

Butterfly Transect Counts

Manual to Monitor Butterflies



Butterfly Transect Counts

Preferred citation

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Aricia artaxerxes



Introduction

Monitoring butterfly populations is an important method for measuring changes in the environment as well as the state of habitats for biodiversity. It is also a useful way that both professional ecologists and volunteers can contribute to the conservation of butterflies and other biodiversity. This manual describes how to set up butterfly monitoring by transect, do the counts and report on them.

Butterfly Transect Counts are the main sampling method of Butterfly Monitoring Schemes (BMSs). Since the creation of this method by Ernie Pollard in the United Kingdom in 1973 (UK) (for full details of the development of the method, see Pollard and Yates, 1993) it has grown in popularity, particularly in the last decade. Transect counts, also known as Pollard walks, are fixed-routes where butterflies are recorded following easy rules, on a regular basis (ideally weekly) and during good weather conditions. The simplicity of transect counting and the generation of robust data are key to the popularity of the method and its adoption by countries throughout Europe.

Butterfly monitoring makes it possible to assess trends in butterfly populations, and to update these on an ongoing, annual, basis. This allows us to track population changes at a local scale as well as across a region, country and even at the European scale. These trends can be used as indicators of the status of biodiversity and to understand the impacts of environmental change. In this way, the Butterfly Monitoring provides regular, standardised data to assess the conservation status of butterflies and produce Butterfly indicators that can inform European environmental and agricultural policies.

When establishing a transect, the route should be selected carefully to enable reliable comparisons of butterfly numbers between years. Transects are typically about 1km long and divided into sections that correspond to different habitat areas or separate components of a site. The transect is ideally walked every week during the butterfly season, counting numbers seen within an imaginary box 5m wide, 5m high and 5m ahead of the observer. Transect walks over a season can be shared between different recorders.

The Butterfly Transect method requires a regular commitment, with walks ideally made on a weekly basis. The method is not always ideal for surveying species that are difficult to see (e.g. arboreal species) or species that occur in remote locations. In these situations, other methods can be more appropriate for monitoring, for example counting other butterfly stages (eggs or larvae) or conducting 15-min counts.

This manual describes the information needed to set up a butterfly transect. Monitoring butterflies is an interesting and fun way to learn about butterflies and contribute to their conservation.



Transect method

In brief, a transect is a **fixed route** established at a site where butterflies are recorded, weekly, over a number of years following some basic rules. The majority of transects are chosen by the walker and they decide which route to choose. Some schemes provide advice about areas to record to get even coverage of land cover/ habitat types as well as ensuring that a good range of the species present in a country are sufficiently monitored.

Period of the year and frequency

Butterfly Monitoring is done during the **butterfly season**. Depending on which region of Europe you are in, this period will be longer or shorter. In the bulk of Western, Central and Eastern Europe the butterfly season normally starts at the beginning of April and runs until the end of September. In Southern Europe, the season starts in March or even in February. In northern areas, or in mountains, transect counting is typically restricted to between May and August.

Transects have to be walked in reasonable weather conditions when butterflies are active (see below). Ideally, they should be walked **every week**, but if this is not possible, they should be walked **as often as possible**. If you are not able to conduct counts during the full recording period, try to cover the summer months when butterfly abundance is highest and do the visit every two weeks or ten days. If visits are made less frequently (e.g. every three or more weeks) it is far harder to make accurate calculations of butterfly abundance.

Butterfly transects, based on citizen science, have been proven to be an easy and effective method (van Swaay et al., 2008) to monitor the diversity and abundance of butterflies. The method is now used in many countries as a central part of their Butterfly Monitoring Schemes.

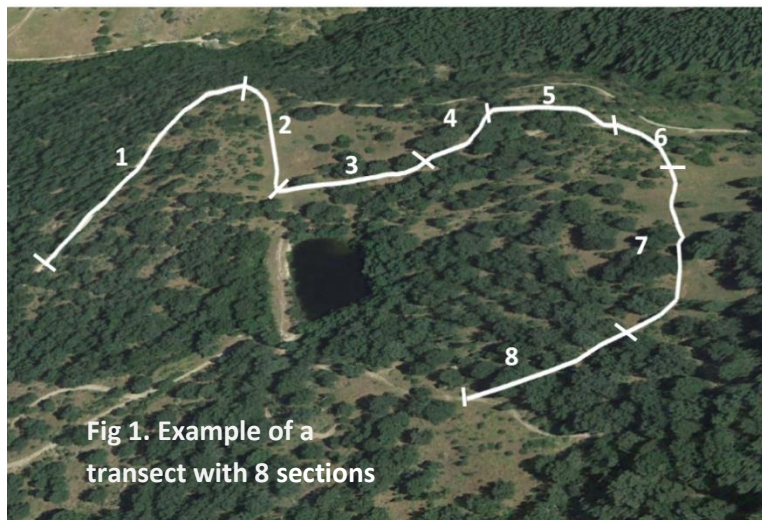


How to design a transect

Where can I do the transect?

Butterfly transects are designed to be an entertaining and pleasant activity to enjoy nature and at the same time improve our knowledge of the status of butterflies. For that reason, we recommend the following:

- **Choose a transect close to your work or home.** This will make it far easier to record and we will get more and better data. The transect should not be a tedious and dull activity that requires a lot of effort. If a transect can be incorporated in your routine, there is a much greater chance that it gets counted for many years. Transects can, for example, be recorded during a lunch break or while walking the dog.
- **If you want to start a transect on an important site,** try to link in with other recorders to share the transects to get good coverage throughout the year. It also provides cover if you go away for a while.
- **Short transects of 1 km, not longer.** A transect of 1 km takes about 45-60 minutes to count in summer when the number of butterflies is highest. For this reason, the length of the total transect in some countries is restricted to 1000m. If the area you want to record is large and you want to sample more area, it is better to split it up into several shorter transects.
- Transect routes are chosen to **monitor different habitat types and land uses** (or management activity) on a site. This provides more diversity to your transect and there is more likelihood to find higher diversity of butterfly species. It is best to include some areas that are good for butterflies and some small areas that are not so good; this combination will help identify the best areas for butterflies and the pressures that are affecting them.



- It is recommended to **divide a transect into sections**. There are two approaches to defining sections:
 - Each section is equal in length (e.g. 50m or 100m)
 - Alternatively, if there are different areas/aspect in your transect (such as a forest, a meadow or a paved path), use these to mark the start and end of a section. Sections should not be over 100 meters in length, if at all possible.

Butterflies are counted separately in each section. The sections makes it easier to keep an overview, process the data and offers extra possibilities to analyse the results. In some countries (e.g. Germany and Netherlands) the section length is fixed to 50m but in other countries the sections vary in length in relations to habitat units (e.g. United Kingdom and Spain).

Whatever you choose, the section lengths should be known and this can be done by entering the transect on Google Maps/Google Earth to measure the length of each section, or setup directly in the European Butterfly Monitoring Scheme (eBMS) website (for more details, see: *Submitting your counts*).

- **Consult your scheme co-ordinator before finalising your transect.** They should be able to give some useful advice and help determine the final route and the different sections.



Setting up your transect

- When you decide the place to set up the transect, **be sure to recognise the sections of the transect by landmarks.** This is convenient for yourself and also helps anyone else who might do the transect. Try to use natural landmarks such as poles, prominent trees or other artificial landmarks (e.g. fences or paths) as starting points for each section. If possible, mark the start and end of each section on a detailed map and by GPS (often available on modern smartphones). They can also be marked on the ground with small posts or ribbon.
- **Try to take pictures of the sections** and enter them in the description of the transect. It will help to recognise the landmarks and also the different habitats present.
- To ensure your safety, **explore the area before you set up your transect**, in order to identify any hazards or risks. Also, check if the area has a private landowner and whether you should ask for permission.
- **Draw the transect on a map.** When the transect is already supervised by an expert or coordinator, you can register your transect on the European Butterfly Monitoring Scheme website (<https://butterfly-monitoring.net>). Create your own transect with different sections, the website will measure the exact length of each section and the complete transect

A few conditions to follow

Time and Weather Conditions

To make standardised counts of adult butterflies, the weather conditions must be suitable for butterfly activity.

- Time:** Butterflies are more active in the **central hours of the day** when the sun warms up and allows for the flight of butterflies. That usually means between 3.5 hours before and 3.5 hours after the sun is at its highest point. The best moment for counts depends on where you are in your time zone.
 In the United Kingdom, counts are best made between 10.30h and 16.30h summertime, in the Netherlands between 10.00h and 17.00h, further east in the Central European Time-zone between 9.30h and 16.30h will be best and in the South of Europe between 9.30h and 17.00h. Under exceptionally hot situations these times can be extended with an extra hour on both sides and in some areas, the central hours of highest temperatures should be avoided in the summer.
- Temperature:** Only count when the air temperature is **13°C** or higher. Between 13 and 17°C it is important that it is sunny with a cloud cover of 50% or less. At temperatures of 18°C or more it is also permissible to count with a higher cloud cover. Try to measure the temperature with a portable thermometer, with a smartphone or from a meteorological website of your region.
- Cloud Cover:** do an estimation of the clouds that cover the sky in rough percentage (%).
- Wind:** it should be 5 or lower on the Beaufort scale (called a fresh breeze), which is when the branches of a moderate size move and small trees in leaf begin to sway.

Beaufort Scale









Beaufort number	Wind Speed (mph)	Seaman's term		Effects on land
0	Under 1	Calm		Calm smoke rises vertically
1	1 - 3	Light Air		Smoke drift indicates wind direction; vanes do not move
2	4 - 7	Light Breeze		Wind felt on face; leaves rustle; vanes begin to move
3	8 - 12	Gentle Breeze		Leaves, small twigs in constant motion; light flags extended
4	13 - 18	Moderate Breeze		Dust, leaves and loose paper raised up; small branches move
5	19 - 24	Fresh Breeze		Small trees begin to sway
6	25 - 31	Strong Breeze		Large branches of trees in motion; whistling heard in wires
7	32 - 38	Moderate Gale		Whole trees in motion; resistance felt in walking against the wind

Fig. 2. Beaufort scale for measuring the wind

In general, count when the weather is nice and pleasant and the butterflies are active!



How to count

- Walk your transect at a steady and a constant speed.
- Count the number of individual butterflies of each species seen inside of an **imaginary box** - 2.5m each side and 5m in front and above you (see figure 3). Write down the number of each species seen per section in the field sheet.
- You may stop (e.g. to identify a butterfly, take a picture), but **do not count when you are stationary**, or when looking behind. This will boost the numbers of butterflies seen in a non-standard way.
- Write down the number of butterflies per species on a field sheet, a notebook or also an app on many smartphones (see the field sheet example)

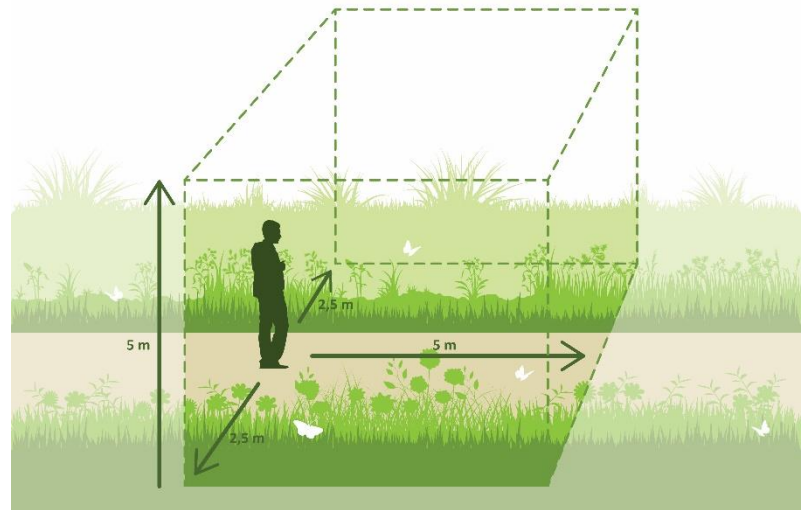


Fig. 3. Imaginary box to count butterflies (5m x 5m x 5m)




Be safe!

- Be aware of climate conditions: bring water, suitable clothes and in case of hot weather protect your skin and the head with a hat.
- Say to somebody where you are going and try to bring your mobile phone.
- Depending on the area, be careful with ticks or other animal that may cause diseases.

How to fill in the field sheet

It is best to use a field sheet or notebook to write down all butterfly records and notes during your transect. We include an example of a field sheet on the next page.

- **Before starting to count:** fill in the name of the transect, the name of the walker, date of the visit and the start time. Next, record the weather conditions: temperature, cloud cover and wind strength on the Beaufort scale.
- **Time to count butterflies:** while you walk, write down every butterfly species per section. In the column of species, write the butterfly Latin name or common name and in the section part, the number of individuals seen*. For each row of the field sheet you should enter a species detected in one of the sections. It is not necessary to fill it in another row, if this butterfly has already been registered in that section. It is recommended to write down the number of butterflies of each species with "marks of content" or "sticks" of five in five (eg III = 3 seen,  = 5 seen).
- * In situations with a large number of individuals that are challenging to count, give your best estimate of the number present. We do not recommend number ranges as these are complex to analyse.
- **Notes:** write anything you consider important like the gender of individuals or rare species, or any other characteristics. You can also mention other animals seen during your transect such as diurnal moths or bumblebees. It is important to make a note if something in the section has changed (vegetation mowed, fertiliser applied, rubbish accumulation...) that could have an impact on the population of any butterfly species present.
- **Finalise the transect:** when you finish the transect, write down the final time and the weather conditions (temperature, cloud cover and wind scale). Also, sum all the individuals seen per species.

The field sheet could be written in an excel sheet and sent to your coordinator or you can input transect records directly on the eBMS website (see description in the following section: *Submitting your counts*).



Example of a Field Sheet

BUTTERFLY MONITORING SCHEME

FIELD SHEET

TRANSECT NAME OBSERVER

DATE WEEK START TIME END TIME

START/ END TEMP / START / END WIND SPEED /
(°C) BEAUFORT SCALE

AVERAGE TEMP AVERAGE WIND SPEED
(°C) BEAUFORT SCALE

BEAUFORT SCALE: 0 - Calm, smoke rises vertically; 1 - Smoke drift indicates wind direction, still wind vanes; 2 - Wind felt on face, leaves rustle, vanes begin to move; 3 - Leaves and small twigs constantly moving, light flags extended; 4 - Dust, leaves, and loose paper lifted, small tree branches move; 5 - Small trees in leaf begin to sway

SECTIONS

[illegible]

Average cloud cover

[illegible]

NOTES:

Submitting your counts

Combining counts into a central database is vital to calculate butterfly population trends by regions and countries. These trend-calculations and other analyses help to improve our knowledge of butterflies and to produce butterfly indicators. The data can also be used to help improve land use policies and assess the impact of environmental change, including climate change.

eBMS – European Butterfly Monitoring Scheme



If your country/region has an existing monitoring scheme, we recommend that you use the national system. For existing schemes in Europe, refer to [the list](#) at the end of this manual.

For new schemes, we recommend the use of the online eBMS system. eBMS is a central online website with a high-quality and automated data entry system. It can be accessed at www.butterfly-monitoring.net. This system enables us to collect butterfly counts efficiently and store them in a systematic way in a central database. In 2019, combining data from established national schemes with data entered using the eBMS online system, eBMS has so far collated data from 17 Butterfly Monitoring Scheme across Europe, totalling almost 3.9 million standardized butterfly counts from more than 4000 transects the majority done by volunteers.

How to submit the data to eBMS website: Quick Guide

These are the simple steps to get you started with entering data on the eBMS online system.

1. [Register](#) for an account in the eBMS website. You will receive a confirmation email of your account.
2. Go to '[My Sites](#)' to setup new transect routes, or review the details of existing ones. Here you will draw your transect by sections and include its details. This only needs to be done once.
3. Go to '[My Walks](#)' to enter the data for each sampling visit for your transect routes. Here you will input the visits made in your transect writing the species and weather conditions.
4. Go to '[Annual Summary](#)' to review and download your butterfly data, and to see what's been entered for other transects in the system.



If the process to set up a transect in eBMS is not clear, we suggest you look at the more detailed [eBMS Guide](#) which has step-by-step instructions for key parts of the system.

By helping to count butterflies, you will join one of the biggest natural history citizen science projects in the world and make a valuable contribution to the conservation of butterflies and our environment. Become a citizen scientist counting butterflies!

Submit data with the eBMS app: ButterflyCount

Butterfly Counts App enables you to contribute to butterfly conservation by providing important information on where different species occur and the abundances in different places across Europe. Contribute with your counts of butterfly species alongside accurate location information, added via a dynamic map or via GPS acquired route information. You can add photos to support your observations.



This free resource makes it easy to keep track of what you see, while making your data openly available for scientific research, education and conservation. More information: <https://butterfly-monitoring.net/ebms-app>

What options does the application give?

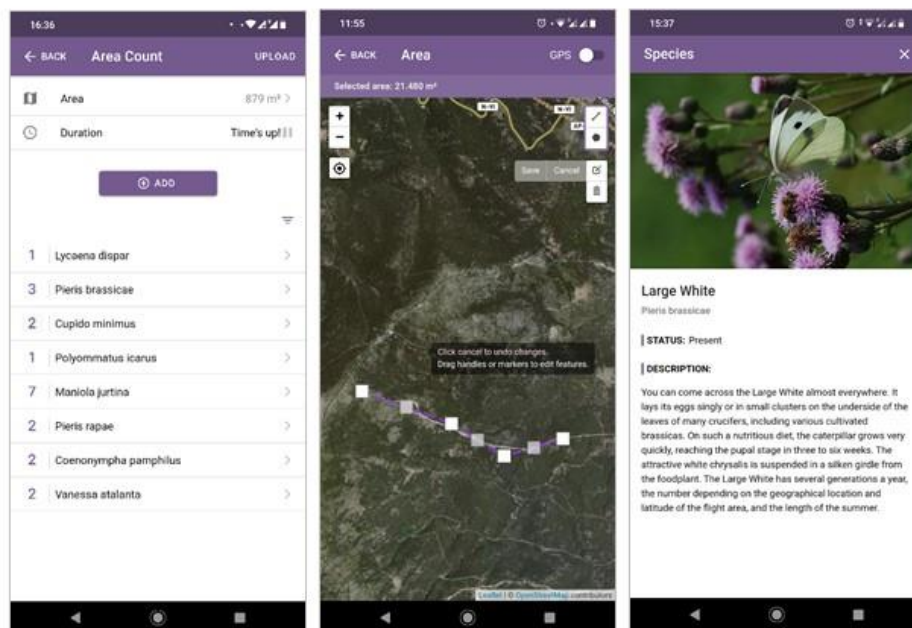
- Make visits to your **eBMS transects** directly with the app. You just need to log in on the app with your eBMS account (if your BMS registers transect on eBMS website)

- **15-minute Counts**: counting butterflies during 15 minutes wherever and whenever you want

- 15-minute Single Species Count: the same methodology applied to register one species; useful for threatened or protected species

- Small **Picture guide** with photos of species per country

- Possibility of registering butterflies, moths, bumblebees and dragonflies from Europe in the species list (need to be selected in the settings)



Existing Butterfly Monitoring Scheme

If you are in a country or region where there is a Butterfly Monitoring Scheme please contact the coordinator for the best way to submit your data. In some countries this is done online, in other countries there is a computer program or you have to enter your data on an Excel sheet or on paper. Check [the list](#) of National Butterfly Monitoring Schemes in Europe to find the contact information. On the European Butterfly Monitoring Scheme website (<https://butterfly-monitoring.net/partners-ebms>) you could find more information of the schemes and the contact information of the scheme coordinators.

Other countries

If you do your transects in a place where there is no Butterfly Monitoring Scheme yet, we advise you to enter your records in the online European Butterfly Monitoring Scheme webpage that can be reached via www.butterfly-monitoring.net. Your counts will be used for European wide indicators, such as the European Grassland Butterfly Indicator and the European Butterfly Climate Change Indicator, produced by Butterfly Conservation Europe and published by the European Environment Agency. Furthermore, as soon as a butterfly monitoring scheme starts up in your country or region, your data will be made available to it.

If you would like to set up a BMS in your country, please contact us at European Butterfly Monitoring Scheme via ebms@ceh.ac.uk and we will help you do it.



References

35 National Butterfly Monitoring Schemes:

- Austria – AUBMS <https://austrian-butterfly-conservation.jimdosite.com/>
- Austria (Viel-Falter) – VFBMS <https://viel-falter.at/cms/>
- Belgium (Flanders) – BEBMS www.inbo.be/content/page.asp?pid=MON_VL_start
- Bulgaria – BUBMS <https://butterfly-monitoring.net/bg/bulgaria-bms>
- Croatia – HRBMS <https://butterfly-monitoring.net/croatia-bms>
- Cyprus – CyBMS <https://butterfly-monitoring.net/cyprus-bms>
- Czech Republic – CZBMS <http://www.lepidoptera-som.cz/>
- Denmark – DKBMS <https://www.facebook.com/groups/183753780986768>
- Estonia – EEBMS
- Finland – FIBMS www.environment.fi/butterflymonitoring
- France – FRBMS www.vigienature.fr/fr/suivi-temporel-des-rhopaloceres-de-france-sterf
- Germany – DEBMS www.tagfalter-monitoring.de
- Greece (Apollo) – ELBMS www.bc.lab.uoi.gr/el/research/projects/apollo/
- Hungary – HUBMS <https://www.facebook.com/lepimonitoring/>
- Ireland – IRBMS <http://www.biodiversityireland.ie/record-biodiversity/butterfly-monitoring-scheme/>
- Italy – ITBMS <https://sway.office.com/JW6oHbROiA5Xi39G?ref=Link>
- Latvia – LVBMS
- Luxembourg – LUBMS <https://butterfly-monitoring.net/luxembourg-bms>
- Lithuania – LTBMS <https://www.facebook.com/profile.php?id=100071512795756>
- Malta – MABMS <https://butterfly-monitoring.net/malta-bms>
- Norway – NOBMS <https://www.nina.no/V%C3%A5re-fagomr%C3%A5der/Milj%C3%B8overv%C3%A5king-p%C3%A5-land/Humler-og-dagsommerfugler>
- Poland – PLBMS <https://butterfly-monitoring.net/pl/poland-bms>
- Portugal – PTBMS <http://www.tagis.pt/>
- Romania – ROBMS <https://butterfly-monitoring.net/ro/romania-bms>
- Slovakia – SKBMS <https://butterfly-monitoring.net/sk/slovakia-bms>
- Slovenia – SIBMS <https://www.facebook.com/metulji/>
- Spain (Catalonia) – ES-CTBMS <http://www.catalanbms.org/>
- Spain (Zerynthia) – ES-CBBMS <https://www.asociacion-zerynthia.org/seguimiento-diurnas>
- Spain (excl. Catalonia, Zerynthia) – ESBMS <http://www.catalanbms.org/ca/xarxa/>
- Sweden – SEBMS <http://www.dagfjarilar.lu.se/>

Switzerland (BDM) – CHBMS <https://www.biodiversitymonitoring.ch/index.php/de/>

Switzerland (volunteers basis) – CHBMS <https://www.swiss-butterfly-monitoring.ch/home>

The Netherlands - NLBMS <https://www.vlinderstichting.nl/wat-wij-doen/meetnetten/landelijk-meetnet-vlinders/vragen-meetnet-vlinders>

UK – UKBMS www.ukbms.org

Turkey – TUBMS <https://butterfly-monitoring.net/tr/node/124>

An overview of the National Butterfly Monitoring Schemes and other countries and collaborators with butterfly monitoring could be found in the [eBMS website](#).

Selected Literature:

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

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