

BAT MIGRATION PROJECT – FIELD PROTOCOL

GENERAL INSTRUCTIONS

The main goal is to have two coordinated capture periods in 2008 for whole Europe, one in spring before the breeding season, and one in autumn during the mating season. The first capture period could be done during March-May 2008 (depending also on arrival or beginning of activity for bats in your area). The second capture period would be done optimally during late August - November 2008, when migrating bats have already arrived to their mating/hibernating areas. The breeding season should be avoided because it would coincide with molting, and we could thus be mixing hair from different years. The same calendar can be applied to both migrating and non-migrating species. Apart from this, if you have the chance to opportunistically collect hair from bats captured during any time of the year (for example if you have other bat captures scheduled for a different period of the year), please do so, it would be useful. If you can only capture the bats during the breeding period in your area, please do so even if there is unwanted chance to mix new-grown hair with old hair (in that case please write down in the observations if you see signs of molting).

We are now interested in acquiring material from all migrating bat species (*Nyctalus leisleri*, *Nyctalus noctula*, *Vespertilio murinus* and *Pipistrellus nathusii*), possible migrants (*Nyctalus lasiopterus*), and also any non-migrating species that you can easily capture (especially *Myotis myotis*, *Myotis daubentoni*, *Pipistrellus pipistrellus*, *Eptesicus serotinus*, *Plecotus* sp., etc), avoiding sensitive species like Rhinolophids. We have not yet reached a consensus on which species are good examples of sedentary behavior. Recent studies by some of our collaborators suggest that *P. pipistrellus* can also perform migrations (for more information contact Josef Bryja in Hungary). We would be glad to hear your opinion about which bat species would be best “references” for sedentary behavior, preferably a couple of species that are also widely distributed across Europe.

We are concerned about inter-individual variability in isotopic values within the same populations; to be able to estimate this variability, it is desirable to work with relatively large sample sizes. In addition, males and females (and young, although these will be difficult to identify!) are likely to have large differences in migratory behavior. For this reason, the optimal sample size would be **20 individuals, 10 females and 10 males, for each species and in each sample site**. These numbers are valid both for migrating and sedentary species. However, please don't be discouraged if you cannot achieve this optimal sample size. We are aware of the difficulties and we will have to work in many cases with much smaller sample sizes. If you can easily sample more than 20 bats/site and species, that will be even better, please do it!

1. Capturing the bats: Use the capture methods you are most acquainted with in your study area. Sampling of non-migrating bat species can be done opportunistically during any capture event that you perform for other purposes, such as monitoring in caves, etc. Migrating species are usually more difficult to capture. If you have individuals

roosting in nest boxes, the simplest method is to take them by hand from the nest boxes (this can be done during the day). If they are roosting in known trees, a good method is to put a mist-net at some distance from the roosting cavity (intercepting the way-out of the bats), and capture them at emergence (alternatively, at their return to the roost, although it is usually easier at emergence because the bats tend to let themselves drop down some distance, so the net can be placed lower than the cavity). If you have not been able to locate any roosts but you know that migrating species are not uncommon in the area, mist-nets can be placed near or over ponds, streams or water spots used by bats for drinking.

2. Please record all the information about the bat detailed in the field data sheet (weight, forearm length if possible, sex, age, etc.).
3. Sampling hair: take the hair from the back of the bat, avoiding to cut the hair close to its base (to prevent taking new hair if the bat has started molting, although this is unlikely if sampling takes place in spring and in autumn, and specially so as to not to leave a bald patch on the bat). Approximate hair mass needed for analysis is 0.1 - 0.3 mg; to have an idea, you can fill approx. the lower $\frac{1}{4}$ of the length of a 1.5 ml Eppendorf tube (or fill loosely a 0.5 ml tube, without compacting the hair). Do not cut too much, only a small amount is needed! An expert has suggested that taking all hair from the neck area should be avoided, as this is the area that contains brown adipose tissue needed for heat production and therefore needs to be better insulated.
 - Careful not to sample the hair at windy places!
 - Careful to remove traces of hair from scissors and tweezers (just with some tissue paper) so as not to mix hair from different individuals in the same tube!
 - Label the tubes with an indelible pen with the Band or Id number of the bat (if possible both in the cap of the tube and in the tube itself), and with the date of capture (only in the tube).
4. Unless other purposes, release bats as soon as possible at the place of capture.

Please always work under a permit licensed to you by the local authorities for capturing bats and collecting hair samples!

INSTRUCTIONS FOR FILLING IN THE DATA SHEET

Location: country and locality of capture (including local names), if possible please state UTM.

Date of capture: in European format (DD/MM/YY)

Time of capture: better in the format 20:30 (not 8:30 p.m.)

Mode of capture: directly by hand from nest boxes, mist-netting near the roosts at emergence or return, mist-netting in a pond or a river, etc.

Captured by: name of the persons who captured the bats.

Species identified by: name of the persons who identified the bats.

In the column **#/R**, please mark the corresponding space with X if the bat is a recapture.

Band / Id. Nr: if the individual is banded, band number. If the individual is not banded, please create an Id number for this individual in the following way: 2-digit abbreviation of the country of capture (as stated in <http://worldatlas.com/aatlas/ctycodes.htm>), YYMMDD - first letter of the genus name, first two letters of the species name, number of sample of that species (example: the second non-banded *Nyctalus leisleri* captured and sampled on the 10th of April 2008 in a region in Bulgaria, would be BG080410-Nle02). This is the same number (band/id) that will be written in the plastic tube containing the hair sample.

Sex: symbols for male and female.

Age: Ad for Adult, Y for Young. Leave the space blank if unsure. For *Nyctalus* species, juveniles can be distinguished by the transparency in the metacarpal-phalangeal joints (corresponding to cartilaginous plates, that later convert into bone). But by mid-late August discrimination with this method will most probably not be possible anymore. So sampling in spring and autumn, it is unlikely that you will be able to differentiate (but if you know a way, please tell us!). The measure of “tooth wear” can be useful in estimating the age of individuals in some species (see ToothW).

Forearm L: forearm length in mm (some people try to measure just the bone length, but here we refer to the more widely used measure of the forearm “structure”, including skin, etc).

Body mass: in grams with one decimal. The best measure of body mass is taken with empty stomach (therefore best before emergence), but this is not always possible (e.g. when bats have to be mist-netted during the night in drinking places, or when returning to the roosts).

ToothW: tooth wear, please estimate in a scale from 0 to 4 the state of the teeth of the individual (0 = perfectly pointed teeth, 4 = dentition extremely worn out). This can be useful for estimating the age of the individual in some species.

Observations: write here anything that is worth mentioning, for example any damage in the individual, particular behavior, special phenotypic characteristic, different capture mode from the rest of the list, a more specific capture location, if another type of sample has been taken of this bat (e.g. biopsy), etc.

Please fill in, in the foot of the page, the page number of a total of how many pages (for that specific date).

MATERIAL NEEDED FOR THE FIELD WORK

- Capture equipment (mist-nets, ladder for checking nest boxes, leather gloves for handling bats, etc)

- Cloth bags (or wooden boxes) to keep the bats
- Caliper to measure fore-arm length (not strictly necessary but desirable)
- Portable balance to weigh the bats (a simple “hanging” balance is sufficient)
- Small scissors to cut the hair (better not very pointed to avoid damaging the skin; even simple small scissors used for sewing are appropriate)
- Eppendorf tubes or similar small plastic tubes to preserve the hair samples
- Tweezers to hold the hairs and transfer them into the tubes
- Tissue paper to clean material
- Indelible pen (with fine point) to label the tubes
- Ideally, small carton boxes to keep Eppendorf tubes organized
- Field data sheet

If you have comments about this protocol or you want to propose any alternatives, please contact anapopa@ebd.csic.es