



## The Pan-European Monitoring of Bats in Underground Sites: A Feasibility Study

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Pan-European Monitoring of Bats in Underground Sites, feasibility study 2008

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# 1. Executive Summary

The feasibility study for the setting up of Pan-European Monitoring of Bats in Underground Sites (PEMBUS) was initiated by EUROBATS and the study was carried out over six months by the Bat Conservation Trust, UK, under the direction of the steering group of experts drawn from 5 countries.

The aim of the study was to agree the scope of the monitoring project and an approach to its implementation. Bat experts from across the EUROBATS range were invited to participate in a study which included broad e-mail consultations, workshops and meetings. Responders from 27 out of 48 EUROBATS Range States participated in the discussions.

The scope of the future project is outlined below.

Aims:

- To provide population indices for European bat species on a regular basis;
- To identify important underground sites and provide information to assist in their protection;
- To raise awareness, enhance information exchange, build capacity and increase volunteer engagement;
- To contribute towards delivering obligations (e.g. under the EC Habitats Directive);
- To measure and assist in predicting the effect of future global change on bat biodiversity.

Outcomes of the project were agreed as:

- a cooperation platform, including the creation of BatLife Europe providing an organisational structure for the implementation of international projects
- a framework for managing information at the European level
- population status reports at European scale based on information from all participating countries, including the production of population indices
- qualitative information about condition of X sites in Europe
- annual reports on European/regional bat population trends, scientific and popular publications (all parties acknowledged), regularly updated project web site, educational leaflets, presentations at media events, scientific conferences, training workshops
- delivery of training in field survey methods, species identification, use of specialised equipment, statistics, data management and processing, safety issues in bat research and handling, fund raising and project management
- production of training materials and guidance in national languages, based on EUROBATS guidelines
- equipment for field research and data management

The participants at the workshops agreed the following general approaches to the project delivery:

- the delivery of the project will be managed and coordinated by the BatLife Europe structure set up by the BCT, VZZ, NABU and other interested NGOs (Fig.1)
- details of the project management will be defined by the partnership
- a strong partnership between the NGOs or academic institutions and the government agencies involved
- the use of agreed protocols (field protocols – in line with the EUROBATS guidelines, data protocols – as defined at the workshops)
- data management will be implemented via a data portal (Fig 2)
- potential multiple participation within individual countries
- all partners who contribute data to the project will be acknowledged in all resulting publications and outputs

Participants at the workshops agreed the data collected should include:

- information allowing identification of the roost (including geographical coordinates)
- date, time, survey method and conditions (weather),

- type of roost, size (category)
- observer and data provider
- bat data (species, numbers)
- conditions at the site (optional)

Next steps:

The partnership will work with a fundraiser to submit the project to funders.

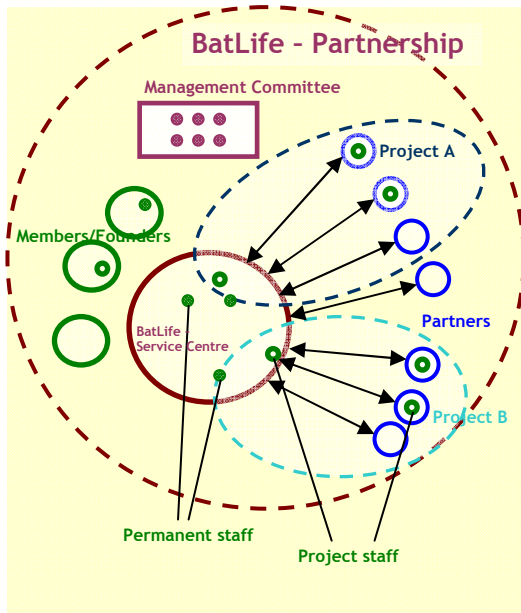


Fig. 1. Proposed approach to BatLife as a project management option.

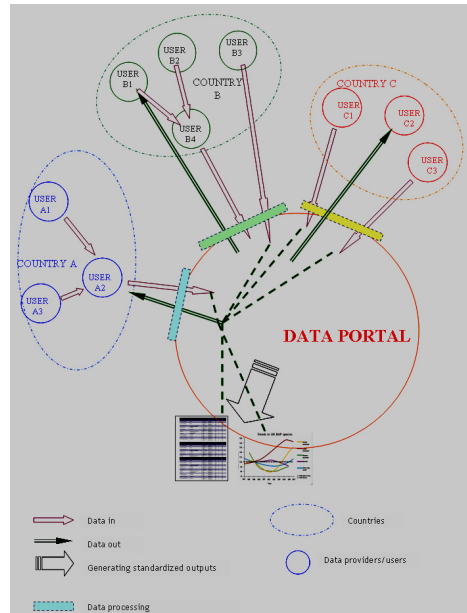


Fig.2. Data management by the Data Portal

The feasibility study has been financially supported by the governments of The Netherlands, Republic of Ireland, United Kingdom, France and Estonia, and by non-governmental organisations: Bat Conservation Trust (UK), Slovenian Association for Bat Research and Conservation, Bosnia Speleological Association, Wildlife Conservation Society MUSTELA (Serbia), The Field Researcher's Union CAMPESTER (Georgia) and Polish Society of Wildlife Friends "pro Natura".

## 2. Vision

The vision for Pan-European Monitoring of Bats is

‘To produce harmonised information on bat population trends across Europe to inform the sustainable use of natural resources’.

The feasibility study to develop Pan-European Monitoring of Bats in Underground Sites (PEMBUS) is the first step towards achieving the vision.

## 3. Aims

The overall aims of PEMBUS were defined in Resolution 5.4 of the 5<sup>th</sup> Meeting of Parties to the EUROBATS Agreement in 2006 (appendix I) and further refined at the 12<sup>th</sup> Meeting of the Advisory Committee to EUROBATS in 2007 (appendix II). The aims are:

- To provide population indices for European bat species on a regular basis;
- To identify important underground sites and provide information to assist in their protection;
- To raise awareness, enhance information exchange, build capacity and increase volunteer engagement;
- To contribute towards delivering obligations (e.g. under the EC Habitats Directive); and,
- To measure and assist in predicting the effect of future global change on bat biodiversity.

## 4. Background

This feasibility study was initiated through EUROBATS - an international (intergovernmental) agreement set up under the auspices of the Convention on Migratory Species (Bonn Convention). EUROBATS recognises that endangered migratory species can be properly protected only if activities are carried out over the entire migratory range of the species (<http://www.eurobats.org>) and that coordinated, synchronised monitoring is a necessary prerequisite for effective and optimised conservation of bats in Europe.

The present state of bat monitoring in Europe does not achieve this goal. A study carried out for the European Environment Agency (Haysom 2008) has shown that very few countries run monitoring programmes that produce robust results. In some countries data are not assembled into a national database so the information is not processed or the results published. Some programmes have been running for over 20 years, but there are no agreements on using the same protocols for data collection and processing and survey methods are not standardised across Europe. Another problem is the lack of an international structure able to coordinate a long-term, harmonized programme.

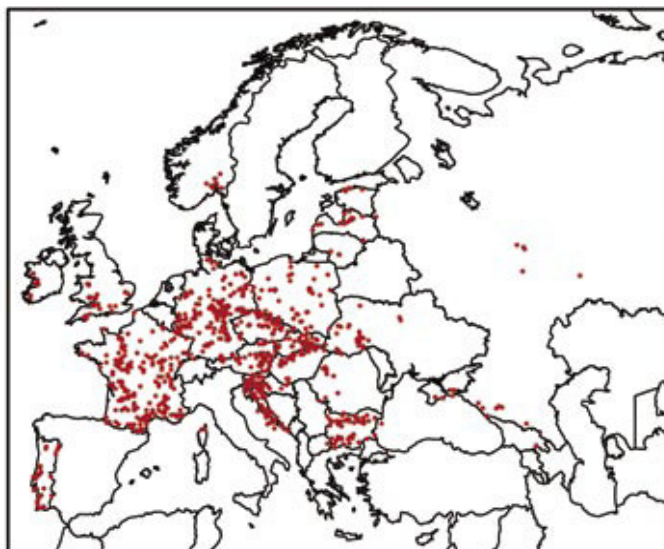
The purpose of this feasibility study was to establish the scope and organisational structure of a project for Pan-European Monitoring of Bats in Underground Sites (PEMBUS). Leading on from this study, it is hoped that one or more funding proposals will be developed and submitted. To facilitate this, the structure of this report is similar to that used in typical funding applications.

To achieve the aims of the project several factors were considered important. Appropriate tools were required, including agreed guidelines on standardised survey methods to allow cross comparison and combining of data collected in different countries. Regular provision of data from a representative sample was required. Methods for interpretation of data needed to be in place, including methods for calculating the indices, use of the data for indicators of wider environmental factors, such as climate change, and analysis of the drivers of change.

## *Why monitoring in Underground Sites?*

The PEMBUS project focus is on underground sites for several reasons:

- Implementation of pan-European monitoring of bats should be developed in a systematic way, building the network in manageable portions. Developing monitoring of underground sites is considered to be the first step in building the network.
- Underground sites are important for bats. In more northern countries they are used for hibernation, in the south of Europe also as maternity colonies, both critical periods during the life cycle. Some species use underground sites for mating (so called swarming) even if they do not use these sites in other seasons.
- Underground sites as bat roosts are threatened. For example, a study carried out in Italy by the GIRC showed that potential threats occurred in 94% of bat roosts (all sites, no categorization into underground or not) and in 2/3 of those cases the conservation of bats was not assured. The main threats the Italian case revealed were similar to those reported from other countries (Kelleher & Marnell 2006, Mitchell-Jones et al 2007) i.e. human access (disturbance) and conversion of the sites (restoration of buildings). Even slight disturbance may be fatal for bat populations inhabiting underground sites, so there is a great need to monitor them.
- Some sites may be occupied by very large numbers of bats, that return year after year, often using the same location in the cave (Harvey and Atlenbach, 1999).
- There is good knowledge of existing underground bat roosts, for instance the EUROBATS catalogue of underground sites (Mitchell-Jones et al., 2007). The distribution map of sites reported by Range States reveals obvious gaps in the knowledge of important bat site distribution (Map 1).



Map 1. Sites of European interest as reported by the EUROBATS Parties (source: Mitchell-Jones et al. 2007)

- Some monitoring programmes are already in place
- The methodology for bat counts is well developed
- Underground site monitoring may be performed without large investments in specialised equipment requiring extensive training.

## 5. Link to other deliverables

The PEMBUS project has not been developed in isolation. It will complement other existing and proposed projects and should be seen in the broader context.

Other initiatives:

- A catalogue of underground sites important for bats in Europe has already been developed
- Guidelines for surveillance and monitoring of European bats are being published, thus providing recommended standardised methods for use across Europe
- Guidelines on protecting and managing underground sites for bats have been published
- In relation to the SEBI 2010 (Streamlining European 2010 Biodiversity Indicators) a methodology for using bats as indicators has been developed. The project sponsored by the EEA analysed potential of the present monitoring schemes for the creation of bat indicators (see Appendix IV for more information on links between this project and the PEMBUS project).
- Bats have been agreed as indicators at a UK level, using information from the national monitoring scheme, the National Bat Monitoring Programme (NBMP).
- The Indicator Bats Program (known as iBats) is run by a partnership of the Zoological Society of London and the Bat Conservation Trust in cooperation with national NGO's in the implementation countries. iBats uses bat detector car surveys which allows monitoring of a number of widespread bat species. It is spreading to include Romania, Bulgaria, Thailand, Mexico and Mongolia and is being piloted in other European countries. The potential of the iBats project for PEMBUS lies in the possibility to easily adopt the data portal developed for iBats, which allows data processing and project management.
- The PEMBUS project will establish a cooperation platform, including creation of BatLife - an organisational structure for international projects. It will also provide information background for conservation actions – directly by naming sites in need of intervention and indirectly by providing information of trends thus allowing prioritisation of conservation needs.
- The information provided by the PEMBUS project will support conservation actions – improvement of the system of protected areas, habitat improvements, mitigation and compensation of damage etc.

## 6. Range State Involvement

Altogether representatives from 27 Range States responded to the initial invitation to take part in the project (see Table 1 for Range States participating). No feedback was received from 21 Range States: **Albania\***, Andorra, Armenia, Azerbaijan, Belarus, **Belgium**, Bosnia and Herzegovina, **Bulgaria\***, **Denmark**, **Finland\***, Greece\*, Kazakhstan, Liechtenstein, **Moldova**, **Monaco**, Montenegro, Serbia\*, **Slovenia\***, Spain, **Sweden** and Turkey. Countries indicated in bold are Parties to Eurobats. It is possible that some of these countries may still wish to participate and that the official contact was not the correct person to approach in this context.

**Addendum:** Those countries marked with \* have since expressed an interest in participating in the project (May 2009).

Some participants were able to attend one or both of two workshops held in London (30 April 2008) and in Berlin (18 July 2008). Others responded via email or telephone.

The workshops were to clarify and agree the key issues of the project. Following discussion regarding participation and resource requirements, countries that responded to the invitation were divided into three categories (only monitoring in underground sites was considered):

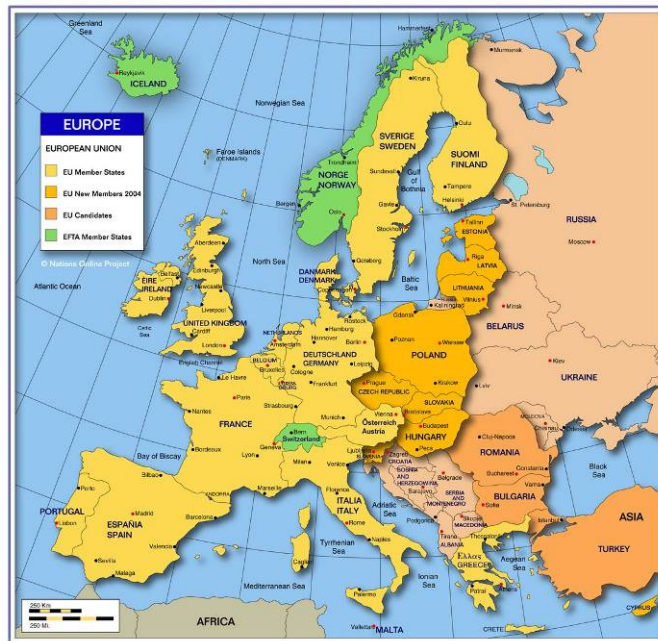
Category 1. Countries with well developed robust monitoring producing results. These countries will benefit from standardisation of the data, allowing analysis at a pan-European level and comparison of bat trends with other countries. They may obtain improved management of their schemes and of the data through a common data portal. These improvements may increase the capacity to implement further research and conservation programmes.

Category 2. Countries with incomplete monitoring activities (possibly only field work – lack of data processing and delivery of the results, lack of a centralised data base, only regional or local research). These countries have some monitoring in place or at least have enough human capacity but lack other resources or organisational structure. The project would focus on improving these capacities and supporting setting up of regular monitoring. These countries should be able to provide appropriate bat data in the first season of their involvement.

Category 3. Countries with no monitoring or poorly developed monitoring. These countries will have their capacity strengthened and will start to collect data on bat abundance and trends. Some of these countries could collect enough information in the first year of participation to provide baseline data, but others would need help to develop the capacity to deliver the information in sufficient quality and quantity. There is the possibility of using existing expert resources from neighbouring countries to train and develop bat expertise in countries where it is lacking. The focus of the project would change over time for this group from increasing the capacity in the first years towards delivery of the bat data. To achieve data sooner it seems reasonable to start with groups already engaged into biological research (foresters, ornithologists) and to choose easy species – like fruit bats or *Pipistrellus kuhlii* (not an underground species – potential for other projects).

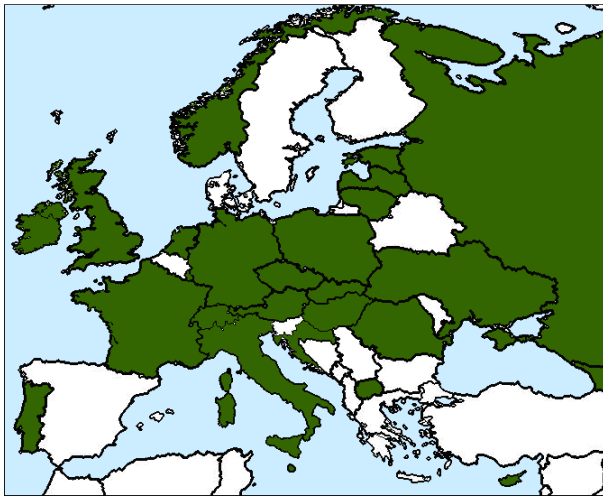
In some countries administration circumstances may complicate the project management: in Germany there are 16 independent Länder and in Austria 9 provinces at the federal level. The island of Cyprus has four administrations, including the UK military bases and the UN buffer zone.

Map 2 shows the countries of Europe and can be used as a reference when assessing country participation and categorisation. Table 1 and Maps 3-6 indicate which category applied to participating countries. The division into categories is not sharp with some countries having better capacity in some areas than others e.g. Hungary agreed with the classification as advanced, but indicated lack of financial stability for monitoring and is surveying only sites selected as most important roosts, which may affect the ability of statistical tests to detect change. However, the division is useful for structuring project delivery.

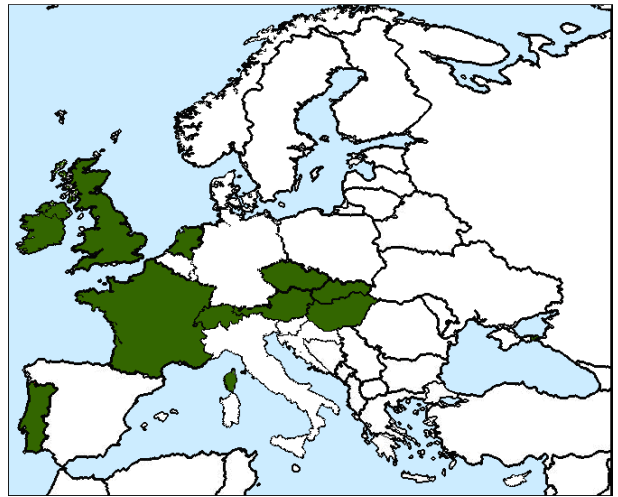


Map 2. Political map of Europe.

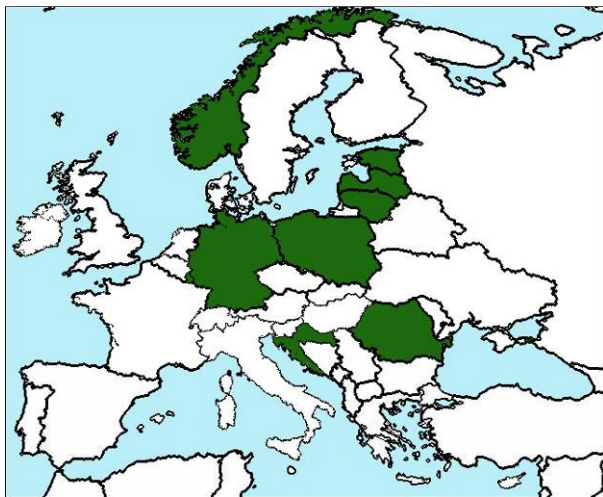
Does not show Easternmost countries like Kazakhstan, Georgia or Azerbaijan.



Map 3. Countries represented in the PEMBUS feasibility study by at least one response



Map 4. Feasibility study countries with well developed monitoring programmes in place



Map 5. Feasibility study countries with monitoring programmes in place but not able to deliver the robust results,



Map 6. Feasibility study countries with none or poorly developed monitoring programmes.

Table 1. Range State categorisation according to their bat monitoring capacities (see also maps 3-6). More detailed information on country monitoring category is provided in Appendix III.

CATEGORY	Characteristics	Priorities and suggestions	Countries (only responding countries)
CATEGORY 1. Countries ready to provide monitoring data	Monitoring programmes running  Usually long term funding of monitoring secured (not the case in Hungary, Czech Republic or Slovakia)	Needs depend on the projects expectations, however there will be cost of assuring data flow converted from present format into new, required at pan-European level  There is also need to improve feedback to volunteers and to local/national governments (flyer in national language similar to the UK)  Equipment may be needed – if additional site data should be gathered (humidity etc.)	Austria Czech Republic France Hungary Ireland Netherlands Portugal Slovakia Switzerland UK
CATEGORY 2 – Intermediate  Able to provide data in the project period	Some monitoring in place but not quite ready to provide data to project  Lack of agreed protocols  Sites not necessarily monitored every year  Poor data processing	Each country needs to think about capacity building to do more sites and inhale/develop data processing protocols. Need to engage more people (training and capacity building).  Need to lobby govt for long term engagements	Croatia Estonia Germany Latvia Lithuania Luxembourg Norway Poland Romania San Marino
CATEGORY 3 – Least advanced	Usually no monitoring in place  Usually insufficient capacity	Main priority in capacity building – training volunteers, equipment for surveying  May start with selection of easier species (like fruit bat in Cyprus)	Cyprus Georgia Italy Macedonia Malta Russia Ukraine

**Addendum (May 2009) Additional expressions of interest:**

Since this report was compiled a number of countries that did not initially respond to the invitation to take part have agreed that they would like to participate in the project. These are:

Albania, Bulgaria, Greece, Finland, Serbia and Slovenia.

Further information about the existing state of monitoring in these countries and their resource requirements has not yet been received.

Involvement in the project means acceptance of certain rules: agreeing common protocols, assuring the legitimate / lawful actions, applying good practice in bat handling, data management and volunteer management. It is also important that the NGOs and governmental institutions agree to work collaboratively.

The workshop participants and some of the responders who were not able to participate in workshops already agreed some basic assumptions:

- the persons present at the workshops represent their countries and are in contact with other bat workers, however multiple representation per country is also possible
- confirm that there is a good partnership between the NGOs or academic institutions which probably will implement the monitoring and the statutory nature conservation organisations
- consent to use the agreed protocols (field protocols – in line with the EUROBATS guidelines, data protocols – as were defined at the workshops)
- overall approach to delivery will be by the BatLife structure set up by the BCT, VZZ, NABU and any other interested NGO (chapter 10)
- details of the project defined by BCT when all components are available (e.g. whether regional training officers will be needed)
- data management issues were agreed (for details see chapter 9).

The main focus of the project should be on coordination of data processing, by providing an appropriate, common tool to allow comparisons between countries and analysis at the European level. Furthermore, the project should create an organisational structure for the management of the international aspects such as data management and processing, delivery of the results, development and strengthening methods used and building capacity at European and national levels.

In all countries the outreach of bat monitoring should improve thanks to the dissemination of the results by publications, at workshops and conferences for scientists, administration and NGOs. The political acceptance of international obligations will increase when their fulfilment becomes more realistic.

## **7. Project delivery**

### **Task 1. Creation of the cooperation platform for monitoring of bats in Europe**

This task consists of setting up a framework for project management (1.1), and creation of tools for project implementation (1.2).

#### **1.1 Set up of the project management structures**

To assure stability of the proposed monitoring programme and to assure that the project would build a solid base for regular, long-term research it is vital to set up a comprehensive framework for Pan-European Bat Monitoring implementation including field research and data management, based on the partnership between the governmental, academic and non-governmental institutions.

The organisational structure in question might take different forms. The earlier initiatives undertaken at and between the European Bat Research Symposium (EBRS) conferences proposed creation of a European organisation under the provisional name of BatLife Europe. Different possible approaches to BatLife Europe were analysed and the chosen arrangement with BatLife Europe created as a new, separate entity is described under the Project Management section (Chapter 10).

The cooperation platform may at first be established as an informal coalition or a partnership formalised by partnership agreements. Registration of the formal BatLife Europe structure may parallel onset of the project.

It will require:

- registration process - raising kick-start funds, meetings of the founders, legal investigations of the best solutions, preparation of the statutes and other documents, registration procedures in a selected host country

- building of the partnership - recruiting partners among NGOs, governmental and academic institutions, at first searching for partners for the PEMBUS project, signing partnership contracts, selection of management committee from the Partners

This goal will be considered achieved if the organisational structure implementing Pan-European Monitoring of Bats in Underground Sites is in place.

BatLife Europe may start as an informal platform for cooperation and should become formalised by the end of second year of the project

Target number of partners joining BatLife Europe by end of 2<sup>nd</sup> year is 10, by end of the 5<sup>th</sup> year of the project – 20.

## 1.2. Creation of the tools for project implementation

This task will be mainly implemented by the creation of a data portal with the data management and project management functions.

Data for pan-European analysis must be standardised. This may be achieved by either keeping the same standards of recording throughout all schemes participating in the programme or by assuring automatic conversion from virtually any format. Automatic conversion mechanism, which is a standard approach in data management allows more flexibility and is needed anyway in importing older data stored in different formats.

The main management tool - European monitoring DATA BASE with *data management* and *project management* functions should become operational by end of 2<sup>nd</sup> year of the project.

The database should:

- ensure flexibility for future extensions – adding new databases or new types of data
- support users in the data control (redundant codes, drop-down selection lists, national language menus) as much as possible
- be compatible with and transferable to other databases such as the National Biodiversity Network (UK) and the Global Biodiversity Information Facility (GBIF), so that the data can actually serve the wider purpose (taking into account restrictions of making data freely available)
- automatically generate reports (tables, graphs, maps, as relevant)
- provide access to annual reports interpreted by bat experts
- assure at all levels full transparency of the observer, data owner and data provider

Information to be collected for Pan-European Monitoring is listed in Chapter 9 and Appendix V).

In brief, records are managed through a cyber infrastructure known as an iData portal. This can provide live project summaries and maps; a programme co-ordinator controls how results are seen, and by who, i.e. users must register with the programme co-ordinator to view data, and different people may be granted different access rights. It provides a simple interface, easy to use by the end users and by the data providers. All of this can be personalised to suit the needs of the project.

A working example of the data portal is iBats (<http://www.ibats.org>). The system has been developed for the purpose of bat detector car surveys and may be adapted to manage the Underground Sites monitoring. However, it is important to note that the adjustment for the use in underground monitoring would require design of the data model which should then be piloted.

## Task 2. Delivery of monitoring data

Two kinds of change will be monitored by the project: population levels of selected European bat species and the health of underground sites. Both kinds of change will be monitored at a European level and in those countries able to provide sufficient data.

This task will require field research to collect appropriate data and data processing to draw conclusions. Data will be submitted, stored and processed via a data portal. Surveys will be based on agreed field protocols (Chapter 8).

The expected number of sites for which survey data will be submitted by each participating country has been estimated at the level shown in Table 2. Some countries submitted alternative scenarios depending on the available funding.

Table 2. Declared number of sites to be surveyed - by countries.

Country	Number of sites									
	hibernation					maternity				
	Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5
Austria	50	50	50	50	50					
Croatia	30	30	30	30	30	40	40	40	40	40
Cyprus	7	7	7	7	7	4	4	4	4	4
Czech Republic	800	800	800	800	800	1	1	1	1	1
Estonia	66	66	66	66	66					
France										
Georgia										
Germany	100	100	100	100	100					
Hungary	100	100	100	100	100	20	20	20	20	20
Ireland	100	100	100	100	100					
Italy	40	40	40	40	40	60	60	60	60	60
San Marino	4	4	4	4	4	3	3	3	3	3
Latvia	130	130	130	130	130					
Lithuania	7	7	10	10	10					
Luxembourg										
Macedonia	10	10	30	30	30	30	30	30	30	30
Malta	3	3	3	3	3	5	5	5	5	5
Netherlands	(988)	(988)	(988)	(988)	(988)					
Norway										
Poland	300	300	300	300	300	3	3	3	3	3
Portugal	96	96	96	96	96	106	106	106	106	106
Romania	60	60	60	60	60	60	60	60	60	60
Russian Federation	180	180	180	180	180	20	20	20	20	20
Slovakia	100	100	100	100	100	2	2	2	2	2
Switzerland										
Ukraine (western part)	40	40	40	40	40	5	5	5	5	5
United Kingdom	300	300	300	300	300					

The target for tracing bat population levels is defined as

- obtaining indices of X bat species calculated at the agreed level of detectable change over agreed period by end of the 5th year for Europe based on information from all participating countries
- country indices for X countries, for as many species as the country data allows (certain number of sites Y must be surveyed in at least two different years to make these calculations possible)

The target for site condition monitoring has been defined as:

- qualitative information for 1000 sites in Europe

It is important to remember that countries have national and international reporting obligations under EC Directives and international conventions. For example, Article 17 under the EC Habitats Directive specifies national reporting by biogeographic region (Map 7) and then national results are combined to give overall results by biogeographic region across the EU. This means that the ability to stratify results of bat monitoring by biogeographic region is important for EU member states and having sufficient capacity in the PEMBUS project to cover all biogeographic regions is a priority.



### Task 3. Dissemination of the results

There are several target audiences for the project: policy and decision makers at European and national levels, governments, chiropterologists, general public. National trends are important for national governments and members of the public while EEC and global policy makers will need also the pan-European perspective. The reports should then address a wide audience and present the results at different geographical levels.

Data will be made available for inclusion into the national reports to EUROBATS and the EU (Art.17 of the Habitat Directive) as well as those resulting from any other international obligations.

The task will produce:

- annual reports on the bat population trends in Europe for politicians, general public in English and national languages
- policy statement
- scientific publication(s) at international and national level (at least X)
- project website ready by end of 6<sup>th</sup> month, updated regularly in national language versions
- popular publications in media – at least X per year
- educational leaflets

Delivery of the results will also be at media events, scientific conferences, training workshops (after the first year).

#### **Task 4. Strengthening capacity to implement national monitoring programmes**

Very limited number of states already implement programmes which respond to the requirements of international treaties. In many countries there is limited capacity, especially not enough human resources able to implement such monitoring. For instance Estonia reports that there are only 4 skilful bat workers in the whole country, Malta – 2 people with appropriate skills, Macedonia – one professional and a handful of students with different level of skills. In Hungary, there are no paid staff working for bat research and there are 20 persons licensed to handle bats.

Important factors of successful implementation are: continuity, common protocols regarding collection, storage and processing of data as well as common standards for presentation of the results. To assure permanence of the monitoring it is important to secure capacity and continuous engagement of the partners.

To strengthen the capacity to monitor bats, the project will:

- provide training in field survey methods, identification of bat species, use of specialised equipment, statistics, data processing, safety in bat research and bat handling (Table 3)
- adopt the EUROBATS guidelines into instructions for surveyors
- produce training materials and recommendations in national languages
- purchase equipment

Experience of BCT shows that it is important to set up monitoring programmes engaging a wide range of people, and training and recruitment of new volunteers (surveyors) should be included. Training may be organised nationally or internationally, depending on the countries' present capacities and needs.

Also task 1.2 (creation of a data portal) will increase the monitoring capacity by providing a data management tool which can be applied to own data and produce robust results without need for deep understanding of the statistics.

It is assumed that by the end of 5<sup>th</sup> year 15 countries will be involved in standardised monitoring (with milestones: after 1<sup>st</sup> year 5 countries, after 3<sup>rd</sup> year 10 countries) and in another x countries capacity to perform national monitoring will substantially increase by end of the 5<sup>th</sup> year.

The countries “involved in standard monitoring” means that they should comply with the protocols, and submit data from at least X underground sites surveyed per year.

Other outputs of the project comprise:

- X newly trained persons who achieve the level of licensed bat worker
- national monitoring database created/improved in X countries by end of the project so that data may be transferred to the pan-European level
- teaching materials, instructions, data forms complying with the pan-European standards in X countries
- adequate equipment made available in X countries
- database with bat contacts on the internet by end of 2<sup>nd</sup> year, updated regularly

Table 3. Training courses by country and year.

Country	Workshops				
	Y1	Y2	Y3	Y4	Y5
Austria					
Croatia	1	2	2	2	1
Cyprus	5	5	v		
Czech Republic	1	1	1	1	1
Estonia	2	2	2	2	2
France	v	v			
Georgia	v				
Germany					
Hungary					
Ireland					
Italy	3	v			
San Marino					
Latvia					
Lithuania					
Luxembourg					
Macedonia	v	v			
Malta	v	v			
Netherlands					
Norway	v	v	v	v	V
Poland	v	v	v	v	V
Portugal					
Romania					
Russia	v				
Slovakia					
Switzerland					
Ukraine (western part)	v	v			
United Kingdom					

## 8. Field protocols

For most species measuring of bat population size and trends is difficult. This difficulty results from the complicated life cycles of bats: they often hide, are unevenly dispersed in the environment and are difficult to detect and track. Some species are very similar and, in some cases, determination is impossible without handling of individuals. Migrations of bats also contribute to the problem. It is possible though to estimate relative change in bat populations.

Well-established indices for birds are already familiar to policy makers, which makes the use of the same concept for bats easier to accept and understand.

- Geographical scale

The project will be based on reporting requirements of the EU Directives but proposed for implementation throughout Range States of the EUROBATs Agreement. The European Union (EU) countries are obliged by the Article 17 of the Habitat Directive to report according to the biogeographical zones – these would be the basic strata in data analysis.

- Scope of data

There are two levels/kinds of information that are needed.

Data concerning particular sites - their relative importance, threats and existing pressures is vital to undertake preventive, remedial or compensation actions.

Data provided by the surveyors and coordinators should suit the needs of the analysis. First of all it should contain the information about bat occurrence and abundance. Also, it is necessary to identify the site (geographical coordinates are crucial to combine the data with information from other sources). Details of the scope of data to be collected can be found in Appendix V.

The additional benefit of keeping the raw data and especially the geographical coordinates is that they may be analysed in different context, for instance by assigning the sites to units such as NUTS (administrative units in EU) or whole bioregions for the statistical reporting.

Obligatory will be this part of the data which is indispensable for the analysis (such as bat species and numbers). Some data will be collected mainly for organisational purposes (like details identifying the site) or collected optionally depending on surveyor's ability e.g. information about the site climatic conditions.

- Drivers for change

Monitoring of change assumes detection of change (surveillance) and the conclusions on the reason why this change occur. Hence it is necessary to identify individual sites by geographical coordinates, making it applicable in the GIS systems.

The bat population data will be analysed against a number of factors, which will be collected elsewhere and made publicly available. Some of the information that cannot be collected that way should be gathered in the field. The surveyors should report pressures and threats detected on site and in its vicinity (including changes in vegetation structure). Use of the EU categories is not fully relevant to the bat roosts, so a simple system dedicated to bat roosts should be developed that can be applied across Europe. Certainly, all modifications to the site must be recorded e.g. site opened to tourism or granted increased protection, door or grille added, habitat improvements applied.

- Selection of sites

Several restrictions have been drawn to make this project practical. First of all the monitoring was narrowed to cover solely the underground sites, i.e. bat habitats in most critical periods of their lives. Secondly, only the hibernation sites and maternity colonies were selected, while others, such as swarming (mating) sites, were not included at this stage. Making this choice automatically restricts list of species which are likely to be covered by the project.

The next step in selecting the sites is related to the purpose of the research. The direct conservation purpose i.e. to detect and mitigate the pressures on bat sites would favour the sites with larger bat concentrations. However for the purpose of measuring population trends, it is important to survey not only the most important sites but also those with low bat numbers. Some countries survey only sites with certain minimum number of bats, In Croatia, the minimum is 40 (Hamidovic, pers. comm). In Ireland, small sites give early indication of changes to the species range (Marnell, pers. comm). Therefore, the project shouldn't specify a minimum bat number per roost.

The underground sites may be of natural and artificial origin, bats use both. Exclusion of any might create bias. The project will not select the sites by their origin or type.

- Stratification and randomisation

Strict randomisation of the site selection is unlikely for multiple reasons. However if no randomisation is applied at all it may lead to bias in data.

Sometimes prime sites are favoured by surveyors, while changes in prime sites don't always represent the whole picture. Another factor is site availability. Roosts easier to find are favoured.

The problem of bias caused by selection made by the surveyors arbitrary decision may be lessened by applying stratification. Site selection should include some small roosts, some medium roosts, and some large roosts, protected and non-protected sites, geographical spread, different habitats.

Another problem in site selection is that they are inhabited by bats of different species, therefore sample selection must consider all species simultaneously, not each one individually.

From the statistical point of view, random selection (with eventual stratification) would be the best. However another requirement to make the data useful is that the sites should be controlled year by year. Therefore it cannot be ignored that there are several earlier programmes with long series of data lasting 10-20 years and even if they are from single sites, it would be waste if the research was not continued.

- Number of sites

The sample size for a given country will be determined after two years of submitting appropriate amount of data. These sample sizes depend on the statistical features, which may vary considerably between countries. In case of UK it was 40 sites per species in a region.

- Field survey methods

When monitoring bats across whole Europe and both in winter and summer roosts, it is impossible to find a single universal field method applicable in all sites.

Using different methods at different sites is valid from the point of view of statistics, assuming that the same method should be applied at the same site over time. In particular, studies that have been carried out earlier should continue using the earlier methods. It should be acceptable: robust and non-harmful to bats. Unless justified, non-handling methods are preferred. The project assumes that the basic methods would be different variations of visual counts, including video or photographic methods. However other methods can also be applied, like automatic data loggers or detector counts of bats emerging from the roost.

Recommended field protocols for all European bat species are available in EUROBATS guidelines catalogue (Battersby *et al* 2008).

- Organisation of surveys

The programme is opened for anyone to participate, however to make it manageable some level of coordination must be achieved.

It should be the responsibility of the countries to assure some level of coordination. Though there is no requirement for a single coordinator per country, which might lead to bottlenecks and conflicts, it is vital that the information is collected in an organised way to assure data quality (knowledge of local bat workers) and no extra disturbance to bats (avoiding double counts). There is also often a language barrier to consider.

It is the shared responsibility of the surveyor and coordinator (representing project partner) to assure legitimate action. They should obtain licenses/permits required in the country and fulfil any reporting requirements related to these permits.

The surveyors should inform programme managers if they are considering making any changes to the methodology. Changes must be given careful consideration, and possibly have a cross-over period if necessary.

It has been agreed by the participants to the feasibility study that while setting up a new monitoring programme, one of the standard protocols should be used, preferably the one most recommended for the species.

Provision of data to Pan-European Monitoring project will be in electronic form, and data may be provided directly by the surveyor or indirectly. The responsibility of providing and validating the data will lie on the entity with which the agreement to participate in the project was signed.

- Rate of recurrence

Revisiting of the site should be done on a yearly basis, however it is possible to apply a 2-year cycle (every other year) if justified. The sites should be visited once in a season, not more than twice unless justified.

## 9. Data management

Data management aspects cover: scope and formats of information collected, validation and processing protocols, outputs, availability of data, technical solutions.

### *Scope of information*

It was agreed at the workshops that:

- the priority data (i.e. data concerning occurrence and abundance of bats in underground sites selected for year to year surveys) will be gathered, while the environmental data are optional, subject to review as the project develops
- the project will collect data from as many sites as possible, covering as many species as possible, subject to review and analysis to assess quality of potential trend information 2 years into the project
- import of historical data is important but at this stage priority is in developing a framework to collect data from the start of the project. Older data may be imported into the created structure at any point; older data may help when assessing sample size requirements.

The data in the database will consist of two types of information:

- actual data, about bat roosts, numbers of bats of each species etc.
- dictionary information to help avoid ambiguity and ease up the use of the system (drop-down lists of typical values to select from, dictionaries translating codes between users); for example species names may be displayed in national language while the computers use an internal species code to assure identity

Design of the data formats should predict long-term use of the database. Therefore the system should be independent of information stored elsewhere, in particular in human brains.

The data portal should be based on the dispersed information with copies in the central node. If the system serves as a project management tool it is desirable that the end users obtain software performing the same functions off-line on their local copy of data.

Details of the scope of information that the database will collect is provided in Appendix V. There should be also additional space for user-defined information. Such a feature would allow the user to use the system as a main management tool and reduce the need for transfer of data between the different locations and formats.

### *Data availability*

Data availability is a sensitive issue for several reasons: scientific interest of people who invested time in their collection, and bat safety in fragile roosts. There may also be an economic aspect of the data ownership. There should be no doubt that the data which became public (for instance were paid for from public funds) should be made available according to the Council Directive 90/313/EEC concerning freedom of access to information on the environment. However some part of the information is collected on voluntary basis or financed from other sources and the availability depends on individual agreements.

Discussions at the workshops led to the optimal solution: data will be made available as widely as possible, taking into account sensitivity issues like scientific interest of data providers or safety of bats for potentially threatened species. The project management committee will define these issues with involvement of all interested parties. Access to data will be open inside the partnership (including the governmental institutions).

The data submitted will be made available to use for deriving trends and any other pan-European monitoring research for the entities belonging to the partnership. Data providers will have priority in publication of country reports and scientific analysis.

The protocols for data use and appropriate agreements will be prepared, applying mechanisms such as time lag for the use of data and support of the data providers in obtaining data owners permissions.

The detailed rules for the data accessibility will be defined by the management committee of the project with involvement of all interested parties.

There are other ways to avoid data sensitivity issues applied elsewhere but were not accepted for application in the PEMBUS.

For example, in France the reports are not geo-referenced, i.e. there is no indication of the site localisation (only the site ID is available). Other similar solutions are applied in some atlas type programmes, where the information is assigned only to an atlas field which may be for instance 10x10 or 50x50 kilometres in size.

Another approach is in hindering raw data and making available only the results of data processing (Pan-European Common Bird Monitoring). This may affect the robustness of statistical analysis at the European level and certainly will make any finer analysis impossible– for instance below the country level. However it is easier to assure availability of information. Among drawbacks there is the reliance on each individual country to process their own data in time.

### ***Processing protocols and outputs***

The data processing needs are:

- selection of data across fields and records according to arbitrary criteria
- creation of summary reports based on these selections
- statistical calculations including averages, standard errors and trends
- graphic presentations of the results – maps, linear graphs of change in indices over time (including smoothing functions - for instance TRIM by Statistics Netherlands), bar or pie charts

All these should be standard functions of the data portal software.

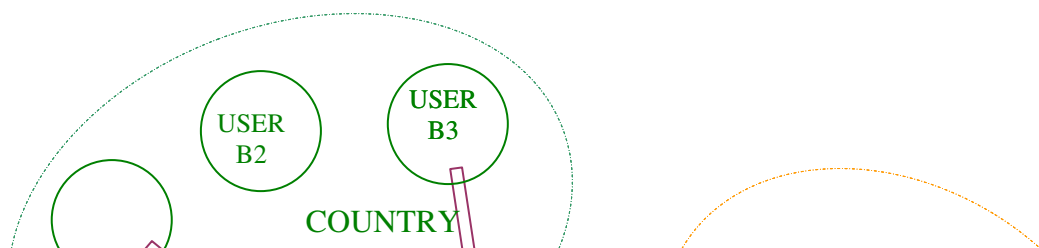
Data validation system will be designed and put in place in the first year of the project. There may be country by country variations which should be dealt by the data portal. Standards such as coding of different data items and validation rules allowing automated error detection will be defined by the project team.

### ***Data Portal***

After discussing the possible management options, participants of the workshops agreed that data should be managed via a data portal with functions similar to the one used for the iBats project, already known by some bat workers.

After brief cost estimation it has been agreed that the database software would best be obtained by adopting the iBats to the needs of the Pan-European project. In particular, the interfaces will be designed to translate data between different formats (Import/Export functions). Data transfer functions might be tested on prior data if made available. Also some of the prior data that was not yet typed-in may serve for training and testing purposes.

Fig. 1 presents the information flow using the data portal. Countries (A,B and C) may apply different coordination schemes without side effects. The partners may provide data via centralised system (model A) or independently (C) or apply a mixed approach (B).



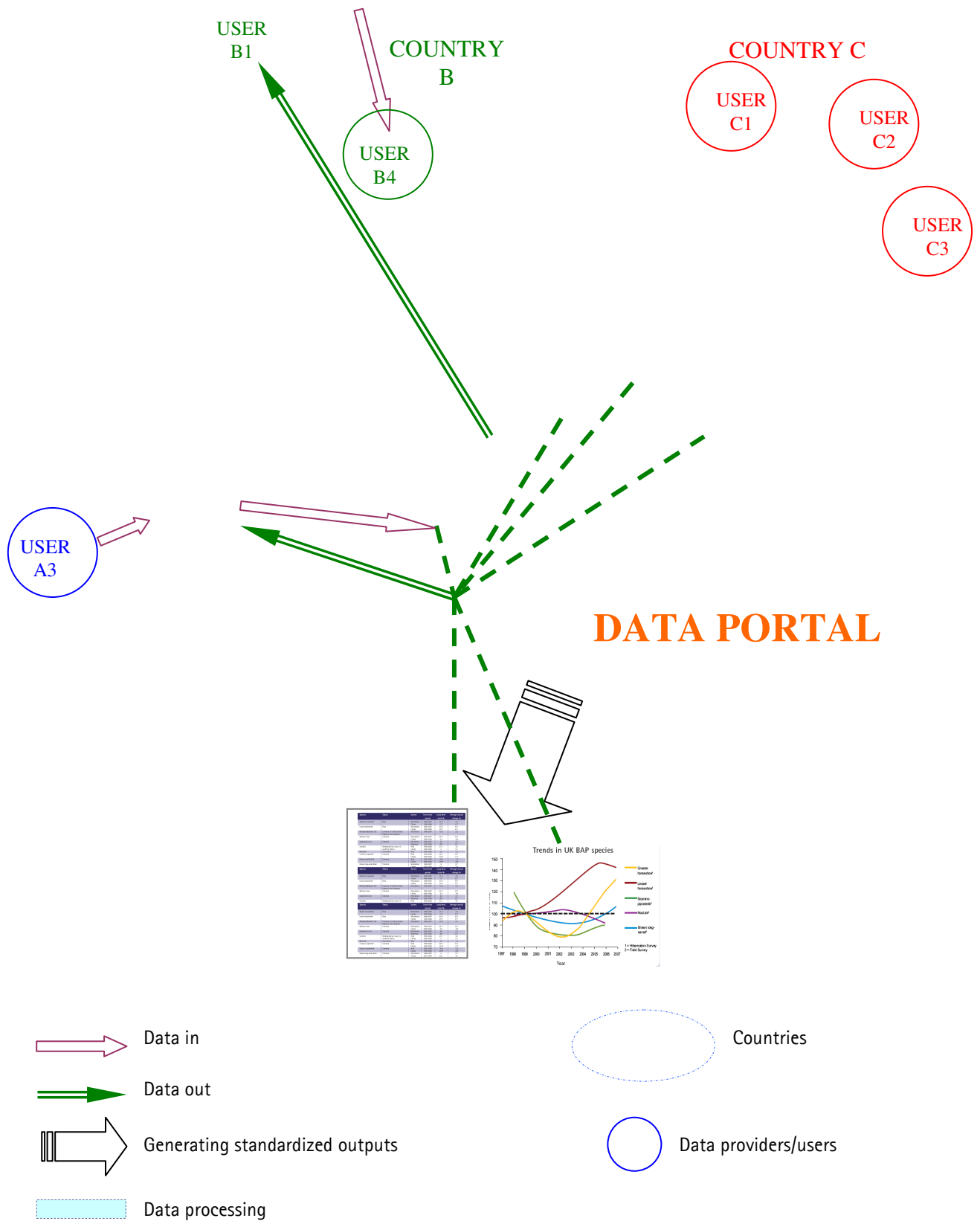


Fig. 1. Data management by the Data Portal

## 10. Overall project management

The PEMBUS project was developed not as a pure delivery project but was placed in a context of building capacity for international, pan-European cooperation. It is of mutual benefit to use this opportunity to establish a regular cooperation platform. Although the initiative came from the intergovernmental body of EUROBATS, there was an understanding that the governments are ready to delegate part of their tasks to the NGOs, and support the already existing idea of BatLife Europe.

### *BatLife Europe*

The prerequisite for the sustainable, long-term delivery of the project is solid capacity at the pan-European and national levels. It has been agreed by the partners engaged in preparation of this feasibility study that PEMBUS should become a BatLife project. The BatLife idea has been broadly discussed in the past and several options were considered.

BatLife might take the form of:

- membership organisation with different possible set ups, with or without fees, with membership restricted per countries (one member per country, one country one vote)
- coalition of separate entities, with legal bonds (agreements) or loose (letter of intent)
- NGO only or mixed (like IUCN or Eurosite) with involvement of governmental or academic institutions or fully opened also for business sector
- with leading partner, cyclic presidency (like in Rotary Club or EU), steering group, all-members collective decision making
- project based ad-hoc partnership with one of partners taking leading role in fund raising and coordination (suitable for some applications)
- new international organisation (like WWF) independent from other groups
- running its own projects
- funding other organisation's project (unlikely)
- providing services to or working in partnerships with other organisations

After discussing some pros and cons, the mixed approach has been selected, which seems to collect the benefits from different attitudes. The structure of the proposed BatLife arrangements is presented in the chart (Fig. 2). Steps to achieve this goal are listed in Chapter 7 - Project delivery.

The core of BatLife would be created as a separate entity by a handful of NGOs (founding members). This would allow to approach some funding sources only available to NGOs. This core organisation would be a secretariat of the broader coalition, based on long-term cooperation contracts and allowing participation of the governmental bodies and other partners.

Projects (including PEMBUS) would be run as a partnership of the BatLife secretariat (usually but not necessarily exclusively a project administrator) and the BatLife Partners. Obviously not all partners must participate in all projects.

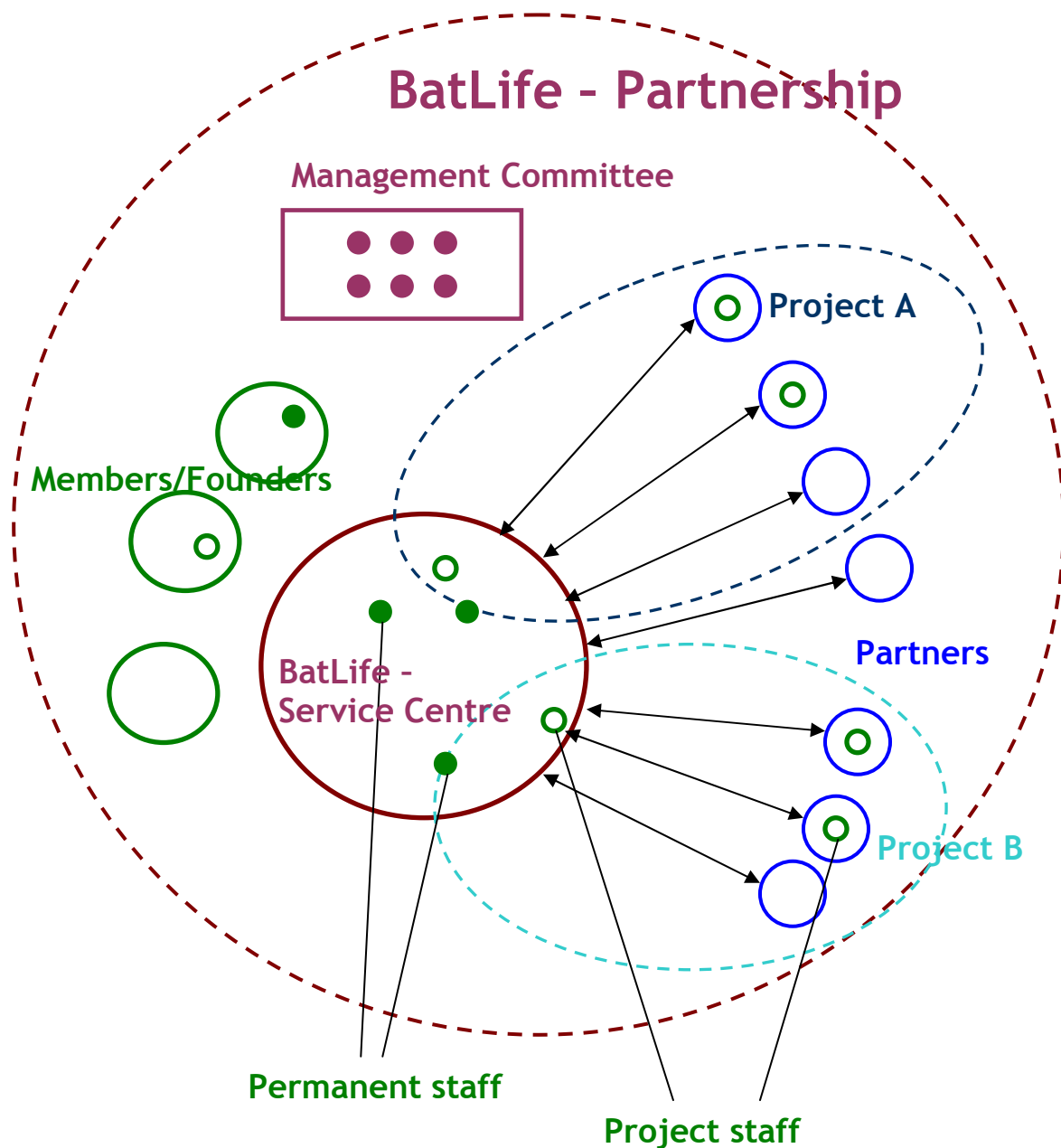


Fig 2. Proposed approach to BatLife as project management option.

BatLife is a Partnership AND separate entity created by some founding<sup>1</sup> organizations as a membership based association (allowing growing of membership) or a foundation with no possibility to increase membership.

Partners may become members if their (and BatLife's) status allows

Founders may become partners as the entity once established is now separate legal body.

<sup>1</sup> NOTE: not *fund*ers but founders – creators,

## ***Project management***

Project management will be split between European level and the national or regional levels. The reports and evaluation will be carried out nationally and compiled at the European level.

The project team (management committee and key project staff) will meet regularly at Annual evaluation meetings.

Selection of the management committee by BatLife Partners will take into account good representation of regions, experience, availability of the persons.

### **PROJECT STAFF**

#### **Pan-European level:**

Staff	Tasks
Project Manager/Coordinator	Management of the partnership, field surveys, data processing, dissemination of the results, part of financial management
Data management team - partly outsourced	Creation of IT technology Data management and processing
Statistician(s) - outsourced	Technical support (advice)
Training team: coordinator + trainers (outsourced)	Organisation of training and capacity building events/workshops, delivery of training
Financial manager (outsourced)	Financial management – accounting, reporting, procurement
Technical staff	Support for the project manager and other staff

#### **National level:**

Staff	Tasks
Project Manager/Coordinator (from part time to full time)	Coordinator of the field work and data management, the surveyors and other team members – staff and volunteers, dissemination of the results, part of financial management
Financial management (part time or outsourced)	Financial management at the country level (accounting, reporting, procurement)

## 11. Budget

### *Financial model*

#### International costs

The project costs at the international level include general project management (coordinator, technical staff, financial management), technical support (creation and management of the data base), statistical advising, and training.

Assuming the full time coordinator, half time assistant, 12,5% financial assistance, 30 days per year - statistical team, 3 days per month database management, the cost at the international level can be estimated as follows:

Staff	Cost		Tasks
	Per year	Per 5 years	
Project Manager/Coordinator	32 000	160 000	Full time
Data management - Creation of IT technology	60 000		Based on the cost of similar data base (iBats)
Data base management	10 000		40 days x 250 euro
Statistician(s) – outsourcing	12 000		Technical support (advice), 30 days
Training	16 000	80 000	Organisation and delivery of training and capacity building events/workshops altogether equivalent of half time job
Financial manager (outsourcing?)	5 000	25 000	Financial management – accounting, reporting, procurement, 1/8 salary
Technical staff	12 000	60 000	Support for the project manager and other staff half time
<b>TOTAL</b>	<b>65 000</b>	<b>407 000</b>	

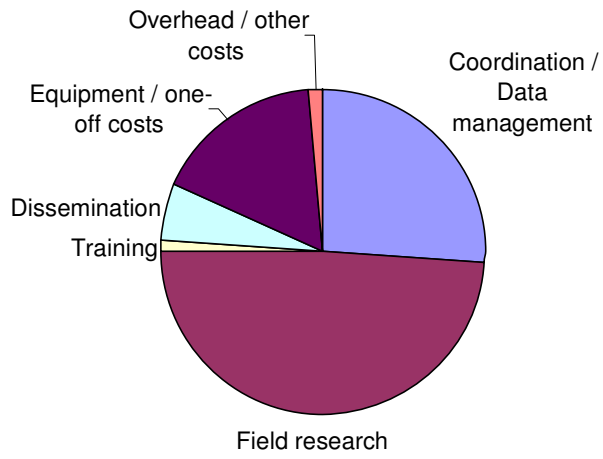
#### Country level costs

The project costs at country level have been grouped into 6 types:

Costs at country level per year in thousands euro	Category of the country			TOTAL
	1	2	3	
1. Coordination/Data management	30	98	36	164
2. Field research	50	162	92	304
3. Training	0	7,8	0	7,8
4. Dissemination	11	18	5,1	34,1
5. Equipment/one-off costs	21	69	16	106
6. Overhead/other costs	1	4,2	3,9	9,1
<b>Total</b>	113	359	153	<b>625</b>
Average per country	28	60	25	
<b>Extrapolation for 27 countries</b>	280	600	175	<b>1055</b>

Cost calculations were based on 16 countries which submitted most detailed information. Where countries submitted more than one option, the lower numbers were applied.

The coordination and data management categories were pooled in some countries - data management was considered direct responsibility of the project coordinator.



**Project costs at the national level by type**

## Detailed Budget

Partners have been asked to provide their need assessments. Fragmented information was also collected during the Berlin workshop.

Country	CATEGORY (1)	Survey		Type of the Partner			COST in €					comments
		hibernation	Maternity	NGO	GOV	ACADemic	Total (2)	Yearly (3)	Field data per site (4)	Data per site (5)	Cofinancing	
Austria	1	50	150	v							24 000	
Croatia	2	30	40									
Cyprus	3	11		v			15 000	660	60	60		GPS, training
Czech Republic		800	1	v		v	123 500	22 500	22	26	15 000	Governmental support, but no long term commitments
Estonia	2	66		v		v	104250	20850	102 (147)	238 (283)		66 comprising 6 big sites, 60 small sites (divided into 6 units of 10) (Includes 15000 for passive monitoring system)
France	1	V	v									
Georgia	3	V	v									
Germany	2	100		v	v		230 000	43 000	250	430	25 000+	financial support of Lands
Hungary	1	100	20	v		v	90 000	15 000	40	65	4 800	Support per year (40€/cave)
Ireland	1	100			v		X5	3000?+travel	30+	30+		Basic costs covered, One month salary/year, only Rh.hipp., travel costs?
Italy	3	40	60	v			217 000	36 800	210	300	(15 000) MoE,	Growing number of sites: 30→100, average per year: 70
San Marino	2	4	3	v			2 500	500	80	80		All known underground sites, financial situation unstable
Latvia	2	130+		v		v	139 700	25460	122	198		Possible application to Latvian Fund for Nature Protection
Lithuania	2	12				v	20 020	3 400	220	250		
		12		v			138 200	27 040	170	?		Includes project coordinator @ 1500/month and dissemination/ education @ 7000/year
Luxembourg	2	v										
Macedonia	3	10→→30	30	v		v	100 440	17 840 →20 720	157 540	317 640	26 960	Own contribution of the NGO: Bat Study Group (BSG) of Macedonia <b>Alternative estimations</b>
Malta	3	3	5	v			2 000	400	50	50		All work voluntary
Netherlands	1	(988)		v	v							
Norway	2	5		v								
Poland	2	300	3	v	v	v	380 000	69 100	150	175	123 750	In-kind: voluntary work
Portugal	1	96	106	v		v	145 710	28 668	132	142		
Romania	2	60	60	v			271 500	43 500	200	360		Car survey well developed;
Russian Federation	3	180	20				280 000	50 000	250	250	Parallel projects	programmes in 5 centres, large distances up to 1000 km one way (sic!)
Slovakia	1	200	2	v								All maternity roosts
Switzerland	1	V										Response only from a local researcher
Ukraine	3	40	5	v	v	v	130 000	25 000	270	520	in kind	Staff of NPA, work
United Kingdom	1	300										well developed programme in place (NBMP)

Table 4. Summary of needs by countries. Table shows countries participating in feasibility study.

1. Level of the present monitoring development in a country (categories 1-3)
2. Includes yearly running costs for 5 years and the one-off costs like equipment
3. Yearly running costs (average if different in different years) including indirect costs, dissemination, public relations etc. Do not include one-off costs such as purchase of equipment.
4. Average cost of obtaining data for one site - only field survey costs.
5. Average cost of obtaining and processing data for one site - field work and data management costs pooled. Indirect costs such as of capacity building or equipment not included.

## *Future Funding Plans / follow up*

The monitoring of the bat population is the responsibility of governments. The project is designed to set up the structures for monitoring and help to create sufficient capacity. Therefore funding of the monitoring should gradually shift from the external to internal sources. Countries joining the project later should receive support for the development of their capacities. Costs of the international coordination should be partially covered by the participating states and partially supported by the project as long as some participating countries.

The cost of coordination both at the national and international levels should drop with increasing capacity.

## 12. Glossary

Bonn Convention, Convention on the Conservation of Migratory Species of Wild Animals, signed in Bonn, where the Secretariat to the Convention is based

EEA, The European Environment Agency, an agency of the European Union which task is to provide sound, independent information on the environment

EUROBATS, The Agreement on the Conservation of Populations of European Bats, which came into force in 1994, The Agreement was set up under the Convention on the Conservation of Migratory Species of Wild Animals, The Agreement on the Conservation of Populations of European Bats, which came into force in 1994, The Agreement was set up under the Convention on the Conservation of Migratory Species of Wild Animals

iBats, The Indicator Bats Program - see: [www.ibats.or.uk](http://www.ibats.or.uk)

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## 14. Appendices

### Appendix I Resolution 5.4 of the 5<sup>th</sup> Session of the Meeting of Parties

EUROBATS.MoP5.Record.

5th Session of the Meeting of Parties

Ljubljana, Slovenia, 4 – 6 September 2006

Resolution 5.4 Monitoring Bats across Europe

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

Recalling Resolution 2.2 Consistent Monitoring Methodologies (Doc.EUROBATS.MoP2.5.Rev.1AnnexA), which recommends the adoption of consistent monitoring methods for bats across Europe;

Recalling also the recommendations of the Agreement’s Conservation and Management Plan 2003-2006 Resolution 4.9 (Doc.EUROBATS.MoP4.15.Rev.2) which recognises the importance of long-term monitoring of bat species (EUROBATS.MoP4.Record.Annex12a);

Recalling further the recommendations of the Agreement’s Conservation and Management Plan 2003-2006, which recognise the importance of international information exchange and cooperation in developing monitoring strategies for bats;

Noting the work of the Advisory Committee in producing Guidelines on Bat Monitoring Methods to Assess Population Trends at Different Levels as recommended in the Agreement’s Conservation and Management Plan 2003-2006;

Noting the results and recommendations of two workshops held in the UK to develop the idea of pan-European surveillance of bats;

Noting the work of the Advisory Committee on compiling a database of information on important underground sites for bats across Europe as recommended in Resolution 2.4;

Noting also the imminent EUROBATS publication of guidelines on management of underground sites for the protection of bats;

Recognising the importance of the surveillance and monitoring of bats at a European level to report on the conservation status of bats as protected species under relevant international conventions and European Directives;

Recognising the possibility for bats to be indicators of environmental quality and to contribute to assessment of CBD biodiversity targets;

Urges Parties and Range States to:

1. Support the development of long-term pan-European surveillance to provide Europe wide population trends for bat species and site condition monitoring of protected sites for bats, with particular reference to underground sites;
2. Raise awareness of the importance of underground sites for bats at the local, regional, national and supranational scales;
3. Maintain collaboration and information exchange within the EUROBATS Agreement area on surveillance and monitoring activities in their country;
4. Support the use of the Guidelines on Bat Monitoring Methods to Assess Population Trends at Different Levels in developing common protocols for bat surveillance across Europe;
5. Support the development of standardised survey forms for use in pan-European bat surveillance and monitoring;
6. Support the development of appropriate data storage and analysis mechanisms to facilitate the production of Europe-wide trends for bat species;
7. Encourage and assist with capacity building of bat workers and surveyors and, where possible, volunteer networks in their country, to carry out bat surveillance projects.

## Appendix II

### **11. Reports from working groups convened during the Meeting Producing Guidelines on Bat Monitoring Methods to Assess Population Trends at Different Levels**

The Intersessional Working Group met to discuss progress with drafting the guidelines, and also to agree the next steps for taking forward Pan-European monitoring of bats as suggested in Resolution 5.4, Monitoring Bats across Europe.

Present: Dr. Jessamy Battersby (United Kingdom, Convenor), Mr. Serghei Andreev (Republic of Moldova), Dr. Stéphane Aulagnier (France), Dr. Zoltán Bihari (Hungary), Ms. Amy Coyte (BCT, United Kingdom), Ms. Edmée Engel (Luxembourg), Dr. Suren Gazaryan (Russian Federation), Dr. Christine Harbusch (NABU, Germany), Mr. Tony Hutson (IUCN/SSC), Dr. Katherine Jones (BCT, United Kingdom), Dr. Ferdia Marnell (Ireland), Dr. Matti Masing (Estonian Bat Group), Prof. Branko Micevski (FYR Macedonia), Mr. Ioseb Natradze (Georgia), Mr. Primoz Presetnik (CKFF, Slovenia), Dr. Danilo Russo (Italy), Dr. Dino Scaravelli (Republic of San Marino), Ms. Abigel Szodoray-Paradi (Romanian Bat Protection Association), Ms. Triinu Torv (Estonia).

The Convenor noted that there had been little progress with publishing the guidelines since MoP5 and advised that there was still some minor work to complete the main text, which could then be circulated to all contributors and all in the IWG for comment. A small editorial group (Dr. Stéphane Aulagnier, Dr. Jessamy Battersby, Dr. Zoltán Bihari, Dr. Ferdia Marnell, Mr. Tony Hutson) was set up to finalise editing the guidelines and will communicate via email. It was agreed that the work could probably be completed within six months and that the final guidelines could then be circulated for adoption at AC13.

Ms. Amy Coyte (BCT, United Kingdom) led a discussion on implementation of Resolution 5.4, with reference to the proposed Pan-European Project on Monitoring Underground Sites.

Firstly the group revisited the aims and objectives of the project.

#### Overall objectives of the Pan-European Project

- To provide population indices for European bat species on a regular basis;
- To identify important sites and provide information to assist in their protection;
- To measure and assist in predicting the effect of future global change on bat biodiversity;
- To raise awareness, enhance information exchange, build capacity and increase volunteer engagement;
- To deliver obligations under the EC Habitats Directive.

At AC11 a recommendation was made to carry out a feasibility study to develop the project and BCT (United Kingdom) agreed to take this forward.

Aims and objectives of the feasibility study

- To produce a detailed project proposal for the Pan-European project;
- To submit a proposal to EU Life Plus and other potential funders;
- Consult with partners to:
  1. Identify the framework for delivery of a Pan-European project;
  2. Clarify the protocols and methodology for the project, using the Monitoring Guidelines agreed by EUROBATS;
  3. Clarify processes for data handling, management and access;
  4. Clarify individual country requirements for delivery e.g. health and safety requirements, resources etc.;
  5. Clarify the management of the project and reporting processes;
- Compile a detailed project plan, agreed by all the partners;
- Investigate funding opportunities for the project;
- Submit proposals to relevant funders - aim to submit a proposal to the EU Life Plus fund.

BCT reported that funding for the feasibility study has been secured from the governments of The Netherlands, Ireland, the United Kingdom and Estonia and also from the following NGOs: Bat Conservation Trust, United Kingdom; the Slovenian Association for Bat Research and Conservation; Bosnia Speleological Association; Wildlife Conservation Society MUSTELA, Serbia; and the Field Researcher's Union CAMPESTER, Georgia. Unfortunately, the funding offered to date was only half the amount required to carry out the full study. The group agreed to take forward the project on a six-month basis, subject to extension if further funds could be secured.

A Steering group was established to help oversee the feasibility project with the BCT. Membership includes: Dr. Stéphane Aulagnier (France), Dr. Jessamy Battersby (United Kingdom), Dr. Zoltán Bihari (Hungary), Ms. Amy Coyte (BCT, United Kingdom), Mr. Tony Hutson (IUCN/SSC), Dr. Katherine Jones (BCT, United Kingdom), Dr. Ferdia Marnell (Ireland), Ms. Abigel Szodoray-Paradi (Romanian Bat Protection Association).

The BCT will draw up a job description and advertise the post. The post will be based in a country suitable to the successful candidate.

The group discussed some of the details to be considered in the feasibility study, such as the existing tools for data management. Two potential systems were mentioned, the ibats interactive database and Recorder. ibats has the advantage of enabling project and volunteer management as well as data management. All agreed that it would be useful to have a tool to enable effective data management and that the project officer should consider existing tools as well as potential development of new ones. There was some discussion concerning data accessibility, sensitivity and appropriate use. There was a general feeling that each country should manage and verify their data, but contribute to the data pool for international population trends.

The possible effects of climate change on the use of hibernation sites by bats and the problems associated with monitoring underground sites to assess population trends were discussed. Consideration was given to developing other Pan-European level surveillance such as colony counts and car surveys, which might prove to be more robust in the long-term. All agreed it is useful to bear these in mind when looking at the framework for delivery but the feasibility study should concentrate on the underground surveys.

Monitoring distribution change was also discussed but all agreed that this was beyond the scope of the feasibility study.

A discussion on which species should be included in the survey took place.

All agreed all *Rhinolophus* species should be covered.

Species should be chosen on criteria such as:

- Traditionally use underground sites for roosting;
- Widespread to provide good sample sizes and Pan-European trends;
- Localised and less common species for regional trends and for use of the data for other purposes.

## Appendix III. Summary of country categories for monitoring

Only countries which expressed their commitment to participate in the project are listed.

### Category 1

**Monitoring programmes running. Usually long term funding of monitoring secured**

#### Austria

Established a monitoring scheme for hibernation and summer roosts over several years

The Austrian Coordination Centre for Bat Conservation and Research (KFFOE) is currently organizing bat conservation and monitoring in 8 out of the 9 provinces of Austria and is interested in participating at the project. Guido Reiter

The division of the country into provinces complicate the coordination. Most provinces finance the monitoring of roosts at the moment (for Art. 17 of the EU Habitat Directive). There is a need to agree with the provinces for a possibility to combine the monitoring they finance with the Pan-European project. The issues of money and data transfer have to be discussed with each of the 9 provinces.

BatLife Austria (already existing organization) may also be involved.

Costs of the project may be estimated later as the response was late.

In 2008 24 000 euro was available from within Austria.

#### Hungary

In Hungary the monitoring is carried out and has some but unsustainable financial base. Coordination body is the Nature Foundation, and about 10 other organisations are involved. There are 20 volunteers controlling 100 hibernation sites and 20 summer roosts.

The yearly costs were estimated at roughly 15 000 euro and the equipment costs at 15 000 euro total.

About 5 000 euro is available from Hungarian environmental ministry as cofinancing but not secured on the long term basis. The cofinancing do not take into account the in-kind contribution of volunteers work and per diem equivalent of the additional cost that the volunteer bears during their travel.

#### Ireland

Governmental institution National Parks and Wildlife Service coordinates the monitoring.

Cost estimation was not submitted yet.

#### Netherlands

In the Netherlands the leading bat research and conservation organisation is the VZZ (Dutch Mammal Society). VZZ runs the well developed monitoring programme supported by the Statistics Netherlands – with high profile statisticians available to design the research and interpret the results. Some other bat research is also carried by the VLEN (Vleermuiswerkgroep Nederland) and provincial workgroups.

The Netherlands role in the project would be in

adapting existing monitoring data to the agreed Pan-European format – by developing appropriate transcoding mechanism

the technical assistance and training for countries in need of capacity building

support in statistics to the international and national teams

Funding of the monitoring is secured - the project is fully funded by Ministry of Nature (partly because of Natura 2000 goal monitoring and WOT).

The data series date back more than 20 years.

#### Portugal

Instituto da Conservação da Natureza e da Biodiversidade (ICNB) coordinates the bat monitoring.

Portugal reported to be in CATEGORY 3, however the proposed scope assumes extension of the existing project by substantially large number of sites. Present monitoring includes 95 sites, and the assumption proposed 202 sites. The proposed site selection assumes that roosts with more than 10 specimens of the same species should be included.

The submitted cost estimation does not incur cost of adaptation to the pan-European formats.

## Switzerland

No information

## United Kingdom

The UK monitoring system NBMP is one of the most developed throughout Europe.

It is based on the centralised data base which provides data to national public data base. The NBMP administered by the Bat Conservation Trust (NGO) is funded by the Joint Nature Conservation Committee (statutory organisation) and is part of the [Tracking Mammals Partnership](#). The Hibernation survey provides data for at least 300 sites and 11 species (BCT web page: [http://www.bats.org.uk/pages/hibernation\\_survey\\_results\\_2007.html](http://www.bats.org.uk/pages/hibernation_survey_results_2007.html)).

UK role in the project would be in:

- providing data in an agreed format;
- sharing experience with other countries;
- intellectual contribution in project development and management; and
- technical support in statistics, data management, creation of reports.

The UK project iBats run in partnership between the BCT and London Zoological Society can provide IT tools for the data and project management by adaptation of the iBats Portal.

## Category 2

Intermediate. Able to provide data in the project period

### Croatia

Daniela Hamidovic representing Croatian Natural History Museum.

In Croatia, surveyors measure small colonies using photos and counting all noses visible, and large colonies by surface estimation.

### Estonia

There are at least two NGOs which could participate in the PEMBUS project: Sicista Development Centre and Estonian Fund for Nature. Tallin University might also wish to be involved. The State Nature Conservation Centre would be interested in the results, but does not have persons to carry out fieldwork on bats. The present national bat monitoring programme surveys 5 hibernation sites. It is supported/financed.

### France (1/2)

NGO: Comportement et Ecologie de la Faune Sauvage I.N.R.A. and Stephane Aulagnier will coordinate the project in France.

### Germany

NABU is the nation-wide conservation organization and is traditionally involved in bat research and conservation.

In Germany the decisions of administration of Lands are independent from the federal level. Some Lands support the research with the lump sum of 250 euro. NABU tries to encourage those Lands which do not support the monitoring yet, to apply the same method.

Germany assumes control of 100 sites most important for bats (related to Natura 2000). This approach may cause bias and affect sensitivity of the monitoring to detect changes starting at the smaller roosts.

Germany apply the TRIM method supported by the Statistics Netherlands for calculating and smoothing of the trends.

### San Marino

San Marino will participate in the project and perform full survey of the underground sites, thanks to its small size.

Dino Scaravelli, Centro Naturalistico Sanmarinese.

Cost estimation was not submitted.

### Latvia

Presently there are no appropriate bat NGO in Latvia. The research is coordinated among small informal group. The Latvian Fund for Nature performed some bat projects. Some of bat scientists work at Universities. Pan-European project may stimulate creation of a new NGO designated to bat work. The approach to the delivery is to work with a small group of people performing the monitoring at present, and extend the number of skilled bat workers by training. The survey protocols would include visual counts and use of automatic data logger based on the light barrier. The surveyors would work in two person teams, surveying the 130 sites in ca. 60 man-days i.e. ca. 4 sites per day per team on the average. The work of a person-day was priced at 35 euro. The training in field research – bat determination would be carried twice a year for the groups of 20-30 people.

## **Lithuania**

Only University, no NGO

## **Luxembourg**

The (informal) bat group consists of members of the Museum of Natural History and the Forestry Department / Ministry of Environment. The persons involved in winter monitoring are mainly Jacques Pir and Christine Harbusch.

The feedback concerning work plan and costs will be given at the EBRs.

## **Norway**

Winter surveys in abandoned mines have been carried out annually since 1991/92 in January/February. A limited number of such localities - those that were found to be of most importance to bats - have been monitored every year since 1995/96.

The project is also part of the Norwegian follow-up of obligations under the EUROBATS agreement, and the Directorate for Nature Management supports the activities financially.

The Bat Group of the Norwegian Zoological Society (NZF) is ready to participate in the Pan-European Monitoring of underground sites for bats.

The NZF Bat group was established in 1991. It is a small, informal group, bringing together individuals that have an interest in bats and are willing to participate in surveys. Most affiliates live in Southeast Norway.

## **Poland**

Partner: PON (Porozumienie dla Ochrony Nietoperzy) [The Bat Conservation Agreement] may be represented by one of its members. Split regional representation by different members is also possible. Presently the PTPP "pro Natura" is ready for the coordinating role, other organizations have interest in the project and in the survey in their region. Rafał Szkudlarek (RS).

The existing monitoring is restricted to field surveys and irregular publication of usually unprocessed data. Nationally agreed protocols and continuity of site control are applied but there is no strict regime in place.

Number of sites surveyed each year varies and in some years reached 900-1200. No central data base of sites exists. Number of bats present exceeds 100 in 74 sites (EUROBATS 2007). It is estimated that 300 hibernation sites and all 3 known underground maternity roosts can be surveyed annually.

The proposed approach to delivery of survey data:

altogether 6 persons in six centers as regional coordinators (with one central coordinator from among them) share the work by regions

project to cover cost of equipping 6 centers with field survey equipment for their teams. The team members may change or there may be more teams working in parallel but to reduce commuting, the regions should be serviced by the nearest bat centre.

survey costs would be reimbursed by the flat rate calculated from: average travel and subsistence costs, work of team leader (licensed bat worker) at the lowest rate applied in such work i.e. 12 euro per hour including taxes and dues. The other 1-2 persons in a team does not need to be licensed and may work as volunteers.

on the average 2 sites will be surveyed per day, and 6 teams need 25 days to survey 300 sites which fits within the survey period in winter

Voluntary licensing system has been implemented by the NGO members of PON, permits for catching/handling or disturbance and for entering the protected areas is required by law. Enforcement is

improving but is not satisfactory, the bat research is under control but there is no control of incidental visitors not related to bats (tourists, treasure hunters, etc).

Training needs were defined as:

Field protocols and data protocols for field workers and regional coordinators, statistics for regional coordinators

Training for staff of landscape and national parks and providers of tourism services carried out in important bat roosts

Conference for the public administration and scientists - dissemination of results

Some of the sessions may be combined with gathering of bat workers at the annual National chiropterological conferences to reduce the costs – workshops on field protocols and presentation of the results. Regular meetings of the conservation officials may be attended to present the project and its results.

RS proposed that a film concerning importance of the underground sites by bats and explaining the need for their protection and monitoring should be made and the shots should come from different parts of Europe.

### **Romania (2/3)**

Romania has well developed car survey monitoring. Situation in the underground sites research is less developed.

Romanian Bat Protection Association (Asociatia pentru Protectia Liliacilor din România) – Abigel Szodoray-Paradi estimated minimal number of sites for monitoring at 60 hibernation and 60 summer roosts.

### **Slovakia (1/2)**

Marcel Uhrin and Martin Celuch both represent the Spoločnosť pre ochranu netopierov na Slovensku (Slovak Bat Conservation Society)

There is no national monitoring programme officially organized, but there is traditional winter bat census run for the long-term period.

The need is mainly for financial support; all monitoring activities are conducted within budgets of state organizations (e.g. State Nature Conservancy (SNC), research institutions or universities; always insufficient) or members of the SBCS voluntary.

### **Ukraine (2/3)**

There are two centres in Ukraine interested in the coordination of the monitoring in the whole Ukraine (Lena Godlevska - Schmalhausen Institute of Zoology of National Academy of Sciences of Ukraine IN Kyiv) and in the western part of Ukraine, which includes Lviv, Ivano-Frankivsk, Chernivtsi, Ternopil, Khmelnytsky, Rivne and Zakarpattia regions (Andriy-Taras Bashta - Bat Research and Protection Group).

LG is involved in cooperation with the Ministry of Environment and EUROBATS (since 2005).

There is no cooperation between the two centers so there is a danger of some overlapping.

Data concerning scope of work and its cost covers only Western Ukraine (provided by ATB).

Only underground sites with at least 20 inds. of bats were selected for the monitoring list which probably still can be changed if required from the statistics point of view.

For observation of bats licenses are not required (as far as ATB knows). In nature protected areas (NPA), permits from their administration is required unless staff of NPAs is part of the monitoring team. Field teams of 3-4 persons + staff of NPA or speleologist or local scientist. It is expected that 26-29 persons will participate in the monitoring and the institution list is quite long: Bat Research and Protection Group, Institute of Ecology of the Carpathians, Lviv National University, State Museum of Nature History, NP "Skolivski Beskydy", Speleological Club "Ciclop", Galytsky NP, Uzhgorod state university, Uzhgorod adventure club "Lynx", Carpathian Biosphere Reserve, Uzhansky NP, Chernivtsi state university, Chernivtsi nature museum, Vyzhnytsky NP, NP "Podilski Tovtry", Kamianets-Podilsky State University.

## **Category 3**

## **Least advanced**

### **Cyprus**

The situation in Cyprus is very complicated due to political problems. There is little expertise in the bat research. Animal Responsibility (Kivotos) NGO takes the leading role. The British Bases have experienced staff but also limited in number – Ian Davidson-Watts.

The main need is in capacity building, in particular training of the field workers. The starting point for the monitoring would be all of the 4 known fruit bat roosts and 7 other sites.

Training should be provided to the staff of institutions related to the biological research like the Game Fund staff or forestry guides.

### **Georgia?**

The NGO – Field Researchers' Union CAMPESTER takes leading role in the bat monitoring in Georgia and in Caucasus.

Through the CAMPETSER's effort the Bats Monitoring Regional Network was created for the Caucasus in 2007. In the period of 2006-2008, CAMPESTER implemented the project - Development and Capacity Building of transboundary Bats Monitoring Network in the Caucasus. The partners to this project were Centre for Biological Diversity (Azerbaijan), Union of Armenian Nature Protectors (Armenia) and Institute of Mountain Ecology of the Kabardino-Balkarian Scientific Centre of Academy of Sciences of Russia.

Within the project above, over 90 field trips were performed in all four countries; 234 points were observed: 33 in Azerbaijan, 49 in Armenia, 62 in Georgia and 90 in Russia. Out of 35 bat species existing in Caucasus, 19 were registered in Azerbaijan, 17 in Armenia, 23 in Georgia and 22 in Georgia. Main obstacle in implementing the monitoring is lack of financial resources.

### **Italy**

The Italian bat research is coordinated by the GIRC (Gruppo ...) which is ready to become the partner for the Pan-European project. Dino Scaravelli who is a member of GIRC but lives in and represents Republic of San Marino will cooperate in Italy as well. There was also access from Edoardo Vernier for coordination in NE Italy, with no cooperation with the GIRC.

Italy considered itself a country with no monitoring in place (CATEGORY 3), while there is a lot of field research going on. There is no any monitoring programme ongoing but the capacity is not insufficient. For the purpose of the project GIRC plans to survey 30 sites at the beginning and increase the number to 100 in later years.

Italy sees a need for trainings, which should be distributed over the country – in the North, Middle and South.

### **Macedonia**

The Bat Study Group (BSG) of Macedonia is the only Macedonian NGO dealing with bats. Number of bat workers is very limited, with one professor and small number of students with different level of expertise.

Macedonia indicated that it needs some training, however this was not reflected in the proposed budget.

### **Malta**

The Malta Bat Conservation Society in cooperation (unconfirmed) with Natural History Museum and MEPA(?).

Basically there are two skilful bat workers in Malta.

The monitoring that is possible to implement at this stage will require no coordination cost. Only 8 colonies will be monitored – 3 hibernation and 5 summer roosts. Due to a small size of the country the individual costs of the survey are minimal.

There may be need for training in protocols, and some equipment (not specified). Capacity building may require some support in developing project management skills.

### **Russian Federation**

No information

## Appendix IV. Information from the European Environment Agency project – developing bats as a European Indicator.

Country	EXISTING MONITORING SCHEMES						
	Abundance/ Population trends	Distribution	Annual?	Duration (years)	Data available?	Publications	Number of species monitored
Austria	x		x	10			18
Azerbaijan	x	x	x			x	25
Belgium	x	x	x	18			
Bulgaria	x	x	x	1	x	x	9 planned
Croatia	x		x	10			30
Czech Republic	x		x	39			23
Estonia	x		x			x	12
France	x	x	x	x			>6
Hungary	x	x	x	>20		planned	17
Ireland	x	x	x	<5	x		6 (1 underground)
Italy	x	x	x	10		x	7-10 regionally
Latvia	x		x	16			9+4 regionally
Netherlands	x	x	x	22		x	10
Poland	x	x	x	20	x	x	21
Portugal	x	x	x	21		x	24
Romania	x	x	x		x		15+15 regionally
Russian Federation	x	x	x	10	x		0+17 locally
Slovak Republic	x		x		x	x	7+3 locally
Sweden		x					
Switzerland	x		x	>10	x		6
Ukraine	x	x	x		x	x	23
UK	x	x	x	10	x	x	12

Table 1. Present status of the bat monitoring schemes in Europe (after Haysom 2008).  
 In case of more different monitoring projects in a country most advanced data provided (for instance longest series);  
 Abundance/population trends and Distribution – type of data collected in monitoring programmes;  
 Availability of data means existence of a data base or other data source not necessarily public availability;  
 Blank spaces – no scheme or no data.

## Appendix V. Scope of the data to collect for the purpose of the Pan-European project

DATA CATEGORY	JUSTIFICATION	DATA	obligatory?	DETAILS
Roost identification	may help identify the site, may be useful for instance when change of surveyor occurs and no continuity is assured for any reason	<b>site ID</b>	y	basically in computer systems numbers are better IDs than names or mixed character symbols, the ID should be constructed in a way excluding double use, May start with the code of the country (for instance codes used as in telephone system though they are of different length 2-3 digits or even better in public statistic offices) Ideally put together by the computer, the European ID may differ from those used locally but must be possible to trace (dictionary/ies)
		Name	y	<b>name of the site in local language</b> , optionally supported with translated English name, aliases as the place may be known under different names, symbols etc. Historically the name may change.
		Location	y	<b>Country, region</b> , etc. These may be also coded with symbols used for NUTS units (but are they in use outside EU?). The different countries use different systems of addressing, also, some information must be related to the physical features of the area (a mountain or valley) rather than to neighbouring town. This means that the system should allow for different entries, and may require several fields. Another option is to appoint one field "address/location" and allow any text, different elements separated by commas. This other solution is not recommended - it would not support the user typing the data in nor would the query for data according to geographical regions be easy
		Geographical coordinates	y	the <b>coordinates</b> from maps and <b>GPS reading</b> as separate fields; these should be the coordinates of the (main) entrance to the site, however in case of many entrances indication of the proper one may be needed. Here maps, photos and sketches may be helpful.
		access (hints of how to get to the site)	n	This information may be useful in case of replacement of the surveyor or when the objects are clustered and the identification may be not that obvious.
		remarks	n	an additional field for information which helps in identification of the roost but does not fit into other categories,
Bat data	basic data	Bat species and numbers	y	<b>bat species ID, scientific name</b> , aliases (names in national language, individual codes of the user, ...) Bat numbers may be exact and then there is no problem or may be estimates like "circa" or "between min and max", etc. The system should be able to deal with this situations.

DATA CATEGORY	JUSTIFICATION	DATA	obligatory?	DETAILS
		Unidentified species	n	In case of some species the determination is extremely difficult and then the information is given as optional - classic example of <i>M.mystacinus/brandtii</i> , but also the <i>Plecotus</i> species may be difficult to determine from a distance. In fact some bats may not be possible to determine to the species or even genus if for instance hidden in crevices. This means that the list of species should also consider such situations. Those more popular may be included on the list, but open entries should be allowed
		Method of determination of species (when justified)	y/n	In large mixed colonies with densely packed clusters it may be impossible to determine the individuals. In such cases methods requiring handling of bats are sometimes applied. The species identification may be made at the level of individual bats or as a percentage of the colony, based on mist netting. Field obligatory when the determination method not obvious.
		remarks		
Site conditions	may be a factor in changes though difficult to analyse at his level of generalisation	Temparature	n	The three fields considered important environmental factors, however there are doubts whether reliable results may be obtained with the mass programme. VZZ research, with long data series and large sample size did not show any relation between this factors and numbers of bats. It seems that these parameters influence choice of location inside the roost rather than the selection between sites.
		Humidity	n	Also it was noted that the volunteers may be reluctant to make additional effort, and that it would demand large amount of equipment
		Air flow (optional)	n	
		Water level	n	Water level may affect the microhabitat conditions and availability of the roost. For the latter important is rather amount of space left above water than the actual depth of water. However again detailed study would need to be carried out in every individual site. It is recommended to note down all the extraordinary situations.
		Threats detected	y	There will be a closed list of typical situations. The threat categories will be agreed.
		Other - descriptive		Any situation that is beyond typical threats or when there is additional data should be described. This description may be useful for revision of the threat list.
		remarks		
Roost description	may be a factor in changes	Type of roost (cave, cellar, ...)	y	List of typical roosts - open for appending new categories
		Size of roost	y	up to five categories of size, qualitative data may include length from the entrabce to deepest point, total length of the system etc.
		Descriptive	n	Any information about the roost considered important -

DATA CATEGORY	JUSTIFICATION	DATA	obligatory?	DETAILS
Graphic data	may help identify the site,	Photographs, Maps, Sketches etc.	n	In case of a cluster of objects it may be helpful to identify the roost. Photographs may provide information about the site condition for comparisons between years.
		Remarks	n	
Field control	may affect results of the count	Date(s) of the control	y	Date and time of the survey
		Weather conditions	n	These may be obtained remotely from weather stations, temperature, wind, rainfall etc. should be noted down
		Method (field protocol) applied	y	Usually it will be choice form existing standard methods, however any differences should be registered, under "remarks"
		Remarks	n	
Observer	may affect results of the count, helps identify the source	Names of the data providers – indicate person responsible for field data quality	y	at least the person who determined the bats should be recorded, there should be a space for more than one person
		Address (including telephone/e-mail, skype etc.)	y	this may be useful in case of need for clarifications, lost contact with intermedate (coordinator) etc., address data should be stored in the data base linked via person's ID
		License	y	if license/permit was required to collect data in the field, some details should be given (license number, date of permit, issued by whom) etc.
		Observer_ID		in case of once registered observers, they receive ID to simplify the date input
		Remarks		Any information related to the observer, which may be considered important.
Data management	data provider may have general rights to use data of direct surveyors or other providers, helps to check the quality when doubts	Quality control – by whom		Name of the data provider - may be institution or individual person - a data base to select from a drop-down list
		Typed in – by whom		Name of a person who read data into the computer, for tracing errors, etc.
		remarks		