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Proposal for discussion in the meeting of the IWG on Protection of Overground Roosts

Recognizing the benefits of listing the important underground roosts: national conservation issues and information on roosting behaviour of cave-dwelling species over Europe (all over the year), a working group convened at AC21 proposed to further discuss the criteria to identify what are important overground roosts which can shelter different species than underground roosts. This paper based on the work of Tony Mitchell Jones for underground roost IWG was prepared to support this discussion.

European importance of overground roosts

"As their metabolic and social requirements vary throughout the year, most bats will use a variety of roosts of different types. Some species are particularly closely associated with tree roosts, but the majority use a range of roosts, which includes trees, buildings and underground sites.

Man-made structures regularly used by bats across Europe include bridges, castles, churches, houses, blocks of flats, barns and stables. Some species have come to rely on such structures, e.g. *Eptesicus* and *Pipistrellus* species usually roost in buildings; *Myotis daubentonii* is, in some countries, particularly associated with bridges and will form roosts in suitable cracks in both old and new structures; *Myotis myotis* can be found roosting in churches over much of its range in the northern part of Europe, while *Plecotus* species have come to rely more and more on man-made roost sites in some countries due to the successive loss of suitable natural habitat.

Bats can be found in buildings all year round. In late spring, maternity roosts are formed in the roofs of buildings to take advantage of the heat provided by the sun, as during this phase of their life-cycle breeding females are seeking warm areas to

minimise the energy cost of maintaining a high body temperature. Some species, such as *Pipistrellus* spp. show a clear preference for confined roost sites, such as soffit boxes, eaves or under hanging tiles, whereas others, such as the *Rhinolophus* spp. are more typically associated with open roof voids that they can fly in. There are many exceptions and many species have been recorded from a wide variety of situations. In winter, bats of most species have been recorded hibernating in various parts of buildings, such as inside cavity walls, around window frames, under ridge tiles and in cooler areas with stable temperatures such as cellars and basements. These latter are covered by the Eurobats report on underground roosts and are not considered further here." (Marnell & Presetnik 2010 *Eurobats Publication Series* n°4)

What is an overground habitat?

The former IWG on bats in overground roosts identified six main types: churches, castles/fortifications, houses/blocks of flats, barns/stables, bridges and trees, and ranked the dependence of bat species to each type (table 1). The percentage of bat species dependant on roosts in trees is underestimated, as in many countries roosts of tree dwelling bats are unknown.

Usage of overground sites

Sites can 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, swarming site, transient site (a transient site is one that is used only for passage and not one occupied by individuals which are still in their hibernation or their nursery roost). This classification may depend on the species of bat.

Criteria for identifying overground habitats of European importance

The most important overground habitats in a territory may include single-species and multi-species sites, both of which make an important contribution to bat conservation. The national conservation importance of underground sites has been assessed on two basic criteria: Species present (or number of species present) and Number of bats. In the majority of situations, the two criteria can be 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.

1. Species richness schemes

Species richness schemes may be 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 - A **simple unweighted scheme** can be used by multiplying the number of bats by the number of species (excluding species which are “rare” - less than 10 individuals).

b - A **simple weighted scheme** can be derived from the former by weighing the species (see §3).

c - A **threshold unweighted scheme** for the number of species and/or the number of individuals can be an alternative method. For example, 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.

d - A **threshold weighted scheme** can be derived as in scheme b.

2. Single species schemes

Overground roosts are often occupied by single species. A threshold scheme based on the number of bats using the site can be weighed for species that are considered to be of particularly high conservation value.

3. Weighting of the species

The IUCN European red list can be a basis for weighing the species. It changes very rarely. We must also recognise that Habitats Directive has identified some species in Annex II as a conservation priority, so this should be taken into account in counting of weight of the species. The dependence to overground roosts can be a relevant third criterium. Table 2 summarizes these three criteria.

4. Geographical variations

Bats are unevenly distributed across Europe, so there may be species that are rare in a country and/or for which there is an international obligation to identify and protect sites (e.g. EU Habitats Directive Annex II). 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. Then threshold schemes can be adapted in order to provide a list of the main sites for each species highly dependent of overground roosts.

Setting the number of sites for each country presents a particular challenge. Where the number of sites used by the species is large, either ranking or threshold systems should be applied to select a subset of sites as nationally important (rising up the threshold).

5. Data collecting

Data about species and numbers in overground 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 10 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 10-year period and we leave it to individual countries to modify their selection if adequate data on declines are available.

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

6. Implementation

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. 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.

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 (10 last years). The maximum count of each species may have been made at a different time during this period, but the importance of the site remained, except when environmental conditions were drastically modified in the recent years.

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

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

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 (church, castle/fortification, etc.)
- Use by bats (all-year, maternity, hibernation, swarming, transient)
- Number of species recorded since 2005
- Maximum total number of bats recorded on a single survey since 2005
- Maximum number of each species recorded since 2005
- Whether site is protected physically or other means of preventing unauthorised entry
- Threats to the site

Table 1. Percentage of Eurobats range countries where bat species are highly dependent on overground roost types. High dependence in: 1 – 20% of countries (+); 21 – 40% (++); 41 – 60 % (+++); 61 – 80 % (++++); 81 – 100 % (+++++).

Overground roost type / Species	Churches	Castles/ Fortifications	Houses/ blocks of flats	Barns / Stables	Bridges	Trees
Barbastella barbastellus		+	+	+		+++
Barbastella leucomelas						
Eptesicus bottae			+++			+++
Eptesicus nilssonii	+	+	+++			+
Eptesicus serotinus	++	+	++++	+		
Hypsugo savii			+			
Miniopterus schreibersii	+	+				
Myotis alcathoe						++
Myotis aurascens			++	++	++	
Myotis bechsteinii						+++++
Myotis blythii	++	+	+	+	+	
Myotis brandtii		+	++			+++
Myotis capaccinii						
Myotis punicus						
Myotis dasycneme	++	++	+++	+		+
Myotis daubentonii	+	++			++	+++++
Myotis emarginatus	++	++		+		
Myotis hajastanicus						
Myotis myotis	++++	++	++			
Myotis mystacinus	+	+	+++	+	+	++
Myotis nattereri	+	+	++		+	+++
Myotis nipalensis						
Myotis schaubi						
Nyctalus lasiopterus						+++++
Nyctalus leisleri			+			+++++
Nyctalus noctula	+	+	++	+	+	+++++
Otonycteris hemprichii						
Pipistrellus kuhlii	+	+	++++	++	+	+
Pipistrellus nathusii	+		+++	+	+	+++++
Pipistrellus pipistrellus	++	++	++++	++	+	++
Pipistrellus pygmaeus	+	+	+++	++	+	+++
Plecotus auritus	+++	++	++	+		+++
Plecotus austriacus	+++	++	+++	+		+
Plecotus kolombatovici						
Plecotus macrobullaris	++		+	+		
Plecotus sardus						
Rhinolophus blasii						
Rhinolophus euryale	+	+				
Rhinolophus ferrumequinum	++	+	+	+	+	
Rhinolophus hipposideros	++	++	++	+	+	
Rhinolophus mehelyi						
Rousettus aegyptiacus						
Tadarida teniotis					+	+
Taphozous nudiventris						
Vespertilio murinus	+	+	++++	+		+

Table 2. Proposed scoring of European bat species based on European / Mediterranean IUCN lists, annex of Habitat Directive and dependence to buildings.

	IUCN red list	Annex II	Dependence buildings	Proposed weight
Rhinolophus euryale	VU A2c	X	+	2
Rhinolophus ferrumequinum	NT	X	++	2
Rhinolophus hipposideros	NT	X	++	2
Rhinolophus mehelyi	VU A4c	X		2
Tadarida teniotis	LC		+	1
Miniopterus schreibersii	NT	X	+	1
Barbastella barbastellus	VU A3c+4c	X	+	2
Eptesicus bottae	LC		+	1
Eptesicus nilssonii	LC		+	1
Eptesicus serotinus	LC		++	1
Hypsugo savii	LC		+	1
Myotis alcathoe	DD			1
Myotis aurascens	LC		+	1
Myotis bechsteinii	VU A4c	X		2
Myotis blythii	NT	X	++	2
Myotis brandtii	LC		+	1
Myotis capaccinii	VU A4bce	X		2
Myotis punicus	NT		+	1
Myotis dasycneme	NT	X	+++	2
Myotis daubentonii	LC		++	1
Myotis emarginatus	LC	X	++	1
Myiotis escalerai	NE	X		1
Myotis myotis	LC	X	+++	2
Myotis mystacinus	LC		++	1
Myotis nattereri	LC		++	1
Nyctalus lasiopterus	NT			1
Nyctalus leisleri	LC			1
Nyctalus noctula	LC		++	1
Pipistrellus kuhlii	LC		++	1
Pipistrellus nathusii	LC		++	1
Pipistrellus pipistrellus	LC		++	1
Pipistrellus pygmaeus	LC		++	1
Plecotus auritus	LC		+++	2
Plecotus austriacus	LC		+++	2
Plecotus kolombatovici	LC		+++	2
Plecotus macrobullaris	NT		++	2
Plecotus sardus	VU B2ab(iii)		+++	3
Vespertilio murinus	LC		++	1