Mammal Society suggested Projects for Undergraduate and Master's students.

1. Estimating density of commonly seen, but data-poor species.

(Can be extended to enable investigations of associations with habitat, time of day, or weather).

Background:

Information is lacking on the distribution and density of mammals commonly found in the UK. One way to collect records of a species is to use transect surveys. This method requires systematic or random routes within a habitat to be walked, recording mammals that are seen.

Mammal Mapper is a free smartphone app that will allow students to collect effort-based data. By recording the transect route as well as mammal observations, analyses can be adjusted for survey effort. Students can also compare locations where they did, and did not, record mammals. For more advanced analyses, students can also undertake distance sampling.

Students can work in pairs on their data collection and divide the analysis either by species or by research question.

Protocol:

Mammal Mapper is a free app that can be downloaded on a smartphone and provides an easy way to record sightings while walking a transect. In return for using Mammal Mapper on 10 transects, the student will gain access to wider data held by the Mammal Society to assist with their project. This can provide either a comparator dataset to the one collected by the student; or the Society's data could be analysed as a 'fall-back' (plan).

Having selected their transect route(s), students should walk their transects starting 20 minutes after sunrise, when there is a higher chance of mammal sightings while still being light, and walk for a minimum of 500 m. The maximum distance we recommend for a transect is 1 km. If a student is looking at the impact of survey timings, further times to survey should be decided for throughout the day but should be the same walk each time.

Students should record all mammals or signs that they see using the app. Habitat data can be derived from remotely-sensed datasets (e.g. Land Cover Map; Google Earth), or by recording manually the locations of key habitats in the field. GIS could be used to

map habitat locations and look for availability within buffers of the record. When using Mammal Mapper, there is room to write location name and also to enter a survey ID which can be connected to the student's project and names of each of the transects they are walking (if more than one).

Key Species: moles, rabbits, grey squirrels, red squirrels, deer, harvest mouse nests, rats, foxes

Suggestions for project questions

- Is the probability of observing the key species linked with time of day?
- Is the probability of observing the chosen species linked with weather variables?
- Is the probability of observing the chosen species linked with habitat? – further suggestions:
    - what tree species are squirrels most commonly associated with?
    - what is the density of squirrels in woodland compared with features such as treelines?
    - is probability of sighting rabbits/field signs linked with availability of (or distance to) scrub?
    - are harvest mouse nests found only where vegetation is above a certain height class?
    - is there an association between particular features e.g. bramble thickets and hedgehogs or rabbits
    - Are red and grey squirrels found in the same or different locations
    - Formal distance sampling project (students work out probability of detecting a model (e.g. newspaper 'rat' at different distances, and uses probability function to compute density e.g. using 'Distance' software.
    - Linear features -walking hedgerows and rivers and completing density calculations (e.g. sight/distance)

2. Car transects to estimate abundance of road casualties.

(Can be extended to analysis of relationship between probability of road casualties and environmental variables)

Background:

Road casualty data can provide important information on mammal distributions and trends. In addition, the Mammal Society has been working on collecting more data of mammal fatalities on roads to develop strategies to mitigate road casualties.

However, most data are available only at a large spatial scale. What is now needed is fine-resolution data on the habitats at locations with and without road casualties.

Protocol:
Students should work in pairs, one driving while the other records roadkill. Using the Mammal Mapper app will provide a quick and easy way of recording GPS location of each casualty sighted, as well as the route taken. For each 200 m section of road driven, the students should identify fine-scale habitat information (e.g. from Google Street View; Ordnance Survey Layers) including type of road and the habitat surrounding road. Information on where speed limits change should be noted during the drive as this information is otherwise difficult to obtain. Each road section should be surveyed at least 5 times.

Key species: hedgehogs, rabbits, grey squirrels, red squirrels, brown rats, badgers. Can be applied to a selected species or across species.

Project suggestions:

- What is the relationship between road type and the number of road casualties per km?
- What is the relationship between road speed limit and number of road casualties (either total or of a given species)?
- Is the number of observed road casualties affected by time of day or weather?
- Is there an increase in the number of road casualties following the change from British Summer Time to Greenwich Mean Time?
- Are road casualties more frequent in locations where hedgerows are perpendicular to the road?

3. Assessment of species presence and habitat use by camera trapping.

(Can be extended to include method comparisons (e.g. walked transects c.f. camera traps).

Background:
Camera traps are a non-invasive way of detecting many of the larger British Mammals. They can also be adapted for use with small mammals using a baited camera-trap box and an inexpensive lens (contact us for further details).

Protocol:
Set the date, time and desired settings for capturing images or videos. Place camera traps somewhere with good visibility and safety e.g. on a fence post with low vegetation, where wires are linked with the fence to avoid cameras being lifted off and taken. A cable lock can be used for extra security. Avoid placing where they can be easily seen by people passing. A handheld GPS should be used to record the exact location of camera traps in WGS84 latitude longitude in decimal format e.g. Lat = 53.870659; Long = - 1.200235. Cameras can be left for 5-7 days depending on memory of SD card and settings used on the camera. After this time, collect the cameras and identify any species captured and capture times.

Project suggestions:

- The projects suggested for transect surveys can also be addressed using camera trapping data.
- What are the temporal and spatial relationships between species e.g. how often are rabbits/hedgehogs and foxes/badgers detected in the same night; what are the relationships between predator and prey species?
- How are activity patterns of a chosen species affected by local habitat (e.g. are animals bolder when more cover is available)?
- What are the relationships between activity patterns and weather or moon-phase?
- How does camera trapping data compare with walked transects (set up cameras along the routes of walked transects)?

4. Relationship between dormouse presence/absence and habitat type, assessed using non-invasive footprint tunnels.

Background:

Footprint tunnels provide a non-invasive way of detecting hazel dormouse presence. In the Mammal Society's Red List of British Mammals, the hazel dormouse is classified as Vulnerable. Therefore, it is important to continue to build knowledge and records of this species, particularly in non-traditional habitats (e.g. bramble thickets, hedgerows, etc.)

Protocol:

Students should survey for at least three months between May and October, or until dormouse footprints are detected. November can be included if footprints are not seen in preceding months. It is recommended that a minimum of 30 tunnels are used. A licence is not required, however if a dormouse builds a nest in a tunnel, it should be left undisturbed.

A tunnel can be made from 65 mm of square, black or brown plastic downpipe cut to 400 mm with plywood inserts cut to 500 mm to allow for 50 mm standing platform at each end. Tunnels are firmly attached to the underside of horizontal branches. In the centre of plywood insert should be a strip of white card. Masking tape, as a base for the tracking ink, is wrapped around the plywood at either end of the card but should not overlap card so it can easily be removed and replaced. Tracking ink can be made from a ratio of three heaped teaspoons of ultra-fine premium pharmaceutical grade activated charcoal powder to 15 level teaspoons of olive oil. This should be sufficient for 50 tunnels. Tunnels should be checked and re-inked every 2 weeks. All footprint papers should be collected and labelled in the field to be checked later. Photographs of potential positive results should be submitted to the Mammal Society.

Students should be sure to mark, using GPS, WGS84 latitude and longitude of their tunnels in decimal format e.g. Lat = 53.870659; Long = -1.200235.

Project suggestions:

- Working alongside existing dormouse surveyors (e.g. those monitoring dormouse box schemes; or consultants using nest-tubes as a survey method), assess the effectiveness of the footprint method to detect dormice.
- Does woody species-richness of a hedgerow predict the likelihood of dormice being present?
- Is the probability of dormice being present linked with hedgerow/woodland connectivity?
- How far from known woodlands with dormice are signs of dormice found in marginal habitats (e.g scrub) or hedgerows? (assessed by placing tubes along a transect).