weather into early summer saw several butterflies thrive with Marbled White, Ringlet and Brimstone all experiencing their best years since 1976.
- The warm start to the summer gave way to colder conditions later in the year which resulted in the butterfly season peaking earlier in July. By early/mid-August, a period which is normally a peak time for butterflies over most of the UK, the season felt eerily quiet and was largely over.
- It was an early season overall, with 52 of 59 species having an earlier mean flight date than the series average. The mean flight date (of the peak count) across all species was on average seven days earlier than the series average.
- Over the season, there were some 'green shoot' signs of recovery for a number of Priority Species for conservation. It was pleasing to report increases in a number of threatened species in steep long-term rapid decline including Lulworth Skipper, Duke of Burgundy, Pearl-bordered Fritillary and Wood White.
- The undoubted highlight though was a fantastic improvement in numbers of the critically endangered High Brown Fritillary. The butterfly experienced its best season since 2004, with abundance up by 180% over 2013 levels.
- The common whites were amongst the biggest 'losers' in 2014, with low numbers of all three species but in particular Small and Large White with 66% and 69% declines respectively over 2013 levels, and Large White registering its 4th lowest index since 1976.
- Many of the blues did not do particularly well either, with for example, Chalk Hill Blue down by 55% and Adonis Blue by 56% over 2013 levels.

MONTHLY ROUND-UP

JANUARY was mild wet and windy. The UK mean temperature was just over 1°C above the 1981-2010 average, whilst rainfall was 155% above average and the third wettest in the series. Sunshine levels were a little below average overall, though in some regions, notably the south-east of England, sunshine was above average. There was some warm weather around at the start of the month, with a maximum temperature of 14.1°C recorded at Bude in *Cornwall* on the 5th. The warm weather



Duke of Burgundy. Photograph by Iain Leach

with sunny spells produced an impressive emergence on the 2nd January, with **Red Admiral** seen in 10 counties, **Peacock** in seven counties, **Small Tortoiseshell** in six, **Brimstone** in four and a **Comma** in *Sussex*². There were butterfly sightings as far north as *Lincolnshire* and as far west as *Glamorgan*. A **Speckled Wood** was seen on the 10th January, which though incredibly early was still nine days later than in 2013! From mid-January onwards there was a return to more typically wintry weather and there were no further new species emerging.

FEBRUARY continued the late January pattern of stormy, unsettled, mild and wet weather (third wettest in the historical series), bringing extensive flooding across parts of southern England. Temperatures peaked at almost 15°C in London on the 24th and there were fewer frosts than for more than 50 years. Two new species were observed during the month, with a **Painted Lady** on the 7th in *Ceredigion* and a **Small White** on the 25th in *Sussex*.

With high pressure dominating, **MARCH** was a much fairer month. For the third month in a row, temperatures were around 1°C above average, whilst an unseasonal high of 20.9°C was recorded in both London and Suffolk on the 30th. It was also drier and sunnier than normal and not surprisingly nine new butterfly species were seen. These included **Large White** in *Dorset* on the 7th, **Holly Blue** in *Dorset* on the 8th, **Green-veined White** in *Oxfordshire* and *Suffolk* on the 15th, **Orange-tip** in *Hampshire* on the 16th, **Clouded Yellow** and **Wall** in *Dorset* on the 26th, **Small Copper** in *Dorset*, a very early **Large Skipper** at *Dersingham Bog* transect, *Norfolk* on the 29th and **Green Hairstreak** on the 30th in *Gloucestershire*.

APRIL was overall another rather warm month, with temperatures almost 2°C above average, making it the third (equal) warmest in the series since 1910. After an unsettled start, there was a fine spell of dry and warm weather in the

² Where only the county names are given, data is from the BNM per Richard Fox, Butterfly Conservation



middle of the month, with temperatures peaking at 23.1°C at *Inverailort, Highland* on the 21st before becoming unsettled at the month end. Sunshine levels were fairly average, whilst rainfall varied regionally. Thirteen species had their first sightings of the year, these being **Grizzled Skipper** (1st in *Kent* and *Sussex*), **Dingy Skipper** (1st on the *Folkestone Escarpment* transect in *Kent*), **Small Heath** (2nd at *Cotom Countryside Reserve, Cambridgeshire*), **Duke of Burgundy** (9th in *Hampshire*), **Common Blue** (11th in *Dorset*), **Small Blue** (13th in *Hampshire*), **Wood White** (13th in *Surrey*), **Pearl-bordered Fritillary** (15th in *Cornwall* and *Devon*), **Brown Argus** (24th on the *Hampton Nature Reserve* transect, *Cambridgeshire*), **Glanville Fritillary** (29th on the *Isle of Wight*), **Meadow Brown** (29th on the *Sizewell Belts* transect, *Suffolk*), **Small Pearl-bordered Fritillary** (30th in *Devon*) and a very early **Swallowtail** (30th on the *Sutton Fen RSPB Reserve* transect, *Norfolk*). On UKBMS sites, species emerging in April generally did so much earlier (by two weeks or more) than in 2013. The first **Dingy Skipper** sighting was noteworthy being 24 days earlier than in 2013, and 42 days earlier than the average date of first appearance, as was the **Swallowtail** which appeared 26 days earlier than in 2013.

MAY was another warmer than average month (by approximately 1°C), mainly due to night time temperatures, with plenty of fair weather interspersed with periods of cloud and rain. Rainfall was generally above average and it was dull in the north, but the south received average sunshine levels. Temperatures peaked at 26.3°C in *London* on the 19th. Thirteen species newly emerged including **Marsh Fritillary** (3rd on the *Lankham Bottom Butterfly Conservation Reserve* transect, *Dorset*), **Adonis Blue** (4th in *Dorset*), **Cryptic Wood White** (6th in *Co Armagh*), **Silver-studded Blue** (7th on the *Mynydd Marian* transect in *Denbighshire* - 27 days earlier than in 2013), **Dark Green Fritillary** (13th on the *Killykeeghan & Crossmurrin Nature Reserve* transect in *Fermanagh* – and 50 days earlier than the average first appearance), **Chequered Skipper** (14th *Argyll*), **Heath Fritillary** (15th *Kent*), **Ringlet** (20th on the *Warburg* transect, *Oxfordshire*), **Lulworth Skipper** (21st in *Dorset*), **Gatekeeper** (21st on the *Mynydd*



Swallowtail. Photograph by Anne Richardson

Marian transect in *Denbighshire*), **Marbled White** (21st in *Avon* and *Herefordshire*), **Small Skipper** (25th on the *Great Orme* transect, *Gwynedd*) and **Essex Skipper** (31st on the *Wraik Hill Nature Reserve* and *Fox's Cross Nature Reserve* transects in *Kent*).

For the sixth month in a row, **JUNE** temperatures were about 1°C above the long-term average. Although there were no spells of exceptionally warm weather, it was the 9th warmest June since 1910. It was rather unsettled early and late in the month, with a period of warm, dry, sunny weather around the middle and temperatures peaking at 27.0°C in *Fife* on the 18th. First sightings were made for 15 species including **Large Blue** (1st in *Somerset*), **Northern Brown Argus** (1st in *Lancashire* and *Cumbria*), **Large Heath** (5th on the *Cors Fochno* transect, *Ceredigion*), **White Admiral** (6th in *Essex* and *Suffolk*), **Mountain Ringlet** (6th *Cumbria*), **Grayling** (6th on the *Whitbarrow NNR – Hervey* transect, *Cumbria*), **Silver-washed Fritillary** (8th *Essex*), **Black Hairstreak** (8th on the *Monks Wood NNR* transect, *Cambridgeshire*), **Purple Hairstreak** (8th on the *Tudeley Woods - Brakey Bank* transect, *Kent*), **High Brown Fritillary** (9th in *Glamorgan*), **White-letter Hairstreak** (10th in *Essex*), **Brown Hairstreak** (16th on the *M40 Compensation Area* transect, *Buckinghamshire*), **Purple Emperor** (17th in *Surrey*), **Scotch Argus** (17th on the *Heathwaite* transect, *Cumbria*) and **Chalk Hill Blue** (26th in *Kent* and *Sussex*). The first sightings for **Grayling** and **Purple Hairstreak** were particularly early, being 40 days earlier than the average date of first sightings across all monitored sites.

With some good spells of weather, a number of spring-flying species showed improvements. **Orange-tip** showed an annual increase of almost 50%, with abundance 25% higher than the series average. **Duke of Burgundy** increased in annual abundance by 25%, whilst there were modest increases for **Grizzled Skipper**, **Green Hairstreak**, **Marsh Fritillary** and **Pearl-bordered Fritillary**. **Dingy Skipper** and **Small Pearl-bordered Fritillary**, however, both dropped in numbers from 2013 levels.



High Brown Fritillary. Photograph by Zoe Caals



Pearl-bordered Fritillary Photograph by Gillian Thompson

Continuing the pattern established over the previous eight months, the temperature in **JULY** was also around 1°C above the average over the last 20 years. There was plenty of warm, dry, sunny weather in most areas (though not as much as in 2013), making July the equal 8th hottest since 1910 and 6th sunniest since 1929, whilst rainfall was below average. Mercury levels peaked at over 32°C in Kent on the 18th. The month saw the last three UK butterflies to emerge including **Silver-spotted Skipper** (5th on the *Castle Hill NNR* transect in *Sussex*), **Scotch Argus** (11th in *Cumbria*), and finally **Brown Hairstreak** (12th in *Dorset*).

Decent spring and early summer weather proved favourable for a number of species. Three species had their best year since 1976. These were **Brimstone**, **Marbled White** and **Ringlet**. The long-term trend for the latter two of these species is of a significant increase, whilst for **Brimstone** the overall population trend is remarkably stable. **Brimstone** had a good year in 2013 and showed a further 20% increase in 2014. At *Gawcombe North* and *South* transects in *Gloucestershire* almost 5,000 **Ringlets** were counted, with both indices exceeding 2,000, making them the amongst the highest values in the 39-year series. On the *Whippingham (fields)* transect, *Hampshire* abundance reached 3,320, this being the highest index for any site in the series and 71 more than the previous record set at *Durlston Country Park West* in 2004. Following the recent pattern, **Silver-washed Fritillary** had a good year; the 3rd best since 1976, though it showed only a small annual increase having had a good year in 2013. The 'golden skippers' fared better too, with **Essex Skipper** up by 66% and **Large Skipper** by 85% from 2013-2014. Not all early summer single-brooded species showed improvements though, with **Large Blue** down by 22% over 2013 levels, though the collated index was still above the series average.

The highlight though was a fantastic improvement in numbers of **High Brown Fritillary**. The butterfly experienced its best season since 2004, with abundance up by 180% over 2013 levels. This striking orange and black butterfly once bred in most large woods in England and Wales but habitat loss has resulted in alarming declines and Red Listing status, raising

fears that it could be heading toward extinction in the UK. The **High Brown Fritillary** is one of only two critically endangered butterflies in the UK and is now restricted to a handful of colonies in North West and South West England and one in Wales. The population recovery in 2014 was chiefly in moorland edge and Bracken hillside habitats in South West England. It is thought the butterfly most benefitted from a combination of warm spring weather and conservation work targeted at restoring its habitat. A huge amount of effort has gone into turning around the fortunes of this butterfly on Dartmoor and Exmoor in recent years, co-ordinated by Jenny Plackett of Butterfly Conservation in partnership with the Devon Wildlife Trust, the National Trust, the Dartmoor and Exmoor National Park Authorities and Natural England. At all sixteen monitored sites regularly supporting colonies of the butterfly in these areas, grazing, scrub cutting and bracken cutting is now carefully controlled and tailored to meet its needs. Much of the work has been delivered through agri-environment schemes, with 12 of the 16 sites entered into Higher Level Stewardship agreements, which have provided vital funding and other support to land owners. Big increases were seen at many of these sites, most notably at *Trentishoe Combe, Exmoor* where the population rose from less than 1,000 in 2013 to more than 5,000 in 2014!

Though none were recorded on transects, 2014 will be remembered for an unprecedented invasion of **Scarce Tortoiseshells**. Up until 2014, the **Scarce Tortoiseshell** was incredibly rare in the UK, with just one previous wild record, a single female at *Shipbourne*, near *Sevenoaks* in *West Kent* on 2nd July 1953. Following a tip-off from Chris van Swaay of Dutch Butterfly Conservation of a likely imminent invasion, remarkably, more than 20 were reported between the 13th July and the 29th July, mainly along the East Coast centred on *Norfolk*, but stretching as far north as *Tyneside*.

The weather in **AUGUST** was unsettled for much of the time, cooler (by 1°C and the coolest since 1993) and wetter (by 55 percentage points) than average and with some unseasonably windy weather. On what would normally be around the peak period for butterfly diversity, the 10th saw winds of up to 64mph battering the South Coast of England. A high of 27.2°C



Ringlet Photograph by Andrew Cooper



was recorded in London on the 7th, with this peak being 7°C lower than the 2013 value. Disappointing weather in August coincided with a downturn in fortunes for a number of both single brooded and multi-brooded species that fly well into August. The common whites were amongst the biggest 'losers' in 2014, with low numbers of all three species especially **Small** and **Large White** with 66% and 69% declines respectively and the latter registering its 4th lowest index since 1976.

White-letter Hairstreak was one of the hardest hit species in 2014 showing an annual decline of 18% making 2014 the 2nd worst year on record for this significantly declining species. A number of other Lycaenid butterflies had poor years as well, with **Purple Hairstreak** down by 50%, **Chalk Hill Blue** down by 55% and **Adonis Blue** down by 56%. **Small Copper**, **Small Blue**, **Silver-studded Blue** and **Holly Blue** all showed substantial annual declines and the only 'blue' to show a sizeable improvement in 2014 was the **Brown Argus** with a 35% increase. A further concern was the **Small Heath**, which declined by 25% from 2013-14, and for the 10th year in a row had a below average year. This butterfly has declined significantly by 56% since 1976.

The weather improved markedly in **SEPTEMBER** with high pressure, bringing plenty of fine, dry and settled weather. The mean temperature was 1.3°C above average, making it the equal-fourth warmest since 1910, with a high of 26.3°C in *West Sussex* on the 18th. With rainfall well below average, it was the driest September since the start of the series in 1910 and the driest month since August 1995. Sunshine levels were fairly average though. In spite of this fine weather, average butterfly abundance per site was well down on both last year's level and the 10-year and series averages, further confirming a petering out of the formal transect recording season at the month end.

There were mixed fortunes for the regular migrants over the season. **Red Admiral** increased in abundance by 189% from 2013-14, with the year ranking as the 10th best in the series and the largest index being 205 at *Southrey Wood*, *Lincolnshire*. **Clouded Yellow** numbers dropped by 42%, but



Brimstone. Photograph by Anne Richardson



Clouded Yellow were recorded into December. Photograph by Iain Leach

it was still a relatively good year; the 9th best in the series. For the 5th year in a row there were very few **Painted Lady** around, with 2014 ranking 29th in the 39-year series.

More typically autumnal weather followed in **OCTOBER** with much of the month unsettled, wet and windy. It remained warm though, with the mean temperature being 1.6°C above average and peaking at 23.6°C in Kent and London on the 31st. Although the formal transect walking season was over, recording continued at 181 transects during the month, with 22 species seen including a second generation **White Admiral** on 2nd October in *Stour Wood*, *Suffolk*; **Chalk Hill Blue** on 2nd October on the *Devil's Dyke* transect, *Cambridgeshire* and **Brown Hairstreak** on 10th October on the *West Sedgemoor* transect, *Somerset*. There was a final flurry on the 27th October, when temperatures on monitored sites peaked at 21°C in *Hertfordshire*. Ten species were recorded, including **Brimstone**, **Clouded Yellow**, **Comma**, **Holly Blue**, **Large White**, **Peacock**, **Red Admiral**, **Small Copper**, **Small Tortoiseshell** and **Speckled Wood**.

Although no transects were walked in **NOVEMBER** and **DECEMBER**, butterflies continued to be sighted and submitted to BC's BNM project, with at least 16 species recorded, including **Clouded Yellow**, **Peacock**, **Red Admiral** and **Small Tortoiseshell** in the last week of December (data per Richard Fox).

Long-term trends

UK-wide and country level trends are described below, whilst further information on each species, including individual collated index plots are available on the UKBMS website www.ukbms.org.

UNITED KINGDOM

For the UK we are able to report on long-term and ten-year trends for 56 of the 59 regularly occurring species, including 28 habitat specialist species, 25 wider countryside species and the three regular migrants (Table 1). Since 1976, 43% of species show positive trends, whilst 57% show negative trends. Of the species with a significant trend, thirteen species (39% of the total) show a long-term increase, whilst twenty (61%) are in significant decline. The top ten species showing the most acute long-term decline (in rank order, most rapidly declining first) are **White-letter Hairstreak, Wood White, Essex Skipper, Heath Fritillary, Wall Brown, Lulworth Skipper, Small Skipper, Small Tortoiseshell, Pearl-bordered Fritillary** and **High Brown Fritillary**. The top ten species showing the largest population increase (in rank order, biggest first) are **Large Blue, Silver-spotted Skipper, Ringlet, Large Heath, Red Admiral, Dark Green Fritillary, Adonis Blue, Scotch Argus, Comma** and **Silver-washed Fritillary**.

Over the last decade the overall picture is very similar. 52% of species show negative trends including all three regular migrants, 45% show positive trends, whilst 4% show no change. **Ringlet** has increased significantly over the decadal period, whilst the decreasing species (in rank order, most rapid first)



Adonis Blue. Photograph by Iain Leach

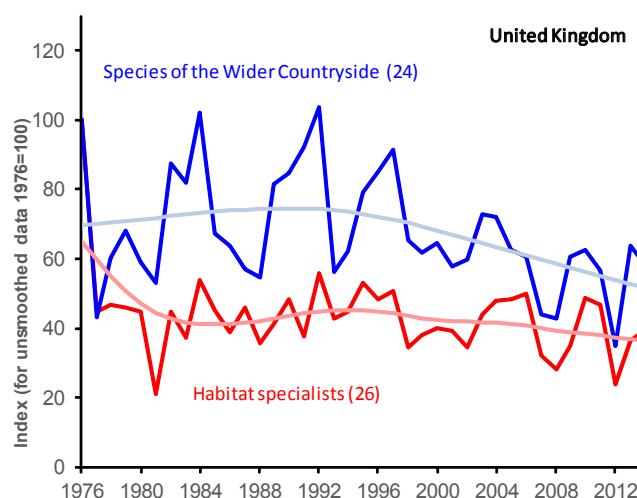


Figure 3. Trends in butterfly populations for habitat specialists and species of the wider countryside, 1976 to 2014

include **Heath Fritillary, White-letter Hairstreak, Holly Blue** and **Gatekeeper**.

Six of the ten species which show the largest long-term increases (since 1976) are habitat specialist species. A number of these such as the Large Blue have been the subject of intensive conservation efforts in recent decades, whilst others including Silver-spotted Skipper are also benefiting from climate warming. Conversely, only four of the top ten species in most severe decline are habitat specialists. On the positive side, these results demonstrate that we are beginning to slow and in some cases reverse the decline of some of our most threatened species. However, the downside is that a number of our common or widespread butterflies seem to be in increasing trouble.

The UK butterfly indicator, published in October 2015, includes data from 26 habitat specialist and 24 wider countryside species. Since 1976, habitat specialists and wider countryside species show apparent declines of 45% and 26% respectively. Analysis of the underlying smoothed trends shows that since 1976 both habitat specialists and species of the wider countryside have declined significantly. Over the last five years (since 2009), habitat specialist butterflies have shown an apparent increase from 35% to 39% of the 1976 level, whilst species of the wider countryside show an apparent decrease from 61% to 59% of the 1976 level. However, the underlying analysis shows that neither of these recent changes is statistically significant. In 2014, habitat specialist butterflies increased by 2% from the previous year, whilst wider countryside species increased by 5%.

ENGLAND

For England, we are able to report on long-term and ten-year trends for 55 of the 57 regularly occurring species, including 28 habitat specialist species, 24 wider countryside species and three regular migrants (Table 2). Since 1976, 31% of species



show positive trends, 65% have a negative trend, whilst 4% show no change. Of the species showing significant trends, twelve species (35%) show a long-term increase, whilst twenty-two (65%) are in decline. The ten species in most severe long-term decline (in rank order, most rapid first) are **White-letter Hairstreak**, **Essex Skipper/Wall Brown/Wood White**, **Heath Fritillary**, **Small Skipper**, **Lulworth Skipper/Marsh Fritillary**, **Scotch Argus** (a 'new entry' in the top ten) and **Small Tortoiseshell**.

Of the twelve species showing a significant population increase, the top ten species (biggest first) are **Large Blue**, **Silver-spotted Skipper**, **Clouded Yellow**, **Dark Green Fritillary**, **Ringlet**, **Red Admiral**, **Adonis Blue**, **Silver-washed Fritillary**, **Comma** and **Swallowtail**.

Over the last decade the trends in England are marginally better than for the series with 30 species (54%) showing negative trends, including all three regular migrants, whilst 24 species (44%) show positive trends and **Grizzled Skipper** shows no overall change. Species which have increased significantly include **Dingy Skipper** and **Ringlet**, whilst species in significant decline are **White-letter Hairstreak**, **Heath Fritillary** and **Marsh Fritillary**.

Composite indices of butterfly abundance are calculated for 23 wider countryside and 26 habitat specialist species. Since 1976, habitat specialists and wider countryside species show apparent declines of 59% and 41% respectively, whilst the three regular migrants show an apparent increase of 89%. Analysis of the underlying smoothed trends shows that since 1976 both habitat specialists and wider countryside species have declined significantly, by 26% and 30% respectively, whilst the trend for regular migrants is classed as uncertain, due to high annual variability. Since 2005, the trend for habitat specialists is classed as stable, whilst for wider countryside species the trend since 2003 is classed as uncertain. In 2014, habitat specialist butterflies showed no overall change from the previous year, wider countryside species decreased by 6%, whilst the regular migrants increased by 2%.

The English Government uses population trends of wider countryside butterflies in farmland and woodland habitats as biodiversity indicators, with an official update in October 2015. Since 1990, the composite measure for 21 species on farmland has fallen by 27%, reaching a historical low point in 2012 and making a substantial recovery in 2013. However, the index dropped by 7% from 2013-2014. These figures demonstrate numbers fluctuate from year to year, but the overall change since 2009 is assessed as showing no overall change, whilst there has been a moderate decline since 1990. Species in severe long-term decline on farmland include **Gatekeeper**, **Large Skipper**, **Peacock**, **Small Copper**, **Small Tortoiseshell** and **Wall Brown**.

Butterfly numbers on woodland sites have fallen by 51% since 1990. As with farmland butterflies, the combined index for woodland species dropped to an historical low point in 2012,



Green-veined White. Photograph by Will Langdon

then made a substantial recovery in 2013, but dropped by 2% in 2014. Since 2008 there has been little or no detectable change in the woodland butterfly indicator, though there was a moderate decline from 1990-2002. Species in severe decline in woodland include **Brown Argus**, **Common Blue**, **Gatekeeper**, **Marbled White**, **Meadow Brown**, **Peacock**, **Small Heath**, **Small Copper**, **Small Tortoiseshell** and **Wall Brown**.

SCOTLAND

For Scotland we are able to report on long-term and ten-year trends for 23 of the 34 regularly occurring species, including six habitat specialist species, 15 wider countryside species and two regular migrants, **Red Admiral** and **Painted Lady** (Table 3). Since 1979, 70% of species show positive trends, whilst 30% show negative trends. Of the eight species showing significant long-term trends, all but one showed an increase, with just **Grayling** showing a decline. Those species showing significant increases (in rank order, most rapid first) are **Orange-tip**, **Small Heath**, **Peacock**, **Small Blue**, **Ringlet**, **Green Hairstreak** and **Scotch Argus**.

Over the last decade, with 61% of species showing negative trends, including the two regular migrants, eight species (35%) show positive trends, whilst **Dark Green Fritillary** shows no overall change. Of the 5 species showing significant trends over this period, **Green-veined White**, **Small Blue** and **Speckled Wood** increased, whilst **Meadow Brown** and **Small Pearl-bordered Fritillary** decreased.

WALES

In Wales, we are able to report on trends for 30 of the 43 regularly occurring butterfly species in the country including nine habitat specialists, the three regular migrants and 18 species of the wider countryside (Table 4).

Over the long-term, 47% of species show a positive trend, whilst 53% have a negative trend. Of the 17 species showing

significant long-term change, ten species are in decline (59%), whilst seven (41%) are increasing. The declining species are (most severely declining first) **Silver-washed Fritillary**, **Grayling**, **Marsh Fritillary**, **Large Skipper**, **Dark Green Fritillary**, **Small White**, **Small Copper**, **Large White**, **Peacock** and **Small Pearl-bordered Fritillary**. The increasing species (most rapid first) are **Orange-tip**, **Pearl-bordered Fritillary**, **Green Hairstreak**, **Ringlet**, **Comma**, **Speckled Wood** and **Green-veined White**.

Over the last decade 63% of species show positive trends, including **Small Skipper** and **Ringlet** which have increased significantly. 33% of species show negative trends, whilst **Small Copper** shows no overall change.

NORTHERN IRELAND

In Northern Ireland, ten-year trends are now calculable for 13 species. Over the decadal period, six species have increased, whilst seven species have decreased. Species which have declined significantly include **Meadow Brown** and **Small Tortoiseshell**, whilst **Green-veined White** and **Ringlet** have shown a significant increase.

Notes on Summary Tables 1-4

In the following summary tables the number of sites monitored is a count of all sites on which a species has been monitored by the current analysis year, including those sites on which a species was absent but has been formerly recorded, and thus contribute to the calculation of the national index. For habitat specialist and regular migrant species only sites with sufficient data to calculate a site-level index for each species are included. As with wider countryside species this includes sites where a species was absent in the most recent year but formerly recorded, if the site has been sufficiently well recorded during the flight period of that species. For species where at country level there are insufficient data to calculate accurate trends the number of sites refers to the total number of sites at which the species was recorded in the current analysis year.

Note: some country-level changes are based on relatively small sample sizes and thus should be interpreted with caution.



Silver-spotted Skipper. Photograph by Simone Noll



Table 1. Summary of species abundance changes in the UK from 2013 to 2014 and long-term (over the entire time series: no. yrs max = 39) and short-term (last 10-years) changes. The mean flight date is calculated as the weighted mean date of counts and is highly correlated to both first appearance and the peak flight date (Botham et al. 2008). 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 2014 and blue text best year in the series.**

Species	Start Year	No. years with Index in 2014	No. sites monitored in 2014	2014 Rank	% change 2013-2014	Series trend (%)	10-year trend (%)	Mean flight date 2014	Series Mean flight date
Chequered Skipper	n/a	n/a	25	n/a	n/a	n/a	n/a	05-Jun	02-Jun
Small Skipper	1976	39	2067	27	29	-75***	27	15-Jul	20-Jul
Essex Skipper	1977	38	946	29	66	-88***	-66	17-Jul	24-Jul
Lulworth Skipper	1992	23	16	9	15	-76**	39	20-Jul	28-Jul
Silver-spotted Skipper	1979	36	39	2	2	943***	12	05-Aug	14-Aug
Large Skipper	1976	39	2105	10	86	-17	23	01-Jul	05-Jul
Dingy Skipper	1976	39	305	10	29	-19	69	24-May	01-Jun
Grizzled Skipper	1976	39	203	35	13	-37*	0	20-May	28-May
Swallowtail	1980	35	11	6	14	88*	16	11-Jun	26-Jun
Wood White	1979	36	45	29	17	-88***	-18	23-Jun	17-Jun
Cryptic Wood White	n/a	n/a	7	n/a	n/a	n/a	n/a	07-Jun	01-Jun
Clouded Yellow	1979	36	450	9	-42	734	-57	12-Aug	08-Aug
Brimstone	1976	39	1908	1	20	1	-1	26-May	08-Jun
Large White	1976	39	3174	36	-69	-30	-28	17-Jul	21-Jul
Small White	1976	39	3190	34	-66	-25	9	11-Jul	22-Jul
Green-veined White	1976	39	3093	12	-15	-7	72	30-Jun	08-Jul
Orange-tip	1976	39	1979	4	48	10	59	04-May	16-May
Green Hairstreak	1976	39	307	22	52	-41**	-34	18-May	28-May
Brown Hairstreak	1983	32	48	17	55	-15	-58	28-Aug	27-Aug
Purple Hairstreak	1976	39	635	33	-50	-54*	-10	24-Jul	30-Jul
White-letter Hairstreak	1976	39	250	38	-18	-96***	-77**	15-Jul	25-Jul
Black Hairstreak	1996	19	10	14	172	-54	-87	16-Jun	28-Jun
Small Copper	1976	39	2245	35	-24	-37	-19	28-Jul	01-Aug
Small Blue	1978	37	185	28	-13	9	-27	18-Jun	30-Jun
Silver-studded Blue	1979	36	68	23	-29	19	-9	30-Jun	15-Jul
Brown Argus	1976	39	1056	11	35	-25	-11	29-Jul	31-Jul
Northern Brown Argus	1979	36	36	30	6	-52*	6	03-Jul	11-Jul
Common Blue	1976	39	2527	17	2	-17	1	22-Jul	24-Jul
Chalk Hill Blue	1976	39	175	21	-55	20	55	01-Aug	08-Aug
Adonis Blue	1979	36	89	21	-56	175**	-43	25-Jul	27-Jul
Holly Blue	1976	39	1847	31	-22	37	-61*	24-Jun	29-Jun
Large Blue	1983	32	29	17	-22	>1000***	-20	22-Jun	25-Jun
Duke of Burgundy	1980	35	86	17	26	-42**	67	16-May	29-May
White Admiral	1976	39	206	23	16	-59**	-45	06-Jul	16-Jul
Purple Emperor	1979	36	65	22	-44	69	-35	13-Jul	21-Jul
Red Admiral	1976	39	806	10	189	257**	-40	29-Jul	06-Aug
Painted Lady	1976	39	553	29	-38	133	-84	20-Jul	30-Jul
Small Tortoiseshell	1976	39	3042	15	45	-73***	146	23-Jun	09-Jul
Peacock	1976	39	3081	5	2	17	21	09-Jun	30-Jun
Comma	1976	39	2468	17	-21	150***	-28	12-Jul	20-Jul
Small Pearl-bordered Fritillary	1976	39	116	31	-8	-58***	3	20-Jun	24-Jun
Pearl-bordered Fritillary	1976	39	135	27	17	-71***	45	27-May	01-Jun
High Brown Fritillary	1978	37	62	14	181	-62*	0	17-Jul	15-Jul
Dark Green Fritillary	1976	39	359	9	-37	186***	18	13-Jul	21-Jul
Silver-washed Fritillary	1976	39	393	3	5	141***	6	20-Jul	26-Jul
Marsh Fritillary	1981	34	94	19	9	-10	-64	31-May	05-Jun
Glanville Fritillary	1992	23	8	14	2175	-42	-88	26-May	08-Jun
Heath Fritillary	1981	34	33	32	0	-87***	-79**	14-Jun	02-Jul
Speckled Wood	1976	39	2834	4	9	84**	4	25-Jul	26-Jul
Wall Brown	1976	39	1018	33	-15	-87***	-25	19-Jul	27-Jul
Mountain Ringlet	n/a	n/a	3	n/a	n/a	n/a	n/a	26-Jun	11-Jul
Scotch Argus	1979	36	103	28	-42	170**	24	31-Jul	08-Aug
Marbled White	1976	39	1271	1	41	50*	25	07-Jul	15-Jul
Grayling	1976	39	161	29	-11	-58***	10	29-Jul	04-Aug
Gatekeeper	1976	39	2662	29	24	-41*	-44*	26-Jul	01-Aug
Meadow Brown	1976	39	3265	21	-7	1	-15	14-Jul	21-Jul
Small Heath	1976	39	1931	30	-24	-54***	18	10-Jul	09-Jul
Large Heath	1990	25	8	11	72	261**	-49	30-Jun	08-Jul
Ringlet	1976	39	2711	1	31	381***	72*	06-Jul	15-Jul

Table 2. England summary of species abundance changes from 2013 to 2014 and long-term (over the entire time series: no. yrs max = 39) and short-term (last 10-years) changes. Significance of trends: *P < 0.05 (significant), **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 2014 and blue text best year in the series.**

Species	Start Year	No. years with Index in 2014	No. sites monitored in 2014	2014 Rank	% change 2013-2014	Series trend (%)	10-year trend (%)
Small Skipper	1976	39	1954	31	32	-76***	22
Essex Skipper	1977	38	921	34	68	-89***	-67
Lulworth Skipper	1992	23	16	12	15	-76**	39
Silver-spotted Skipper	1979	36	39	3	2	943***	12
Large Skipper	1976	39	1980	33	83	-14	25
Dingy Skipper	1976	39	288	17	24	-15	73*
Grizzled Skipper	1976	39	200	39	13	-38*	0
Swallowtail	1976	35	11	10	14	88*	30
Wood White	1979	36	45	30	17	-88***	-18
Clouded Yellow	1979	36	430	5	-42	772*	-57
Brimstone	1976	39	1850	8	20	0	-1
Large White	1976	39	2697	4	-70	-29	-26
Small White	1976	39	2711	3	-66	-22	11
Green-veined White	1976	39	2485	8	-13	-11	59
Orange-tip	1976	39	1671	29	45	0	63
Green Hairstreak	1976	39	296	36	41	-46**	-35
Brown Hairstreak	1983	32	47	28	50	-16	-59
Purple Hairstreak	1976	39	602	18	-50	-57*	-6
White-letter Hairstreak	1976	39	242	37	-22	-96***	-79**
Black Hairstreak	1995	19	10	18	172	-54	-87
Small Copper	1976	39	1903	24	-24	-33	-16
Small Blue	1979	36	160	23	-8	-35	-33
Silver-studded Blue	1984	31	64	11	-24	-26	8
Brown Argus	1976	39	1026	21	35	-23	-9
Northern Brown Argus	1979	33	31	30	7	-67***	6
Common Blue	1976	39	2182	19	7	-16	4
Chalk Hill Blue	1976	39	175	1	-55	20	55
Adonis Blue	1979	36	89	6	-56	175**	-43
Holly Blue	1976	39	1727	27	-22	35	-61
Large Blue	1983	32	29	10	-22	>1000***	-20
Duke of Burgundy	1980	35	86	24	26	-42**	67
White Admiral	1976	39	205	29	16	-59***	-45
Purple Emperor	1979	36	65	7	-44	69	-35
Red Admiral	1976	39	751	30	189	264***	-41
Painted Lady	1976	39	514	22	-36	142	-85
Small Tortoiseshell	1976	39	2482	23	52	-73***	167
Peacock	1976	39	2578	6	2	19	30
Comma	1976	39	2287	8	-21	154***	-28
Small Pearl-bordered Fritillary	1978	37	87	25	-8	-37*	32
Pearl-bordered Fritillary	1978	37	77	35	-7	-59**	-13
High Brown Fritillary	1978	37	53	31	187	-63*	-1
Dark Green Fritillary	1976	39	312	2	-34	409***	15
Silver-washed Fritillary	1976	39	381	4	5	159***	4
Marsh Fritillary	1982	33	54	29	-44	-76**	-88*
Glanville Fritillary	1989	23	8	23	2175	-43	-88
Heath Fritillary	1981	34	33	33	0	-87***	-79**
Speckled Wood	1976	39	2518	8	7	84***	4
Wall Brown	1976	39	865	32	-10	-89***	-26
Mountain Ringlet	n/a	n/a	1	n/a	n/a	n/a	n/a
Scotch Argus	1995	20	13	11	-75	-74***	-40
Marbled White	1976	39	1261	13	45	49*	24
Grayling	1976	39	137	24	-15	-39**	26
Gatekeeper	1976	39	2477	34	24	-45**	-43
Meadow Brown	1976	39	2692	17	-9	-2	-15
Small Heath	1976	39	1544	25	-28	-60***	25
Large Heath	n/a	n/a	3	n/a	n/a	n/a	n/a
Ringlet	1976	39	2252	3	31	399***	73*



Table 3. Scotland summary of species abundance changes from 2013 to 2014 and long-term (over the entire time series: no. yrs max = 39) 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).**

Species	Start Year	No. years with Index in 2014	No. sites monitored in 2014	2014 Rank	% change 2013-2014	Series trend (%)	10-year trend (%)
Chequered Skipper	n/a	n/a	25	n/a	n/a	n/a	n/a
Small Skipper	n/a	n/a	2	n/a	n/a	n/a	n/a
Large Skipper	n/a	n/a	3	n/a	n/a	n/a	n/a
Dingy Skipper	n/a	n/a	3	n/a	n/a	n/a	n/a
Large White	1979	36	205	17	-16	6	-43
Small White	1979	36	210	14	-5	8	-21
Green-veined White	1979	36	340	1	-2	33	140*
Orange-tip	1999	16	183	6	95	252***	110
Green Hairstreak	1990	14	5	7	140	80*	7
Small Copper	1979	36	162	27	-35	-28	-42
Small Blue	2005	10	21	4	-17	156*	156*
Northern Brown Argus	1981	20	5	15	26	-75	-93
Common Blue	1979	36	164	9	-37	113	-18
Red Admiral	1980	28	22	24	349	107	-55
Painted Lady	1980	20	12	17	-57	-66	-91
Small Tortoiseshell	1979	36	296	10	-22	-38	40
Peacock	1995	20	262	11	69	198**	-37
Small Pearl-bordered Fritillary	1979	32	17	22	0	24	-62*
Pearl-bordered Fritillary	2002	9	43	6	32	16	-3
Dark Green Fritillary	1979	34	21	4	-66	-30	0
Marsh Fritillary	n/a	n/a	1	n/a	n/a	n/a	n/a
Speckled Wood	2001	14	70	2	-9	27	72*
Wall Brown	1999	16	20	9	12	-75	-63
Mountain Ringlet	n/a	n/a	2	n/a	n/a	n/a	n/a
Scotch Argus	1990	25	90	6	-14	49*	57
Grayling	1990	16	5	12	-53	-71***	-59
Meadow Brown	1979	36	284	25	35	2	-58*
Small Heath	1979	36	211	17	23	209***	-35
Large Heath	n/a	n/a	3	n/a	n/a	n/a	n/a
Ringlet	1999	16	260	5	42	95**	19

Table 4. Wales summary of species abundance changes from 2013 to 2014 and long-term (over the entire time series: no. yrs max = 39) 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 2014.**

Species	Start Year	No. years with Index in 2014	No. sites monitored in 2014	2014 Rank	% change 2013-2014	Series trend (%)	10-year trend (%)
Small Skipper	1984	31	110	7	13	35	205*
Essex Skipper	n/a	n/a	2	n/a	n/a	n/a	n/a
Large Skipper	1977	38	84	36	188	-78***	3
Dingy Skipper	2004	5	12	5	225	-52	-48
Grizzled Skipper	n/a	n/a	2	n/a	n/a	n/a	n/a
Clouded Yellow	1983	15	17	8	-17	-99	-99
Brimstone	n/a	n/a	43	n/a	15	n/a	n/a
Large White	1976	39	180	18	-55	-54**	-49
Small White	1976	39	172	7	-69	-70***	82
Green-veined White	1976	39	171	1	-47	90*	200
Orange-tip	1978	37	80	8	48	355***	37
Green Hairstreak	1993	20	6	3	58	225*	137
Brown Hairstreak	n/a	n/a	1	n/a	n/a	n/a	n/a
Purple Hairstreak	n/a	n/a	4	n/a	n/a	n/a	n/a
White-letter Hairstreak	n/a	n/a	1	n/a	n/a	n/a	-n/a
Small Copper	1976	39	116	18	-34	-55*	0
Small Blue	n/a	n/a	4	n/a	n/a	n/a	n/a
Silver-studded Blue	n/a	n/a	4	n/a	n/a	n/a	n/a
Brown Argus	1977	18	9	2	-26	77	20
Common Blue	1976	39	118	18	-3	-7	10
Holly Blue	n/a	n/a	63	n/a	66	n/a	n/a
Red Admiral	1976	39	25	26	177	136	-37
Painted Lady	1977	26	21	18	-30	-48	-74
Small Tortoiseshell	1976	39	175	11	-29	-34	122
Peacock	1976	39	164	17	14	-52*	9
Comma	1992	23	107	6	-11	136*	-6
Small Pearl-bordered Fritillary	1993	15	12	6	-23	-36*	44
Pearl-bordered Fritillary	1997	17	15	2	5	260**	187
High Brown Fritillary	1995	11	9	2	-24	2	30
Dark Green Fritillary	1979	22	20	11	-7	-71***	57
Silver-washed Fritillary	1995	14	8	6	-15	-88**	99
Marsh Fritillary	1990	25	27	13	37	-81*	-1
Speckled Wood	1978	37	147	14	29	114**	-20
Wall Brown	1976	39	87	2	-70	-37	53
Marbled White	n/a	n/a	3	n/a	n/a	n/a	n/a
Grayling	1976	28	17	8	-68	-82***	46
Gatekeeper	1978	37	145	23	11	38	-37
Meadow Brown	1976	39	188	22	32	29	-3
Small Heath	1976	39	118	5	-5	26	43
Large Heath	n/a	n/a	2	n/a	n/a	n/a	n/a
Ringlet	1983	32	137	2	23	206***	136*



Table 5. Northern Ireland summary of species abundance changes from 2013 to 2014 and long-term (over the entire time series: no. yrs max = 39) 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 2014 and blue text best year in the series.**

Species	Start Year	No. years with Index in 2014	No. sites monitored in 2014	2014 Rank	% change 2013-2014	Series trend (%)	10-year trend (%)
Dingy Skipper	n/a	n/a	1	n/a	n/a	n/a	n/a
Cryptic Wood White	2007	7	13	5	7	-60	-60
Clouded Yellow	n/a	n/a	1	n/a	n/a	n/a	n/a
Brimstone	n/a	n/a	1	n/a	n/a	n/a	n/a
Large White	2006	9	50	6	44	4	4
Small White	2006	9	54	6	10	-30	-30
Green-veined White	2005	10	65	1	-19	216**	216**
Orange-tip	2007	8	36	8	138	-37	-37
Green Hairstreak	n/a	n/a	2	n/a	n/a	n/a	n/a
Purple Hairstreak	n/a	n/a	1	n/a	n/a	n/a	n/a
Small Copper	2005	10	27	7	18	38	38
Common Blue	2005	10	20	6	44	-60	-60
Holly Blue	n/a	n/a	1	n/a	66	n/a	n/a
Red Admiral	n/a	n/a	8	n/a	n/a	n/a	n/a
Painted Lady	n/a	n/a	6	n/a	n/a	n/a	n/a
Small Tortoiseshell	2010	5	60	5	4	-72*	-72*
Peacock	2006	9	42	6	124	-76	-76
Dark Green Fritillary	n/a	n/a	6	n/a	n/a	n/a	n/a
Silver-washed Fritillary	n/a	n/a	4	n/a	n/a	n/a	n/a
Marsh Fritillary	2004	11	12	3	10	49	-10
Speckled Wood	2007	8	60	2	51	77	77
Grayling	n/a	n/a	3	n/a	n/a	n/a	n/a
Meadow Brown	2009	6	60	4	-5	-51*	-51*
Small Heath	2009	6	27	6	25	-69	-69
Ringlet	2006	9	60	2	26	220*	220*

Appendix 1

Listings of habitat specialist and wider countryside species

Habitat specialists

- Adonis Blue
- Black Hairstreak
- Brown Hairstreak
- Chalk Hill Blue
- Chequered Skipper
- Dark Green Fritillary
- Dingy Skipper
- Duke of Burgundy
- Glanville Fritillary
- Grayling
- Green Hairstreak
- Grizzled Skipper
- Heath Fritillary
- High Brown Fritillary
- Large Blue
- Large Heath
- Lulworth Skipper
- Marsh Fritillary
- Mountain Ringlet
- Northern Brown Argus
- Pearl-bordered Fritillary
- Purple Emperor
- Réal's Wood White
- Silver-spotted Skipper
- Silver-studded Blue
- Silver-washed Fritillary
- Small Blue
- Small Pearl-bordered Fritillary
- Swallowtail
- White Admiral
- Wood White

Wider countryside species

- Brimstone
- Brown Argus
- Comma
- Common Blue
- Common Blue (northern)
- Essex Skipper
- Gatekeeper
- Green-veined White
- Holly Blue
- Large Skipper
- Large White
- Marbled White
- Meadow Brown
- Orange-tip
- Peacock
- Purple Hairstreak
- Ringlet
- Scotch Argus
- Small Copper
- Small Heath
- Small Skipper
- Small Tortoiseshell
- Small White
- Small/Essex Skipper
- Speckled Wood
- Wall Brown
- White-letter Hairstreak

Appendix 2

List of country-level Priority Species

Common name	Scientific name	England	Northern Ireland	Scotland	Wales
Chequered Skipper	<i>Carterocephalus palaemon</i>			✓	
Small Skipper	<i>Thymelicus sylvestris</i>				
Lulworth Skipper	<i>Thymelicus acteon</i>	✓			
Silver-spotted Skipper	<i>Hesperia comma</i>				
Large Skipper	<i>Ochlodes sylvanus</i>				
Dingy Skipper	<i>Erynnis tages</i>	✓	✓	✓	✓
Grizzled Skipper	<i>Pyrgus malvae</i>	✓			✓
Swallowtail	<i>Papilio machaon</i>				
Wood White	<i>Leptidea sinapis</i>	✓			✓
Cryptic Wood White	<i>Leptidea juvernica</i>		✓		
Clouded Yellow	<i>Colias croceus</i>				
Brimstone	<i>Gonepteryx rhamni</i>				
Large White	<i>Pieris brassicae</i>				
Small White	<i>Pieris rapae</i>				
Green-veined White	<i>Pieris napi</i>				
Orange-tip	<i>Anthocharis cardamines</i>				
Green Hairstreak	<i>Callophrys rubi</i>				
Brown Hairstreak	<i>Thecla betulae</i>	✓			✓
Purple Hairstreak	<i>Favonius (Neozephyrus) quercus</i>				
White-letter Hairstreak	<i>Satyrium w-album</i>	✓			✓
Black Hairstreak	<i>Satyrium pruni</i>				
Small Copper	<i>Lycaena phlaeas</i>				
Small Blue	<i>Cupido minimus</i>	✓	✓	✓	✓
Silver-studded Blue	<i>Plebejus argus</i>	✓			✓
Brown Argus	<i>Aricia agestis</i>				
Northern Brown Argus	<i>Aricia artaxerxes</i>	✓		✓	
Common Blue	<i>Polyommatus icarus</i>				
Chalkhill Blue	<i>Polyommatus (Lysandra) coridon</i>				
Adonis Blue	<i>Polyommatus (Lysandra) bellargus</i>				
Holly Blue	<i>Celastrina argiolus</i>				
Large Blue	<i>Phengaris (Maculinea) arion</i>	✓			
Duke of Burgundy	<i>Hamearis lucina</i>	✓			
White Admiral	<i>Limenitis camilla</i>	✓			✓
Purple Emperor	<i>Apatura iris</i>				
Red Admiral	<i>Vanessa atalanta</i>				
Painted Lady	<i>Vanessa (Cynthia) cardui</i>				
Small Tortoiseshell	<i>Aglais urticae</i>				
Peacock	<i>Aglais (Inachis) io</i>				
Comma	<i>Polygona c-album</i>				
Small Pearl-bordered Fritillary	<i>Boloria selene</i>	✓		✓	✓
Pearl-bordered Fritillary	<i>Boloria euphrosyne</i>	✓		✓	✓
High Brown Fritillary	<i>Argynnis adippe</i>	✓			✓
Dark Green Fritillary	<i>Argynnis aglaja</i>				
Silver-washed Fritillary	<i>Argynnis paphia</i>				
Marsh Fritillary	<i>Euphydryas (Eurodryas) aurinia</i>	✓	✓	✓	✓
Glanville Fritillary	<i>Melitaea cinxia</i>	✓			
Heath Fritillary	<i>Melitaea (Mellicta) athalia</i>	✓			
Speckled Wood	<i>Pararge aegeria</i>				
Wall Brown	<i>Lasiommata megera</i>	✓	✓	✓	✓
Mountain Ringlet	<i>Erebia epiphron</i>	✓		✓	
Scotch Argus	<i>Erebia aethiops</i>				
Marbled White	<i>Melanargia galathea</i>				
Grayling	<i>Hipparchia semele</i>	✓	✓	✓	✓
Gatekeeper	<i>Pyronia tithonus</i>				
Meadow Brown	<i>Maniola jurtina</i>				
Small Heath	<i>Coenonympha pamphilus</i>	✓	✓	✓	✓
Large Heath	<i>Coenonympha tullia</i>	✓	✓	✓	✓
Ringlet	<i>Aphantopus hyperantus</i>				



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.



Butterfly Conservation (BC) 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 British Trust for Ornithology (BTO) is an independent charitable research institute combining professional and citizen science aimed at using evidence of change in wildlife populations, particularly birds, to inform the public, opinion-formers and environmental policy- and decision-makers.



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



Natural Resources Wales (NRW) is the principle adviser to the Welsh Government on the environment, enabling the sustainable development of Wales' natural resources for the benefit of people, the economy and wildlife.



The Forestry Commission (FC) 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.



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 (SNH) is the government body that looks after all of Scotland's nature and landscapes, across all of Scotland, for everyone.



Northern Ireland Environment Agency (NIEA) is the agency for the protection and conservation of the natural and built environment in Northern Ireland

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