

## Identifying and monitoring small mammals

### Overview

Small mammals can be identified and monitored year-round, but hibernation and deep snow cover must be considered. Although live trapping is one of the most cost-efficient methods of monitoring small mammals, it should be combined with other methods for a more thorough analysis. The monitoring method for a species should be chosen based on the species' ecology and distribution.

### Methods

**Traps:** Small mammals, are often caught using traps. They offer a year-round, cost-effective method for evaluating the presence of species and the size of populations. Using live catching traps is advisable because it affects the populations least. 2-3 trapping periods per year, lasting five days, provides information of the main species and some information on the population size and its fluctuations. The number of traps can vary between 20-60, depending on the size and diversity of habitats. Live catching traps must be checked at least once per day.

**Audio sensors:** Audio sensors are used to record and identify signals emitted by animals, usually different bat species. Portable detectors are often connected with parabolic antennas, allowing more sensitive signals to be identified. Automatic detectors can be put in the same area several times, allowing the comparison of results between years. Nowadays there are specific programs available that automatically identify the species in audio recordings. Species-specific ecology and habitat demands are very important when placing audio detectors, especially due to low range of detectors.

**Tracks and other signs:** Identifying tracks from snow or ground or other signs is a cost-effective year-round method and can offer valuable knowledge on individual movements.

**Trail cameras/camera traps:** Trail cameras monitor a specific spot, and when movement is detected, a photo or a short video is taken. Due to limitations of detecting small animals, it takes special care for optimal camera placement. Trail cameras can operate for long periods of time in a wide range of environments, function even in darkness and can send the photos directly to a website or a phone. Trail cameras offer a discreet way to monitor e.g. changes in migration and foraging behavior during different seasons, population sizes and individual behavior.

**Feces, other remains:** Certain species can be identified by visually observing the feces. Animal remains, such as roadkill, can offer valuable data that can be used to strengthen population estimates and provide indications of migration and activity.

**Hunting:** Hunting activities should be documented to provide indirect data on the density of game species. Samples can also be sent to research institutes that can offer valuable insight into e.g. the infections and parasites of these species.

**DNA, eDNA:** DNA (blood, feces, other remains) or Environmental DNA (eDNA) samples can be used to identify species and even individuals. DNA can be obtained from fecal samples also to identify the simultaneously indicate the presence of several species. At best, eDNA is a cost-effective and non-invasive way for monitoring, but it can also be used to assess the viability of populations, e.g. how inbred a population is.

### Bat monitoring

Bat monitoring by using audio detectors should be repeated 3-5 times per season in all relevant habitats, prioritizing those habitats that bats usually use for territories and foraging. Monitoring both during the spring and the autumn may provide additional

information about migration routes and wintering sites. Bats should also be identified and monitored from their roosting sites, from both daytime hides (caves, hollow trees, old buildings, etc.) as well as from their wintering sites. These sites provide data that can't be obtained by audio signals, e.g. accurate population sizes, offspring numbers etc.

### Small mammal case study

Mediterranean horseshoe bat (*Rhinolophus euryale*)

IUCN status in Europe: Vulnerable (VU)

Legal status in the EU: Habitats Directive: Annex II and IV, Bern Convention, Annex II.

IUCN status in Armenia: Endangered (EN).

How to inventory and monitor: Audio sensors, other signs, camera traps.

When to inventory and monitor: All year round.



Mediterranean horseshoe bat (*Rhinolophus euryale*). Photo: Julien Renoult (CC BY 4.0).

### Small mammal case study

Small five-toed jerboa, (*Allactaga elater*)

IUCN status in Europe: Least concern (LC)

Legal status in the EU: -

IUCN status in Armenia: Endangered (EN).

How to inventory and monitor: Traps, tracks and other signs, trail cameras.

When to inventory and monitor: All year round.



Small five-toed jerboa (*Allactaga elater*). Photo: Parham Beyhaghi (CC BY-NC 4.0).