Moth monitoring in EU PoMS

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Dutch Butterfly Conservation

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eBMS

UK Centre for Ecology & Hydrology

Butterfly Conservation

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Dutch Butterfly Conservation

European Commission environment

Importance of moths as pollinators

Butterfly CONSERVATION EUROPE

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Addition of nocturnal pollinators modifies the structure of pollination networks

Yedra García[1,2], Luis Giménez-Benavides[1], José M. Iriondo[1], Carlos Lara-Romero[1✉], Marcos Méndez[1], Javier Morente-López[1,3] & Silvia Santamaría[1]

Although the ecological network approach has substantially contributed to the study of plant-pollinator interactions, current understanding of their functional structure is biased towards diurnal pollinators. Nocturnal pollinators have been systematically ignored despite the publication of several studies that have tried to alleviate this diurnal bias. Here, we explored whether adding this neglected group of pollinators had a relevant effect on the overall architecture of three high mountain plant-pollinator networks. Including nocturnal moth pollinators modified network properties by decreasing total connectivity, connectance, nestedness and robustness to plant extinction; and increasing web asymmetry and modularity. Nocturnal moths were not preferentially connected to the most linked plants of the networks, and they were grouped into a specific "night" module in only one of the three

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Helen Hipperson[2]

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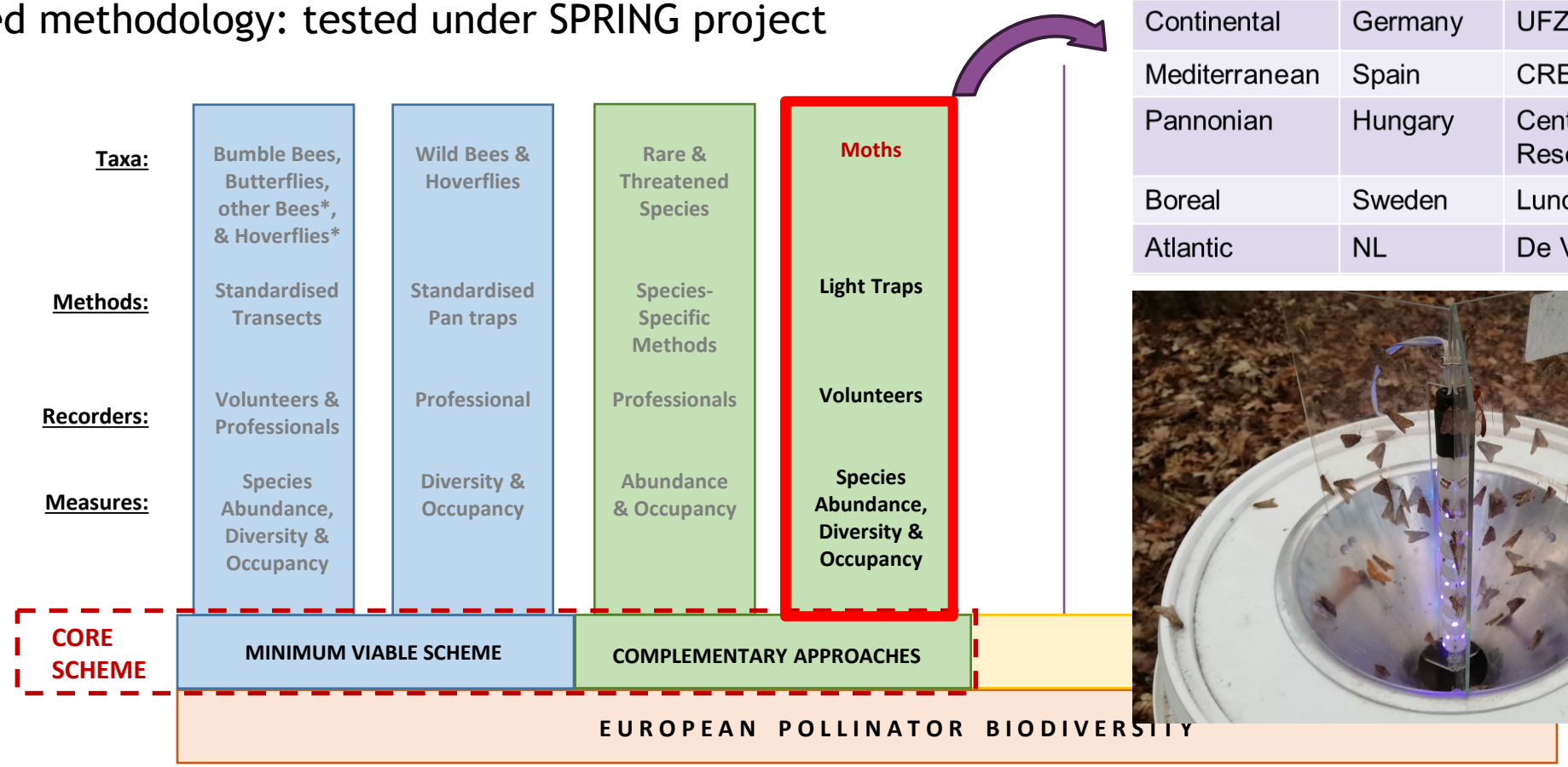
[4], Yoko L. Dupont[1],

ss and climate change, and cities be particularly vulnerable. The orks remain poorly understood, and comparative studies of taxa with divergent niches are lacking. Here, for the first time, we simultaneously compare nocturnal moth and diurnal bee pollen-

s, Denmark

Moth monitoring: light traps

Agreed methodology: tested under SPRING project

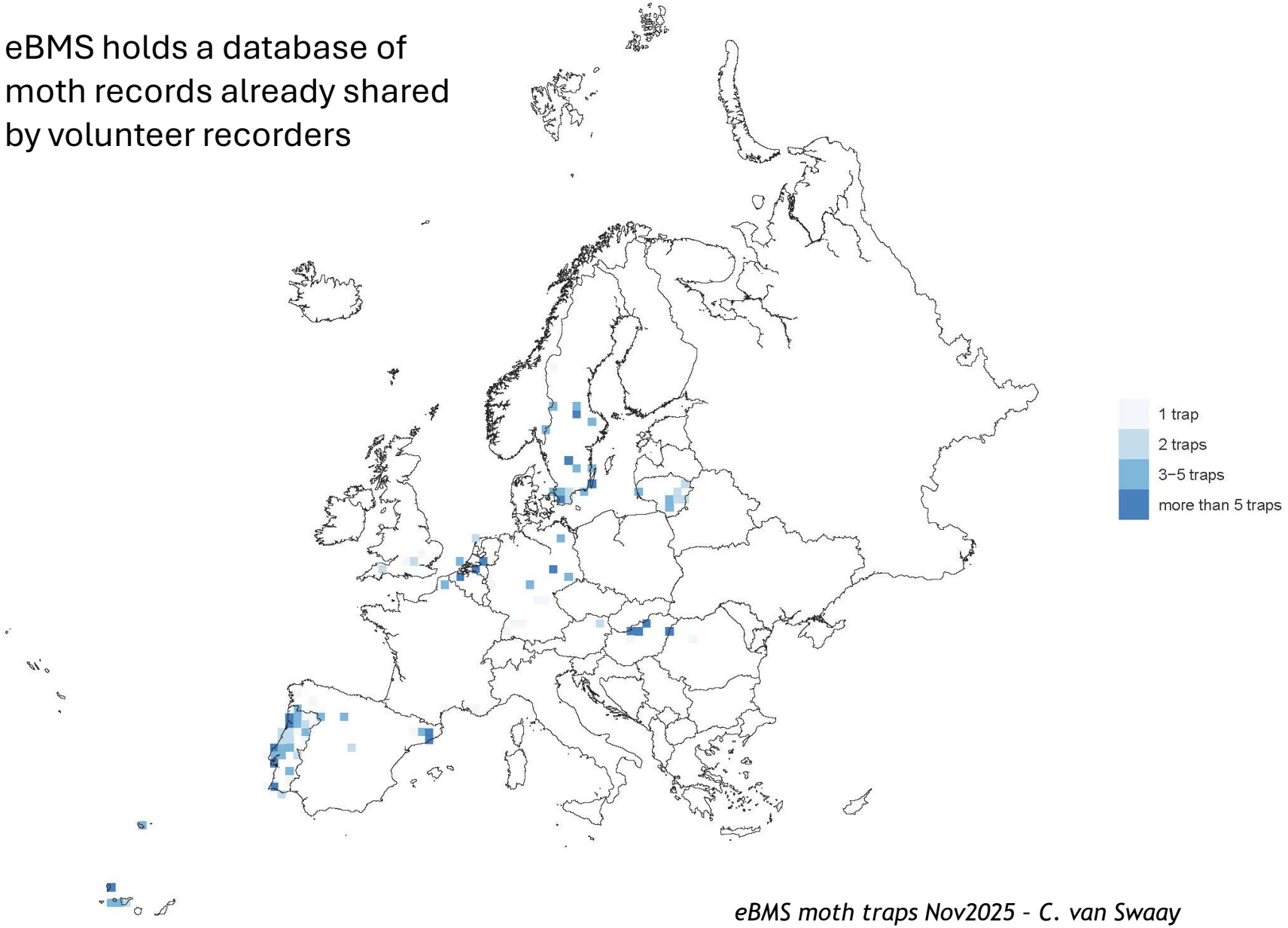


Climate	Country	Partner
Continental	Germany	UFZ
Mediterranean	Spain	CREAF
Pannonian	Hungary	Centre for Ecological Research
Boreal	Sweden	Lund
Atlantic	NL	De Vlinderstichting

Extrapolate to other countries; **citizens** can participate AI + validation; calculate trends (small country) min. **25 traps** set at least **12 times a year**

Sampling locations moth monitoring (Moth-traps)

eBMS holds a database of moth records already shared by volunteer recorders



Spring countries:
NL, Spain, Sweden, Hungary, Germany
+
Portugal
Lithuania
Belgium
Austria
France
UK

eBMS moth traps Nov2025 - C. van Swaay

LED-trap tested

- Cheap, not very powerful → attracts local moths
- Sensor and powerbank → automatically switched on all night
  → no need to stay all night up
- Not very notable → low risk of stolen *(site selection)*
- Moths photographed → feed into AI algorythm

Involving amateurs scientists

eBMS capabilities

Manuals with instructions, database, app and website

Self-made bucket traps by the Dutch Butterfly Conservation

In 2017 the Dutch Butterfly Conservation invented a new trap with LED to boost the number of locations for the monitoring scheme. To stimulate other monitoring schemes as well we want to make available the specifications of the parts we have used. We use a 15.000 mAh power bank, on which the LED strip burns all night long. Thereby egg boxes are needed which we placed inside the bucket.

A simple bucket. We used a 27-litre bucket. Make a round hole in the lid so the funnel fits. Be aware that they are very light, so on windy places you have to attach them to the ground.

- We ordered here

Moths like to sit in the deepest recesses of the egg boxes.

ne Plexiglas plate and the funnel. Beware: sometimes moths e inside of the funnel.

emove the egg boxes from the bucket. The moths often like the deepest recesses of the egg box. When you can't view perly, first try photographing all the other moths, and then try to remove the moth by gently tapping the egg box against and then take your photograph.

inside of the bucket and make photos of all moths present.

store the LEDtrap and charge the powerbank immediately, so to use on your next trapping night.

1. Put the two egg cartons upright in the LEDtrap. The butterflies can hide under these boxes when they land in the bucket.

Put two egg cartons

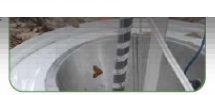
2. Connect the power bank and place it upright in the bucket. When properly connected, a light will flash near the light sensor.

Note: There are two different USB connections. The one with one lightning bolt on it consumes much less power than the one with two, so it's recommended to use this connector.

3. Put the lid on the bucket, but do not click it into place. Otherwise there will be such a shock to the bucket when you try to empty it that the moths will become active and possibly fly away.

the trap.

5. Empty the LEDtrap early in the morning. If the sun shines on the bucket, the moths might become active and fly away when you open the trap.



This is the screw for the light sensor.

The light sensor is attached to the screw.

6. There is a screw on the side of the bucket to which the light sensor can be attached.
7. If necessary, pull the cord at the top of the LED strip a little tighter, so that the tube with the LED strip stands upright between the three Plexiglas plates.
8. Place the LEDtrap at the same location each time.

eBMS Website

Moth traps registration and samples

Moth trap type:

- (●) **LED funnel trap**
- ( ) **Other funnel trap**
- ( ) **Trap with 2 sheets**
- ( ) **Other trap**

Types of lamp in trap:

In the table below, list all the lamps in the trap. Add a row for each lamp type.

Lamp type	Additional description of lamp	How many of this lamp
LED->Ledstrip->395-405 SMD 2835	2 watt	2

<Please select>
LED->Ledstrip->395-405 SMD 2835
LED->Ledstrip->395-405 SMD 5050
LED->PowerLED->Please describe
LED->LepiLed->Mini
LED->LepiLed->Standard
LED->LepiLed->Maxi
LED->LepiLed->Maxi switch
LED->Other->Please describe
TL->Actinic->6W
TL->Actinic->8W
TL->Blacklight->18W
TL->Other->Please describe
E27->Mercury vapour - ML->160W
E27->Mercury vapour - ML->250W
E27->Mercury vapour - ML->500W
E27->Mercury vapour - HPL->125W
E27->Mercury vapour - HPL->400W
E27->Mercury vapour - Blacklight->160W
E27->Mercury vapour - Blacklight->400W

Moth trap details

Weergeven | Vertalen

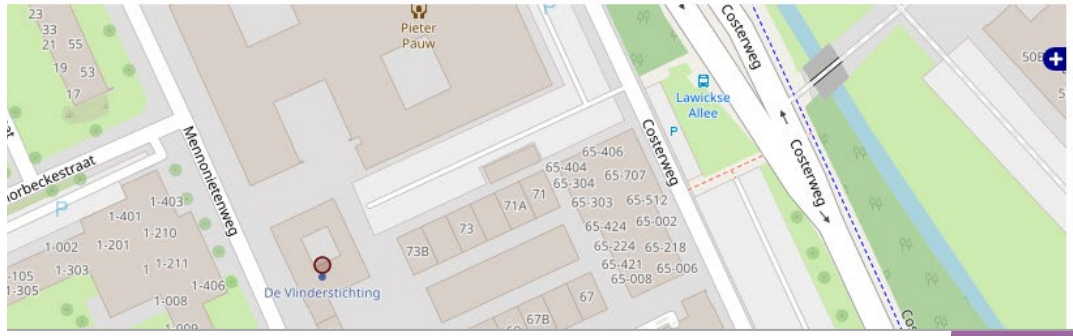
Please provide the spatial reference of the location. You can enter the reference directly, or search for a place then click on the map to set it.

Land:

Netherlands

Location Name:

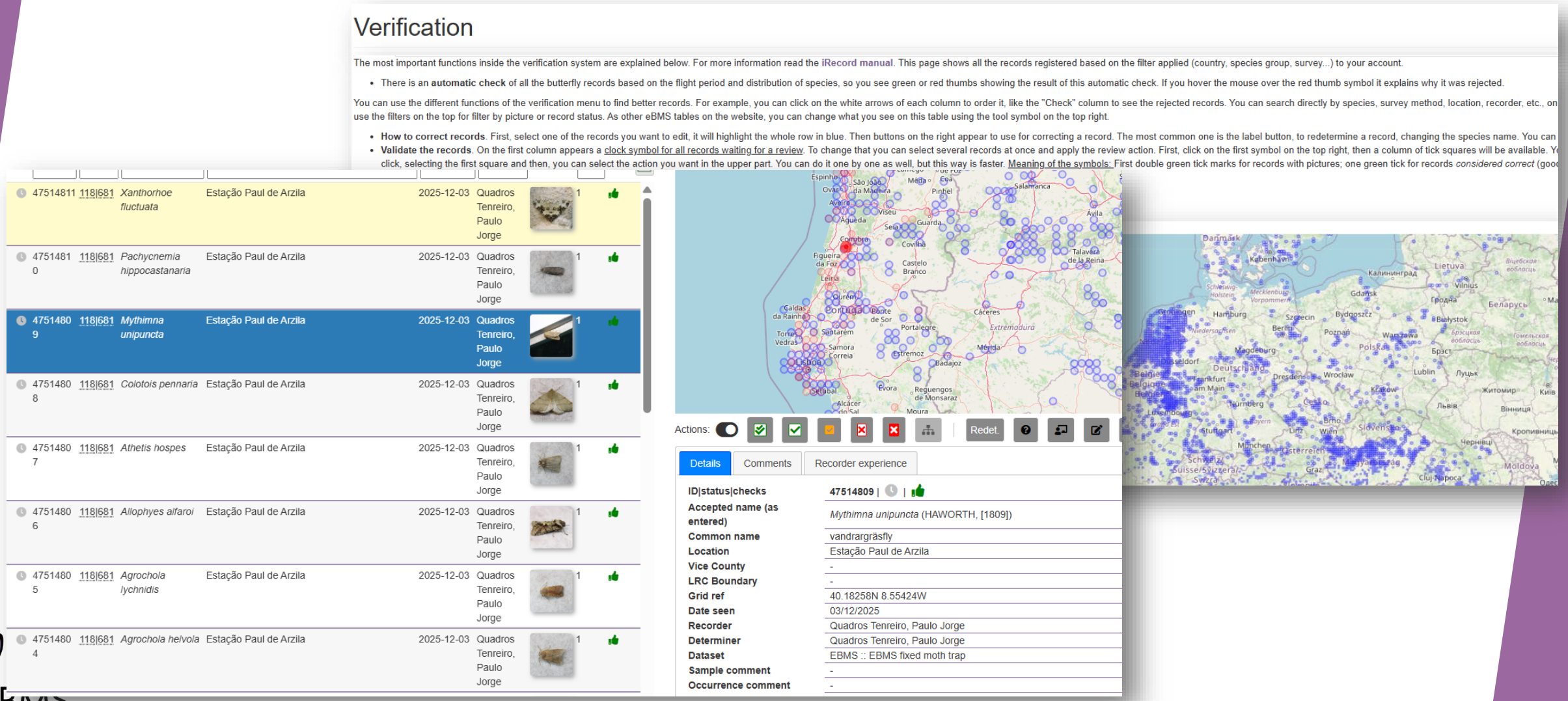
Zoeken



UK Centre for Ecology & Hydrology

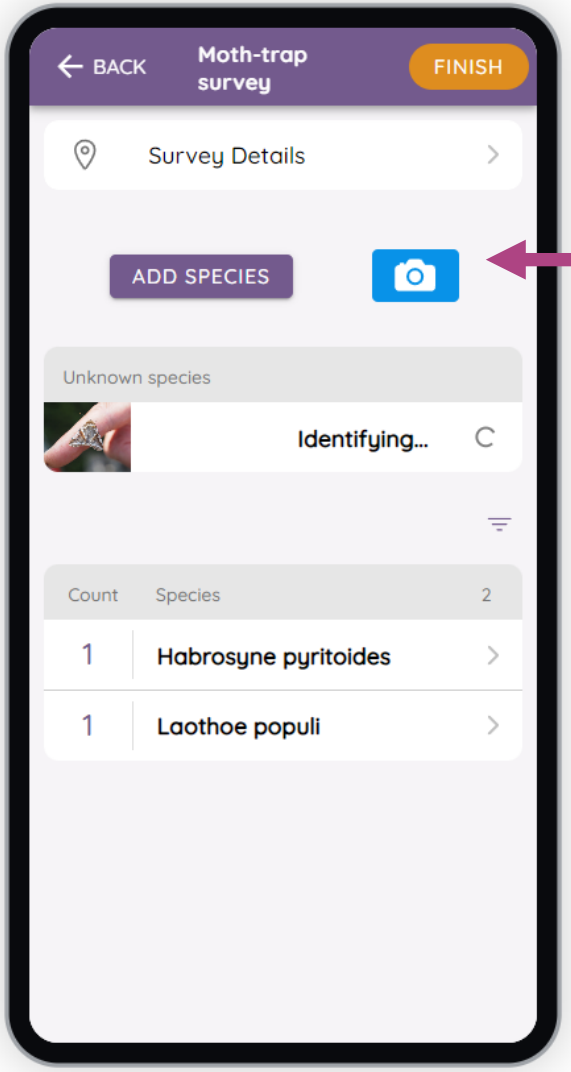
eBMS Website

Verification by experts



ButterflyCount

Butterfly Count App has capability to record moths with photo based automatic image recognition for identification of Atlantic zone moths (improving algorithm)



Adding a photo will start image recognition AI algorithm and will add species and counts

correct identification of 95% of moths in North-Western Europe

reliable moth monitoring by citizens

AI needs improvement: add more areas (remote) + specialists

coordinators for moth monitoring are needed

Moth monitoring EUPoMS: methodology

COMMISSION DELEGATED REGULATION(EU) 2025/2188:
Article 6 "Data Collection protocol for night-active moths"

- …collect data on night-active moths at each monitoring site by using light traps.
- The light traps shall be active for **one night a month** during the observation period, with a minimum time interval … of three weeks *(exception: bad weather conditions)*.
- The light traps **placed more frequently**… where the observation period is shorter than six months. In this case, the minimum time interval shall be less than three weeks.

Moth monitoring EUPoMS: methodology

COMMISSION DELEGATED REGULATION(EU) 2025/2188:
Article 6 “Data Collection protocol for night-active moths”

- **Record environmental parameters**: temp (in °C); cloud cover (in oktas); wind speed (in m/s); principal moon phase; fog and precipitation (presence/absence)

- **Two light traps** shall be placed at each monitoring site, with a distance of at least 50 m between them.

- **Use an identical light trap design** and an **identical light source** type at all monitoring sites. The light trap design and the light source type shall not be changed in the course of an assessment period.

The light source has a high output in the ultra-violet and blue light range (350-550 nm)

Moth monitoring eBMS: weaknesses

- We need to **expand the image recognition** capabilities of the App to cover more moths, particularly those occurring outside Western Europe

- At BCE and DVS we know a lot of (mainly **unconnected) moth experts** around Europe and joining them up in a network would foster progress in establishing an effective citizen science based moth Monitoring scheme

- **Ensure standard moth trap production** (or key components for self assembly) is scaled up and accessible traps available in all MSs soonish → Dutch production (Vivara 2026)

- We need **financial support** to really develop effectively and fast

Summary

- Scientific evidence: equally **important pollinators** as bees and hoverflies.
- We have a **tested method** to monitor them -> can easily be enrolled to other countries/regions.
- Easy identification by AI -> **citizens** can participate (volunteers, farmers, etc.)
- To detect a significant trend in the total number of moths in a small country or region, around **25 traps** are needed which are set at least **12 times a year** (from SPRING)
- There is a **website** and an **app** to enter all data into the eBMS **database**.
- **Trends** can be calculated using the same methods as for butterflies.
- These trends can be combined to **indicators**, just as we already do for butterflies.




Main messages

Monitoring of moths is ready to be used on a European level

- Now is the time to make a significant step in **organising a coordinated moth monitoring network** across Europe.
- We can learn from establishing the eBMS network and from work on the moth Red List to make good progress on a voluntary basis network
- We have a growing network of moth experts
- We need **financial support** to really develop effectively and fast

Everything is ready to start monitoring moths at a European scale now

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EMBRACE Project: EC-ENV/2024/NP/0040: Grassland butterfly indicator and European Butterfly Monitoring Scheme update (2021-2026)

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