

Garden Moth Scheme

Data description

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2 Background

This document aims to provide a summary of what data is available from the GMS, with a particular focus on what is needed for a reliable analysis of trends. The purpose is to inform subsequent analysis of the data.

- Notes on aspects of the scheme that are relevant to understanding the data and its analysis.
- A summary of the steps required to assemble the data

3 About GMS data and its quirks

- Scheme is organised regionally. [Region is readily identified as the first 2 characters of the Site.Code and maps onto sets of Vice Counties, WM has a numeric sub-region (VC) code (36-40)]
- Scheme began locally in the West Midlands in 2003 and expanded to become notionally “national” in 2007. However, 2007 did not include 5 of the regions. By 2008 all UK regions were included, and in 2009 Ireland and the Channel Islands were added.
- The main scheme covers a 36 week period Mar-Oct. A separate winter scheme covers the Nov-Feb period and is undertaken by a hardy subset of dedicated recorders (2008 onwards).
- The GMS only records a subset of moth species:
 - Prior to 2015 there were separate lists for the main scheme for each region

- From 2015 onwards, following a major review of the species lists, a “Core” set to be recorded by all sites was defined, with regional lists adding additional moths. Recorders in most regions could choose to record only the core moths or the full regional list for their region.
- Lists have grown substantially over the years.
- The winter scheme has always used a single common list, although again this has expanded over the years.
- *The database does not retain information on which (core/additional) list the recorder used in each year.*
- Prior to 2014 there was a column on the annual recording sheets where recorders could opt-out of recording moths they “couldn’t identify” *This data is not held in the main MapMate database and is not retrievable.* Anecdotal evidence and the wording of the recording instructions suggests that this field was not used well or as intended by all recorders. It seems it was introduced to allow recorders to opt out of the micro moths in the days where there was not an easy field guide, with defaults to exclude these moths in some forms.
- Both the core dataset and the regional lists have varied over time, generally increasing except for:
 - Yorkshire/Humberside form changed significantly in 2008 with moths both removed and added
 - Some species that were later aggregated were recorded as separate species in earlier years.
 - Apple/Orchard Ermine aggregate was on the North-East list for just a couple of years
- **We don’t have a complete set of the regional lists (yet).** But we can infer a full set from 2008 (excluding the CI) based on the lists not changing between the years before and after). Missing lists:
 - IR 2011 (can assume same as 2010)
 - EE 2011 (can assume same as 2010)
 - EE 2012 (can assume same as 2010)
 - CI 2011 (can assume same as 2010)
 - CI 2012 (can assume same as 2010)
 - EE 2008 (can assume same as 2009)
 - **CI 2009**
 - **SC, NE, EE, SW all missing 2007** (only have 2007 lists for SE, CY and WM)
 - **Pre 2007 only have WM 2005 & 2006**
 - We do have full the set of Winter forms 2008-2023
- A few species pairs that cannot be reliably identified visually are recorded as aggregate species. A number of species that were added to the core list in 2015 as aggregates have earlier records as separate species in a few regions. These will need care in any analysis as they may not have been recorded as cannot be reliably identified visually. Uncertain/Rustic,

Copper underwings, Dark/Grey Dagger, Marbled Minor agg. See recording form data for when these were recorded separately.

- The species data has had some validation, and difficult ID issues have been avoided by careful selection of species. The number of incorrect ID issues should be small. However if we are going to present distribution maps or phenology plots then we do need to check these for outliers to maintain credibility!
- Recording is done each week, with weeks centred on Fridays and (for the main summer scheme) starting on the 1st Friday of March for 36 weeks. *Except for 2014 which has week 1 centred on Friday 28/2/2014*
- The winter scheme continues the weekly recording throughout the whole year again with weeks centred on Fridays. As this fills the gaps between 2 main seasons and this is usually 16 weeks, but can be 17 (leap years and depending how the Fridays fall)
- The GMS attempts to record on the same day each week, thus avoiding recorders choosing favourable nights (in contrast to butterfly transects). The suggestion is that everyone records on Fridays, but recorders may choose a different night of the week. This has the theoretical downside that the dates of recording vary by 7 days over a 7-year period (give or take leap years!) - the recording moves forward a day a week till the first Friday again falls on March 1st. This means the recording-week phenology does not align across years and may cause issues for moths whose light season extend significantly beyond the summer scheme window.
- Where recorders can't trap on Friday (or their nominal day) then the actual day can vary +/-3 days from the nominal Friday and are assigned to the week of the nearest Friday. Actual trapping can therefore happen on any day of the week and on the forms is assigned to the week of the nearest Friday.
- Empty traps are recorded as a Taxon "nothing" and Code 0.000
- From 2014 dummy records were created for weeks when the trap was not run with "Trap not run" added to the comments. Prior to 2014 there were simply no records entered when the trap wasn't run that week.
- Peppered moth has 3 forms with same Code Number but different taxon/common (see below).
- Gardens are very variable in location and habitat and therefore in the number of species and moths present. There is a concern that we are dominated by a few gardens with very large numbers of moths?
- There are a large number of traps with only 1 year's recording so are not informative for trends.

4 Data sources

4.1 GMS data

- The primary data are provided as a series of Excel files, downloaded from the master Mapmate database, one per year - Data consists of one row per species recorded giving the number seen and the date and recorder, the recorder in this case being the garden site code.

- A separate Excel file contains the garden habitat data from the form filled in by the recorders and indexed by Site.Code. Where these have been updated a second row is added with the date of the amendment recorded. Need to assume where there is no date that it applies from the start of that site.

4.2 Other data (Currently Available from Steve Roberts)

- All the available recording forms have been collated, given consistent naming (following the 2024 form format) and converted to the most recent xlsx format if necessary. These are in yearly subfolders under /Recording forms along with a WinterScheme folder.
- Excel and R files have been created detailing the species that were recorded in each region in each year (SpeciesList.xlsx, SpeciesList.Rd)
- A manually curated Excel spreadsheet (/RawData2023/Species2024.xlsx) contains a list of all the species on the recording forms with both ABH and BF codes and scientific and vernacular names following those used in the 2024 forms and the MapMate database.
- A base map showing the 3 UK countries, Ireland, Channel Islands and IoM was created using the GADM.org geopackage files (see code in CreateBasemaps.R, GADM shapefiles in /GADMshapefiles) (creating an sf object in basemaps.Rd containing basemap3 for UK/Ireland and basemap 5 also including the Channel Islands).
- Grid references can be extracted and converted to latitude and longitude using a modified version of the R function org_parse from Claudia Vitolo [code in org_parse.R].