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Butterfly Conservation
Saving butterflies, moths and our environment

Guidance for monitoring butterflies at a local scale

A guide for local project coordinators and volunteer butterfly surveyors

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This guidance was produced by Butterfly Conservation and JNCC through the Natural Capital and Ecosystem Assessment programme.

Contents

1. Introduction

The monitoring of biodiversity is a very important activity, producing highly valuable and informative data to aid the understanding of changes in our natural environment, responses to habitat management and restoration, as well as being a hugely rewarding activity for those undertaking the surveys. Butterflies are a particularly popular and useful group to study, with long-term scientific monitoring in the UK dating back to the 1970s. However, there are several technical aspects to consider when designing a monitoring programme in order to get the most from the data collected.

This document provides guidance for those intending to set up monitoring initiatives for butterflies across local landscapes or project areas, using standardised methodologies to produce meaningful outputs that can be analysed alongside national data.

2. Why Monitor Butterflies

Butterflies have always been extremely popular subjects of natural history studies. Being bright, colourful and visibly active on sunny days, they are very popular with the general public. They are also relatively easy to identify, with only 59 species occurring regularly in the UK.

Butterflies are considered excellent indicators of environmental change due to their rapid lifecycles and highly sensitive response to subtle habitat or climate changes. As the most widely studied group of terrestrial invertebrates, they are uniquely placed to shine a light on the pressures facing many other taxa sharing the same habitats across our changing landscape.

Butterflies occur in a wide range of habitats across the countryside, in protected areas and intensive farmland as well as in towns and gardens. In addition, their life cycles are well understood, which makes it possible to interpret trends in their abundance alongside changes to the physical environment.

Unfortunately, across the UK, long-term trends show that 80% of our butterfly species have decreased in abundance or distribution (or both) since the 1970s (see The State of the UK's Butterflies 2022 Report | Butterfly Conservation). It is very important that we continue to gather as much data as possible to inform and support conservation work to reverse these trends.

3. Issues that affect butterfly surveys

Whilst butterflies are very popular subjects for biodiversity monitoring, and their numbers can provide valuable information on environmental change, there are several considerations that must be accounted for when designing surveys in order to get the best out of the data.

Adult butterflies are short-lived and seasonal

As with most insects, butterflies undergo one or two complete life cycles within a year (sometimes more). For much of the year they will exist in immature life stages (eggs, caterpillars, pupae) which are difficult for the novice to locate and identify. Meanwhile the adults, which are the subject of most surveys, are typically short-lived, so will only be encountered for a short time during the year.

Different species of butterfly occur at different times of the year, and many species will only be abundant for a few weeks at the peak of their flight period. This means that, in any single visit to survey for adult butterflies, it is unlikely that you will see every species that occurs on that site.

Abundance counts for each brood of butterfly will typically follow a standard flight curve, with numbers growing to a peak a few weeks after their first emergence, falling back to a few individuals once mating and egg-laying has taken place.

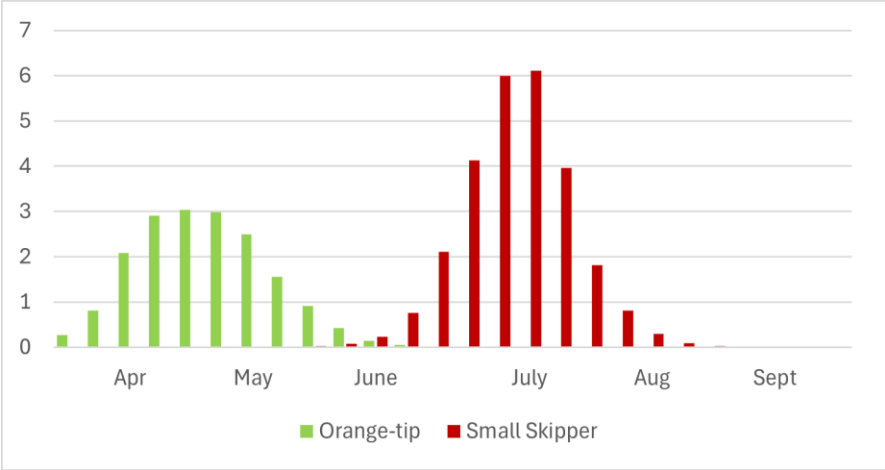


Figure 1 – Flight period charts for a typical spring species (Orange-tip) and summer species (Small Skipper) which have very little overlap.

Several visits throughout the year are usually required to record the full range of butterflies present at any site. And in order to estimate the relative population size for any species, you must carry out surveys around the peak of their flight period, rather than too early or too late when numbers will be low.

With multiple species, each peaking at different times, the need for several visits across the butterfly season is amplified.

Flight periods can vary from year to year

To make things more complicated, the annual timing of the emergence and peak of each butterfly species will be impacted by seasonal weather conditions, such as a mild winter, a wet spring or an early warm spell. This leads to flight periods for individual species moving backwards or forwards by up to two or three weeks from one year to the next.

The consequence of this is that a survey on any particular day in one year will not be directly comparable with the same day the following year. One year you may hit the peak flight period, but if the following year sees an early start to the season, you may be too late to record the same species on the same day.

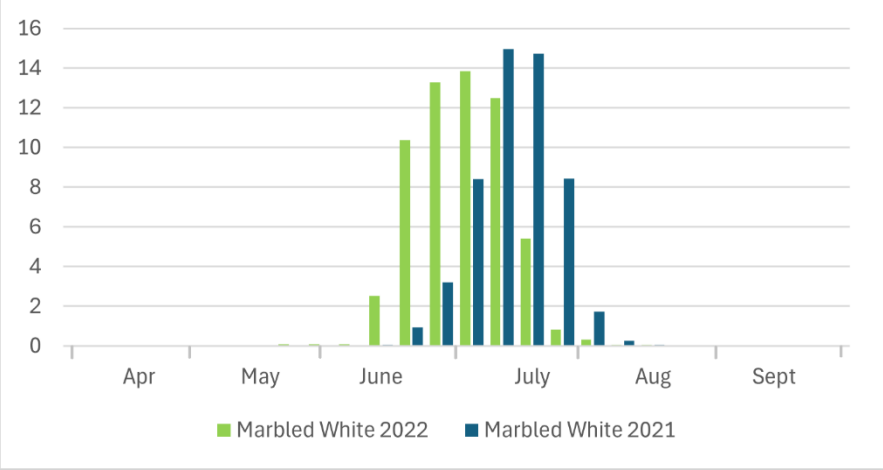


Figure 2 – Flight period shift from one year to the next for Marbled White. A count in mid-June would have looked poor in 2021, but much better the following year. Whereas the opposite would be true for a count in late-July.

Butterfly activity is weather dependent

Adult butterflies are sun-loving creatures, requiring heat from the sun to warm up their bodies ready for flight. Being very light creatures, they are also susceptible to high winds. All of this can have a significant impact on survey results, as the butterflies are much easier to spot when they are actively flying around, rather than resting in the vegetation. On a day-to-day basis, the numbers you see will be influenced by the weather conditions, with fewer butterflies encountered on cool or windy days. For this reason, it is important to conduct butterfly surveys during suitable weather for optimal results.

This also means, from year-to-year, that butterfly numbers can be heavily influenced by the annual weather patterns. An increase or decrease in butterfly numbers from one year to the next may well be dominated by impacts of the weather, rather than changes in habitat condition. Because of this wide annual variation, it can take several years of regular counts (ideally 10 or more years) to be able to identify other significant changes or trends from butterfly data.

Butterflies exist in metapopulations

Many butterflies can thrive in metapopulations, where they frequently appear or disappear from individual sites whilst maintaining a healthy presence across the broader landscape. This may mean that monitoring of individual sites gives mixed results, but monitoring a network of sites across a linked landscape can produce a more reliable picture of how butterflies are faring.

In addition, the presence of adult butterflies on a particular site does not necessarily mean that the site supports breeding populations of all those species. Adult butterflies are typically very mobile and can travel great distances to find suitable breeding habitat, pausing to top-up energy supplies as they go. If you are seeking to confirm the presence of breeding populations for key species, you may need to carry out more specialised surveys for immature stages at the appropriate time of year.

4. Establishing clear objectives

What do you want to find out?

At the start of your project, you need to establish a clear idea of what you hope to achieve from surveying butterflies across the project area. These objectives should be framed in the context of the resources that are available to collect data, project duration, how those data will be analysed, and how the results will be used to review/inform land management in the future.

There are a number of different ways in which butterfly data can be interpreted, depending on which survey methods are utilized. The main output types are listed here, in order of complexity:

Presence/Absence – at the most basic level, the simplest thing to establish is which butterfly species are present across the project site or landscape.

This is something that could be achieved across the course of a year without any formal survey design or structure. However, this still requires a commitment to get out and record butterflies at regular intervals throughout the butterfly season (esp. April to September), across the full range of habitats present in the area.

Without covering the full season and range of habitats, you may only encounter a subset of the butterfly species that are present, and you will not have any level of confidence in establishing which species are absent (or were just missed during the limited surveys).

Establishing the full range of butterfly species that are present (or absent) across a project area would help to identify species of importance that might benefit from further study and sympathetic management. It could identify a suite of species associated with a key habitat for protection. It could also identify the absence of some local species where habitat improvements or restoration might promote their colonization.

Frequency – beyond establishing a simple list of butterfly species in the project area, collating the results of all your surveys will enable you to establish additional metrics, which could potentially be compared from year-to-year, or across different sites/habitats in the landscape. One such measure is the frequency, or the number of times that each species is recorded during the year.

Frequency data will help you to understand which species are well established in the area, being recorded on a regular basis, as opposed to those species which are rarely seen and may just be passing through in search of suitable habitat. Frequency data

can be compared year on year to highlight which species are being seen more regularly or otherwise.

Distribution – another layer of detail can be gained by establishing exactly where each species occurs across the site or landscape. This could still be achieved as a result of the less formal surveys as described above, as long as location data are being collected alongside the species records. This would enable the mapping of species distributions across the project area.

However, at this stage, you may also want to think more carefully about how you demarcate different parts of the project landscape, and organise your surveys in a way that makes it easier to group together records from the same sites or compartments. Ideally, you would organize your sampling in such a way as to ensure all habitats are fairly represented and undue bias is avoided.

Occupancy – if you've taken the step to divide your project area into distinct sites or compartments, then you have the opportunity to calculate occupancy rates for each species. This means the proportion of the project area that is occupied by each species. So, for example, if you've surveyed ten different localities through the summer, and Holly Blue has been recorded in six of those localities, then you have an occupancy rate of 60%.

Occupancy data will help you to understand which are the more widespread species, and which are more localized across the landscape. From year to year, the annual occupancy figures can also be used as a simple metric to identify whether a species is expanding or reducing its range within the project area.

Relative Abundance – if your butterfly records are not just identifying where species are recorded, but also how many of each species, then you can collate those figures to establish which are the most abundant species across the site or landscape. This will give you useful information on the most productive areas or habitats in the project area.

However, this type of statistic will be influenced by the way that your surveys are timed and structured. When you start to look at abundance figures, you also need to take some account of recording effort across the season. For example, if far more surveys are conducted in the summer than the spring, then spring species will be under-represented in the counts, and their population size could be under-estimated in relation to the summer species.

Encounter Rate – this is a very useful way of incorporating some measure of recording effort into the abundance data that are being collected. By calculating the number of butterflies seen per unit of time you can derive figures which allow a fair comparison across different sites, or landscapes, or months, or years.

However, in order to calculate this measure, it is necessary to collect additional information from each survey – specifically a start-time and end-time, or at least a record of the number of minutes spent on the survey.

Alternatively, you can set up a standard protocol where all surveys are conducted for the same length of time. In this way, the number of butterflies seen per visit is equally valid as a metric, and probably easier to calculate.

Abundance Trends – the primary output of the UK Butterfly Monitoring Scheme (UKBMS) is to establish which species are increasing or decreasing over time, and by how much. This type of analysis really requires a good time series of reliable counts, which are collected in a way that can be fairly compared with each other from one year to the next over a long period of time.

As discussed above, short-term trends are generally driven by weather patterns, so long-term trends are required to identify other factors driving the changes in butterfly numbers. This kind of analysis, whilst incredibly informative, would only be a reasonable objective for projects which are going to have a long shelf-life, with all the resourcing implications that come with that.

5. Butterfly Survey Methods – pros and cons

There are a number of different standardised methods for surveying for butterflies. Each of them is designed for a particular purpose, and some are more intensive than others. The intention here is to outline the pros and cons of each method, rather than go into great technical detail about how to carry them out (guidance notes for each method can be found via the links).

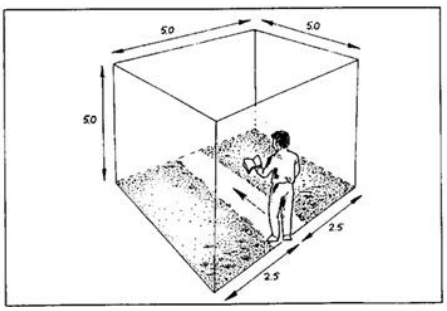
Those methods marked by an asterisk* are currently used by the UKBMS to produce long-term national trends for butterfly species across the four nations of the UK.

5.1 Traditional Butterfly Transects (Pollard Walks)*

Butterfly transects are generally considered the 'gold standard' for monitoring adult butterflies, and they have formed the core of the UKBMS since it began in 1976. There are now well over 2,000 transects being walked each week across the UK.

The method involves setting up a fixed route around your site. The route can be broken up into different sections for each change of habitat or management compartment, and this makes it easier to see how species are responding to different management practices.

The transect route should be walked every week of the standard recording season, that's 26 weeks from 1st April through to the end of September. The walk should only be conducted when minimum weather criteria are met, and all butterflies within a 5m recording box should be identified and counted during the walk.



Detailed guidance notes and training videos on this method can be found at: https://ukbms.org/guidance-recording-forms

Pros - the data collected from this scientifically validated method can be very powerful, particularly in the long term. Conducting weekly walks across the entire season means that no resident species is likely to be missed, and covering the peak flight period for each species means that annual abundance indices can be reliably calculated for each site monitored in this way.

There is freedom to set up traditional transects in any location that is of interest to the surveyor, targeting key sites which support important butterfly populations, or collecting data to inform site management practices.

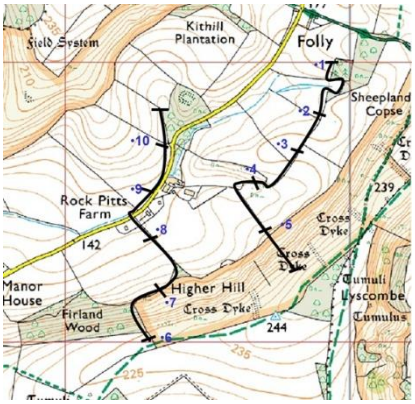
The fixed route also means that the weekly counts and annual indices are truly comparable from one year to the next, as the same areas are always being recorded. The data are very valuable locally, for understanding the effects of management and habitat changes, as well as feeding into national species trends through the UKBMS.

Cons – the main disadvantage of this method is the time and commitment required to record butterflies in good weather every week for six months of the year at a single site. This is amplified if you are trying to monitor butterflies across several sites or a large area, where multiple transects would be required, and all would need the same level of commitment.

Another minor disadvantage of the transect, is that, in only sampling a fixed part of the site, it can miss changes happening elsewhere. Recorders sometimes wish to alter their route to adapt to the way a site has changed over time, and to record in new areas. However, this can lead to a break in the data run if it is not handled correctly.

In the way that the UKBMS is organised, there is also an issue of bias brought into the sampling network through these traditional transects, as there is a free choice of sites which inevitably leads to the 'best' butterfly sites being monitored at the expense of less interesting sites. This has partially been addressed through the introduction of the Wider Countryside Butterfly Survey as described below.

5.2 Wider Countryside Butterfly Survey (WCBS)*



The Wider Countryside Butterfly Survey adds a stratified random element to the UKBMS data, generating additional data from under-recorded habitats. It is based on the Breeding Bird Survey organized by the BTO, with two (roughly) parallel 1km transect lines set up in a randomly selected 1km square.

Volunteers are asked to record butterflies along these routes in the same way as they would for a traditional transect. However, they are only required to do so twice per year during the height of the butterfly season in July and August, with additional visits being optional.

The main guidance note for WCBS can be found here: https://ukbms.org/sites/default/files/downloads/WCBS%20Guidance%202023.pdf with further information and training videos here: https://ukbms.org/guidance-recording-forms

Pros – the randomised nature of this scheme helps to reduce bias in the dataset, ensuring that the full range of habitats (both good and bad) are sampled across the landscape. And within the context of the UKBMS, it represents a much reduced commitment with only two walks required per year.

Cons – from a practical point of view, the main issues with this scheme stem from the nature of the 1km squares allocated to some recorders. They may contain very little butterfly interest, they may be some distance from the recorder's home, or they may present access issues. All these issues make it more difficult to retain the interest of

the recorder, and consequently there is a higher rate of turnover compared to traditional transects.

Being randomly selected, the 1km squares might be representative of the overall study region, but for a local project they may not target the areas that are of most interest.

More importantly, when it comes to interpreting the data, the small number of visits to each 1km square means that a lot of squares need to be monitored each year in order to generate enough data to detect changes in species abundance.

With only two visits per year, it is not possible to generate a full species list for each square, or to infer the absence of species, because they could easily be missed during the two visits or could be flying at a different time of year. Certainly, annual abundance indices cannot be reliably generated for each 1km square in the same way as they can for individual sites monitored by traditional transects. The scheme is really only designed to generate abundance trends by combining the data across a large number of squares.

Analysis conducted during the development of this scheme showed that the two-visit protocol would require (on average) 630 squares to be surveyed each year in order to detect a 25% change in the abundance of a butterfly species over 10 years. This falls to 430 squares if three visits are made over the same July-August period.

5.3 Single Species Monitoring*

The third type of data that contribute to the UKBMS come from single-species monitoring, which is typically targeted at priority butterfly species with a restricted distribution, and aims to fill in the gaps where these species are not monitored sufficiently across the transect network. The variety of different ways in which these counts are achieved is outlined here for information, though it is assumed that most local projects would be looking to collect data on a wider range of butterfly species.

Single-species transects – these are effectively the same as traditional transects, except that the transect route is only designed to run through suitable habitat for the target species and weekly counts are only required during the flight period of that species, rather than the full 26-week season. Therefore the time commitment is much reduced, but the data for that single species are of equal value to a full traditional transect.

Adult timed-counts – this is a useful 'reduced effort' method for monitoring rare habitat specialist butterflies, especially those which form discrete colonies whose distribution can change over time across large sites. The surveyor will identify the area of suitable habitat, record the extent of that habitat, and then sample that area counting individuals of the target species and recording the time taken to do the count. Full guidance is provided here:
https://ukbms.org/sites/default/files/downloads/UKBMS%20Ng1%20-%20Timed%20count%20guidance%20notes.pdf

Timed counts only need to be carried out once per year at a site to provide meaningful results. However, the margins of error in timed count data tend to be greater than transects. For the most accurate results, counts should be conducted right at the peak of the flight period for that butterfly. Local transect data is often required to identify that peak period and to generate a reliable index from the raw timed count data. However, the reduced commitment for a single timed count at a site allows for a greater number of sites to be monitored each year across a single landscape with more limited resources.

Whilst very useful for habitat specialist butterflies, timed counts are not a suitable method for monitoring more widespread and mobile species.

Other approaches to single-species monitoring – not all adult butterfly species are readily encountered at ground level during the day on traditional transects (particularly species of the tree canopy), whilst other species might be easier to locate and monitor during other life stages.

The UKBMS has developed a number of alternative methodologies over the years to accommodate different types of counts for a few species, and is continuing to look at new methods for other species which have been poorly monitored in the past. Current approved methods are listed here, along with links to their UKBMS guidance note:

Larval web counts for Marsh Fritillary, conducted in late summer:
https://ukbms.org/sites/default/files/downloads/UKBMS%20Ng2%20-%20Marsh%20Frit%20Webs%20guidance%20notes.pdf

Egg counts for Brown Hairstreak, conducted during the winter:
https://ukbms.org/sites/default/files/downloads/NG3_Brown%20Hairstreak%20Egg%20Count%20Guidance_0.pdf

Canopy point counts for Purple Hairstreak, conducted during early evening:
https://ukbms.org/sites/default/files/downloads/Ng4%20UKBMS%20Purple%20Hairstreak%20Monitoring%20Method_0.pdf

5.4 Multi Species Timed Counts

This final type of butterfly monitoring has been developed under the direction of the European Butterfly Monitoring Scheme (eBMS). It is a 15-minute count that can be conducted anywhere, anytime by a recorder with knowledge of the species likely to be encountered. Primarily intended to fill in some knowledge gaps where little recording has taken place, the timed element of this method allows for some more detailed analysis, as the recording effort is consistent across all counts.

At present, such counts are not incorporated into the UKBMS, which is based on monitoring at fixed site locations. However, work is underway to investigate how 15-minute multi-species counts can add value to more structured monitoring data. In the meantime, this method has good scope for contributing to monitoring butterflies in local projects with broad objectives and perhaps limited volunteer resources. This is discussed further below.

6. Selecting the best methods for your project

From the discussion above, it will be clear that some methods are not suitable in all situations. Traditional transects may be the 'gold standard', and we would always recommend that approach if resources allow. But, from a practical viewpoint, if you have limited volunteer resources and a large area to cover, or your project is time-limited, then a more pragmatic approach is required.

Some project administrators are drawn towards the WCBS concept, because it is seen as a 'reduced-effort' alternative to traditional transects, and its stratified design can reduce the bias inherent in self-selected transect locations. This may be appropriate if the project area lends itself well to a randomised approach rather than more targeted (or free choice) site selection.

However, reduced-effort also means reduced data, and this approach only really works by combining data across a large number of 1km squares, and/or by increasing the number of visits required. There are rarely any shortcuts to collecting sufficient data for meaningful results. We would only recommend considering this approach across a very large project area or landholding and, even then, this approach places additional administration effort on the project, with the need for individual recorders to be assigned to specific 1km squares.

Single-species monitoring is very much aimed at priority species. If your project is focused on rare or conservation-priority species, then it would certainly be worthwhile investigating the different methods available and checking out what is most appropriate for your target species. UKBMS staff are always happy to offer advice in these cases, especially if the species is currently under-recorded in the scheme and your project can help to boost the volume of data available for national-level analysis.

This leaves the multi-species timed counts, which have been rising in popularity since their development. Although not currently forming part of the UKBMS, **we consider this to be an appropriate method for consideration by local monitoring projects**, with several advantages over more tightly structured methodologies – particularly with respect to the administrative demands. As such, we have been working, along with JNCC, to develop a mechanism for local projects to adopt these counts, as detailed below.

Multi-species timed counts for local projects

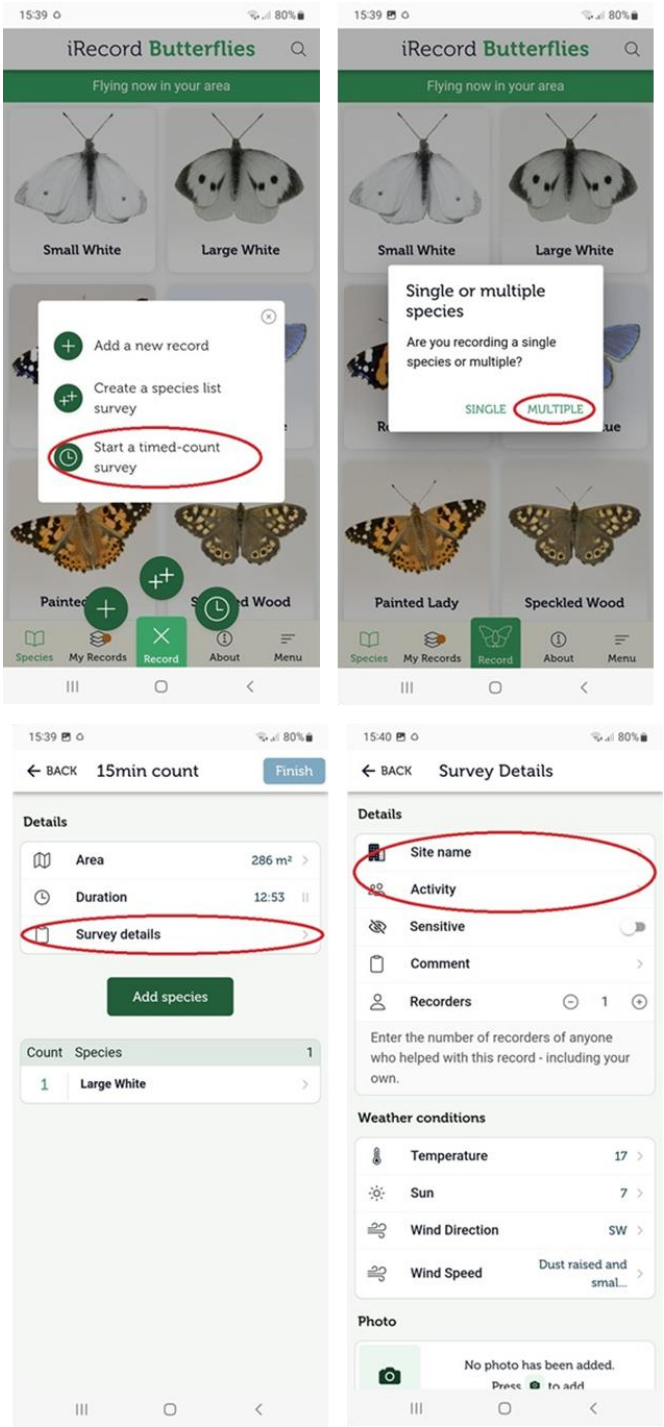
The free iRecord Butterflies App, has been developed by Butterfly Conservation and UKCEH to aid butterfly recording across the UK, with guides to identification, and links to recorders accounts on the iRecord website https://irecord.org.uk/. This app, which is available in Apple and Android formats, has now been enhanced by a number of features which are aimed at assisting local monitoring projects:

Firstly, there is now an option to carry out a 15-minute multi-species timed count in the UK. While undertaking the count, the app maps the area surveyed and spatially logs each individual butterfly sighting. Thus at the end of the survey, you not only have a record of the types and numbers of each butterfly species seen, but also the precise location of each sighting and the area of land surveyed.

Secondly, this timed-count has been complemented by the ability to set up fixed sites, which means that repeat timed-counts can be assigned to the same identified location. Finally, it is possible for recorders to link these counts to an iRecord Activity, which they can join within the app.

This means it will now be possible for a local project administrator to set up an Activity on the iRecord website and direct local recorders to that activity. The recorders can then use the iRecord Butterflies app to join the project and submit a series of 15-minute counts across a number of sites in the project area.

The project administrator then has access to those data, and would be able to start collating statistics for the project area. With sufficient survey effort, it should be possible to compile meaningful figures for frequency, distribution, occupancy, relative abundance and encounter rate for a well-supported project activity.



Screenshots from the iRecord Butterflies App, showing how to set up a multi-species timed-count. Once the count is completed, you will be able to complete the survey details which allows you to use a standard Site Name for repeat visits to the same locality, and to submit your count to the relevant Activity for your local project.

7. Understanding the results

Results from your surveys will need to be examined within the context of how the data were collected and the initial objectives you set out for your project. Hopefully you will have designed your surveys at the outset of the project with this in mind, and you understand the type of data you are collecting.

We find that a couple of factors are most easily and often misunderstood by short-term projects when looking at small butterfly datasets.

Firstly, one of the key considerations that needs to be taken into account is the spread of recording effort. If you are comparing counts across different sites, or from year to year, you should ask yourself "*was the recording effort consistent or do you need to make some adjustments in order to make a fair comparison?*".

It might look good for publicity purposes to say that the number of butterflies has increased by 80% since last year, but if that is simply a result of carrying out twice as many surveys then you are giving a very misleading picture!

Assuming you have achieved a consistent level of recording across monitored sites, the fairest way to start looking at the data (in terms of relative abundance) is to consider the encounter rate – that is the number of butterflies seen 'per visit' or 'per hour' of recording effort. This is fairly simple to calculate if 15-minute counts have been utilised. With sufficient sites and frequent visits, you can also see how relative abundance changes across the season.

EXAMPLE

This hypothetical example shows results for a common butterfly species (Meadow Brown) recorded across ten sites within a community project area. The project was designed around 15-minute surveys being conducted at each site every three to four weeks from May through to September.

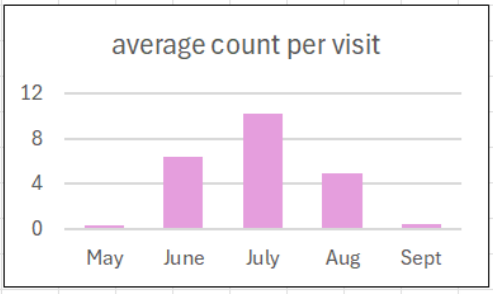
	May				June				July				August				September				total
North Meadow		0				16			30				18			8				1	73
Parish Field	0				2						9				3				0		14
Rough Common			2				6			10			4				2				24
Parsons Copse		0			0			0				0			0			0			0
Green Park	0			1		2			6		6			3			1			0	19
New Plantation			0				2				1				0				0		3
Town Gardens	0				3					14			6			3				0	26
Nature Trail		0				8			24			15			9				1		57
Wild Heath				0					4			2			1			0			7
South Hill	0				9			22			12			4						0	47
no. of counts	4	3	2	2	4	3	2	2	4	2	4	3	3	2	5	2	2	2	3	4	58

All sites managed at least 5 visits, with a total of 58 counts across the season:

- Meadow Browns were recorded at 9 of the 10 sites, giving an occupancy of 90%.
- Meadow Browns were recorded during 37 of the 58 counts, giving a frequency of 64%.
- A total of 270 Meadow Browns were recorded across the 58 visits, giving an average abundance of 4.66 butterflies per visit (or 18.6 per hour).

Only a minority of sites were counted each week (ranging from 2 to 5), so weekly analysis would not be appropriate. But the number of counts per month ranged from 11 to 13, with each site being visited at least once per month, so some monthly analysis could be useful:

	May	June	July	Aug	Sept
no. of counts	11	11	13	12	11
positive counts	2	9	12	10	4
frequency	18%	82%	92%	83%	36%
total seen	3	70	133	59	5
average per visit	0.273	6.364	10.23	4.917	0.455



Although you can get a reasonable sense of which sites hold the strongest populations of Meadow Brown, making direct comparisons between sites based on these data could be troublesome. For example, the peak of the flight period was likely around late-June/early-July, but no count was conducted at Parish Field during this time, so the relative abundance for that site may be underestimated in comparison to other sites.

Secondly, when it comes to comparing data across different years, it's important to remember (as noted earlier in this document) that butterfly numbers can vary greatly from one year to the next in response to seasonal weather patterns. Therefore, it is important to view your own results within that context. A short-term increase or decrease in butterfly numbers across your project area may not be directly attributed to changes in habitat quality.

It is advisable to get a broader understanding of how butterfly numbers have been affected by the weather – either nationally or in your local area. One way to do this is to keep an eye out for the results of the Big Butterfly Count which is organised by Butterfly Conservation each summer. The results of this national citizen science survey give a very good indication of how well our most common butterflies have done compared to the previous year's counts. These results are usually publicised at the end of the summer and are based on thousands of 15-minute counts across the country.

More comprehensive year-on-year abundance trends for all our species are published by the UKBMS at the end of the following March. These will show long-term trends and 10-year trends as well as the percentage change for each species from the previous year. Looking at your project data, you can check to see if the changes in relative abundance that you've identified are in line with national trends, or if they show a different picture.

8. Conclusions

The monitoring of butterflies can be a deeply rewarding activity, and the data generated can be incredibly valuable for understanding biodiversity on a local, regional and national scale.

There are some well-established methodologies for monitoring butterflies in a reliable scientific way, which have been contributing to a national monitoring scheme since the 1970s. The results of this scheme are recognized as official statistics and contribute to government biodiversity indicators.

Butterflies respond rapidly to environmental change, which makes them highly valuable subjects for monitoring studies. However, the short-term variability in numbers that results from this sensitivity also means that careful interpretation of the results is required.

The methods employed to monitor butterflies on a local scale will depend on the scale of resources available. Adopting traditional transects on key sites, which would enable contributions to the UKBMS, may be desirable. However, there are now less intensive options available.

This guidance highlights the potential value of 15-minute multi-species counts for local monitoring projects. Development of the iRecord Butterflies App now allows these counts to be collated in a semi-structured way, and our guidance gives an example of how the data collected might be understood and interpreted.