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Chiro'Act

Guidelines for monitoring of hibernating bats in underground sites

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Natterer's bat in hibernation (Photo: Bram Conings ©)

Micro-Interreg.-project Chiro'Act: Guidelines for monitoring of hibernating bats in underground sites.

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1 Introduction

For successful survival, bats need both a hunting area with sufficient food supply and potable water, as suitable places to stay, and this year round, both in summer and during winter. Wintering bats in natural cavities such as hollow trees are usually difficult to detect, while natural caves are not present in all regions, or sometimes difficult to access. However, because many species also hibernate in cave-like structures such as bunkers, ice cellars, fortresses and quarries, these species can be monitored in a standardized way in regions where these kinds of structures are present. The data collected in this way are useful as an indication to identify trends in bat populations.

However, because the exact origin of bats in hibernation in a given object is usually not known, caution is required when drawing conclusions from winter censuses. They do not necessarily reflect a local or even a regional trend of the summer population in the same area. If censuses are carried out in a similar and systematic way, they can be used to make comparisons between regions or countries, or to map the national distribution, and even to identify trends on a cross-border scale. All native species of bats are included in the EU Habitats Directive, and are therefore also monitored in all EU Member States.

2 Monitoring hibernating bats: the main objectives

Since any physical visits by humans to bats cause a certain disturbance, and the deliberate disturbance of bats and their habitat is prohibited throughout the EU, such visits can only be made within the purpose of a scientific study. Of course, an object can be better protected and managed if data are available that demonstrate its importance as a bat's habitat.

The main objective of monitoring hibernating bats is to obtain a good insight for each object on these matters:

- Which species are present?
- In what numbers is each species present?
- The relative numbers (relative to all species present)
- The exact location of each species in the object (only relevant for large objects)
- Possible changes in environmental factors, both inside the object and in the surrounding environment

By repeating the study regularly, and monitoring the objects in a standardised way:

- Individual sites can be compared (with regards to their relative local or regional importance)
- Changes in species composition and numbers are identified so that they can be responded to in a timely manner by management or protection
- Relationships can be identified between the state of the bat populations present and (any changes in) the condition or management of the site and the surrouding environment
- The results can provide indications of population trends at a regional, national or international level.

Please note: Since most species can cover a reasonable distance between their summer and winter habitat, figures on the numbers of bats in a wintering location will mainly tell something about the condition of this winter object and less about the condition or management of the surrounding area as a summer habitat.

3 Methods

3.1 Visual observations

3.1.1 Planning

Monitoring of the species and numbers of bats in winter is usually done by visual inspection of the winter residences. It is important to note that any physical visit to a winter residence where bats hibernate causes some disruption. In order to avoid the same place being examined by different people, it is therefore always necessary that both the administrator(s) and the regional Bat Working Group are aware of the research. All potential wintering locations of the region/area are accurately identified on map, and each object also gets a unique name and number. It also makes sense to note locations where no presence of bats has yet been established, but which may have potential as a winter object for bats.

3.1.2 Frequency of the monitoring

In the case of long-term monitoring, it makes sense to draw up a schedule of which locations are being investigated in which year. Ideally, each location will be re-examined every year. This is especially true for objects where multiple bats of different species hibernate. If this is not possible or undesirable, a schedule can be drawn up whereby each location is visited at least once every 2 or 3 years. Each location to be examined is therefore preferably examined at least 1 and a maximum of 2 times per winter. A higher counting frequency can only be justified under very specific circumstances and/or for answering very specific research questions. As a minimum period between visits, it is best to count four weeks. For example, a second count may make sense at the end of an exceptionally cold period.

3.1.3 Chosing the right period

The best period for counting bats in our regions (North-West Europe) is from mid-December to the end of February. Observations outside this period cannot be compared well. If an object is counted annually around the same date (and in the same way) it gives the most similar results.

3.1.4 How to search and count the bats?

The object is fully searched, and all accessible cavities and cracks are to be inspected. In principle, only a good flashlight is required, although a mirror is also useful for searching in deeper cavities and crevices. For places with a high ceiling, a pair of binoculars with short focus distance is necessary. In complex objects with multiple adjacent spaces that are visited with multiple counters, good coordination is needed to avoid spaces either not being counted or double counted. If, by using endoscopes for the inspection of cavities in objects, significantly more bats are counted, then this must be reported on the counting forms, and it must be decided whether or not to use an endoscope annually for that object. If not, the results of these counts are less useful for deducing trends. For counting large clusters, taking pictures can make sense: in this way, large numbers of animals need to be disturbed for less time. Please make sure that taking the photo (photos) is no more disruptive than counting itself. Photographing only makes sense with clear clusters of several dozen animals. Smaller clusters or clusters in which the animals do not hang clearly visible can be better counted on the spot.

3.1.5 What type of data should be collected?

- Site: name and number (postal code). In case of a new site: city, adress and geolocation coördinates, the type of object (ice cellar, bunker, marl quarry, …), contact details of the owner, other features (entrance, possible risks, …), a quick drawing of the site and the surroudings.
- Date, total duration of the monitoring (hours, minutes).
- Name of the person responsible for the visit and the results.
- All (!) other participants (full names).
- Special remarks (noticable changes on the site or its surroundings, vegetation,…).
- Temperature (interior, outside). For this purpose, permanent minimum-maximum-thermometers can be used to provide a reliable indication of upper and lower T limits at any location inside and or outside the object during the course of the year. The use of digital T-loggers may be considered too.
- Species present and number of individuals of each species.
- Each individual bat should be identified as detailed as its position allows it to be, permanently assessing the risk of disturbance. In case a bat can not be identified up to the species level, it should be identified as detailed as possible, i.e. cryptic species (f.i. *Myotis mystacinus/Brandtii*), genus (f.i. *Plecotus species*), family (f.i. *Rhin. species*), down to '*Chiroptera species*').

3.1.6 Quality of the data

The quality of the collected data depends on several factors. Both in terms of the numbers and the accuracy of the species determination, considerable margins of error are possible depending on the situation. How close the counted number of bats in an object is to the actual number depends not only on how thoroughly searched, and on the tools used for this (such as mirrors and/or endoscopes) but also on the number of bats in the object that are simply untraceable, because of hiding too deep away. For objects with one entrance, it may be considered to check whether the counted numbers differ very much from the actual number of bats present using a so-called 'automatic counting port'.
The species identification can be difficult for bats that hang too high up, or often hide deep in crevices. The accuracy of the identification ultimately depends on the skills and the experience of the people involved. Therefore, it is important that experienced counters during a count sufficiently often - and if possible always - verify the identification of the less experienced counters, especially in the species groups or so-called 'cryptic species' that are hard to distinguish. It is important that the experienced counters devote sufficient time and attention to giving additional explanations and feedback in case of any incorrect identifications.

3.1.7 Protection comes prior to research

Although a winter bat count almost inevitably causes some disturbance of the animals, a lot of precautions can be taken to minimise the disturbance:

- Do not touch the animals, also avoid accidentally touching low-hanging animals.
- Do not illuminate the animals for longer than necessary
- Limit noise during the visit
- Limit the number of researchers, especially in smaller objects (body heat raises the temperature)
- Avoid standing still under bats
- Do not exhale under or in the direction of bats. This is of extra importance while counting clusters.
- Close doors immediately after entering or exiting
- Never smoke in a site or even near the entrance!
- Avoid heat sources (gas lamp)
- Photograph only if in doubt about rare species identification. To avoid any discussions during the monitoring, agree in advance which species are and which are not to be photographed.

3.2 Automatic monitoring ports

In this manual we do not go into more detail about the technical aspects of automatic counting ports. In practice, automatic counting ports are especially applicable to objects with only one entrance, which should not be too large. The installation must be installed in such a way that it is protected against theft or vandalism. In addition, the counting port needs to be correctly adjusted, a permanent power source is required for at least six months (from the beginning of October to the end of March), and regular inspection is required during the winter months. Taking into account an inevitable and sometimes considerable margin of error on the results, their use only makes sense in objects where there is a suspicion that the actual numbers are significantly or much higher than the counted numbers of bats.

4 References and Internetlinks

References:

Agnelli P., Martinoli A., Partriarca E., Russo D., Scaravelli D., Genovesi P. (Ed.'s). Guidelines for Bat monitoring: methods for the study and conservation of bats in Italy. Modena, 2006

Battersby, J. (Comp.), Guidelines for Surveillance and Monitoring of European Bats. Eurobats Publication Series No 5., Bonn, 2010.

Dietz, C., Kiefer, A., Veldgids Vleermuizen van Europa. KNNV Uitgeverij, Zeist, 2017.

Parsons K., Crompton R., Graves R., Markham S., Matthews J., Oxford M., Shepherd P., Sowler S., (Ed's), Bat Surveys. Good Practice Guidelines. Bat Conservation Trust. London, 2007.

Links:

www.natuurpunt.be/vleermuizenwerkgroep
www.vleermuis.net
http://www.chauves-souris.be

5 Attachments

Att. 1 - Abreviations of the species names in Dutch (Note the use of minors and capitals!)

Md	Md Watervleermuis	*Myotis daubentonii*
Mmb	Mmb Baard/Brandts vleermuis	*Myotis mystacinus/Brandtii*
Mb	Mb Brandts vleermuis	*Myotis Brandtii*
Mm	Mm Baardvleermuis	*Myotis mystacinus*
Mn	Mn Franjestaart	Myotis nattereri
MD	MD Meervleermuis	*Myotis dasycneme*
Me	Me Ingekorven vleermuis	*Myotis emarginatus*
MM	MM Vale vleermuis	*Myotis myotis*
MB	MB Bechsteins vleermuis	*Myotis Bechsteinii*
Ma	Nimfvleermuis	*Myotis alcathoë*
Msp	Myotis (soort)	Myotis species
PaA	Gewone of grijze grootoorvleermuis	Plecotus auritus/austriacus
Pa	Gewone grootoorvleermuis	Plecotus auritus
PA	Grijze grootoorvleermuis	*Plecotus Austriacus*
Psp	Dwergvleermuis (soort)	*Pipistrellus species*
Pp	Gewone dwergvleermuis	*Pipistrellus pipistrellus*
Pn	Ruige dwergvleermuis	*Pipistrellus Nathusius*
Es	Laatvlieger	*Eptesicus serotinus*
En	Noordse vleermuis	*Eptesicus Nilsonii*
Bb	Mopsvleermuis	*Barbastella barbastellus*
Chirsp	Vleermuis (soort)	*Chiroptera species*
Vm	Tweekleurige vleermuis	*Vespertilio murinus*
Rf	Grote hoefijzerneus	*Rhinolophus ferrumequinum*
Rh	Kleine hoefijzerneus	*Rhinolophus hipposideros*
Nn	Rosse vleermuis	*Nyctalus noctula*
Nl	Bosvleermuis	*Nyctalus Leislerii*
NL	Grote rosse vleermuis	*Nyctalus Lasiopterus*