EUROBATS

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Guidelines for the implementation of Resolution No. 4 adopted by the 2nd Session of the Meeting of Parties

Transboundary programme - habitats: Data Compilation

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1. What is an underground habitat?

Because bats have adapted to using a variety of man-made structures as 'artificial caves' the term 'underground habitat' should be interpreted widely to include any underground (or mainly underground) structures which fulfil the function of a natural cave in the lives of bats. Such places should have many of the characteristics of an underground climate: absence of light and photoperiod, moderate annual temperature range and high humidity.

This definition would include, for example:
Natural caves and rock crevices
Mines, galleries and other underground workings
Tunnels (road, rail, service, canal etc), particularly when these are disused
Underground fortifications of all types
Cellars, ice-houses and other structures associated with buildings.

Some classifications have been proposed for types of underground site. Masing (1990), for example, proposed a system that differentiated sites on accessibility to humans and whether the sites had an artificial lining. However, any such hierarchical classifications suffer from difficulties when attempting to classify sites with a mixed origin, such as natural caves that have been modified by mining. Instead, we proposed that sites are initially allotted to one (or more) of the following categories:

Natural caves and rock crevices (that have not been extensively modified by man)
Mines of all types
Tunnels (road, rail, canal, water)
Fortifications (bunkers, forts, turrets etc)

Cellars, ice houses, ventilation shafts
Industrial buildings (lime-kilns etc)
Wells
Other (include short description)

Sites can also be classified according to the main season of use by bats or by the use bats make of them. In general, the latter classification is probably more useful as it relates to the biological requirement: A suitable classification, based on the **main** use of the site is:

Maternity site
Hibernation site
All-year site
Transient site

This classification may depend on the species of bat. For example, a site may function as a maternity site for one species but a hibernation site for another species. In this case, the site would be classified as an all-year site in a multi-species list but as a maternity site when classifying sites for the first species. Bats also use underground habitats for other reasons (night-roosts, swarming sites, mating roosts), but sites are unlikely to be nationally important for these reasons alone.

Within these definitions, there are also differing interpretations of the concept of a site. In some cases a site can be taken to be a single tunnel, cave or mine, in other cases a group of closely related underground features may be considered as a single site. We propose that, at the first stage, the question of what constitutes a site is left to the national authorities, who are best placed to make this judgement.

2 Criteria for identifying underground habitats of European importance

The national conservation importance of sites has been assessed on two basic criteria:

Species present (or number of species present)
Number of bats

In the majority of situations, the two criteria are used together so that both the species and number of bats are used together in selecting sites of national importance. These two criteria have been applied in various ways across Europe and several national classification schemes have been developed.

2.1 Species richness schemes

Species richness schemes have been applied to sites used by multiple species. These take into consideration both the number of bats using the site and the number of species recorded there (both recorded in a variety of ways).

A simple unweighted system (Masing, 1998) has used the number of bats multiplied by the number of species to rank hibernation sites in Estonia at a national level. The same system could also be used to rank underground habitats used as maternity sites in southern Europe. Identifying sites of national importance then requires the application of a threshold point to the ordered list.

An alternative method of classifying multi-species sites has been to set thresholds for the number of species and/or the number of individuals. For example, in the UK sites containing either:

4 or more species and 50 or more individuals,
3 or more species and 100 or more individuals,
2 or more species and 150 or more individuals,

have been identified as nationally important (Nature Conservancy Council, 1989) (see Appendix 1). A very similar scheme has been applied in Portugal (Palmeirim & Rodrigues, 1993), where the IUCN conservation status of the species was also taken into account. Clearly, the application of such a system requires some prior knowledge of the species and numbers of bats found in underground habitats in the territory and implies that some assessment of the number of sites likely to qualify has been done.

For this project, where there is little prior knowledge of the number of sites across Europe, we propose collecting information about species and numbers in a selection of the best sites in each country and then testing a simple scoring system to rank sites at the European scale. The proposed scoring (Table 1) is based on the Eurobats priority list and conservation status from the draft European Red Data Book for Vertebrates (ERDB) (Council of Europe, 1997). Species which are Eurobats priority or considered VU in the ERDB score 4 points, species which are LRnt score 2 points (with *Myotis blythii* included as it is difficult to separate from *M. myotis)*, the remaining species score 1 point. The only exception seems to be *Barbastella leucomelas*, which should, perhaps, be a Eurobats priority species. This scoring system could also be used in the initial selection of sites for each country, though we recognise that a final decision about the application of a scoring system cannot be made until it can be tested on some data.

Table 1.				
Scientific name	**Eurobats priority**	**ERDB Status**	**Dependence on underground habitats**	**Proposed score**
Rhinolophus blasii		VU	H	4
Rhinolophus euryale	Y	VU	H	4
Rhinolophus ferrumequinum	Y	VU	H	4
Rhinolophus hipposideros	Y	VU	H	4
Rhinolophus mehelyi	Y	VU	H	4
Myotis bechsteinii	Y	VU	M	4
Myotis blythii			H	2
Myotis brandtii			M	1
Myotis capaccinii	Y	VU	H	4
Myotis dasycneme	Y	VU	M	4
Myotis daubentonii			M	1
Myotis emarginatus	Y	VU	H	4
Myotis myotis		LRnt	H	2
Myotis mystacinus			M	1
Myotis nattereri			M	1
Myotis schaubi			M	1
Pipistrellus kuhlii			L	1
Pipistrellus nathusii	Y		L	1
Pipistrellus pipistrellus			L	1
Pipistrellus savii			L	1
Nyctalus lasiopterus	Y	LRnt	L	4
Nyctalus leisleri			L	1
Nyctalus noctula			L	1
Eptesicus bottae		LRnt	L	1
Eptesicus nilssonii			L	1
Eptesicus serotinus			L	1
Vespertilio murinus			L	1
Barbastella barbastellus	Y	VU	M	4
Barbastella leucomelas		VU	M	1
Plecotus auritus			L	1
Plecotus austriacus			L	1
Miniopterus schreibersii	Y	VU	H	4
Tadarida teniotis	Y		L	4
Otonycteris hemprichii			L	1

When applying scoring systems of this type, data may be selected in two ways:

1 The score may be applied to the highest count of each species separately within the agreed time-frame (20 years). The maximum count of each species may have been made at a different time during this period.

2 The maximum combined count within the agreed time-frame may be taken and the scoring applied to each species contributing to this total.

For this project, we will apply method 1, as this may give a more accurate picture of the number of each species that use the site.

2.2 Single species schemes

Single species schemes have generally been applied to a subset of species that are considered to be of particularly high conservation value. These may be species that are rare in the territory and/or for which there is an international obligation to identify and protect sites (eg EU Habitats Directive Annex II). Ranking underground habitats for single species has been applied in two ways. For species of particularly high conservation value (most commonly *Rhinolophus* species) the whole resource may be considered to be of national significance. For example, in Portugal all breeding roosts of *Rhinolophus* species are considered to be nationally important (Palmeirim & Rodrigues, 1993). Where the number of sites used by the species is large, either ranking or threshold systems have been applied to select a subset of sites as nationally important. For example, in the UK a threshold system was used to identify nationally important hibernation sites for lesser horseshoe bats (*R. hipposideros*) by selecting all sites containing 50 or more bats (Nature Conservancy Council, 1989) (see Appendix 2).

3 Selecting the most important sites

As described above, the most important underground habitats in a territory may include single-species and multi-species sites, both of which make an important contribution to bat conservation. A project to identify the most important sites at both a national and European scale should thus allow for the inclusion of both types of site, though in many cases it is likely that many of the sites that are important for single species will also be important for multiple species.

For the purposes of the Eurobats project, single species sites should initially be identified for those species which have been agreed as a priority. These are: *Rhinolophus euryale, R. ferrumequinum, R. hipposideros, R. mehelyi, Myotis bechsteinii, M. capaccinii, M. emarginatus, M. dasycneme, Nyctalus lasiopterus, Pipistrellus nathusii, Barbastella barbastellus, Miniopterus schreibersii, Tadarida teniotis.*

4 Data requirements and use

Data about species and numbers in underground habitats have been collected by researchers in a variety of formats and at varying intervals. For some sites (rather few) long data series are available over periods of many years, but for the majority of sites

data are fragmented and incomplete, consisting of perhaps only a few observations. If the selection of important sites is limited to only those with long runs of data it seems certain that many sites, perhaps even some of the most important, would be excluded from consideration. This suggests that ranking or selecting sites should use as much of the available information as possible and that very simple measures of value should be used. We propose, therefore, that the maximum number of individuals counted at the site within the previous 20 years is used. This simple measure has the advantage of including all sites and does not require any complex assessment of numbers. It does not, however, take into account any possible declines in numbers that may have occurred in the 20-year period and we leave it to individual countries to modify their selection if adequate data on declines are available.

5 How many sites in each country?

Bats are unevenly distributed across Europe, so that a site considered nationally important by one country may be considered of only local importance in another. If all sites were ranked only at the European scale, the result would be a list of sites heavily biased towards those countries that still have the richest bat populations. Such an outcome would ignore the objective of maintaining the geographic range of species and the contribution of bats to biodiversity in each country. This would probably also exclude sites in areas where the conservation of underground sites is most urgent and the decline in bat populations has been greatest. We propose, therefore, that each country should first identify its most important underground habitats for bats and submit this list for further consideration and possible inclusion in a European list. This process is similar to the one being carried out by the EU to identify Natura 2000 sites and the Bern Convention Emerald Network proposals and we would expect many of the same sites to be selected.

Setting the number of sites for each country presents a particular challenge. A mechanistic approach could be adopted, for example identifying the 10 best sites in each category (single species, species assemblage), or the judgement about how many sites to include in the initial list could be left to each country. As there are currently few sources of information about the relative numbers of underground habitats known in each country, we suggest that it would be valuable at this stage for countries to submit more extensive lists for discussion. This would allow the development of an overview of the state of knowledge of underground sites in Europe and allow broad comparisons to be made on biogeographic grounds.

6 The next steps

In order to make progress, data are now required from each Party or Range State wishing to participate. For the initial stage, sites for inclusion in the draft lists should be selected at the national level.

6.1 Multi-species sites

Multi-species sites should be selected according to the following criteria.

Sites which are considered to be nationally-important for their bat species assemblages.

The following data are required for each site:

Name of site (or code number if the national authority considers the name to be confidential)

Location (latitude, longitude)

Type of site (cave, mine etc.)

Use by bats (all-year, maternity, hibernation, transient)

Number of species recorded since 1980

Maximum total number of bats recorded on a single survey since 1980

Maximum number of each species recorded since 1980

Whether site is protected with a grille or other means of preventing unauthorised entry

Threats to the site

6.2 Single species sites

Single species sites should be selected according to the following criteria:

Sites for Habitats and Species Directive Annex II species (Natura 2000 sites) should all be included.

Sites considered to be nationally-important for the following species: *Rhinolophus euryale, R. ferrumequinum, R. hipposideros, R. mehelyi, Myotis bechsteinii, M. capaccinii, M. emarginatus, M. dasycneme, Nyctalus lasiopterus, Pipistrellus nathusii, Barbastella barbastellus, Miniopterus schreibersii, Tadarida teniotis.*

The following data are required for each site:

Species

Name of site (or code number if the national authority considers the name to be confidential)

Location (latitude, longitude)

Type of site (cave, mine etc.)

Use by bats (all-year, maternity, hibernation, transient)

Maximum number of individuals of the species recorded on a single visit since 1980

Whether site is protected with a grille or other means of preventing unauthorised entry

Threats to the site

7 References

Council of Europe (1997) Red Data Book of European Vertebrates. T-PVS (97) 61. 153 pp.

Masing, M. (1990). Caves of Estonia - unique places of mass-hibernation of bats. Tallinn, 83pp. (in Russian).

Masing, M. (1998). A method for estimating the value of bat roosts. Myotis **36**: 37-40.

Nature Conservancy Council (1989) Guidelines for the selection of biological SSSIs. NCC, Peterborough, 288 pp.

Palmeirim, J. M. & Rodrigues, L. (1993) *Critérios para a identifição de areas naturais importantes (ANI's) em Portugal Continental - Morcegos*. Pp 52-57 in LPN (ed) *Critérios para a identifição de areas naturais importantes (ANI's) em Portugal Continental - Morcegos*. Lisboa.

Appendix 1. Example: selection of multi-species sites for the UK

Site name	Lat	Long	Site type	Usage	Species recorded	Max count since 1980
Chilmark Stone Quarry	51.095	N 2.028 W	Mine	Hibernation	12	641
Beer Stone Quarries	50.698	N 3.111 W	Mine	Hibernation	11	109
Westbury Brook Ironstone Mine	51.846	N 2.489 W	Mine	Hibernation	8	196
West Llangynog Slate Mine	52.820	N 3.412 W	Mine	Hibernation	8	85
Agen Allwedd	51.829	N 3.179 W	Cave	Hibernation	7	303
Pixies Hole, Chudleigh	50.596	N 3.603 W	Cave	Hibernation	7	183
West Dean Tunnel	50.905	N 0.781 W	Tunnel	Hibernation	7	80
Westerham Mines	51.254	N 0.082 E	Mine	Hibernation	7	52
Singleton Tunnel	50.925	N 0.759 W	Tunnel	Hibernation	6	237
Garth-Eryr Mine	52.803	N 3.238 W	Mine	Hibernation	6	200
Westhumble Chalk Mine	51.256	N 0.346 W	Mine	Hibernation	6	85
Box Mine	51.416	N 2.244 W	Mine	Hibernation	5	255
Alltymain	52.726	N 3.227 W	Mine	Hibernation	5	241
Wigpool Iron Mine	51.872	N 2.498 W	Mine	Hibernation	5	130
Brown's Folly Mine	51.394	N 2.296 W	Mine	Hibernation	5	130
Winsley Sewage Works	51.344	N 2.295 W	Mine	Hibernation	5	101
Combe Mine, Bradford	51.355	N 2.247 W	Mine	Hibernation	5	84
Carew Castle	51.707	N 4.828 W	Fortification	Hibernation	5	70
Rock House Cave	50.486	N 3.772 W	Cave	Hibernation	4	435
Old Bow	51.777	N 2.610 W	Mine	Hibernation	4	237
Doune Castle	56.185	N 4.097 W	Fortification	Hibernation	4	200
The Glen	52.247	N 0.730 E	Mine	Hibernation	4	131
Colwall Tunnel	52.035	N 2.348 W	Tunnel	Hibernation	4	122
Boulton's Rift	50.597	N 3.603 W	Cave	Hibernation	4	100
Buckshaft Ironstone Mine	51.806	N 2.500 W	Mine	Hibernation	4	89
Hangmans Wood Deneholes	51.489	N 0.349 E	Mine	Hibernation	4	85
The Cavern, Berry Head	50.399	N 3.490 W	Cave	Hibernation	4	76
Shaft Mine	51.357	N 2.334 W	Mine	Hibernation	4	60
Ogof Cynnes	51.830	N 3.248 W	Cave	Hibernation	4	50
Carisbrooke Castle	50.687	N 1.310 W	Fortification	Hibernation	4	50
Greywell Tunnel	51.256	N 0.970 W	Tunnel	Hibernation	3	555
Little Blakenham Pits	52.095	N 1.095 E	Mine	Hibernation	3	370
Horringer Court Caves	52.232	N 0.690 E	Mine	Hibernation	3	361
Bulkamore Iron Mine	50.453	N 3.762 W	Mine	Hibernation	3	223
Penygarnedd Phosphate Mine	52.803	N 3.321 W	Mine	Hibernation	3	145
Reed's Cave	50.484	N 3.772 W	Cave	Hibernation	2	224
Rift Cave	50.483	N 3.771 W	Cave	Hibernation	2	160
Downton Castle	52.365	N 2.812 W	Fortification	Hibernation	2	150

Appendix 2. Example: selection of *Rhinolophus hipposideros* sites for the UK

Site name	Lat	Long	Site type	Usage	Max count since 1980
Buckland Ice House	51.884 N	3.259 W	Ice-house	All year	393
Agen Allwedd	51.829 N	3.179 W	Cave	Hibernation	303
Alltymain	52.726 N	3.227 W	Mine	Hibernation	239
Old Bow	51.777 N	2.610 W	Mine	Hibernation	232
Garth-Eryr Mine	52.803 N	3.238 W	Mine	Hibernation	200
Westbury Brook Ironstone Mine	51.846 N	2.489 W	Mine	Hibernation	189
Downton Castle	52.365 N	2.812 W	Fortification	All year	150
Penygarnedd Phosphate Mine	52.803 N	3.321 W	Mine	Hibernation	144
Cave near Black Rock	50.552 N	3.880 W	Cave	All year	135
Wigpool Iron Mine	51.872 N	2.498 W	Mine	Hibernation	122
Colwall Tunnel	52..35 N	2.348 W	Tunnel	Hibernation	122
Castell Cawr Caves	53.275 N	3.597 W	Cave	Hibernation	95
Chilmark Stone Quarry	51.095 N	2.028 W	Mine	Hibernation	93
Swan Hill Mine	52.802 N	3.055 W	Mine	Hibernation	93
West Llangynog Slate Mine	52.820 N	3.412 W	Mine	Hibernation	83
Coed y Cerrig Caves	51.889 N	3..87 W	Cave	Hibernation	80
Quarry Hill Shaft	51.750 N	1.859 W	Mine	Hibernation	75
Beer Stone Quarries	50.698 N	3.111 W	Mine	Hibernation	72
Talyllyn Tunnel	51.939 N	3.307 W	Tunnel	Hibernation	61
Cae Gwyn	53.240 N	3.371 W	Cave	Hibernation	59
Pencelli Limekiln	51.919 N	3.320 W	Kiln	Hibernation	58
Llanfrynach Sluice	51.921 N	3.351 W	Tunnel	Hibernation	58