Manual Data Entry Moth Monitoring - eBMS

INTRODUCTION

There are many ways to attract moths (e.g. with a lamp and a sheet or with wine ropes), but most of these methods are hard to standardise, making it difficult to compare the results of different locations, or calculate trends over time.
We can solve most of these issues by:

- *Using a light trap*: moths are attracted to the light and can be counted in a standardised way.
- *Using the same trap each time*: using the same light and trap type make possible to interpret the results throughout the year and from year to year. Differences in the number of moths inside the traps will be caused by changes in the number of moths around the trap, not by differences between recorders, lamps, the recipe of wine ropes, etc.
- *Let the trap work from sunset to sunrise*: Some moth species are more active in the first part of the night, when others more in the last part. By letting the trap run for the whole night, we avoid only counting a subset of the species.

Monitoring via moth traps

Any moth trap, that can be operated on a regular basis, can be used for moth monitoring. Of course, stronger lights (often needing a 220V outlet) will attract more moths than weaker lamps, as e.g., LED's. LED traps have the advantage of being portable, easy to carry (light), relatively cheap and having a low energy-consumption, so a power bank can be enough to keep them running for several nights. Therefore, you can run the trap also on remote locations. Ideally the trap will switch on and off at dusk or dawn, so you don't have to stay near the traps.

LED trap of Vlinderstichting (NL)

This LED trap has been designed following the upper arguments to monitor moths in a standardise way in the whole of Europe and beyond. This LED trap is based on a plastic bucket, with a funnel with an entrance hole for the moths, three plastic plate-glass and in the middle the lid of **LED lights (Ledstrip 395-405 SDM 2835).** The light energy source is a power bank that normally last for two nights (normal use) and connected to a sensor turning on the LED lights. This allows us to leave the trap before sunset and save energy in the sunrise.

More instructions on placing this LED trap on the field **here (pdf in English).**

COLLECTING MOTH MONITORING DATA ON EBMS

The European Butterfly Monitoring Scheme (eBMS) made possible the registration of the moth traps in order to get standardised monitoring moth data, with the possibility to insert, visualize, edit and download data by the user and coordinators. Any trap can be registered on eBMS if the type of light and trap is specified and also, if the **survey time is specified for every night**.

> To register Moth trap monitor the trap type and light and time and date

Data-entry is possible via the eBMS website or ButterflyCount app:

- eBMS website is www.butterfly-monitoring.net, available in several languages.
- The ButterflyCount app (connected to the website) free to download:
  - For Apple devices (iPhones, iPads) - https://apps.apple.com/ie/app/ebms/id1461711373
  - For Android devices - https://play.google.com/store/apps/details?id=uk.ac.ceh.ebms&hl=en_GB

This manual will show you every step on two ways, through the website and the app.

1. Register an account on eBMS

Before the first count, you have to register an account on eBMS, you can do it through the website or the app. The account will be the same for both, eBMS website and app are connected. Please check your email after registration to activate your account clicking on the link sent.

➔ *Website: Page on the website to register a new account http://www.butterfly-monitoring.net/user/login, click on "Log in" button on the top-right and then on "Create new account" in the bottom part (orange arrow). Fill the required fields and register your account.*

➔ *App: Download the app, open it and go to the left button "Menu" (arrow) and then on Register (square). Fill the fields and click on register.*
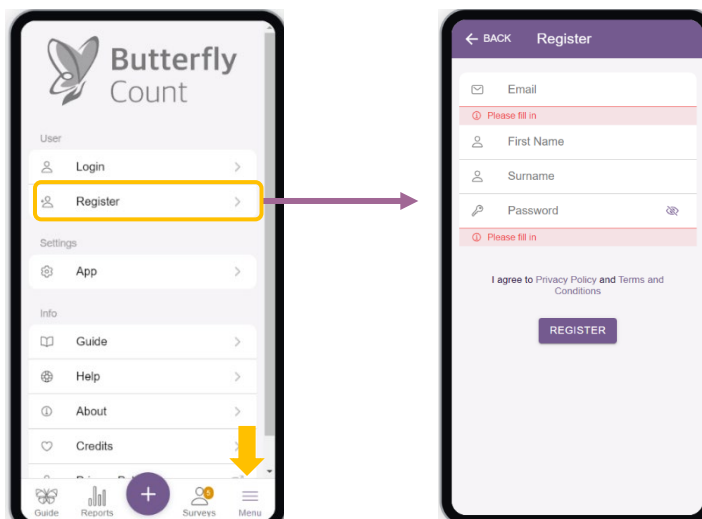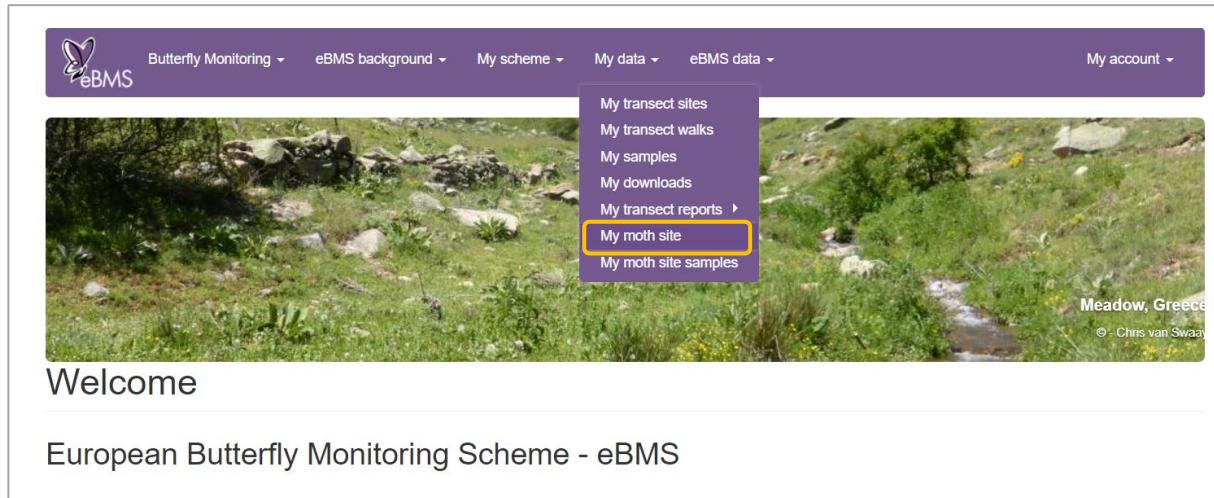

Remember to activate your account with the link sent to your email
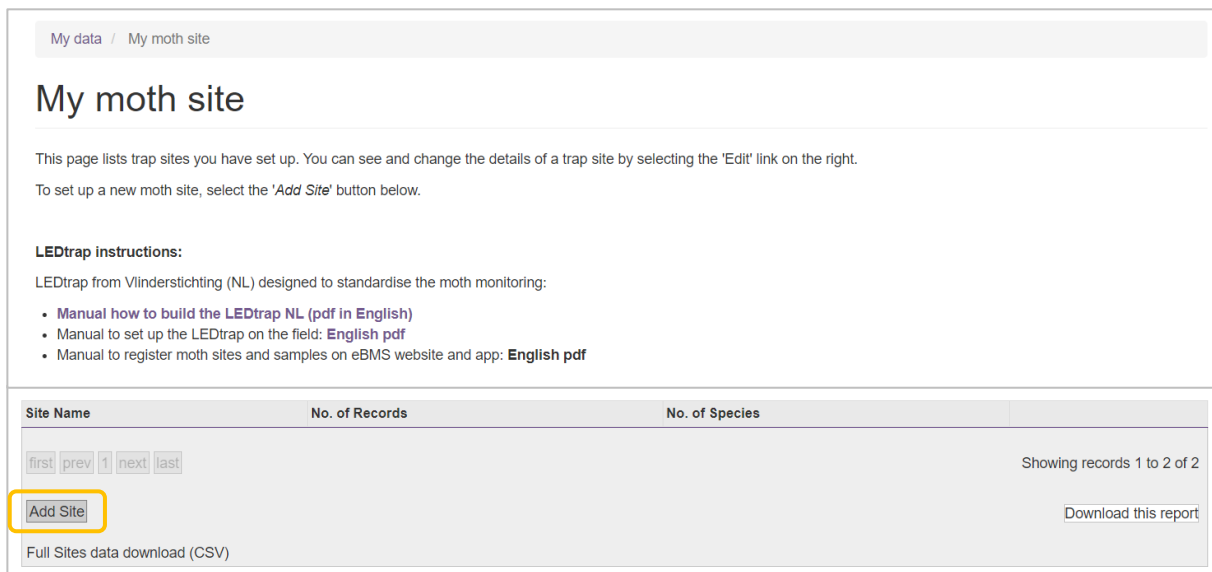
2. *Register your trap*

After activating your eBMS account, you can already start registering data.

It is important to know the exact location of the trap as well as what type of trap and lamp is used.

➔ **Website**: *Log in and go to <u>My moth site</u> page under My data.*

There, click on "Add Site" in the bottom to create <u>a new moth site with the trap details</u> you will use.

*Fill the fields of Country, Location name, and the spatial reference. **Important to register the type of trap using in this moth site and the Lamp type** (type of light). Finally, click on Submit for registering your moth site. <u>Dutch LED trap are LED funnel trap and Ledstrip 395-405 SDM 2835.</u>*

➔ **App**: *click longer the centre purple button (+) and select moth survey (SPRING). Once inside the moth survey, select Moth trap to select the trap already register or register a new one.*
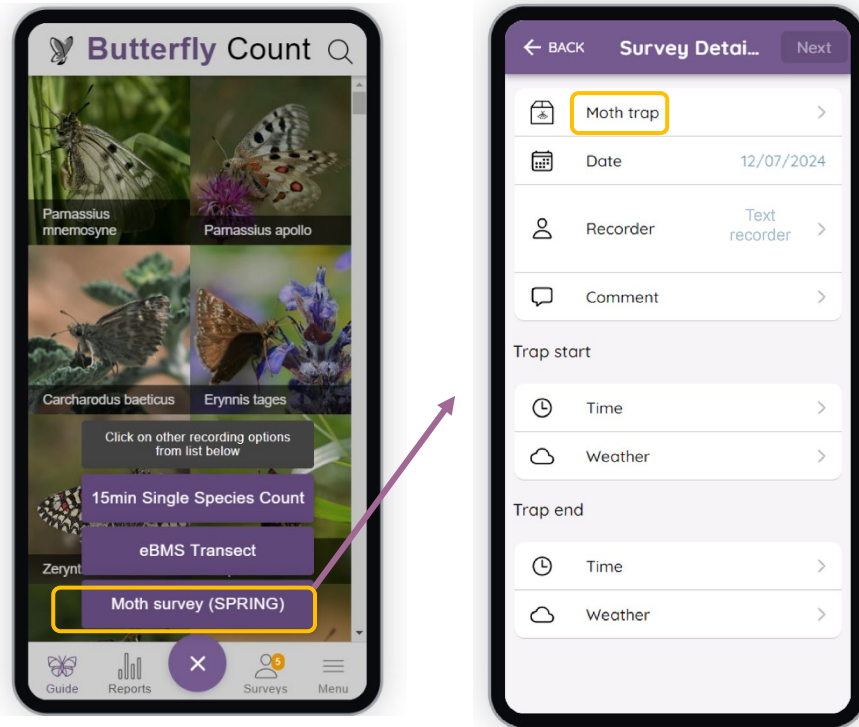
In the next page after clicking on Moth trap, click on the button Add *to create a new trap. Click on* Location *to set up the place; allow to use your GPS to select the trap on your current place or select a place on the map to determine the location of your trap. Like on the website, determine a name to your moth site under Location. Then click on* Type *to select the type of trap and lamp used. When everything is completed the Save button will be active to save your moth site; click on the Save button on the upper part.*
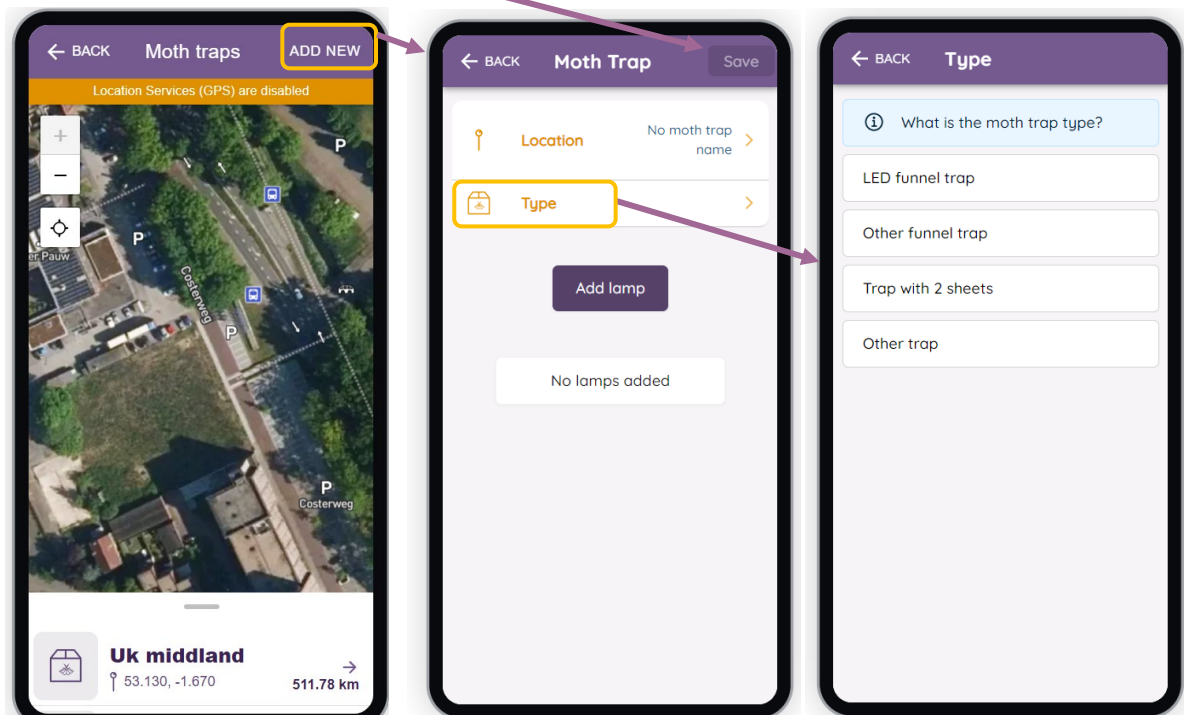
MAKING COUNTS TO YOUR MOTH SITE

Once the moth site is registered with the trap type, you can start entering samples to your moth site.
Put the trap out during daytime (at least before it gets dark). Leave a few egg-boxes in the trap, the moths will hide between them. It is best <u>to empty the traps as early as possible after sunrise.</u> Once the sun shines on the traps, they warm up and the moths can get more and more active, making it difficult to identify and count them.

❖ *Check out the guidelines "[Manual to setup the LED trap on the field](#)", available in other languages on [Method page](#).*

Most moths are normally inside the trap, but sometimes there are moths sitting on the trap. A favourite spot is directly under the edge of the bucket. Both the moths on the trap and the ones inside the trap will be counted separately. Only count the moths outside the trap which are still sitting on the trap. A moth counts as inside the trap when it went through the funnel.

3. Record your moth visit

Depending on your preferences and your moth-id skills, there are several options to record the results:

1. You are familiar with the species and can identify most of them directly at the trap

➔ ***App - Directly in the field with the app:*** you can write down the moth species and abundances directly in the ButterflyCount app, the easiest way is to enter the moth names.

Press long on the middle purple button and select Moth Survey (SPRING).

-First: Select the trap previously registered, check the Date, Recorder (by default the account user) and include any Comment if needed.

Time is filled automatically (sunset and sunrise time of your location) and Weather is filled automatically by the closest weather station <u>if there is internet connection.</u> With or without internet, the time and weather variables can be edited.
*Select Weather to fill or edit the environmental variables: Temperature, Wind Direction, Wind Speed, Moon phase and Cloud cover %.*
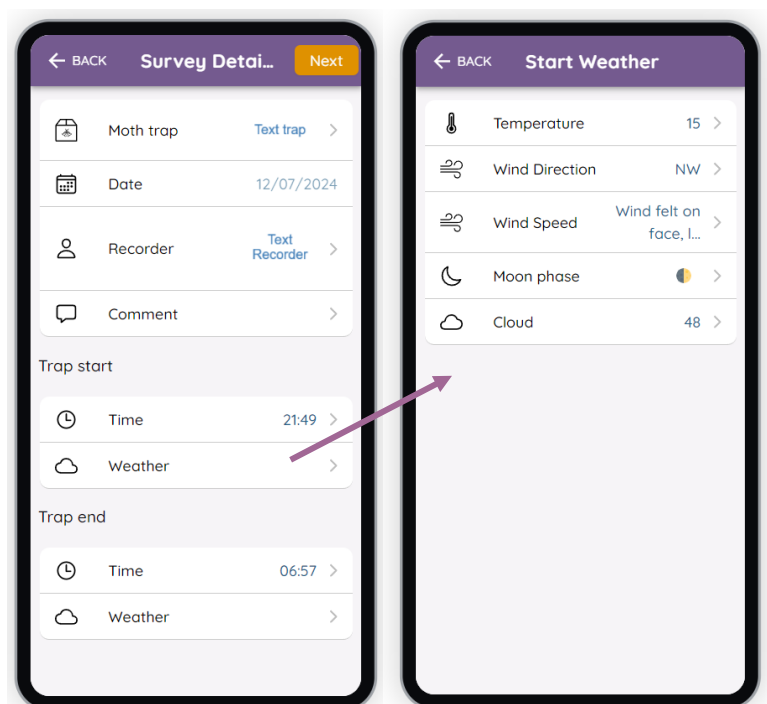
- Second: Click on Next button (upper part) to go to the second page where start writing the name of the moth species. For that, click on "Add Species" and write the moth names of the species seen, search by Scientific name or Common name. You can click on the number on the left to increase the number of individuals of that species.

Always good to take photos of rare or unfamiliar species for later identification.

eBMS allows to enter "**unknown**" species including the correspondence picture.
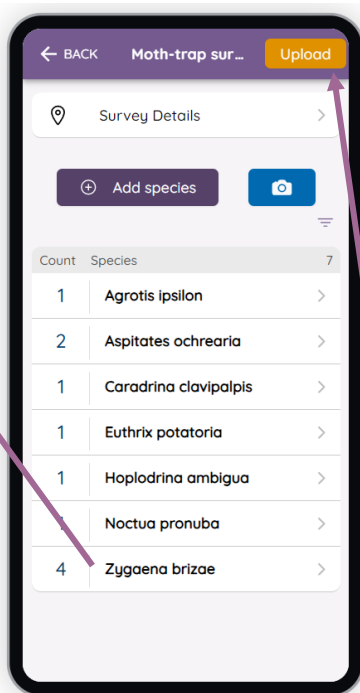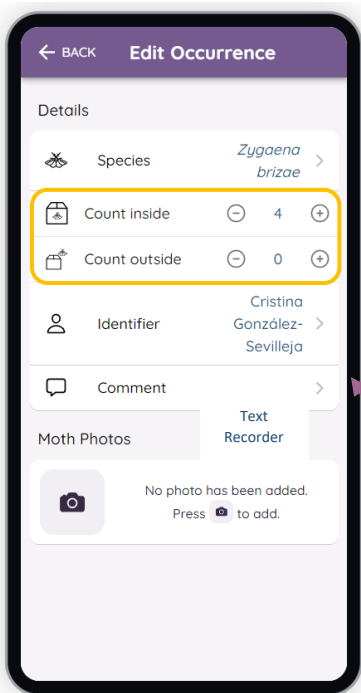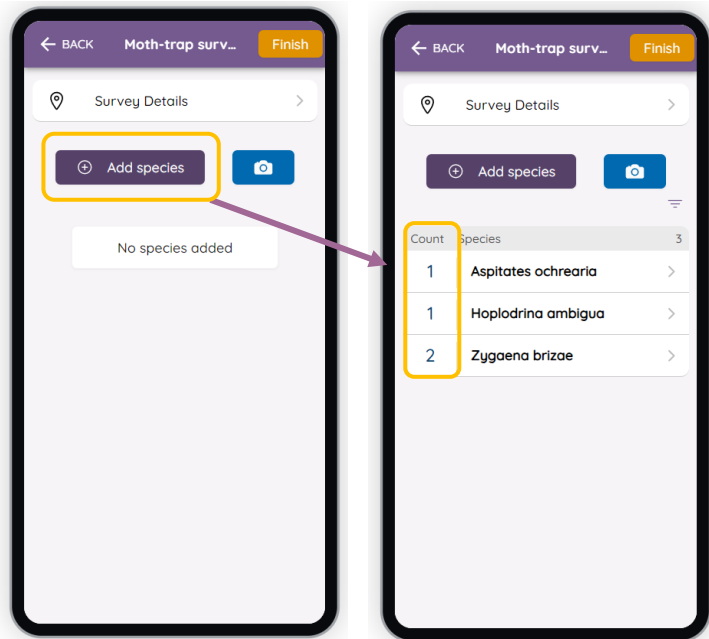
You have the possibility to include the moths seen inside and outside the trap, comment and make photos of the individuals. When all the species are included with their abundances and you check the visit is completed (time and weather variables filled), you can click on "Finish"(upper button) to finish the survey. This button will turn into "Upload" to send the visit to the database, you will need internet for doing that.

-To Finish: There is a second step, to upload your survey to the database (orange button upper part "Upper"). You can keep your survey in "Pending" without submission until the doubts and final identifications are done. Later you can upload your survey from the app when all records, species and pictures are included and the survey is completed.

All **submitted surveys** from the app can be edited later, but **only through the website**.

When a survey is submitted from the app, it cannot be edited anymore in the app.

***While you keep a survey on pending is only saved on your phone; in case something happens to your phone you will lose this visit. Therefore, as soon as possible submit the visit to the database.

➔ *Later after the survey - Website/app:* you can enter the moth trap visit later at home or at the office, either in the app or via the website. We recommend to make photos of moth species; the photos can be taken by phone to directly charge them on the app or by camera to upload them later on the website.

On the website, go to *My moth site samples*. The calendar year will appear and you just have to click on the day of the visit (the day you set up the trap). Then, the enter visit page will load and you have to select the moth trap (previously registered), all the moth species and abundances and any comment. Like on the app, you can include pictures and individuals inside or outside the trap.

The European moth list is loaded on the eBMS, so automatically the list of species will appear when writing the genus. Just select the correct species.
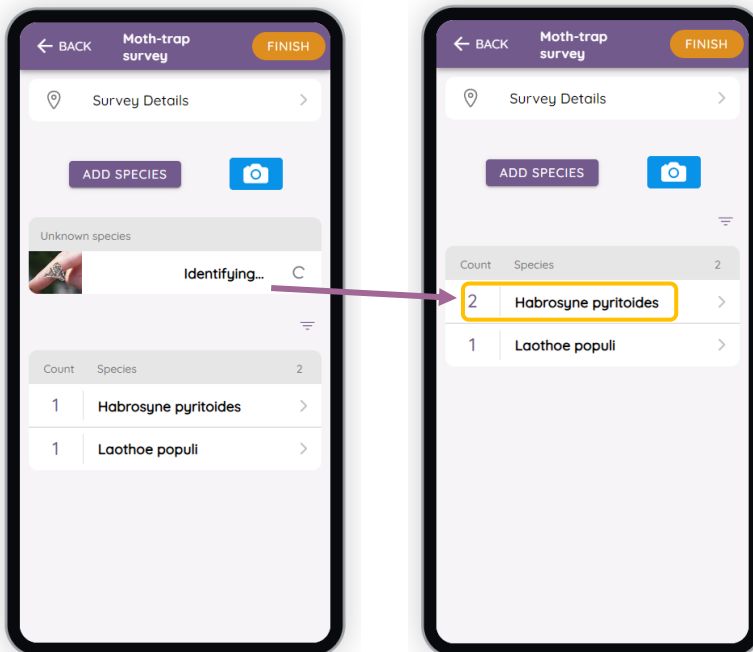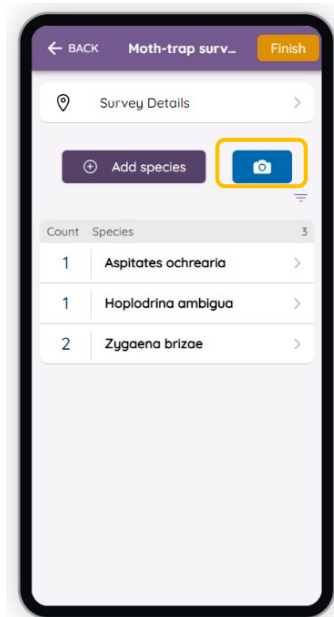

For the app, you can register the trap visit as before mentioned entering all the parameters.

It is good to take photographs of the specimens, certainly if they are rare or unfamiliar species. Photos can be uploaded via the app directly (using data-connection or later via WIFI) or via the website. So, we can also build up a photo database which can help to identify other photo's.

2. You cannot identify (all) moths, The best is to make a photo of each individual. Try to get as close as possible, so the moth picture has a good resolution and proper detail. Be sure that every single individual is only on one single photo.

- *Automatic Identification (AI) *only available on the ButterflyCount app:* Photos can be uploaded via the app directly (using data-connection or later via WIFI) or via the website. As soon as the photo arrives at the server, the moth will be identified by the algorithm of image recognition (based on the database of Observado.org).

How does it work? On the second page of the app, when you enter the species names, there is a camera icon. Click on it to take a picture directly or select from the gallery. You have two options: 1) take a photo by selecting the camera and send them directly for automatic identification or 2) take pictures of all your specimens and upload them all together later by selecting from the gallery. The second option is recommended if there are many individuals. Either way, if you have internet, **the algorithm will start to identify the specimens and produce a list of moth species and abundances based on the photos**. As you see below, a photo is being identifying and then the app rises the number of the individuals if the species is already on the list. If not, the species name will be added with one as abundance.

It is possible that the identifier may not be able to identify all the moths, in which case they will be marked as **'unknown'**. Of course, there can be mistakes, and you can change the name later, either in the app or on the website. As the image recognition has been trained with data from NW Europe, it will probably work best in that region, and not so well in Eastern and Southern Europe. However,

Try to get as close as possible and a good resolution for the photos.

The more photos you take, the more we can "**feed**" the algorithm for correct identification of moths.

photos that are uploaded and identified, either by the recorder or by an expert, will be used to train the image recognition to improve future identifications.

Specimens which cannot be identified to species level can also be entered at family/genus level or with aggregated species for difficult ones. It is also possible to enter micromoths, but this is an extra, as the main focus is on the macromoths. All records will end up on the eBMS website with the photo and will later be uploaded to observation.org to feed the algorithm and improve it (a few times every year).

When the visit is ready, you can click on finish and the survey will be in the Pending page under Surveys on the bottom bar. Click on the button "Upload", when the visit is checked, all records, identification of species and pictures are included and the survey is completed.
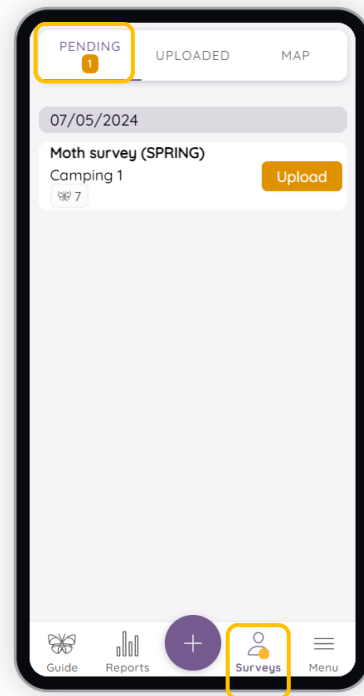
4. Check/Edit your moth trap visit

Your trap visit is submitted to the website, directly on the field, later with good internet connection or directly on the website. In any of the ways, you can see your data and edit it in any case in the page *My samples*. All the data submitted to eBMS (butterfly transects, 15min counts and moth traps) from your account will be visible there.

In this page, you can explore the different submitted surveys. On the right of every survey there are three tools (orange square previous image), the first one is for "View sample details", the second one the loupe is to "Quick view" and the third one is for "Edit sample details". Select any of them for seeing the species and abundances. For editing your species, adding photos, comments or change anything from the trap visit, select "Edit sample details". As described before (page 7), you will enter on the Edit sample page for moth trap and there you could edit, change or add anything of your moth trap visit.