



AGREEMENT ON THE CONSERVATION OF POPULATIONS OF EUROPEAN BATS

Report on implementation of the Agreement in Portugal

- 14 AC Meeting-

INDEX

A. General information

B. Status of bats within the territory of the party

1. Summary details of resident species.
2. Status and trends.
3. Habitats and roost sites.
4. Threats.
5. Data collection, analysis, interpretation and dissemination.

C. Measures taken to implement Article III of the Agreement

6. Legal measures taken to protect bats, including enforcement action.
7. Sites identified and protected which are important to the conservation of bats.
8. Consideration given to habitats which are important to bats.
9. Activities to promote the awareness of the importance of the conservation of bats.
10. Responsible bodies, in accordance with Article III.5 of the Agreement, nominated for the provision of advice on bat conservation and management.
11. Additional action undertaken to safeguard populations of bats.
12. Recent and ongoing programmes (including research and policy initiatives) relating to the conservation and management of bats. In the case of research, summaries of completed projects should be provided, giving references where possible and acknowledging the sources of funding.
13. Consideration being given to the potential effects of pesticides on bats, and their food sources, and efforts to replace timber treatment chemicals which are highly toxic to bats.

D. Functioning of the agreement

14. Co-operation with other Range States.
15. Measures taken to implement Resolutions adopted by Meetings of Parties.

A. General Information

- ◆ *Name of Party:* Portugal
- ◆ *Date of Report:* 31 March 2009
- ◆ *Period Covered:* July 2008 to March 2009
- ◆ *Competent Authority:* Instituto da Conservação da Natureza e da Biodiversidade (ICNB)
- ◆ *Compiler of report:* Luísa Rodrigues

B. Status of bats within the territory of the party

1. Summary details of Resident Species

24 species are known in Continental Portugal (Table 1).

The revision of the Portuguese Red Data Book, using the new criteria of IUCN, was published in 2005 (Cabral MJ (coord.), Almeida J, Almeida PR, Dellinger T, Ferrand de Almeida N, Oliveira ME, Palmeirim JM, Queiroz AI, Rogado L & Santos-Reis M (eds). 2005. *Livro Vermelho dos Vertebrados de Portugal*. Instituto da Conservação da Natureza. Lisboa. 660pp.). *Pipistrellus nathusii* was not evaluated in the continent because its presence was reported in 1910 but there are no recent observations for this species.

2. Status and Trends

Table 1 shows the status and the apparent population trends of the species known in Continental Portugal.

Table 1 - Status and apparent population trends of the species known in Continental Portugal. Trends were calculated only for species with status other than Least Concern. Data published in the Portuguese Red Data Book (Cabral *et al.*, 2005).

Species	Status	Apparent Trend
<i>Rhinolophus ferrumequinum</i>	Vulnerable	Indetermined
<i>R. hipposideros</i>	Vulnerable	Indetermined
<i>R. euryale</i>	Critically Endangered	Declining
<i>R. mehelyi</i>	Critically Endangered	Severe declining
<i>Myotis mystacinus</i>	Data Deficient	Unknown
<i>M. emarginatus</i>	Data Deficient	Indetermined
<i>M. nattereri</i>	Vulnerable	Seems to be increasing
<i>M. bechsteinii</i>	Endangered	Unknown
<i>M. myotis</i>	Vulnerable	Declining
<i>M. blythii</i>	Critically Endangered	Severe declining

<i>M. daubentonii</i>	Least Concern	
<i>Pipistrellus pipistrellus</i>	Least Concern	
<i>P. kuhli</i>	Least Concern	
<i>P. pygmaeus</i>	Least Concern	
<i>Hypsugo savii</i>	Data Deficient	Unknown
<i>Nyctalus leisleri</i>	Data Deficient	Unknown
<i>N. noctula</i>	Data Deficient	Unknown
<i>N. lasiopterus</i>	Data Deficient	Unknown
<i>Eptesicus serotinus</i>	Least Concern	
<i>Barbastella barbastella</i>	Data Deficient	Unknown
<i>Plecotus auritus</i>	Data Deficient	Unknown
<i>P. austriacus</i>	Least Concern	
<i>Miniopterus schreibersii</i>	Vulnerable	Stable
<i>Tadarida teniotis</i>	Data Deficient	Unknown

3. Habitats and Roost Sites

In Portugal there are many habitats that can be used by bats. We have extensive limestone zones, with many caves, that are used by cave-dwelling species both in the winter and during the maternity season. In the last decades, with the declining of the mining activities, new potential roosts became available and are now occupied.

There are also many known roosts in buildings, cliffs, bridges and a few trees used by bats are identified.

4. Threats

The major threats that occur in Portugal are:

Disturbance

In the last years there has been an increase in the number of people involved in outdoor activities, including caving, and we often find signs of the recent presence of visitors inside the caves. The disturbance is particularly bad during the hibernation and maternity seasons. In some caves we even found signs of fires and shotgun cartridges.

Roost destruction

Shepherds sometimes blocked the entrance of vertical caves to keep their animals from falling in them; there are no data on the numbers of holes closed for this reason, but the practice does not seem to continue.

Loss of feeding areas

Portugal's landscape changed, due to the integration in EU. The traditional land use practices (low intensity grazing, large areas of holm oak "montados", and little use of pesticides) were overall better for the bats. Clearing of riparian vegetation is still a common practice.

Pesticides

Pesticides probably affect bats, but there is no data on the subject.

Traffic injuries

In particular low-flight bat species can be killed by cars. There are a few records of several species (*R. ferrumequinum*, *R. hipposideros*, *P. kuhli*, *P. pipistrellus* or *P. pygmaeus*, *P. austriacus*, *B. barbastellus*) that were found dead in roads, but there are no quantitative data on this subject.

Wind-turbines

In particular high-flight species can be killed by wind turbines. A preliminary report of the effect of 14 wind farms was prepared in December 2008; there were found 66 carcasses of several species (18 *N. leisleri*, 16 *P. pipistrellus* or *P. pygmaeus*, 10 *P. pipistrellus*, 7 not identified, 6 *H. savii*, 2 *P. pygmaeus*, 2 *M. daubentonii*, 1 *N. noctula*, 1 *E. serotinus*, 1 *M. schreibersii*, 1 *T. tenotis*, 1 *Nyctalus* spp).

5. Data Collection, analysis, interpretation and dissemination

Data collection, analysis, interpretation and dissemination are done by "ICNB", Universities ("Faculdade de Ciências de Lisboa", "Universidade do Porto" and "Universidade de Trás-os-Montes e Alto Douro"), speleologists who are doing roost monitoring and technicians who are developing roost and habitat local monitoring in the frame of minimization measures of projects subjected to Impact Studies (particularly wind farms).

There are some databases prepared by "ICNB" and "Faculdade de Ciências de Lisboa": (a) Bat observations (based on bibliography and fieldwork), (b) Underground roosts monitoring programme, and (c) Banding (captures and recaptures).

The web site of "ICNB" contains a database called SIPNAT ("Sistema de Informação do Património Natural"; <http://portal.icnb.pt/ICNPportal/vPT2007/Valores+Naturais/SIPNAT/>) which includes information of all bat species that occur in Portugal.

The web site of “ICNB” contains a plan (“Plano Sectorial da Rede Natura 2000”; <http://portal.icnb.pt/ICNPortal/vPT2007/O+ICNB/Ordenamento+e+Gestão/Plano+Sectorial+da+Rede+Natura+2000/>) which comprehends cartography and conservation and management measures of Portuguese SCI’s. The plan includes information on natural values included in the annex II of Habitats Directive and data on the species present in the Portuguese SCI’s (covering species included in annexes II and IV).

The web site of “ICNB” contains two maps of the location of bat roosts (one regarding roosts of national importance, and another regarding other roosts) (<http://portal.icnb.pt/NR/rdonlyres/3A1E6911-67D7-41C1-B451-B30D17F46277/0/morcegos.zip>).

C. Measures taken to implement Article III of the Agreement

6. Legal measures taken to protect bats, including enforcement action

Portuguese law protects all bat species since 1967. They are also covered by international legislation that was transferred to national legislation, such as Bern Convention, Bonn Convention, and Habitats Directive.

A few incidents involving bats were reported to the police.

Several calls concerning bats in houses were received and support on exclusion was provided in a few cases.

7. Sites identified and protected which are important to the conservation of bats

The survey of the underground roosts is already quite complete. The actual list of Portuguese SCI’s includes the majority of underground important roosts.

The roosts of the remaining species are still poorly known.

8. Consideration given to habitats which are important to bats

In Portugal the landscape is not managed specifically to protect bat-feeding habitats. However, since most of the main important known roosts are inside SCI’s, some planning/management and regulatory rules will protect directly or indirectly feeding habitats (as well as roosts). Under the implementation of environmental impact assessment regulation there are also compensation and minimization measures, as well as monitoring, specifically for bats feeding habitats (and also roosts).

There was a conflict regarding a colony of around 150 *Rhinolophus hipposideros* which use to breed in a Historical Building. A heated roost was created by a Speleologist Association (“Associação dos Espeleólogos de Sintra”) in a building located quite closed, funded by “Cultursintra” and “Associação dos Espeleólogos de Sintra”. The new roost was colonized by the colony and the bats breed there.

9. Activities carried out to promote the awareness of the importance of the conservation of bats

One talk about bat conservation and one workshop were done in schools.

Several talks were presented in Conferences.

12th Bat Night (second phase) was organized by “ICNB” and “Carsoscópio” on 30 August 2008. An online programme was held, with interviews to bat specialists and EUROBATS Secretariat (Andreas Streit). After dusk there was a walk near the entrance of a maternity roost with bat detectors.

An Interpretation Centre was built in “Parque Natural das Serras de Aire e Candeeiros”, near a cave that harbours maternity colonies of several species (<http://www.alviela.cienciaviva.pt/home/>). The Centre has an interactive exhibition and during summer weekends organizes walks after dusk near the entrance of a maternity roost with bat detectors.

A website about bats was created (<http://static.publico.clix.pt/morcegosnaweb>). It includes online images collected in a maternity roost by 4 infrared cameras and videos. Visitors may ask questions, which are answered by specialist.

A blog about bats was created (<http://morceguismos.blogspot.com/>). It intends to be a way of dissemination and raising awareness about these mammals and it includes the divulgation of past and ongoing projects, news, activities and technical reviews. The blog hopes to give an important contribution to the conservation of Portuguese bats species.

A time-table regarding the seasons when caves should not be visited due the presence of important bat colonies is presented in the website of “Federação Portuguesa de Espeleologia” (http://www.fpe-espeleo.org/index.php?option=com_content&view=article&id=5:epoca-de-hibernacao-dos-morcegos&catid=25:noticias&Itemid=9).

10. Responsible bodies, in accordance with Article III.5 of the Agreement, nominated for the provision of advice on bat conservation and management

This point has not been implemented yet.

11. Additional action undertaken to safeguard populations of bats

In accordance with Portuguese law the entrances of inactive mine galleries should be closed for security reasons. There has been an effort that methods compatible with the continuation of their use by bats (suggested by EUROBATS Publication Series nº 2) are adopted. Galleries colonized by important bat colonies are being closed by fences, galleries used by some bats are being closed by bat friendly gates with doors (to allow monitoring) and galleries not used by bats are being closed by walls with large respiration holes (this will

allow a future colonization but not their monitoring). Vertical shafts are being protected with grilles. Several mines were already closed with bat friendly methods.

12. *Recent and ongoing programmes (including research and policy initiatives) relating to the conservation and management of bats. In the case of research, summaries of completed projects should be provided, giving references where possible and acknowledging the sources of funding.*

- a) Monitoring programme of cave-dwelling species. A monitoring programme of the cave-dwelling species is in progress since 1987. This programme involves the estimation of bat numbers present in the most important wintering and parturition roosts. The surveys are carried out annually in most of the roosts. Co-funded by "ICNB", "Faculdade de Ciências de Lisboa" and "Federação Portuguesa de Espeleologia" (namely, Grupo Protecção Sicó, Associação dos Espeleólogos de Sintra, Alto Relevo - Clube de Montanhismo, Núcleo de Espeleologia da Costa Azul, Núcleo de Espeleologia de Leiria, GEONAUTA, Espelo Clube de Torres Vedras, Núcleo de Espeleologia de Alcobaça, Núcleo de Espeleologia da Associação Académica da Universidade de Aveiro, and Grupo de Espeleologia e Montanhismo).
- b) Control of the vegetation in the entrances of some roosts. There has been an effort to cut the vegetation in the entrances of some roosts, which sometimes become blocked. Funded by "ICNB".
- c) Interactive module about bats in the Science Center of Lousal- The module is part of a wider exhibition about the biology and geology of the abandoned mine of Lousal, and it will include short documentaries, 2 D games and quizzes about bats. Its main objective is to introduce several aspects of bat biology and ecology to the general public, and particularly to school communities, and to encourage an understanding of these animals, and their important role in nature.
- d) Influence of vegetation clutter on the capacity of a ground foraging bat to detect and capture prey. This study aims to investigate how grass density affects the foraging ability of *Myotis myotis*. Spatial and temporal patterns in the availability of food are key elements in the foraging ecology of bats, but the mechanisms of food limitation in insectivorous bats are poorly understood. In general prey abundance is used as a surrogate for prey availability, but there may be an important difference between the two if there are habitat factors that make the access to prey difficult. The results of short captivity experiments, in which bats were given crickets in different types of ground cover – sparse, intermediate, and dense, demonstrated that vegetation clutter greatly affected their capacity to forage. They captured crickets in the three treatments,

but they often ignored them in the densest grass. They were equally efficient locating prey in the intermediate and sparse treatments, but were far more efficient capturing them in the sparse grass. Grasslands, natural and managed, are important foraging habitat for *M. myotis* in much of its range, but in the absence of natural grazers the vegetation may become too dense to allow effective access to its prey. Consequently, the management of foraging habitats of *M. myotis* in some regions should involve the use of grazing by domestic ungulates. Funded by “Foundation for Science and Technology”.

- e) Bat winter activity: the influence of prey abundance. In the temperate zones bats spend most of the winter in hibernation, but they are known to interrupt it for reasons that are not always understood. Our objective was to determine if foraging was a relevant activity during these interruptions in a part of the temperate zone with particularly mild winters - the Mediterranean. To do this, using a colony of *Myotis myotis* located in southern Portugal as a model, we (i) compared the abundance of prey during the winter with that of other seasons, (ii) checked if bats frequently made potential foraging trips, and (iii) verified if the fecal pellets produced in the winter contained prey. Bats often made potential foraging flights throughout the winter, and preliminary analyses of the content of fecal pellets confirmed that they are often foraging. The quantification of the abundance of prey in the major types of the land cover demonstrated that there is much less prey during the winter than in autumn and spring. However, in winter prey were somewhat more abundant than in the summer, a season that is probably a food bottleneck for Mediterranean *M. myotis*. Consequently, our preliminary analysis suggests that, thanks to mild winters, there is sufficient prey to make winter foraging by Mediterranean *M. myotis* possible, but that food is not abundant at this time of the year. As winter feeding may be important for the survival of Mediterranean bats, management around key colonies should take into consideration the winter foraging needs of bats.
- f) Ecology of a host-parasite system: a study in temperate cave-dwelling bats. Parasitism is one of the most successful modes of life displayed by living organisms. The transition to a parasitic lifestyle brought many advantages to parasites, namely a stable environment, mobility and a lesser investment in nutritional functions. However, it also entailed a set of adaptive challenges that had to be met by parasites. These had to find a way of dispersing between hosts often discontinuously distributed in space and time. Moreover, they had to adapt to the frequent presence of other potential competing parasites within the host's body. Lastly, due to their dependence on hosts for successfully reproducing and dispersing, parasites had to balance the exploitation

of resources of a host with the need to keep it alive. The main aim of this PhD was to determine how bat ectoparasites have overcome some of these challenges and successfully adapted to their hosts, using two temperate-zone cave dwelling bats (*Miniopterus schreibersii* and *Myotis myotis*) and its ectoparasites as model systems. Results showed that a group of specific bat ectoparasites, the nycteribiids, was able to overcome the spatial unpredictability of its hosts within caves by evolving efficient sensorial mechanisms to locate them from a distance. In addition, some parasitic mites, ticks and nycteribiids were found to deal with the temporal unpredictability of their bat hosts, by maximising their reproduction during the reproductive period of bats, when more hosts were more available and particularly vulnerable. Results also showed that competition is likely to occur among bat parasite species, even if for short-term periods, influencing the structure of their communities. Finally, a suggestion was found of potential costs induced by a parasitic mite on the body condition of its bat host. It was discussed how these potential costs may play a role in the social structure of the bat. Overall, this study provided evidences that bat parasites have tightly coevolved with their hosts. Some of conclusions are likely to apply to other host-parasite systems involving bats in temperate-zones. Funded by “Foundation for Science and Technology”.

- g) Ecology of the barbastelle bat, *Barbastella barbastellus*. The purpose of this PhD is to investigate the ecological characteristics of one of the least known and most threatened species of tree-dwelling bats (*B. barbastellus*) and also consider other tree-dwelling species. This study will focus on developing habitat-suitability maps that highlight areas of likely occupancy by this bat. Subsequently, new trapping techniques will be tested in these areas to improve capture efficiency. From captured individuals a non-lethal biopsy punch will be collected for genetic analysis to characterize the population structure and species' evolutionary history. Individuals will be released and followed to their roosts by radio-tracking. This research will try to identify patterns of resource utilization and demographic structure that can be used in effective conservation strategies for tree-dwelling bats. Besides these objectives, this research will also focus on investigating barbastelle phylogeography and European post-glacial colonization routes combining mtDNA analysis with GIS predictive modelling. Moreover, using predictive modelling this research will also try to asses the impact of climate change on 28 European bat species considering their biogeographic patterns. Funded by “Foundation for Science and Technology”.
- h) The importance of riparian vegetation for bat populations. In central Europe the riparian galleries, constituted by vegetation along the water courses, are important for some

species of bats. This relation has not been studied in the Mediterranean region, but it is probable that due to the dryness of the climate they are here a habitat particularly critical for bats. Furthermore, this vegetation is frequently cutted down along the water courses. The overall objective of this PhD is to determine the importance of the riparian galleries for the populations of bats in Mediterranean ecosystems, contributing to the improvement of the management of the landscape and of the habitat for bats. Simultaneously, different aspects of this topic were studied, such as influence on bat activity of presence of vegetation along the water courses, structure of the vegetation, and availability of trophic resources (insects) for bats in water courses with different kinds vegetation structure. Funded by “Foundation for Science and Technology”.

- i) Document “Manual de apoio à análise de projectos relativos à implementação de infra-estruturas lineares”. The manual (<http://portal.icnb.pt/ICNPportal/vPT2007/O+ICNB/Ordenamento+e+Gestão/Infra-estruturas+Lineares+-+Manuais+de+Apoio/>) aims to be a guideline for the analysis of new infrastructures (roads, railway lines and canals) projects. The manual gathers referenced information on impacts, minimization measures, compensation and monitoring of natural values.
- j) Document “Tenho morcegos em casa, o que devo fazer? - Guia de apoio a situações de coabitação e exclusão de morcegos em edifícios”. The document (<http://portal.icnb.pt/NR/ronlyres/7F5271FA-7CE7-423A-8F45-69E03E9B34E7/0/GuiacoabitacaoeexclusaoDCGB.pdf>) aims to be an informative guide for the general public regarding cohabitation with bats and giving advice on bat exclusion.
- k) Bat exclusion. These activities will be done by rangers. To give training to them, a document on bat exclusion devices was prepared.
- l) Publications

Augusto AM. 2008. Actividade de *Myotis myotis* (Chiroptera) durante o Inverno: influência da abundância alimentar. Tese de Mestrado, FCUL.

Lourenço S. 2008. Ecology of a host-parasite system. A study in temperate cave-dwelling bat. PhD Thesis. University of Lisboa, Portugal

Rebelo H. & A. Rainho. 2008. Bat conservation and large dams: spatial changes in habitat use caused by Europe's largest reservoir. Endangered Species Research. Preprint, doi: 10.3354/esr00100.

13. *Consideration being given to the potential effects of pesticides on bats, and efforts to replace timber treatment chemicals which are highly toxic to bats*

Pest control agencies were contacted, so that bats will not be harmed during their operations.

D. Functioning of the Agreement

14. Co-operation with other Range States

Cooperation with Spain concerning the recapture of banded bats is being carried out.

Luísa Rodrigues participated in several EUROBATS Intersessional Working Groups (IWG on Transboundary Programme – Habitats: Data Compilation, IWG on Geographical Scope of the Agreement, IWG on Review of Guidelines for the Issue of Permits for the Capture and Study of Captured Wild Bats, IWG on Producing Guidelines on Bat Monitoring Methods to Assess Population Trends at Different Levels, IWG on Autecological Studies for Priority Species, IWG on Impact of Roads and Other Traffic Infrastructures on Bats, and IWG on Wind Turbines and Bat Populations, convening the last one.

Several bat workers from Portugal attended the *11th European Bat Research Symposium* (Cluj, Roménia – 18-22 August 2008), the *Jornadas para la conservación y gestión de los quirópteros* (Cáceres, Espanha – 3-5 November 2008) and the *1st International Symposium on Bat Migration* (Berlim, Alemanha – 16-18 January 2009).

15. Measures taken to implement Resolutions adopted by Meetings of Parties.

Resolution 2.2 - Consistent Monitoring Methodologies and Resolution 5.4 – Monitoring bats across Europe

In Portugal, since 1987 there has been a programme to monitor cave-dwelling species, coordinated by ICNB and developed in collaboration with “Faculdade de Ciências de Lisboa” and “Federação Portuguesa de Espeleologia”. Maternity and hibernation underground roosts considered being of National importance and some buildings that harbour important colonies of "cave-dwelling species" such as *R. ferrumequinum* and *R. hipposideros* are monitored, in a total of around 30 places each season. Observations inside the roosts are done, counting the individuals or estimating the area of the colonies (visually and with photographs), using the methods described for *Myotis myotis/blythii* and *Miniopterus schreibersii* in the resolution approved in 2MoP. These methods can be successfully applied to *R. euryale*, *R. mehelyi*, *M. myotis*, *M. blythii* and *M. schreibersii*, that are very faithful to their roosts and hang from the ceiling, making the observations very reliable. In the case of *R. ferrumequinum* and *R. hipposideros*, there are more problems since they use many roosts to breed, in small numbers. Even during the winter, when they are expected to use only underground sites, they are not as philopatric as the other species. In the case of *M. nattereri* and *M. emarginatus*, although most maternity colonies are known in underground roosts, since normally they use hidden places (especially *M. nattereri*), very often they are not observable inside. Often, only the capture of flying juveniles enables the identification of maternity sites. Details of monitoring programme have been forwarded to the relevant IWG.

Roosts inventoried during local monitoring programmes established as minimization measures of projects subjected to Impact Studies (particularly wind farms) are monitored by promoters. If any underground roost of National importance is found, it is included in the programme coordinated by ICNB.

Portugal participates in the preparation of the Pan-European Monitoring Scheme for Underground Sites.

Resolution 2.4 – Transboundary Programme: Habitat Proposals

Since underground habitats are particularly important in Portugal, a special attention has been given to them. In the National Conservation Plan of Cave-dwelling Bats (1992), information about the most important roosts is available. A database of all roosts was prepared.

Details of the most important underground roosts have been forwarded to the relevant IWG.

Resolution 2.5 – Geographical Scope of the Agreement

A study of migratory patterns of some cave-dwelling species (*Miniopterus schreibersii*, *Myotis myotis* and *Myotis blythii*) is being conducted in a few roosts.

Resolutions 2.7 and 3.3 – Format of National Reports

The reports have been prepared accordingly to the new formats.

Resolutions 2.8, 3.8, 4.9 and 5.10 – On the implementation of the conservation and management plan

An effort to implement the Article III of the Agreement has being taken, as presented in this Report.

Resolution 3.7 – Amendment of the Agreement

This point has not been implemented yet.

Resolutions 4.3 – Guidelines for the Protection and Management of Important Underground Habitats

Portugal already sent information to the IWG. Several roosts were already protected with fences; other roosts should be protected. Abandoned mines are being protected with bat friendly methods.

Resolution 4.4 – Bat Conservation and Sustainable Forest Management

This point has not been implemented yet.

Resolution 4.5 – Guidelines for the Use of Remedial Timber Treatment

Remedial Timber Treatment is not commonly used in Portugal.

Resolutions 4.6 and 5.5 – Guidelines for the Issue of Permits for the Capture and Study of captured wild Bats

Permits are prepared taking into consideration these guidelines.

Resolutions 4.7 and 5.6 – Wind Turbines and Bat Populations

Portuguese recommendations for Environmental Assessment of wind turbines projects were updated in 2009, being completed with the guidelines referred in EUROBATS Publication Series nº 3.

Resolution 5.2 – Bats and Rabies in Europe

Passive surveillance is being carried out. Vaccination of people regularly handling bats is being recommended.

Other points have not been implemented yet.

Resolution 5.7 – Guidelines for the protection of overground roosts, with particular reference to roosts in buildings of cultural heritage importance

The known roosts are included in the database on bat observations. The roosts occupied by important colonies of species with cave-dwelling habits (*R. ferrumequinum* and *R. hipposideros*) are being monitored, and an agreement about its maintenance has been achieved with the owners.

Other points have not been implemented yet.

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