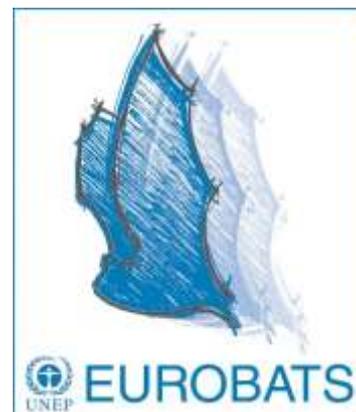


8th Session of the Meeting of the Parties

Monte Carlo, Monaco, 8 – 10 October 2018

Resolution 8.8

Guidelines for Bat Rescue and Rehabilitation



The Meeting of the Parties to the Agreement on the Conservation of Populations of European Bats (hereafter "the Agreement"),

Recalling Resolution 7.8 on Conservation and Management of critical Feeding Areas, Core Areas around Colonies and Commuting Routes;

Recalling Resolution 7.10 on Bat Rescue and Rehabilitation and all resolutions being referenced in it;

Further recalling that the 7th Session of the Meeting of the Parties to the Agreement requested the Advisory Committee to develop guidelines for bat rehabilitators and develop a system for collecting information for international cooperation;

Recalling the importance of bat rescue and rehabilitation for bat conservation, monitoring, raising public awareness of bat conservation, as well as for bat research and surveillance of bat zoonoses;

Recommends Parties and non-party Range States to:

Develop appropriate national guidelines, drawing on the general guidance to be finalised by the Advisory Committee;

Instructs the Advisory Committee to:

1. Finalise the draft Guidelines for Bat Rescue and Rehabilitation, currently available as an Annex to this Resolution.
2. Publish the Guidelines following circulation to all Parties for approval.

Annex

**Guidelines:
Bat rescue and rehabilitation
for bat conservation, research
and monitoring**

Prepared by members of the IWG on bat rescue and rehabilitation of the Advisory Committee
to the EUROBATS Agreement

DRAFT

version

September, 2018

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Introduction

The intersessional working group on Bat Rescue and Rehabilitation (BatReR) consulted with experts from party and non-party ranges of the EUROBATS Agreement and it was clear that most European countries deal with bat rescue and rehabilitation issues.

In some countries there are many bat rehabilitation centres which have been in place for decades. In others, such centres appeared only recently, and in some cases, no centres exist and bat rehabilitation is done by individual bat workers on varying scales.

It was also noted that bat rescue and rehabilitation can be an important method for contributing towards bat monitoring, research and conservation. A Resolution adopted by EUROBATS parties at the 7th Meeting of parties (see Annex 2) requested the Advisory Committee of the Agreement to develop guidelines for people currently dealing with bat rescue and rehabilitation or those who will do so in the future, and to develop a system for collecting information for international cooperation.

The main goal of the guidelines is to review the basic principles of BatReR, best practice and examples of how BatReR can contribute to bat conservation, research and monitoring, as well as facilitating exchange of ideas and experience by bat workers dealing with these issues.

1. We briefly review the BatReR situation across Europe and neighbouring states (based on answers to questionnaires and publications of Parties and non Party Range States).
2. We provide a general review of basics for BatReR, including communication with those finding bats, and good practice in relation to transportation, keeping and releasing individual bats and colonies.
3. We provide guidelines for how BatReR can be used for bat research, conservation and public education, in particular, good practice where bats are used in public education and events.
4. We consider the potential health risks for bat rehabilitators.
5. To facilitate connections between experts and international cooperation, the list of bat workers dealing with BatReR in different countries of EUROBATS range is given. The list of web-links to the corresponding sites or pages is given.
6. A list of references is provided for those who would like more detailed information on bat rehabilitation

We also include case studies on these issues from different range states.

1. Review of bat rescue and rehabilitation in Europe

The questionnaire was prepared and circulated among the EUROBATS Parties and Range States (Annex 1). The aim of the questionnaire was to collect the information and, correspondingly, to estimate the significance of bat rescue and rehabilitation throughout Europe, particularly in relation to bat conservation, public education and data collection. The respondents were also asked to give references to manuals or guidelines available in national languages and to provide contacts of bat rehabilitation institutions and / or persons. Answers from 36 EUROBATS Parties and Range States were received: Albania, Algeria, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, France, Georgia, Germany, Hungary, Ireland, Italy, Latvia, Luxembourg, Macedonia, Moldova, Montenegro, the Netherlands, Norway, Poland, Portugal (Mainland, Madeira, Azores), Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Switzerland, Ukraine, and the United Kingdom. Additionally, we analysed national reports of the EUROBATS Parties and Range States, scientific publications and spoke individually to bat experts from the Agreement range.

1.1. Countries

Many EUROBATS States deal with bat rehabilitation (fig. 1): 30 of 36. The development of bat rescue and rehabilitation centres differs from country to country. Some countries, according to answers, have many centres; some, one or few. In some countries the rehabilitation centres have funding support from corresponding ministries, NGOs etc; in others, the rehabilitation is being carried out only with private resources by volunteers.



Fig. 1. Countries dealing with bat rescue and rehabilitation, based on questionnaires and interviewing of countries' bat workers (orange, yes; grey, no; white, no information). As for September 2018.

In 20 countries there are databases on animals being rescued and rehabilitated. Bat experts from 20 countries use BatReR data as the source for additional faunistic data (new localities, occurrence

of species, sex ratio, etc). 23 countries use dead animals originated from BatReR for virological, morphological, parasitological, histological and other investigations and for replenishment of museum collections.

However, only 11 countries have their own manual guidelines for bat rescue and rehabilitation (of different level of development).

1.2. Species

The majority of bats being rehabilitated are mostly synanthropic species which are more or less common in different regions and typically dwell in buildings, forming their aggregations either all year around or during certain seasons.

The species most commonly rescued and rehabilitated are: *Nyctalus noctula*, *Vespertilio murinus*, *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus*, *Pipistrellus nathusii*, *Pipistrellus kuhlii*, and *Eptesicus serotinus*.

However, the full list of bats that have been rehabilitated include at least more species: *Miniopterus schreibersii*, *Rhinolophus ferrumequinum*, *Myotis mystacinus/brandtii*, *M. daubentonii*, *M. emarginatus*, *Plecotus auritus*, *Plecotus austriacus*, *Barbastella barbastellus*, *Pipistrellus maderensis*, *Hypsugo savii*, *Nyctalus leisleri*, *Eptesicus nillsonii*, *Tadarida teniotis*.

1.3. Numbers

The number of bats received for bat rehabilitation per year differs from country to country. This number may, obviously, be determined by different factors (the severity of winters, availability of contacts of bat carers, the number of incidents where roosts were demolished, etc.). However, this number may reach considerable values (>3000 individuals per country / year).

The percentage of bats released successfully after rehabilitation differs throughout countries. It ranges from 50% to 70%.

To estimate the conservation significance of bat rescue and rehabilitation respondents were asked to give a rough number of rehabilitated bats by species (1–10, 10–100, 100–1000, >1000 ind. annually).

It is not possible to the exact total numbers of bats being rehabilitated but a rough estimate (if to take 1–10 as 5 ind., 10–100 as 50, 100–1000 as 500, >1000 as 1000) suggests a total sum of over 10 000 bat individuals through Europe per year (fig. 2).

In reality, the number of bat individuals being rehabilitated through Europe may be even more: not all countries presented information, and not all countries dealing with rehabilitation were able to provide numerical information.

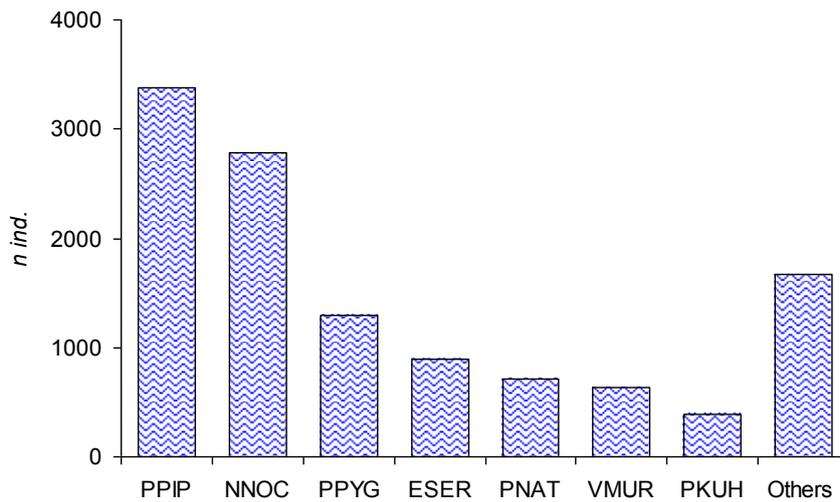


Fig. 2. Rough estimation of number of bats being rescued and rehabilitated per year in 25 European countries.

Species acronyms:

NNOC – *N. noctula*, VMUR – *V. murinus*, PPIP – *P. pipistrellus*, PPYG – *P. pygmaeus*, PNAT – *P. nathusii*, PKUH – *P. kuhlii*, ESER – *E. serotinus*.

Therefore, the total number of bats being rescued and successfully released into the wild through Europe is likely to be more than 5 000 – 7 000 per year.

1.4. Situations

Fig. 3 summarises the information on bats being rescued and rehabilitated by situation categories. The category “many in rooms” includes cases where bats rescued from internal rooms (e.g. living areas) require some additional help, for example, food, water, etc., and therefore can’t be released immediately. For example, there are known situations when bats can occasionally be found in rooms in winter, in periods of frosts. In such cases they can not be released and, correspondingly, need an (artificial) shelter for further hibernation.

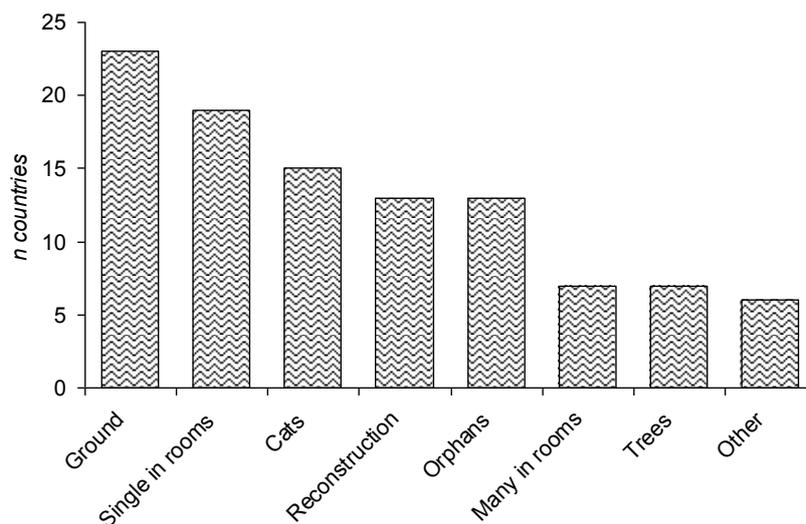


Fig. 3. Situations providing bats for rescue and rehabilitation in responded countries.

“Ground” – grounded adult specimens, “single in rooms” – single bats found in rooms, “cats” – caught by cats, “reconstruction” – extracted during construction works in buildings, “orphans” – orphaned juveniles, “many in rooms” – seasonal mass getting of bats into inner rooms of buildings, “trees” – bats found in felled trees, Category “Other” includes some other cases, like: bats were trapped in chimney, hit by a car, found in piles of firewood, etc.

1.5. Legislation

13 countries reported about national regulations for bat rescues and rehabilitation. However, they vary from country to country. Yet, there are differences in regulations on giving the first aid to distressed animals, on keeping bats, for using alive bats (including disabled) in education bat events. As well, countries differ by approaches for presenting bats (including disabled) during public events (Table 1).

Table 1. Details on national regulations for BaReR in different regions*.

Country	Yes	First aid				Keeping				Events				Presenting			
		E	CP	CO	N	E	CP	CO	N	E	CP	CO	N	W	B	G	H
Algeria					X				X		X	X		X		X	
Austria	X		X	X			X	X			X	X		X		X	X
Croatia			X	X				X		NA	NA	NA	NA				
Czech Republic	X	X					X	X			X	X		X	+	X	X
Estonia			X	X			X	X			X	X		-	-	-	-
Hungary	X	X						X				X		X	X	X	X
Ireland		X				X					X			X		X	
Portugal Mainland			X	X			X	X			X			X			
Portugal Madeira			X	X			X						X	NA	NA	NA	NA
Portugal Azores			X				X				X			-	-	-	-
Slovakia			X				X				X			X			
Spain			X	X			X	X			X	X		X	X	X	
Ukraine	X	X					X	X			X	X		X	X	X	X
United Kingdom	X	X					X				X			X	X		

* Yes = special legislation concerning manipulations, rescue and rehabilitation of bats. First aid specifies who can give a first aid to a needy bat (picking up, examination, manipulations, transport). Keeping specifies who can give a long-term care (>few days) and contact rehabilitation to bats. Events specifies Who is allowed to use alive bats (caught for this purpose or those being rehabilitated or disabled) in bat public event. Var: E, everyone; CP, only certified persons; CO, certified organization; N, nobody.

Presenting specifies a way of presenting bats to people during public bat events, when allowed. Var: W, handling only by a bat worker; B, in a box; G, people can touch bats in gloves; H, touch bats by bare hands.

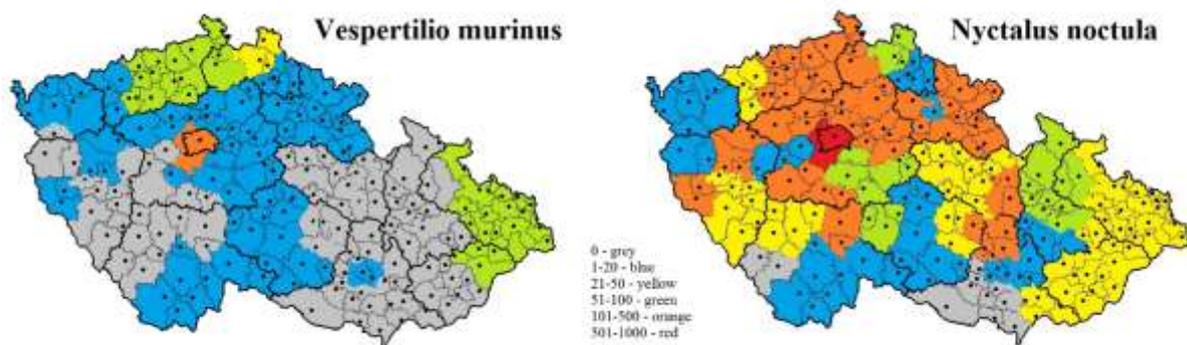
Case study 1.1: Bat Rescue and Rehabilitation in Belarus

Minsk Bat Contact Centre has existed as an informal organisation since 2007. The work of the Centre is mainly to provide information and support to people who have contacted them when finding bats. If the animals cannot not be left in their original roost (for example, if found on the

street, on balconies and in living quarters, during construction works, etc.), bats are accepted by the Centre for rehabilitation and artificial hibernation with subsequent release into the wild. In addition, the indirect result of the work of the Centre is the accumulation of scientific information and monitoring of the fauna of bats. Thus, during the operation of the Centre, data on the hibernation of 6 species were obtained from 18 localities of Belarus (Shpak, 2017;). These data have significantly improved our knowledge of hibernating bats in Belarus, particularly for *V. murinus*, *P. kuhlii* and *N. noctula* where the expansion of the wintering range was registered. Besides the fact of Parti-coloured bat hibernation, its prevalence between wintering bats was shown.

Case study 1.2: Czech Republic – animal rescue centres and bat workers in NGOs

Majority of wild animals found by public reach one of 29 animal rescue centres which are covered by Czech Union of Conservationists and are supported from Ministry of the Environment. There are also some private animal rescue centers which must meet legislation requirements. Individual persons can provide to found wild animal only first aid and then should transfer the animal to workers of rescue centre. No center is so far specialized only on bats, nevertheless there are members in NGOs focused on bats (Czech Bat Conservation Trust, Nyctalus) which cooperate with several centres. Rescue centers of CUNC have to send each year list of incoming animals to central database. Database could be shared for scientific purpose. Detailed protocols which can be used for conservational or scientific purpose fill only several centres. Carcasses of bats are provided for scientific purpose only by several centres.



Occurrence data of two bat species from 3-year period from 29 rescue centers in the Czech Republic (modified from Hudcová 2013).

Case study 1.3: Bat Rescue and Rehabilitation in Serbia

Bat rescue and rehabilitation procedure in Serbia is not defined by national legislation. However, bats are strictly protected mammals by the Serbian law, and special licence for their handling and capturing is necessary. Permit for capturing and handling bats is given by the Ministry agriculture and environmental protection of Serbia. People who have permit that permit are authorized to do rescue and rehabilitation. There is still no Center for bat rescue and rehabilitation in Serbia, but since 2011 bat experts with permits have been involved in that matter. Main activities are advising people what to do if they find a bat, taking care of juvenile and injured animals and bat popularization to the general public. People call Natural History Museum (NHM) in Belgrade to report that they have found bat on the ground or in their home, and occasionally they bring the animal personally to the NHM. A smaller percent of enquiries are solved by telephone

conversation, but in most cases bat experts are going to field, picking up the animal and releasing it afterwards or taking it for rehabilitation. Due to non-existence of facilities, animals are temporarily being kept in houses of authorized bat workers taking care of them. In case of larger numbers of animals rescued at the same time, a group of volunteers (mainly biology students) are involved during feeding sessions. About 10% of rescued animals are juveniles, up to 10% injured animals (most often cat attacks and broken forearms), and majority are healthy adults, sometimes dehydrated and/or underweight. 2 most frequent rescued species are *Nyctalus noctula* and *Pipistrellus kuhlii*, and occasionally *Hypsugo savii*, *Vespertilio murinus* and *Pipistrellus nathusii*. Carcasses of bats that do not survive are being deposited in NHM mammal collection. All the work is being done on the voluntary basis and with no fundings. There is an initiative for forming an official Center for bat rescue and rehabilitation, establishing the network of volunteers and providing funding for future activities.

Case Study 1.4: Switzerland: Bat Rehabilitation

60 rescue stations are spread over Switzerland operated mainly by volunteers, lead rescue center in Zurich with veterinarian and biologist. Bat Conservation Switzerland has been authorized by Swiss Veterinary Authority to educate volunteers and veterinarians in emergency caring according the law on animal welfare. As cantons (regional departments) are responsible for permissions volunteers get it from regional authority. Workshops and courses are given by the leaders of the rescue center in Zurich. Centres solve 400 - 800 emergency care cases each year and approximately 50% of animals can be set free again successfully.

Case study 1.5: UK: Bat Rescue and Rehabilitation

Case Study 1.6: Ukraine: Bat Rehabilitation in Kharkiv

Bat group started its activity with two bat rehabilitators-volunteers in 2008. In 2013, they got support from private zoo Feldman Ecopark and establish a group with five employees, own office and recruit new volunteers. Each bat is measured, weight, ringed and detailed protocols including bat history are filled into the database. Each year the centre took care about 800-2200 bats. Since 2012, the centre received 8082 bats of 9 species from 59 municipalities.

2. Communication with public when bats are found

2.1. Basic advice

Situations for bat rescue and rehabilitation include not only animal contact rehabilitation but as well calls concerning bats (a bat occasionally got into a room, a colony in a houses, rabies, etc.).

The situations differ and there is no one universal advice applicable for the certain situation (e. g. a bat in a room). The final advice will depend of many conditions, from legislation to the species and outer temperature. For example, a bat got in a room may be released in winter in some southern countries. However,, this decesion is unappropriate for regions with severe winters, when the temperature is -10 and below.

In any situation when the contact manipulations are expected (e.g. a bat on ground, bat babies, a bat brought by cat, inconvenient weather conditions), than a bat-worker should with a regard to the situation including availability or presence of national rehabilitation centres and national legislation *recommend the finder following solutions*:

- Do not to touch a bat with bare hands, always use tough gloves or bundled piece of cloth (e.g. a towel).
- In case, that there were any biting incident, ask a finder to take contacts of a bitten person or home pets and ask to contact doctor or vet. Do not advice to release a bat. This bat should be kept separately from other bats and not released until situation is solved.

In situations, when a bat(s) can't be released and need keeping.

- Ask a finder to put a bat or few bats with gloves or cloth in a box with a secure fitting lid (a lid should be fixed so that a bat couldn't push it and get out; e.g. a lid of a shoe box should be fixed by a sticky tape). A few punctures in the lid of the box for ventilation are recommended for paper boxes and necessary for plastic containers. In a corner of the box should be crumpled cloth (no free long sewings, tattered edges or holes) where a bat can rest. It's also recommended to have a cloth fixed at the box wall so that a bat may place itself upside down. On the opposite site provide water in a bottle cap (fig. *). Box should be placed in a quite safe room. In winter should be temperature of place cold, but not below zero, in summer the box should not be placed in direct sun. In case bat is injured, crawl, is immobile or in bad weather condition ask finder to stay in touch and wait until bat worker comes.



Fig. *. An example of organising a box for a bat temporary keeping.

If a bat appears healthy and it is adult individual which just landed on improper place, hasn't been involved in a cat attack and the weather conditions are appropriate it may be released.

- Ask finder to go during sunset to near suitable place (e.g. park, pond with old trees, riverside), put the open box in a place at least 1,5 m from ground and enfold the cloth partly over the top edge of box that the bat can crawl up and start from the fly up form edge of the box. Wait 30 minutes and watch the bat. The bat needs different time for warming its body

for functional temperature. If the bat does not fly away within this time, take it back inside and contact expert. Point out to take torch and gloves in case bat can not fly properly and land on ground.

In case there is a colony in danger (e.g. felling tree, reconstruction of roost, insulation, invasions, etc.)

- appropriately large box or boxes should be used the bats lay on the bottom in one layer. Providing water is not recommended in huge amount of bats, because stressed bats often crawl and soak themselves. Ask finder to do photodocumentation of the case, especially the place, where the bats were found and take contacts if any person or company was engaged in discovery of colony or in unwanted damage of bat roost (e.g. disinfestation company, construction company, tree felling company). Priority for bat worker is to come as soon as possible.

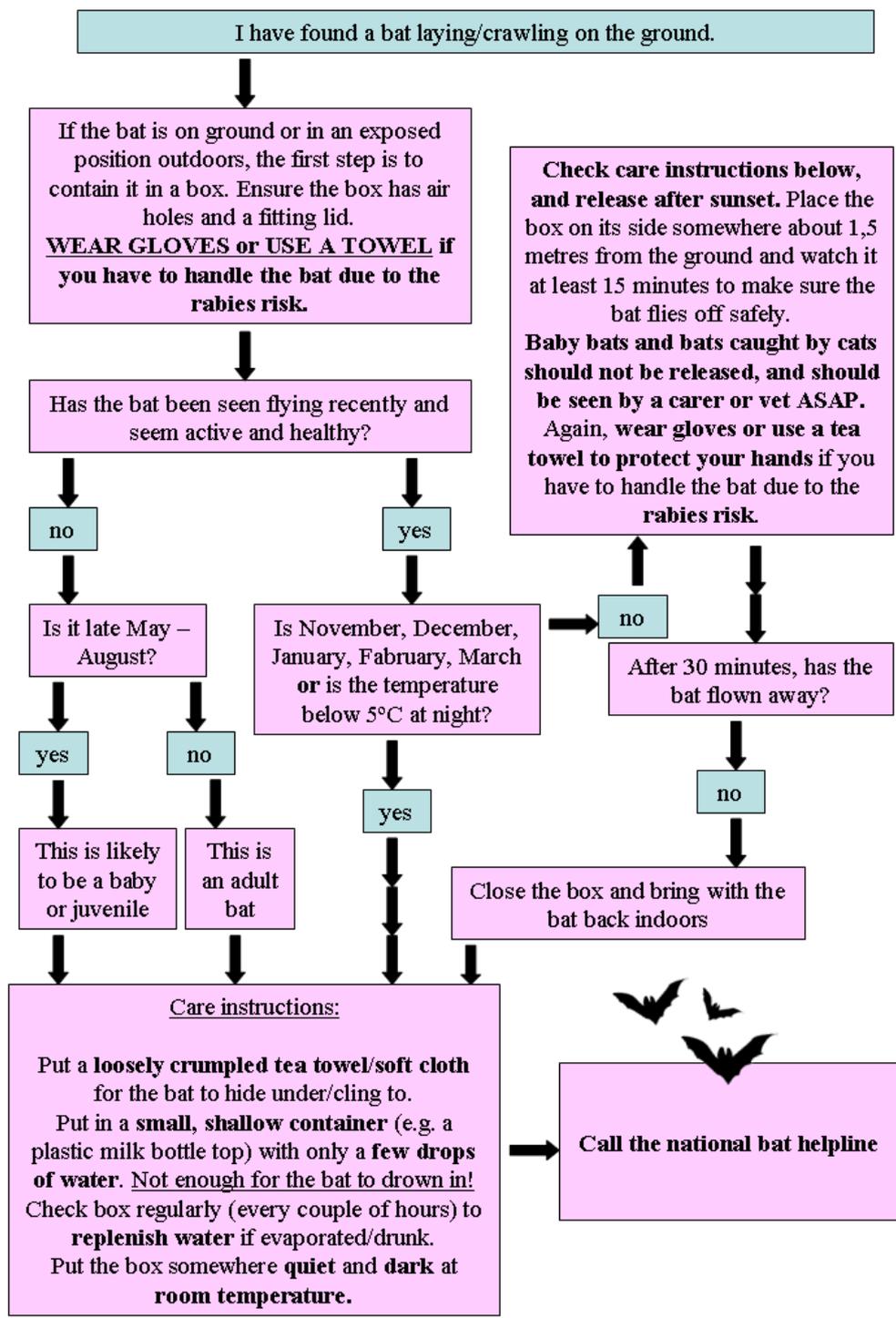


Fig. 2.1. Flowing chart for the situation with a grounded bat (modified from BCT, UK).

2.2. FAQ from public

Answers to the question are country-specific and depend on legislation and development of bat or animal rescue centres, level of public interest and participation on nature protection, as well as type of problems concerning bats.

Here, we provide the “average” and possible answers to the most frequently questions and possible solutions to the certain situations (which may be adopted to the circumstances) which should be added with comments appropriate to the country or region.

Answers for questions are based mostly on Bat Conservation Trust (UK) experience where the bat rescue system is well developed.

Q: A bat in a room, what to do?

A. Flight into the room by open window during nights with favourable weather conditions. Advise to enclose the bat into one single room with a window or door to the outside if possible. If it is dark outside, remove any clutter from the room and open the windows and/or external doors as widely as possible, dim or turn off the lights and let it find its own way out. It's highly recommended to stay in a room with a bat and to make certain the bat has left a room (otherwise the bat may hide inside and, usually next evening reveals itself again. Yet, you may ask to make photo of a sitting bat. This may allow you to identify a bat species, and the call will become a record in a database.

If it's cold season and the outside temperature is below zero, a bat should be accurately caught and placed into a box for further keeping.

Q: I have a bat hibernating in my cellar.

A. Don't disturb and be sure that there openings through which a bat can flow away.

Q: I have a bat roost in my house, what do I do?

A: Having a roost should not present any problems; many home-owners and tenants share their property with bats without being alerted to their presence. Bats are not rodents, and do not nibble or gnaw wood or wires, and will not generally cause any structural damage. They use existing spaces to roost, and will not bring in bedding material or food – they are clean and sociable animals which spend many hours grooming themselves. All bats (besides one) in European fauna are insectivores, and there are no known health risks associated with their droppings. If you need to carry out works or timber treatment, please contact a bat-expert.

Q: A bat colony lives in my house. I don't like them. May I move them?

A. The decision should be based on the national legislation and must involve bat-experts. All actions should be directed to the saving of a roost and / or to be absolutely safety to bats.

Q: I have found a bat on a ground.

A: See chapter 2.1 and **fig.** 2.1.

Q: My cat caught a bat, what to do?

A: Cats do not eat bats but they like to play with them. *If a bat has been caught by a cat it will need expert help and contact vet as soon as possible.* Even a tiny amount of cat saliva in a bat's bloodstream can cause infection and without help they are likely to die. Antibiotics are often administered under the correct supervision if there is a suspicion of a cat related injury and this practice has been found to increase survival rates. If the owner of cat is concerned about transmissions of possible infection from bat to cat, he should speak to their vet. In parts of Europe there are a two recorded cases of a virus EBLV-1, being transmitted by cats.

Advice should also be given on how the cat owner can stop bats being harmed especially if the cat is a repeat offender. Cats will often learn where a bat roost is and catch bats as they leave the roost, putting a whole colony at risk. Possible ways to reduce this risk is for the cat to be brought indoors half an hour before sunset and keep it in for an hour afterwards or all night when bats are most active (April – October). Mid-June to August is especially crucial as mothers will be raising their pups. See [chapter 2.1](#).

Q: What shall I do I have found an injured bat and there is no bat rescue person/organisation nearby?

AI (BCT example): If there are no carers nearby, provide the option of taking the bat to a local vet. Though the vet may not have great knowledge of bats, treating it as any small mammal may allow for a prognosis and further treatment if no one else is available.

When going through the vet advice:

- You could write the number of a bat rescue centre or carer on the box containing the bat, so the vet can seek further advice. If there is no-one available or it is out of hours, then the vet could look online for the BCT Bat Care Guidelines. Add link
- The finder should also make sure that the vet takes a note of where the bat was found and of their own contact details, so that the bat can be released when/if it recovers. Veterinary staff are supposed to record this information anyway, but often don't!
- We can email a copy of the BCT *Bat Care Guidelines* (also easily found on the web to download Add link), put them in touch with closest care contacts if possible, or potentially a bat carer who is happy to give advice remote by phone.

Q: It's winter I've found a bat, it's minus 5 or below, there are no rescue centres nearby.

A: If a national legislation allows, then you may provide the help by yourself. First of all, you may provide the bat with appropriate place and conditions for continuation of hibernation. *** See also [chapter 3](#).

Q: I have a bat roost in my house and I am planning maintenance or alterations. What should I do?

A: Bats and their roosts are protected by law whether occupied or not. It is illegal to damage, destroy or disturb any bats or roosts without having taken the necessary precautions. If you need to undertake any works that may affect your roost, it is recommended that you take the necessary precautions by seeking advice on how to do works lawfully. This advice can be provided by the relevant authority for your country. The earlier in the process the bats are taken into account, the less disruption there will be.

When works are planned where there is a roost, the work will need to be organised so that any risk of harming the bats or their roosts is avoided, for example, by timing operations to fit with the life-cycle of the bats. This is important not only to help protect these scarce species, but also because

it will help you get the work done in the most efficient way possible within the constraints of these strict laws.

E. g.: Natural England provides a free advice service for small scale repair works to dwelling places and churches where bats may be affected, and relies on the generosity of volunteers to be able to run this service. If the scale of the works is outside the remit of the volunteer service e.g. works requiring planning permission or a mitigation licence, it may be necessary to engage the services of an ecological consultant. The ecological consultant will carry out a survey and write a method statement on behalf of the person proposing the work. They will also help apply for a licence if this is necessary.

Q: What to do, if you find a bat or bat colony, during construction or timber treatment procedures?

A: If bats are discovered during work then the **work must stop immediately** until the relevant authority has been contacted and advice given.

Q: How do I carry out tree works?

A: Bat populations have suffered significant declines across Europe over the past century, and are therefore protected under the European Union's Habitats Directive in addition to country specific legislations. Bats and their roosts are protected by law meaning that it is illegal to damage, destroy or disturb bats or their roost sites. A roost is defined as any place that a wild bat uses for shelter or protection, and the roost is protected whether bats are present or not. It is the land owner's responsibility, in addition to those conducting the works, to ensure that protected species, such as bats, have been taken into account before any actions are conducted that could disturb those animals.

If you need to undertake works (pruning/felling/crowning etc.), you will need to consider if the tree has any features that could support bats. Please note that confirming the presence/absence of a roost may require assistance from a specialist with the necessary training and equipment for a full survey. If you are unsure about bat potential it is best to seek advice.

The presence of bats will not stop works, but means that advice needs to be sought on how they are to be done lawfully. If the presence of a bat roost is suspected you will typically need to seek the services of an experienced ecological consultant with knowledge of bats to conduct a survey; establishing any impacts the works are likely to have. The consultant should also be able to assist with any EPS licence application required.

If emergency situations arise where urgent tree works are necessary due to confirmed and overriding public health and safety, and the potential for bats is high or actively present, the relevant authority should be contacted for further advice.

If, after inspection the tree is deemed as low potential for a roost to be present (no potential roost sites visible on the tree), then work may proceed with care. As a precaution, and where possible, we recommend any works are conducted in September/October, to avoid maternity and hibernation seasons when bats are most vulnerable to disturbance. If the tree is to be felled then we recommend soft felling, where tree limbs are cut and left grounded over night to allow any bats to make their way out.

Q: What to do if find a bat when felling trees?

A: As bats are protected, if you are undertaking tree works, the tree should already have been assessed for the presence/absence of bats (and relevant licences obtained if a roost is present). However, bat roosting sites can change depending on a variety of factors and therefore the presence of bats should never be ruled out completely.

If, in the unlikely event any bats or new evidence are discovered prior to work or whilst work is in progress, we advise pausing work and consulting the relevant authority immediately for further advice. This will help to avoid any harm to bats and offences being committed.

Q: I was bitten by bat what should I do?

A small number of bats in Europe have been found to carry a type of rabies. This virus is transmitted via a bite or scratch from an infected animal so the risk is very small and is removed if you do not handle the bat. Bats seldom show any aggression but they are wild animals and may be frightened or in pain. In situations where handling is necessary, i.e. if a grounded or injured bat needs to be contained, wear protective thick gloves or use a tea towel and handle the bat as little as possible. If despite precautions you are bitten or scratched by a bat or if a bite or scratch is suspected:

Wash the area bitten or scratched immediately with soap and water for at least five minutes. Additional cleansing of the area with an alcohol base or other disinfectant is also recommended.

Seek advice from your doctor as soon as possible. (For more detailed on rabies look [chapter 3.5](#))

3. Basics for handling, transporting and keeping bats

Bat care and rehabilitation is dependent on national legislation, which varies between countries, in relation to the standard of rescue centres, number of bat workers, availability of drugs, and possibilities of accommodation needed for proper bat care.

3.1 Transporting bats

Individual bats can be transported both by a finder and / or a bat worker. We strongly recommend to use gloves for any contact operations with a bat to mitigate the rabies risk. A bat can be transported by a finder in a box for a temporary keeping as recommended in [section 2.2 \(fig. *\)](#), but the cap with the water must be removed. To transport bats for short distances it's possible to use almost any type of box, having punctures for air and no slits or holes allowing the bat to escape, with a crumpled cloth inside providing shelter for the bat.

Colonies can be found unexpectedly, for example, during building reparation works, or during seasonal mass penetrating inside rooms, or in felt trees, and they need to be rescued promptly. As above, gloves should be used, but it is very important to choose transport box/boxes that are big enough. The bats should be able to lie on the bottom of the box in a single layer to prevent soiling, ideally with crumpled cloth at the bottom and / or shaggy fabric fixed at the box walls so that bats can cling and hang on it. The fabric must not have loose thread, tattered edges or holes because the bats can entangle themselves. Bats may also be transported by a bat-worker in cloth bags free enough to allow bats to move freely inside. However, in this case, precautions should be taken to keep bags with bats in proper conditions, to prevent the occasional pressure on bags, overcooling, etc.

During the meeting with a finder of a bat(s), a bat worker should:

- Write down the contact details of the finder, the location and circumstances of finding the bat and, if possible, to fill in the information included in the protocol agreed during 7th MOP ([Annex 2](#)).

- Decide if the situation requires additional input and if it is necessary to contact other organisation (e.g. bat experts at universities, NGOs with experiences with building renovation, officials from national conservation agencies, local authorities, media)
- Take photodocumentation, if necessary
- Prior to transporting the bat(s), remove the water from temporary finder box or put a bat into its own transport box (fig. 3.*).



Fig. 3.*. Transport box for one or several few bats can be small, if time of transport is not too long to cause dehydration or souring of bat.

3.2 Basics of handling with individual bats and colonies

3.2.1 Individual bat or small number of bats – entry control

After transporting the bat to a rescue center or rehabilitator, it is necessary to examine the bat and assess its condition to make a decision about the further steps. The bat should be examined with gloves. We recommend that bats should not be held by their forearms, it is very stressful for the bat and in the case of a broken or twisted arm, also very painful. The tips of the wings should also not be used to hold the bat. The bat should be held softly, but firmly in one hand and the second hand used for examination (fig. 3.*).



Fig. *. Examination of wings of *Nyctalus noctula*.

Nutritional condition of a bat

In short-haired bats, such as noctules, the condition is visible at first glance, whereas in other species, the bat worker must touch the site between shoulder blades and neck, and loin region to check the amount of fat.

- Well-fed condition – body has „tube shape“, no depressions in loin region, condition for hibernation; in room temperature bat warm itself from low body temperature to active body temperature till 15 minutes and behave normally
- Normal condition – in loin region are slight depressions; in room temperature bat warm itself from low body temperature to active body temperature till 15 minutes and behave normally
- Lean condition – in loin region, behind neck and between shoulders are apparent depressions; in room temperature bat warm itself from low body temperature to active body temperature till 15 minutes and behave normally
- Emaciated/dehydrated condition – in loin region, behind neck and between shoulders are apparent depressions; in room temperature bat is not able to warm itself in 15 minutes, lay on bottom of box.

The bat also should be weighed. However, the optimal weight varies among different seasons and depend on the region (how much the hibernation lasts). Average „summer“ weight is not appropriate in autumn for bat hibernation (Table *). Again, a good weight of a bat in march will depend of the spring course.

Table 3.*. Examples of good weight for four bat species of different species for Ukraine (severe winters).

Parasites

Bats can suffer from many different types of parasites. The larger of them can be removed manually by tweezers from the body or membrane; tiny mites can be removed by small dough roller from flour and water. Antiparasitic preparations (both internal and external) should be used only in bat in well-fed and normal condition.

Most common injuries are:

- Torn wing membranes – holes in wings usually recover and the bat is able to fly after some recovery time. In some cases even large vertical cuts will heal, but usually a bat with a split or torn membrane is unable to fly in the future. Bats are likely to be assessed as potentially unable to return back to the wild, but could live in captivity without special care.
- Broken fingers – depending on the species and extent of the injury, the bat is likely to be assessed as unable to return back to the wild, but could live in captivity without special care.
- One limb or one forearm broken – depending on the species and extent of injury, the is likely to be assessed as unable to return back to the wild, but could live in captivity if healed, but with some special care. Often the limb, where an open fracture is identified, must be amputated (in which case euthanasia should be considered).
- Both forearms, limb or forearm and limb broken – bats likely to be assessed as both unable to return back to the wild or live in captivity without really special care (euthanasia recommended).
- Blood around anus together with inactivity of bat when was warmed up, likely inner injury – euthanasia recommended.
- Traces of bites on the body, torn membrane, broken arms, inactivity (all together) – euthanasia recommended.

We recommend placing injured and emaciated bats on a heating stone (usually used for reptiles) in the box. Treatment and surgery of bats can be found in special literature (see chapter 5) and should only be undertaken by those with appropriate knowledge, skills and experience.

In spring, summer and early autumn bats in a normal condition and slightly injured animals can be released when the weather and weather forecast are suitable (no rain, not windy, $>5^{\circ}\text{C}$ at night at least for three days). In the winter, when the outside temperature often reach values below zero, hibernating bats with sufficient fat reserves and no visible injuries can be overwintered in a suitable cellar, in a box with cloths to hang on and a shallow bowl with water. They should be checked weekly.

3.2.2. Bat colony – entry control

It is possible that large colonies could be discovered through building works, felt trees or autumn/spring mass getting of bats into inner rooms. Where colonies are discovered, it is particularly important that bat experts are informed and involved; the right protocols need to followed, and both data and material could be important for conservation and public health and contribute to the knowledge of species. Where there are **hundreds of bats and bat workers don't have enough capacity, it is preferable to save as many as possible of those bats in good condition, and those that are badly injured and/or emaciated, euthanasia may need to be an option.** It is important that bat workers are aware that feeding one bat takes a minimum of 5-10 minutes/person, so for a colony with 100 animals it takes 8-16 hours. After transportation the bats should be assessed and separated into several groups:

- Dead bats (if possible, keep for scientific purposes, deeply frozen)
- Ill or? wounded bats – broken legs, forearms, etc. (euthanasia recommended)
- Emaciated and dehydrated bats (in bad cases euthanasia recommended)
- Wounded bats – broken fingers, long rupture on wing membrane (consider whether appropriate to keep as a permanently disabled bat captive bat or otherwise, euthanasia recommended)
- Slightly injured bats – little holes in wing membranes, abrasions
- If small babies are present, let them find and attach to the mother (for abandoned pups consider euthanasia or keeping in captivity for education purposes)
- Bats in normal condition without visible injuries.
- **Females and males should be kept in separate boxes.**

In **spring, summer and early autumn** bats in a normal condition can be released when the weather and weather forecast are suitable (no rain, not windy, $>5^{\circ}\text{C}$ at night at least for three days), and those that have potential for being returned to the wild, should be kept and rehabilitated.

In the **winter** is situation in many countries different, because it is a hibernation period and outside temperature often reach values below zero. Bats in normal condition with no visible injury should be as soon as possible hibernated in suitable cellar in a boxes with cloths from not-moulded material to hang on and a shallow bowl with water, and weekly controlled. Due to stress many of bats do not fall into the winter sleep but actively swarm in the box with following exhaustion. These individuals should be taken back into the care. We do not recommend mixing sexes, because males often harrassed sleeping females and mate with them. Never put into hibernation box bats with slight injury, because even small abrasions could be infected with bacteria and inactive hibernating bats do not care about themselves.

3.2.3 Euthanasia

Appropriate methods should be used. The best option is two phase chlorophorm (ether) inhalation. Not appropriate methods: freezing, dissection of cervical vertebrae, injections.

3.3. Basics for keeping bats

The final goal of bat rescue and rehabilitation should be to return bats back into the wild. In some cases bats do not fully recover and stay as permanent disabled individuals dependent on human care. For correct type of arrangement of box interior, food and vitamins requirements, bat species should be recognized. We recommend to keep both sexes separated not to mate (especially in late summer, autumn, winter and early spring).

3.3.1 Temporary care

Plastic fauna boxes are very easily to handle and keep clean; they are available in most pet shops and come in several sizes. A box for temporary care should have proportions of at least 40x30x30 cm or similar, for two active bats of noctule size. In very short care it is possible to add more individuals, but not more than 10 altogether, because of risk of bite incidents among bats and souring. In injured bats the size of used box depend on vet recommendation, and it is usually smaller. Both sexes should be kept separately. At least two walls of the box should be provided by a soft net with small mesh (1mm) , partly covered with cloth, which enables bats to use safe roost of fissure type. Bedding should not be dusty or toxic, there is good experience with some types of litter for cats for health bats. In case of injured bats should be used easily changeable soft paper towels. Heating stones or pads placed vertically in the box help injured or emaciated bats to recover. Water in shallow bowl (e.g. 1cm height) should be always present, and bowl(s) with food (e.g. live mealworms larvae) according to situation. (Fig. *).

Fig. *. Large plastic box can be used for temporary care. It is easy to handle and kept clean. Heating stone for geckos leans against the wall. From the outside is attached to the wall a plastic envelope, where information about species, care and state of bats can be stored (i will take new photo).

Basic food is represented by healthy mealworms (larvae only!!!) fed by various types of food (cereals, fruit, vegetable, non-toxic leaves, vitamine mixture, etc.), soluble vitamins could be added to the water. Some species lives quite well on this diet (pipistrelles, noctules, vespertilio, serotine), in some species it is necessary to add crickets, beetles, wax-moth larvae, etc.

Species mostly accepted to the rescue centers are **aerial insectivores** and they are used to seek their food in the air, so it depends on species and adaptability of each individual, when it learns to look food in the bowl. At the beginnig it is usually necessary to feed them by hand.

Before feeding, bats must be warmed up to their normal body temperature. The bat should be held in the hand with gloves softly, but tightly, wrapped by fingers, or soft towel can be used instead a hard gloves. The feeding room should be quiet and not with sharp light. Water should be provided during the first feeding by syringe, when bat is licking the tip of it (not allow the water to spirth forth). Mealworms should be killed and decapitated, that the bat can lick its guts, until the bat is eager to eat them. It is better to offer melaworms by pincers from below, because bat learns to seek food on the ground. It can speed up the process of feeding from the bowl (fig. *). When mealworms are too small and bat worker has many bats to feed, it is possible to use hand blender to make smooth mealworm mash with addition of little amount of water and feed bats by syringe. Bats in normal condition should be fed once a day during evening.



Fig. *. Bat can be held during feeding in a glove or in a towel to prevent bite incidents. If the grip is tight, but soft, many bats stay calm and cooperate. (new photo, hand should not be without glove)

In emaciated bats it is important to recognize the current state. At the beginning it is better to provide Ringer solution and Glucose (G5) by infusions, or per mouth slightly sweet solution of glucose and water. If the bat reacts normally, and actively wants water, it is possible to feed him afterwards, but preferably only by guts and only by some few mealworms. Another feeding and providing water with glucose should be done after several hours. Following days the amount of mealworms should be gradually increased according to the state of the bat.

Non-volant juveniles are often found during summer. Bare and blind juveniles should be fed several times a day by pup milk formula for cats or dogs and gradually during following days add guts of mealworms and later mixed whole mealworms. Heating pads or stones should be placed in the box. If it is possible to make a group of juveniles or add a juvenile to its own species, they seem to face up the orphanhood much better. If there are not conditions in a rescue center to prepare orphaned bats to return back into the wild, it is recommended not to release them. Care of non-volant juveniles is time-consuming and not always successful. If there are not conditions to provide proper care, consider euthanasia.

Hibernation in winter is possible only for healthy bats without any visible injury. In the box should not be any material, which could mould, but provide water in a shallow dish. Noctules, pipistrelles, parti-coloured bats and serotines tolerate relatively dry air in a cellar with relatively stable temperature – if the cellar is good for storage of potatoes and apples, it is suitable for these species. Never mix sexes in hibernation boxes. During hibernation, when activity is very low, plastic box 40x30x30 cm is sufficient for 10 bats of size of noctule bat. During hibernation bats should be controlled. After awaking in spring, some bats are able to be released the same day, some must be fed for several days to reach correct condition.

Bat mating season lasts during the autumn, but they can mate also during winter and probably also during early spring. Injured females accepted to the centres can be fertilized or pregnant and can give birth in captivity. Fate of juveniles depends on circumstances (e.g. group of juveniles and adult bats of the same species, outer bat aviary, mother care of baby), but hand-raised pups should not be released. Also, preterm pregnancy could occur in females, which were not hibernated due to different reasons and centres should be get ready for this.

More information about bat care can be found in special literature (see chapter *).

3.3.2 Keeping permanently disabled bats in captivity

When national legislation permits permanent disabled bats could be used in environmental education programs. They should have much bigger boxes (e.g. modified wardrobe) with several roosting possibilities, clothes, curtains, etc., with access to water and food (fig. *). If they are capable of gliding flight, the cage should have proportions to enable at least short gliding flights. For pipistrelles, noctules and vespertilio it is recommended that, where possible, two or more bats of the same sex are kept together, because in these species even males are very social. It is not necessary for them to be the same species, but they should be a similar sized species. Information on the long-term care of bats, housing, food and vitamin requirements, possible diseases, etc. can be found in the additional references (see chapter 5).



Fig. *. Example of interior design for permanently disabled bats kept in captivity, which do not need special care.

3.4 Release into the wild

Care of bats is a time consuming activity, and thus it is important to consider carefully all the criteria for a successful release. The ability to fly should always be confirmed, because there are some hidden injuries, which may not allow the bat to fully control its wings. The bats should ideally be released where it was found. If this is not possible or suitable for some reason, then suitable habitat preferred by the species should be found. Near rivers or other water bodies with older trees nearby are favourable for many species. The bat should be released after sunset on a day when the weather forecast is good for at least three days (not windy, no rain, at least 5°C during the night). The open transport box should be placed at least 1.5 m from the ground and cloth or mesh partly folded over the top of the edge of box, so that the bat can crawl up and take off from the top edge of the box. The bat may need some time to warm up to a suitable temperature, so it is necessary to wait about 15-30 minutes and watch the bat. Some bats warm themselves during transportation and they fly immediately, but some can be still in torpor. If the bat does not fly away within this time, it should be checked for inconspicuous injuries. Gloves and a powerful torch should be in basic equipment.

It is possible that the release of an individual or a colony in favourable conditions can be utilised for public education and, if appropriate, the media.

3.5. Health risks for bat rehabilitators

People dealing with contact operations with bats have to follow general rules for keeping and handling wild animals and bats in particular (gloves' using, hand washing, separation of rooms for living and animal operations, etc.).

The main risks associated with rabies and some other viral infections, allergy to bat food are considered below.

3.5.1. Bat rabies

Rabies is an infectious disease caused by the classical rabies virus and related viruses. These viruses belong to the family of the Rhabdoviruses and to the genus Lyssavirus. So far, 14 genotypes of Lyssavirus have been found in bat species, of which 6 in European bat species.

Genotype 1 includes the classical rabies virus that can occur almost globally in terrestrial mammals, such as foxes and dogs, but is also regularly found in bats on the American continents and surrounding islands.

- European Bat Lyssavirus-1 (EBLV-1) is, so far, only found in the Serotine Bat, *Eptesicus serotinus* and *E. isabellinus* (Vásquez-Morón *et al.* 2008).
- European Bat Lyssa Virus-2 (EBLV-2) is found in Daubenton's Bat, *Myotis daubentonii* and in the Pond Bat, *Myotis dasycneme*.
- Bokeloh Bat Lyssavirus (BBLV) has been found, so far, in 3 cases in Natterer's Bat, *Myotis nattereri* in respectively Germany and France.
- West Caucasian Bat Virus (WCBV) has been found in South-eastern Europe in the genus *Miniopterus*.
- Lleida Bat Lyssavirus (LLEBV) has been found in 2 cases in Schreiber's Bent-winged Bat, *Miniopterus schreibersii*, in respectively Spain and France (Servat *et al.* 2017).
- Kotlahti bat lyssavirus has been found in Brandts Bat, *Myotis brandtii*, in Finland (a single case).

The transfer of rabies infection can take place by a bite, but also by contact with saliva or urine of infected animals through mucous membranes or open injuries of the skin. The rabies virus is mainly found in the saliva. Infected saliva can also be transferred on the animal's fur during grooming. After the death of an infected animal, the virus can remain alive for a period of about two weeks at a normal temperature and even many years at freezing temperatures. After an infection, the virus moves subcutaneously through the nervous system at a rate of 3-4 mm per hour to the central nervous system. There, multiplication of the virus takes place in the neurons. From the central nervous system the virus spreads through the nervous system further into the body.

The incubation period varies and depends on the distance between the place where the infection occurred and the central nervous system. The concentration of the inserted virus particles can also play a role in this. The virus is not spread through the blood circulation.

People infected by rabies virus show first some flu-like symptoms that hold for two to four days. Afterwards, the affected nerves feel painful and a distinct fear of swallowing is felt by painful cramps of the swallowing muscles. Subsequently, paralysis of the respiratory muscles occurs, and death will usually follow shortly thereafter. There are no tests that can show or exclude an infection with rabies virus at an early stage before the symptoms of rabies are shown.

Bats infected with rabies virus do not show aggressive offensive behaviour. Rabies virus affects the central nervous system. As a result, paralysis symptoms occur and the emitting and receiving of echolocation does not function properly. In the first phase when the disease manifests itself, the animals show by the paralysis an uncoordinated flight behaviour and can thus fly against objects

or sometimes also against humans. This is sometimes misinterpreted as an attacking behaviour. Animals can already be contagious before they already show signs of the disease.

In the next phase the animals can no longer fly and are then sometimes found on the ground, so that they can be easily caught by cats and people. When irritated by high sounds, the animals often show long loud screams. This does, however, not necessarily indicates rabies. The Parti-coloured Bat, *Vespertilio murinus*, shows approximately the same persistent screaming behaviour in case of disturbance during hibernation or lethargy. Also, persisting bite behaviour (Pitbull-terrier-bite behaviour) in an object is a phenomenon that can occur at this stage. After the animals have become completely paralyzed, they die shortly thereafter. However, most of the bats that are found to be depleted or apparently ill are not infected with rabies virus.

Since 1977, four people in Europe have died from bat rabies, two children in the former Soviet Union, a bat researcher in Finland, and an amateur bat conservationist in Scotland. The genotype of the rabies virus from which the first child passed away. The second child was infected with EBLV-1 and the other two fatal cases with EBLV-2. There may also be a fifth case in the Ukraine, but it is not known about the genotype of the virus and the bat species that had inflicted a bite. This number of deaths is remarkably low when realized that many amateur bat workers, students and professional scientists have been dealing with a study of Serotine Bats or other bat species and have often worked with unprotected hands, with regular bite contacts, while these individuals were not vaccinated against rabies. In addition, many others will have been in direct contact with bats and have also suffered from bites, without being vaccinated preventively or curative.

It seems that people are likely to be significantly less susceptible to an infection with one of the EBL-viruses than for an infection with the classical rabies virus. But there is also evidence that the concentrations of EBL-viruses in the salivary glands of infected bats are relatively low, so that at a bite only relatively few virus particles are transferred. Nevertheless, any unnecessary direct contact with bats will have to be avoided. When handling bats, and certainly live and dead Serotine Bats, it is advisable not to handle these with unprotected hands.

Bats, which have inflicted a bite or which otherwise have had direct contact with damaged skin (hands) or mucous membranes and which are still available, should be examined for rabies as soon as possible. Dead bats with direct contact with men or pets should also be made available for rabies testing as soon as possible. A live bat that has caused a bite case should be offered to for euthanasia and should be submitted for rabies examination.

Pets who have been in direct contact with bats should be vaccinated against rabies for safety as soon as possible by a veterinarian. However, most contact cases between bats and pets are not observed and there is usually no vaccination in these animals. A natural transfer of bat rabies to dogs and cats has not yet been demonstrated, although a cat in France showed contamination with EBLV. This can be an indication that dogs and cats and possibly other terrestrial mammals are also not very susceptible to an infection with one of the EBL-viruses.

Cats are also significantly more in direct contact with bats than dogs. Only at a fraction of the cats who have been in contact with (rabid) bats is observed that this contact has taken place.

There is no public health reason to exclude colonies of Serotine Bats or other bats species from roosts such as cavity walls, to prevent the transfer of rabies to humans and pets. In the first place, the bats present do not have to be carriers of rabies, and when examination shows that infected animals have probably been present in a colony with rabies virus, it is probably better not to take measures. In colonies where rabies infected bats have been found, most of the animals, including the young, are simply surviving. Most likely, the immune system of these animals builds sufficient resistance to rabies, so that such a colony is free of rabies for a long time and therefore does not constitute a nidus of any possible contamination.

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Epidemiological data available so far show that the destruction of an infected bat colony is ineffective and must be avoided. This strategy will disturb the balance of the metacolony and should be avoided as far as possible not to induce an unpredictable dispersion of infected animals. It is preferable to monitor the known positive colonies (salivary excretion and serological survey with marking of sampled bats belonging to the colony), collection of all sick or dead bats.

Medical treatment. People who may come into contact with bats because of their work should take the necessary precautions. Direct body contact with bats should be avoided as much as possible. Although there is very little chance of being infected with bat rabies virus, preventive vaccination against rabies is highly recommended in a number of cases. If necessary, vaccination may be carried out in consultation with a family or company doctor or with an area health authority.

If a bat has been bitten or has had direct hand contact, the following actions should be carried out as soon as possible:

- Wash the bite spot /or hands well with water and soap in running water for 10 minutes
- Disinfect the bite spot and/or hands with alcohol 70% and if not available with ordinary household methylated spirit or betadine iodine 10%
- Contact immediately the family or company doctor or with an area health authority.

The administering of rabies vaccinations is done on the basis of schemes recommended by the World Health Organisation (WHO). A distinction is made between preventive and treating or curative (post-exposition) vaccinations.

In the case of preventive vaccination, on days 0, 7 and 21 (day 21 may also be day 28) each time 1 ml rabies vaccine is injected into one of the upper arm muscles. Thereafter, in principle, an injection (booster vaccination) of 1 ml of vaccine can suffice every two years. A revaccination can be delayed for an extended period of time when a titre of antibody in the blood reveals that there is still sufficient immunity to rabies. Excessive vaccination can lead to side effects. Should a bite of a rabid bat occurred within two years of vaccination, a post-exposition vaccination will be advised on days 0 and 3, unless the titre is ≥ 1.0 IU/ml. This scheme can also be held when the last vaccination occurred between 2 and 10 years ago and the vaccination commences within 24 hours of the bite of a rabid bat.

Anyone who has been bitten by a rabid bat or has had any other direct contact with that animal, or has had such contact with a bat that could not be examined for rabies, and has not previously been vaccinated against rabies, needs a more extensive post-exposition vaccination on days 0, 3, 7, 14, 30 and 90, each with 1 ml of vaccine. When this post exposure vaccination commences within 5 days of contact with a bat, usually, certainly with a serious injury, also human anti-rabies immunoglobulins (HARIG) should be administered when the vaccination on day 0 take place. The dose of HARIG to be administered depends on the body weight of the person concerned.

Rabies vaccine is not cheap and HARIG is even very costly. It is, therefore, very important to let examine a rabies suspected bat, which caused a bit contact, as quickly as possible, so that the treatment can be stopped in case of a negative rabies test. People who, in connection with their work, are likely to come into contact with bats in several occasions, could be considered to be on the schedule of preventive vaccination in such a case.

3.5.2. Other viral infections

Persons, who can regularly come into contact with wild animals and therefore can incur injuries by bites or scratch, are advised to also be vaccinated against tetanus. An infection with the tetanus bacterium, *Clostridium tetani*, can have a very serious course and can lead to death. The procedure for preventive vaccination and the post-exposition treatment against tetanus is not discussed here. After a preventive vaccination, a revaccination (booster vaccination) is usually only necessary after 10 years. The symptoms of tetanus are untreatable.

3.5.3. Allergy to bat food

Some people can develop allergic reaction to fodder for bats in captivity (*Tenebrio molitor*, *Zophobas morio*), specifically to insects' frass and scales. The symptoms include allergic conjunctivitis, rhinitis, eczema, asthmatic problems and in serious cases also anaphylactic shock. It is recommended to keep mealworms outside living space; the type feeding can also reduce amount of microscopic fragments, which are airborne (e.g. oat flakes instead of bread or meal products).

4. Bat rescue and rehabilitation for bat research, conservation and public education

In the rescue centers are yearly accepted thousands of bats of different species and thus represent a huge store of data. If there is no connection between rescue centers and bat specialists in the country, information about bat species occurrence, disease (e.g. rabies), roost biology and related conservation problems (e.g. loss of roost or damage of colony by renovation, insulation, felling old trees) are lost. Often it is very hard to establish cooperation between centres and NGOs or individual bat workers and sometimes it is even impossible. Rescue organization can keep no evidence of findings or they can have own databases, which are not willing to share. Even if they are willing to share their database, if they have no bat expert at the center, identification of species is however often incorrect (e.g. all small bat species including small *Myotis* and *Hypsugo* assigned to genus *Pipistrellus*, etc.). If the cooperation is possible even in small steps, both conservation organizations or universities and rescue centers can profit (e.g. collective grants, collective public events, medialization which can attract donors, etc.).

Cooperation with rescued centers with shared database, where bats are identified by bat expert, can be mighty tool in especially in countries with few bat specialists, and can be used as method for: bat monitoring, bat conservation, bat biology studyings, parasitological, virological research, and for public education. Not survived animals are the source for the replenishment of museum collections.

4.1. Source of new faunistic data

Case study 4.: BCT*

Case study 4.: Ukraine: Contact-centres and new discoveries*

4.2. Bat monitoring

Every year huge amount of reliable data can be evaluated; evaluation of IUCN status and EU states conservation status,

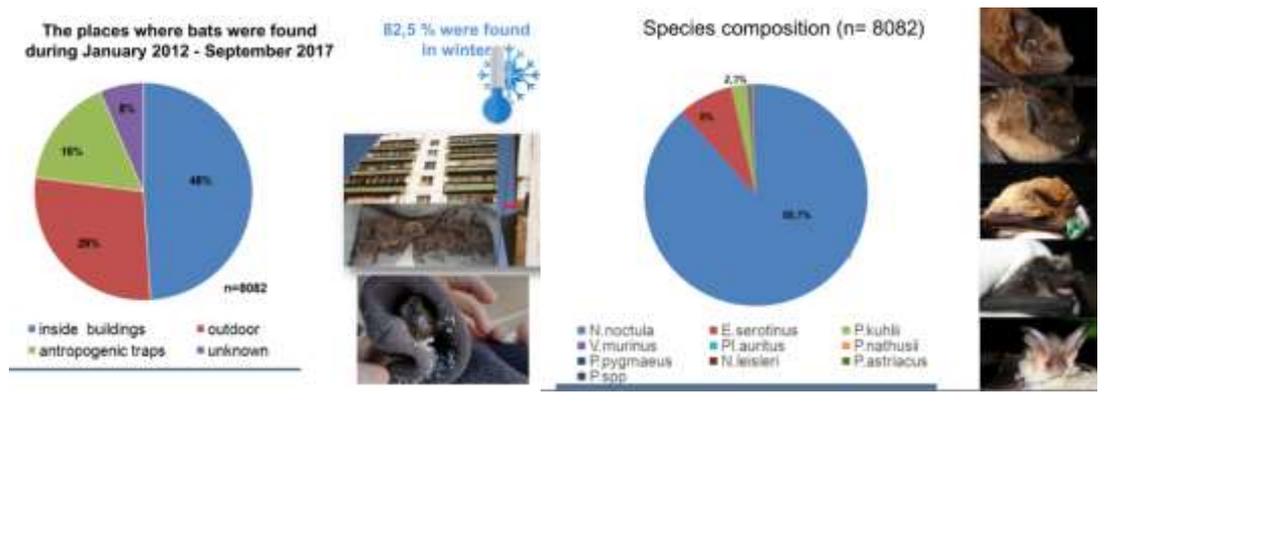
4.3. Bat conservation

– protection of particular bat roosts and huge bat colonies, prompt act during reconstruction or felling trees, etc.,

4.4. Bat biology studyings

– roosting preferences, migration behaviour, seasonal pattern of occurrence, structure of hibernating or invasive colonies, etc.

Case study Ukraine: species composition, roost sites from 2012-2018 (8082 bats) Will be added According Pryluskka et al 2018 (and othe presentation concernning this theme):Results of bat rehabilitiaition centre work 2012-2017, Kharkiv, Ukraine.



4.5. Public education

– if the legislation of country permits, disabled bats kept in rescue centers and accustomed to handling and petting can be used at public events as well as for education training for officials, insulation companies or forestry staff.

Holding annual **International Bat Nights** is good possibility for establishment the cooperation between bat workers and rescue centres. Captive disabled bats represent an important educational tool for their wild counterparts. Only bats that cannot be released back into the wild should be considered for education and the possible use is restricted to natural temperament, species of bat and actual condition. One of the most popular, social and generally easily tamed species is noctule bat. On the other hand, species that are considered high disease risks (such as Daubenton's bats, serotines, pipistrelles) should not be used widely for public engagement events. To reduce the risk of transmission of zoonotic disease any bat to be used for education must be kept isolated from other bats for at least six months. This isolation period is essential to ensure the health and safety

of the bat, the handler and the general public. When using a bat for education the following should always be considered:

- where handled, bats should always be shown in gloved hands,
- the general public should not be allowed to handle the bats,
- showing of a bat in the hand should only constitute few minutes of a talk, the bats have to be used for handling and stay calm during manipulation
- the welfare of the bat should always be a priority, and sufficient food and water provided to the bat as required.
- until the bat is needed, it should be kept out of sight and in a secure box where it is comfortable and its welfare needs are met, and covered so that the bat does not undergo any additional stress.

Caution on species used in demonstrations. There is information that representatives of some species are critically stressed because of touching (e. g. *Plecotus auritus*). Such species should not be used for contact demonstration. The most appropriate species (of European fauna) seems to be *Nyctalus noctula*. It 's comparatively big and stands well touching and stroking.

Case study 4.*. Serbia: bats use for public education

Non-releasable bats and bats in rehabilitation are being used for bat popularization and education of general public. Most commonly we have *Nyctalus noctula* and *Pipistrellus kuhlii*. Those animals are being shown to people during International bat night events. Occassionally we organize lectures in schools and kindergartens, where kids can see and touch them. Few times we organized “feeding” events where children came with their parents, and assisted during feeding sessions. Also, few times we were releasing bats in front of the “audience” – for example, once a girl rescued a grounded bat that she found in the school yard. After one week of rehabilitation, animal was ready to be released back to the nature. That girl came together with her parents and school friends to watch that bat being released and flying away.

4.6. Bat histopathology and parasitology

Dead bats or bats with suspicious behaviour are valuable material for epidemiology research (e.g rabies) or can be used as bioindicators by chemical analysis (e.g. traces of lead, insecticide), etc.,

4.7. Zoonotic diseases

Case study 4.*: the Netherlands: rehabilitation centres and bat rabies surveillance

4.8. Destination of dead bats

Dead bats should never be thrown away because they still can be used for many scientific purposes. Non well documented bats can be used for educational purposes. Private collections have hardly any scientific value and are usually not accessible to researchers, so that in fact research material is lost.

The purpose of research on a dead animal determines how it should be kept for the time being. It is important that the information about an animal, such as the finding location and date and its conditions, are recorded as accurately as possible and attached with a label to the animal. Animals of which material should be used for toxicological research (e.g. pesticides), DNA analyses, rabies research, or other disease tests should be kept at -10 to -20 °C. In any case, they should not be kept in alcohol, formalin or other preservatives.

In order to prevent the drying out of the animals in a freezer, small bats, like the Common Pipistrelle Bat, can be stored in, for example, a small plastic or glass medicine jar.

Larger animals can, for example, be kept in larger glass or plastic medicine jars or in a plastic food box. Dead animals can also be wrapped in aluminium foil. For some research, the animals should be delivered deep-frozen.

Consult the concerned researcher how this can be achieved. Animals for toxicological research should be sent to a research institute as soon as possible, as some substances can quickly disappear from a dead animal. Dead animals for scientific museum collections or for research on endoparasites can be stored frozen or in alcohol (preferably ethanol) 70-96%. In case ethanol is not available, household methylated spirits can also be used.

Preserve the animals never in formalin. Make with a scalpel or a pointed scissors a small, long cut of about 5 mm in the abdominal skin, so that the preservation fluid can penetrate the inner side of the bat as well. When more animals are kept together, each animal should be labeled with the required data, so that exchange of such data cannot take place. The data can best be written with a pencil, Indian ink or any other alcohol proof ink on the label which can then be attached with a thin string or cotton thread to one of the hind legs of the bat.

As said before, dead bats of which no proper finding data are known, can be used for educational purposes. Of dead bats which have already been dissolved, the skeleton material can still be used for a scientific museum collection.

Dead bats should be mailed in a sturdy box and not in an envelope, even not in a blister envelope. Animals that are not treated with a preservative are first wrapped in a plastic bag and then wrapped with paper. Never send dead animals just before a weekend or before general public holidays. Send dead animals per priority mail. Both the post(wo)man and the recipient will not appreciate stinky parcels. Dead bats can, of course, also be delivered at the visiting address of the concerning research institutes. (by P. Lina)

Case study 4.1: Czech republic – colony in gas-heaters: cooperation between NGOs Nyctalus, Czech Bat Conservation trust and media

In old estate in Prague many households use gas-heaters. The vents of gas-heaters are covered by various types of metal equipment, which should protect invasion of birds and light waste. Bat rehabilitators were called by neighbour, because owner did not care about bats, and he used gas heater even when bats were present. After strong reproof, he let dismantle the gas heater, and took out 24 dead and dying burned bats and 13 alive bats. We asked other neighbours and discovered that this roost was traditionally inhabited during autumn migration and also during hibernation. The case was medialized, and thus other new cases of bats in gas-heaters were reported including regular occurrence of colonies (Zieglerová et al. 2016). This case was also assigned to Czech Bat Conservation Trust, which suggest and realized acceptable solution of this problem, and to Czech Inspection of Environment.



Noctules squeeze through horizontal fissures in metal protection and invade to gas heater and according the type they can be imprisoned here. Distress calls of bats often lure other bats. Once the heating season starts, bats are burned alive.

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http://www.bats.org.uk/publications_download.php/1114/Bat_Care_Guidelines_Update_2013_May_2013.pdf

6. National bat rescue and rehabilitation contacts

Based on answers to questionnaires 2015&2018.

????? EU Directive on the PRIVACY; no emails, only web-sites or to ask people to confirm their presence in this list

Adrià López Baucells; Switzerland: Hans-Peter B. Stutz; Turkey: Emrah Çoraman; Ukraine: Lena Godlevska, Alona Prylutska; the United Kingdom: Jess Barker, Maggie Brown.

+++

Valuable comments and additions to the manuscript: Stéphane Aulagnie, Laurent Arthur , +++.

+++

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Annex 1. Questionnaire

IWG14 – Bat Rehabilitation: Questionnaire

Country	
Completed by	
Organisation	
Contact details	
Date	

Bat rehabilitation is temporary caring for bats which lost their roosts, or were injured or orphaned, following to release them back into the wild. Please, forward the questionnaire to responsible bat-rehabilitation workers in your country.

* Circle what is applicable.

General

01) Who is rehabilitating bats in your country? Approximate number?

→a) Persons	Y/N*	n =
→b) NGOs	Y/N*	n =
→c) Governmental organizations	Y/N*	n =
→d) Others	Y/N*	n =
→e) Nobody	Y/N*	

If others, please, specify:

02) Who is funding bat rehabilitation in your country?

→a) Governmental bodies	Y/N*
→b) Local authorities	Y/N*
→c) NGOs / funds	Y/N*
→d) Private contributors	Y/N*
e) Others	Y/N*
→e) Nobody	Y/N*

If others, please, specify:

03) Are there any regulations for bat rehabilitation in your country? Y/N*

If yes, please, give details:

04) Do bat rehabilitation centres (or people) in your country co-operate with each other?
Y/N*

If yes,

→a) Bat rehabilitation centres (or people) co-operate closely	X*
→b) Bat rehabilitation centres (or people) co-operate more or less	X*

<input checked="" type="checkbox"/> c) Only some bat rehabilitation centres (or people) co-operate	X*
<input checked="" type="checkbox"/> d) Bat rehabilitation centres (or people) don't co-operate	X*

0)5) Are there summarizing descriptions of bat rehabilitation systems in your country? Y/N*

If yes, please give references to the summarizing publications:

0)6) Are there databases for bat rehabilitation records available? Y/N*

If yes,

<input checked="" type="checkbox"/> a) All bat rehabilitation records are inserted in a national database	X
<input checked="" type="checkbox"/> b) Each rehabilitation centre (or person) has its own database, available for sharing	X
<input checked="" type="checkbox"/> c) Each rehabilitation centre (or person) has its own database, but they do not share data	X
<input checked="" type="checkbox"/> d) Only a few rehabilitation centres (or persons) record received bats	X
<input checked="" type="checkbox"/> e) Others	X

If others, please, specify: _____

Rehabilitation for conservation of bat populations and their roosts

0)7) Can you estimate the number of received and released rehabilitated bats per year in your country? Y/N*

If yes, please, give approximate numbers: _____

If available, please, give references to the summarizing publications: _____

0)8) What species are mostly rehabilitated? In what numbers (per year)?

<input checked="" type="checkbox"/> a) <i>Nyctalus noctula</i>	1-10 / 10-100 / 100-1000/ >1000 ind.*
<input checked="" type="checkbox"/> b) <i>Vespertilio murinus</i>	1-10 / 10-100 / 100-1000/ >1000 ind.*
<input checked="" type="checkbox"/> c) <i>Pipistrellus pipistrellus</i>	1-10 / 10-100 / 100-1000/ >1000 ind.*
<input checked="" type="checkbox"/> d) <i>Pipistrellus pygmaeus</i>	1-10 / 10-100 / 100-1000/ >1000 ind.*
<input checked="" type="checkbox"/> e) <i>Pipistrellus nathusii</i>	1-10 / 10-100 / 100-1000/ >1000 ind.*
<input checked="" type="checkbox"/> f) <i>Eptesicus serotinus</i>	1-10 / 10-100 / 100-1000/ >1000 ind.*
<input checked="" type="checkbox"/> g) Others	1-10 / 10-100 / 100-1000/ >1000 ind.*

If others, please, specify: _____

If available, please, give references to the summarizing publications: _____

0)9) Which bats are mostly rehabilitated (choose max 4 points)?

<input checked="" type="checkbox"/> a) Extracted during renovation works in buildings	X*
<input checked="" type="checkbox"/> b) Single bats in rooms	X*
<input checked="" type="checkbox"/> c) Seasonal mass invasions of tens/hundreds of bats in rooms	X*
<input checked="" type="checkbox"/> d) Caught by cats/dogs	X*
<input checked="" type="checkbox"/> e) Grounded adult specimens	X*

→f) Found in felled trees	X*
→g) Orphaned juveniles	X*
→h) Others	X*

If others, please, specify: _____

Q10) Are bat rehabilitation records used to rescue / monitor colonies or to prevent demolishing of roosts during renovation and insulation works?

Y/N*

Rehab data and rehab bats for scientific purposes

Q11) Are bat rehabilitation records used for collecting additional faunistic data (new localities, occurrence of species, etc, etc,)?

Y/N*

If published, please give references:

Q12) Are dead animals used for virological, morphological, parasitological, histological etc. research? Or for museum collections?

Y/N*

If yes,

→a) All died bats are stored in a freezer for further research* / museums*	X*
→b) Dead bat bodies are occasionally utilised	X*
→c) Others	X*

If others, please, specify:

Q13) Do you have national regulations concerning the use of dead animals for different purposes?

Y/N*

If yes, please, specify:

Rehabilitated bats for public education

Q14) Are bats under rehabilitation used for public education during bat events in your country?

Y/N*

Q15) Are healthy wild bats used for public education during bat events in your country? Y/N*

Q16) Are there any regulations and restrictions for using (rehabilitated) bats during bat events in your country?

Y/N*

If yes, please, specify:

If available, please, give references to the summarizing publications:

Q17) What bat species are used during bat events?

Please, specify:

Q18) During bat events, in your country, visitors can:

a) See bats in hands of bat-workers	X*
b) See bats only in a box	X*
c) Touch bats by hands in gloves	X*
d) Touch bats by hands without gloves	X*

Q19) Who is authorized in your country to euthanize bats of which their clinical situation avoids further successful rehabilitation?

Please, specify: _____

Rehabilitation itself: exchange of experience

20) Do you have any manuals or guidelines in your country in national language(s)?

Y/N*

If yes, please, give reference, if possible with an on-line link.

21) Please point few names and contacts of experts involved in bat rehabilitation in your country.

Name	Country	City	Organisation	E-mail

22) Please give references to main bat rehabilitation web-sites, if available:

Other

**23) Rabies vaccination is compulsory for all people
who works with bats in animal rescue centers
Y/N***

Annex 2. EUROBATS Resolution 7.10 Bat Rescue and Rehabilitation

The Meeting of the Parties to the Agreement on the Conservation of Populations of European Bats (hereafter “the Agreement”),

Recalling Article III of the Agreement, especially paragraphs 1, 2, 4 and 5;

Noting that bat rescue and rehabilitation involves rescuing bats and bat colonies at risk and temporarily caring for bats which have lost their roosts, or those which are diseased, injured or orphaned; then every effort is made to release them back into the wild;

Further noting Resolution 5.2 on Bats Rabies in Europe that recommends rabies surveillance of bats which have died or injured bats which have been euthanized;

Further noting Resolution 5.4 on Monitoring Bats across Europe for the further collection of faunistic data;

Further noting Resolution 5.7 on Guidelines for the Protection of Overground Roosts, with particular reference to roosts in buildings of cultural heritage importance since most bats received by bat rehabilitators are found in or nearby buildings;

Further noting Resolution 6.5 on Guidelines on Ethics for Research and Field Work Practices;

Further noting Resolution 6.8 on Monitoring of Daily and Seasonal Movements of Bats;

Further noting Resolution 6.16 on Implementation of the Conservation and Management plan 2011-2014 that parties should continue efforts to raise public awareness to improve education;

Further noting Resolution 7.11 on Bats and Building Insulation which recommends the collection and sharing of information on bat presence in buildings;

Recognising that Bat rescue and rehabilitation may play an important role in bat conservation;

Further recognising that relevant information obtained from bat rehabilitators can be used for practical bat conservation including roosts;

Further recognising that data collected by bat rehabilitators can provide important information for scientific research such as species distribution and disease monitoring as well as for practical conservation;

Further recognising that the level of bat rehabilitation varies across Parties and Non-Party Range states ranging from countries with no rehabilitators to those with established operating networks;

Further recognising that the recording protocols are not standardised and differ widely across Parties and Non-Party Range states;

Further recognising that public awareness is important for effective bat conservation;

Urges Parties and non-party Range States to:

1. Encourage the establishment and support of effective animal rescue and rehabilitation systems which include bats in their countries;
2. Encourage capacity building and training in order to raise the standards of bat rescue and rehabilitation;
3. Recommend the use of standardised record protocols (Annex 1) by bat rehabilitators and encourage the contribution of data to any existing national database, or if absent, encourage the establishment of such a database;
4. Encourage collaboration between bat rehabilitators and bat scientists for the purposes of data collection, other scientific research and exchange of knowledge;
5. Use only captive disabled bats for public events when national legislation permits it;

Requests the Advisory Committee to develop guidelines for bat rehabilitators and develop a system for collecting information for international cooperation.

Annex for Resolution 7.10

A standard form of bat record protocol applicable for bat conservation should include at least these items:

ID number

Name of finder:

Name of rehabilitator/organization:

Date of finding:

Location of finding (address if appropriate):

Place of finding: ground building block-of facade cellar
tree unknown other

Circumstances of finding: reconstruction in situation fallen tree
brought by cat dog unknown
other

Bite incidents human cat other

Species:

Sex: male female **Age:** non-pregnant baby juvenile adult

Individual/colony: Individual Colony Size of colony

Condition of bat: normal dehydration exhausted emaciated
injured dead other

Sent for disease test: Yes No

Final fate: Released Euthanasia Captivity Death

Comments:

We also recommend to take photographic documentation if possible.