



Mammal Survey Methodologies

*Prepared for Nature Iraq by Prof. Zuhair Amr,
Jordan University of Science & Technology*

For any study on mammals in a new survey area, the main objective should include identifying all species of mammals that are present in the defined area. Several approaches are known and followed internationally in order to establish an inventory of mammals in the study area. Such methods are known and include:

Order Chiroptera

- Mist netting
- Sample preservation

Order Rodentia

- Opportunistic trapping
- Trapping grid
- Sample preservation

Order Carnivora

- Interviews
- Trapping
- Track counts
- Spotlight transect

Order Artiodactyla

- Observation point
- Spotlight transect
- Aerial survey

All these methods are described in details in Wilson et al (1996) and are reviewed in this document. It should be noted that extreme care by and proper training should be conducted for survey members to avoid injury to mammals (in trap and release programs) as well as team members during survey work.

1. Order Chiroptera

Mist Netting

Mist nets placed at the mouth of a cave containing bats can catch most of the bats, providing a good measure of the absolute density of bats in each cave. Combined with informal interviews to establish where suitable caves are, this is a very comprehensive method for bat surveys. Where more than one species is present, this method can be used to determine relative abundance.

Equipment:

- Mist net (including net, poles, ropes, and stakes)
- Mallet (or a rock can be used at the site)
- Flashlight
- Stopwatch or timer (for the second method)
- Data sheets
- Sampling jars and cotton bags (if taking specimens)
- GPS Unit

Sample Preservation

To kill and store captured bat specimens.

Labels should clearly show the date of collection, the location of collection, the name of the collector, sex and reproductive information of the sample, measurements of the sample, and other collected material from the same sample.

Equipment:

- Killing agent (formalin, chloroform, or ether)
- Cloth or tissues (to soak with killing agent and anaesthetise specimens)
- Thick plastic bags or jars (to store killed specimens while in the field)
- Dissection kit
- Cotton
- Wires
- Labels
- Mounting boxes (with pins and mothballs)

2. Order Rodentia

This order comprises the rodents. These small animals are best surveyed by setting traps in the study area. For more information, detailed survey techniques for this order are described in Barnett & Dutton (1995).

Opportunistic Trapping

Used to establish the presence and absence of rodents in an area. This method is simple to carry out, but does not offer population information.

Method: Since the aim of this method is simply to determine which small mammal species are present in an area, there is no need to place the traps in random locations or in any pattern. Instead, traps should be placed in locations where individuals are most likely to be trapped.

To determine the best locations to place the traps, one can rely on several factors. First, the field researcher may actually see individuals running for cover while in the field. Signs such as nests, footprints, or droppings are also helpful. If there is no direct evidence of the target species, one may need to rely on the habitat or vegetation that the species is generally found in. Interviews with locals may also reveal some locations, but this method will not be as effective for small mammals as for other species.

Equipment:

- Sherman traps
- Bait (oats and peanut butter)
- Data sheets

Trapping Grid

Used to establish the presence and absence of rodents and with more time, to establish the absolute density of the various species present in the study area.

Method: Grid locations should be chosen randomly across the total study area. Depending on the number of traps available, it may only be possible to survey one grid location at a time.

At the grid location, determine the corner point and the direction of grid placement, and then start arranging the traps. The standard used is to arrange the traps at 10m intervals, with a total of 50 traps. The effective grid size extends 5m beyond the outer traps, making a 100m x 50m grid. This is the theoretical grid size, based on the spacing of the traps, the grid size may be different based on the number of animals caught in each trap. The traps are set each evening, and checked just after sunrise, with the setting of the traps done in the same order each day. This is repeated for five consecutive nights.

In general, the traps should be baited. Oats and peanut butter are sufficient. Guide poles may also be used to increase the effectiveness of each trap, although this will affect results and should be evaluated. Depending on the weather situation, cotton bedding may be necessary in the traps.

Equipment:

- Sherman traps
- 50m measuring tape
- Bait (oats and peanut butter)
- Data sheets

Sample Preservation

To kill and store captured rodent specimens.

Method: Use individuals that are already injured or otherwise damaged, and set the others free.

The labelling process must not be forgotten, because the sample loses most of its scientific value without the basic information included on the label. It should be well tied to the right hind foot. Include the date of collection, location of collection, name of collector, sex and reproductive information of sample, measurements of sample, and other collected material.

Equipment:

- Killing agent (formalin, chloroform, or ether)
- Cloth or tissues (to soak with killing agent and anaesthetise specimens)
- Thick plastic bags or jars (to store killed specimens while in the field)
- *Dermestes* beetle larvae (for cleaning skulls)
- Dissection kit

- Cotton
- Wires
- Labels
- Mounting boxes (with pins and mothballs)

3. Order Carnivora

Interviews

Use for species which are otherwise difficult to detect. To determine locations where individuals of the target species may be observed.

Trapping

Used to establish the presence and absence of carnivores and possibly to estimate their absolute density.

Method: Depending on the aims of the survey, traps can be laid out either opportunistically or in a systematic fashion similar to the trapping grid method. Either way, the wide territorial range of carnivore species make grids less effective in determining species distribution than those used for smaller species. The presence and absence of species can be established using either method, and as long as the study covers a large enough area over a sufficient amount of time, either way can also be used to determine absolute density of species.

The traps should be kept in place for several days, and checked at least daily, or they can be replaced at the same locations over the course of the study. Caught animals should be marked, measured, photographed and released (such activities require adequate pre-survey training to avoid injury to target animals and survey members).

Equipment:

- Traps
- Bait (mammal remains, poultry, fish, urine, gland secretions, fish oil, rotten eggs, etc.)
- 100m measuring tape (if you are placing the traps along a grid or a transect)

Note: camera traps can be used as well.

Track Counts

For species which are difficult to observe directly, but which leave identifiable signs such as tracks or droppings. To estimate the activity of such species and possibly to estimate their absolute density.

Spotlight Transect

This is suitable for establishing the presence and absence of nocturnal species which are spread out over a large area.

4. Order Artiodactyla

This order is comprised of the ungulates, another group of large mammals. Ungulates have wide ranges like carnivores, but generally have higher populations. They are also often in pairs or groups, making trapping less suitable to determine their absolute density but camera trapping can be used to identify presence and absence.

Point Counts

To count the number of individuals of each ungulate species present around the observation point. It can be used to estimate relative abundance between species, but is only reliable for estimating the absolute density of individual species when repeated many times in many locations or when combined with other methods.

Spotlight transects

This is suitable for establishing the presence and absence of nocturnal species which are spread out over a large area. It can give some insight as to the relative abundance.

Aerial Surveys

Aerial surveys enable researchers to observe a very large area in a short time. It is suitable for species which are spread out and move a lot, in vegetation that is open enough to spot the animals from above. It can provide measures of relative abundance and absolute density with a minimum of effort.

Method: There are two ways of counting the animals, either total counts or sample counts. Total counts are used when a target species is terrestrial and fairly dispersed within a relatively small survey area (a few hundred square kilometers). In very large land areas sample counts are usually used.

The survey area should be divided into blocks or quadrats and located or marked on a large-scale map (1:50,000). Each plot is searched thoroughly by flying over it in order to locate and count all target animals. The aircraft usually traverses a quadrat across its width rather than along its length because the travel path can be monitored more accurately across the shorter distance.

The travel path must be mapped to use it for navigation during aerial survey. Flight paths are arranged so that the time required to fly between sample plots is minimal. The travel path should also be arranged so that the sun is not directly ahead and so that the crosswinds do not cause the aircraft to drift away from the flight path.

The accuracy of counting is influenced by aircraft altitudes and speed. Altitudes between 100m and 200m and speed of 100 km/hr to 150 km/hr permit observers to count animals fairly accurately. The key to success when using this method is to count the observed animals accurately and to map animal locations and areas searched exactly.

The population size of the target species within the survey area can be obtained by summing the total counts from sub areas. Density is obtained by dividing the population size by the size of the study area.

Equipment

- GPS Unit
- Maps (1:50,000)
- Binoculars
- Camera, zoom lenses
- Helicopter or other light aircraft
- Data sheets

References:

Barnett, A. and J. Dutton. (1995). Expedition field techniques. Small mammals. Second edition. Expedition Advising Centre, Royal Geographic Society, London, England.

Wilson, D. E., Cole, F. R. Nichols, J. D., Rudran, R. & Foster, M. S. (1996). Measuring and Monitoring Biological Diversity. Standard Methods for Mammals.