



Guidelines for the Selection of biological SSSIs

Part 2: Detailed guidelines for habitats and species groups

Chapter 16 Mammals

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Cover note

Version 1 of this chapter, published in 2019, updates and replaces the previous Mammals SSSI Selection Guidelines chapter (Nature Conservancy Council 1989). It was prepared by Katherine Walsh and Kate Morris (Natural England), Jean Matthews and Elisabeth Halliwell (Natural Resources Wales), Rob Raynor and Jenny Bryce (Scottish Natural Heritage), and provides detailed guidance for use in selecting mammal sites throughout Great Britain to recommend for notification as SSSIs. It should be used in conjunction with Part 1 of the SSSI Selection Guidelines, as published in 2013 (Bainbridge *et al.* 2013), which details the overarching rationale, operational approach and criteria for selection of SSSIs.

The main changes from the original (1989) version of the chapter are:

- The text on distribution and conservation status of most species has been updated reflecting our greater understanding of the species;
- Site selection requirements – the water vole section has been included within the main body of the text;
- A section on common dormouse has been added.
- The bats section has been revised including species not previously mentioned and the text now gives guidance on protecting habitats as well as roosts, providing advice on determining appropriate boundaries to ensure adequacy of site size to meet the ecological needs of the species. A section on swarming sites has also been included;
- Additional sections on red squirrel and wildcat have been added;
- A legislative section has been added;
- Table 26 – Status and distribution of British mammals (1985), is superfluous and has been removed as this information is readily available elsewhere;
- In version 1 (2019), section 5, covering seals, was not updated, but instead was made available as a separate subchapter.

This version (1.1), published in 2022, is a slight update of the reviewed chapter (version 1) published in 2019. In version 1.1, section 5 of the guidance (seals) has been removed, based on a decision by the Chief Scientists' Group of the statutory nature conservation bodies. No other amendments have been made.

This chapter has been subjected to appropriate levels of evidence quality assurance. It is compliant with the JNCC Evidence Quality Assurance Policy 2014 and has been subjected to external peer review by Dr Tony Mitchell-Jones and Prof Robbie McDonald.

1 Introduction

- 1.1 The current species composition of the mammalian fauna of Great Britain is largely a result of natural colonisation before the islands were cut off by rising sea levels, selective extinction due to climatic change and human influence, and deliberate or accidental introductions by humans (Yalden 1982, 1999).
- 1.2 Many British mammal species are highly mobile. As such their dependence on a particular, fixed area may change throughout the seasons and from year to year, for a variety of reasons. However, some mammals can be dependent on, and remain highly faithful to, certain sites for breeding, hibernating, resting or roosting. They may be highly vulnerable at these times and the protection of such sites is often important for their conservation.
- 1.3 Most mammals are not bound to a specific habitat type, instead tending to use a range of habitats, according to their requirements. However, several mammal species, e.g. red squirrel and otter, are associated with fewer habitat types, in which they spend the majority of their time. The relationship that a species has with habitats is often complex and in some cases is still not completely understood. Sites of Special Scientific Interest for mammal species will sometimes protect particular elements of the species' habitat requirements e.g. a hibernation site, while not necessarily protecting other elements e.g. its foraging areas. Some species range so widely, e.g. otters that can occupy linear ranges up to 40km along river systems, that it can be impractical to protect their entire ranges and so sections of important habitat may be identified instead.
- 1.4 At the population level, most British mammals are dependent on 'wider countryside' conservation policies and legislative protection, specifically through the Conservation of Habitats and Species Regulations (2010) and the Wildlife and Countryside Act (1981) as amended in England and Wales and the Conservation (Natural Habitats &c) Regulations 1994 (as amended) and the Wildlife and Countryside Act (1981) amended by the Nature Conservation (Scotland) Act (2004) and the Wildlife and Natural Environment (Scotland) Act (2011) in Scotland, for their protection. Where site selection is an appropriate measure it must be used to protect the 'best' examples (Section 4).

2 Recent history of change

- 2.1 This section gives a brief overview of the mammal species that are to be considered for SSSI selection. Section 4.7 discusses other mammals in relation to SSSI selection.

Species should be considered for selection on the basis of:

- 2.1.1 All species on Annex II of the Habitats Directive (1992), thus requiring the designation of Special Areas of Conservation (SACs), due to their conservation significance. Protection of SACs is delivered primarily through the SSSI mechanism.
- 2.1.2 Species not on Annex II, but where a significant proportion of the population aggregates at habitual sites at certain times of the year, which could make their population vulnerable.
- 2.1.3 Species not on Annex II, but showing significant population declines that are strongly associated with a particular habitat type, so that SSSIs could deliver a beneficial effect.
- 2.2 The otter (*Lutra lutra*) suffered a serious and dramatic population decline from the mid-1950s to the late 1970s across Scotland, England and Wales (Strachan *et al.* 1993, 2000). In the early 1980s there was concern that the species might be completely lost

from England (<http://www.anglingtrust.net/news.asp?section=29&itemid=633>).

However, otter populations have made a significant recovery across Britain primarily as a result of improvements in water quality, with the withdrawal of certain organochlorine pesticides such as dieldrin and other related chemicals and legal protection. By the early 1990s there was a strong natural recovery of the otter in their former strongholds in Wales and South-West England. The recovery of the otter has been almost as dramatic as its population crash. The fifth national otter survey of England (2009-10) (Crawford 2010), showed that the otter had returned to most of the country, though there are distinct differences across the counties in terms of numbers present. This latest survey of England showed that there had been a 59% increase in positive records since the previous survey in 2000-2002. In Wales (2009-10) (Strachan 2015), otters were found at 90% of sites (up from 72% in 2002), with the species well distributed across some individual catchments. In Scotland, much of the northern half of the country was largely unaffected by the overall decline, which occurred in the 1970's and the species' recovery has been mainly in central and southern parts. However, there is some recent evidence of a local decline in Shetland and suggested declines at several other sites in northern Scotland (Findlay *et al.* 2015) which are being monitored.

- 2.3 Since the production of the previous SSSI guidelines, *Pipistrellus pipistrellus* now comprises two cryptic species; *P. pipistrellus* (common pipistrelle) and *P. pygmaeus* (soprano pipistrelle). Nathusius's pipistrelle (*P. nathusii*), once thought a vagrant in Britain, has been found across Britain with several confirmed breeding roosts in England. The British population of *P. nathusii* seems to be comprised of both migratory and resident animals, as there is a clear peak in records during the autumn, particularly in eastern England (JNCC 2013). The Alcaho bat (*Myotis alcathoe*) has recently been confirmed as resident and breeding in England (Jan *et al.* 2010). The improved understanding of the ecology and conservation of the rare Annex II bat species is discussed in later sections. All bats are particularly vulnerable at their breeding and hibernation sites and some of these sites can support a significant proportion of the species' population. The importance of swarming sites for particular species is now recognised. Enhancing the protection of key sites through the SSSI mechanism can be helpful. Some species are almost solely reliant on built structures for maternity roosts, but the notification of sites in buildings, particularly domestic dwellings, needs to be considered carefully if it is to have the desired effect.
- 2.4 The common or hazel dormouse (*Muscardinus avellanarius*) has a predominantly southern distribution in Great Britain, extending into the west Midlands, southern East Anglia and most of Wales (except Anglesey) and as far north as Cumbria. (JNCC 2013). Data from the National Dormouse Monitoring Programme indicate a long-term decline since the 1990s (Wembridge *et al.* 2016). A decline of 72% (95% confidence intervals 62-79%) over the 22 years from 1993 to 2014, is equivalent to a mean annual rate of decline of 5.8% (4.5 – 7.1%) that is ongoing (Goodwin *et al.* 2017). The causes of this decline are not well understood, but could include habitat loss and fragmentation, reduction in habitat quality due to poor or absent woodland management and climate change disrupting food supplies and/or increasing overwinter mortality (Wembridge *et al.* 2016; Goodwin *et al.* 2017, 2018).
- 2.5 The red squirrel (*Sciurus vulgaris*) population in Great Britain has declined dramatically in the last 70 years, now being confined to much of Scotland (where most of the British population is found), northern England, the Isle of Wight, small islands in Poole Harbour, Anglesey and remnant populations in mainland Wales (Parrott *et al.* 2009). Conservation effort in recent years in England has focussed on maintaining and enhancing populations in 17 red squirrel reserves in northern England and protecting the island populations on the Isle of Wight and Brownsea. The same approach is taken

in parts of Wales, where conservation is prioritised to three focal sites, and in Scotland to reduce and prevent incursion of the non-native grey squirrel (*S. carolinensis*).

- 2.6 The water vole (*Arvicola amphibius*) was added to the SSSI selection guidelines in 2005. The species has undergone a national decline since 1900. However, latterly the decline has been more rapid due to the spread of the non-native American mink (*Neovison vison*), habitat loss and fragmentation. The first national water vole survey in 1989/90 (Strachan and Jefferies 1993) revealed that the water vole had declined by 68% since 1939 from sites where it had previously been recorded and the second survey (1996-98) (Strachan *et al.* 2000) noted it had been lost from over 90% of the sites where previously been recorded since the last survey. The water vole has shown one of the most rapid declines recorded for any mammal in the UK and robust populations are now only distributed patchily across Britain. Water vole distribution trends have been monitored through the national water vole mapping project since 2008. The last review of data from the national water vole mapping project (2012) revealed continuing losses, with a decline of more than one fifth in the areas where they had been recorded through this project (McGuire *et al.* 2014).

3 National and International commitments

- 3.1 Britain's mammalian fauna is relatively impoverished in species through its early post-glacial isolation from the continent of Europe. The distribution of many mammals is limited and the largest number of species occur in the south. Many bats and the common dormouse, for example, do not occur in Scotland.
- 3.2 The lesser and greater horseshoe bats *Rhinolophus hipposideros* and *R. ferrumequinum* are widespread but rare species across their European range and have suffered population declines. In England and Wales, both species are at their northern limits of their range. Nevertheless, the UK supports one of the largest populations of the lesser horseshoe bat in Western Europe (JNCC 2013).
- 3.3 The main UK wildlife legislation enables international obligations:

International protection for the UK's wildlife comes from two sources; European Union directives, which are legally binding on all Member States, and international conventions, which are voluntary but binding on signatories, though derogations can be applied. The main directives and conventions that protect the UK's mammals are:

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna, 1992 (Habitats Directive). This requires member states to implement a strict system of protection for species on Annex IV (European Protected Species). This is achieved by inclusion on Schedule 2 of the Conservation of Habitats and Species Regulations (2017) (Table 1). The Directive further requires member states to designate areas (Special Areas of Conservation, SACs) for the protection of species if they are listed on Annex II of the Directive. Inclusion on Annex V of the Directive relates to species that may not be killed or captured in certain ways. The Directive is transposed into English and Welsh law as the **Conservation of Habitats and Species Regulations (2017)**. In Scotland the **Conservation (Natural Habitats, &c.) Regulations (1994) (as amended)** apply (Tables 1 & 2).

Convention on the Conservation of European Wildlife and Natural Habitats, 1979 (Bern Convention). Signatories are obliged to protect listed species. The Wildlife and Countryside Act (WCA, 1981) enabled the UK to ratify the Bern Convention by transposing it into UK law. The Act has been amended several times and applies in Scotland but has been amended by the **Nature Conservation (Scotland) Act (2004)** and the **Wildlife and Natural Environment (Scotland) Act (2011)**. Schedule 5 of the WCA lists animals (apart from birds)

which receive the highest level of protection and is reviewed every five years by JNCC and the statutory nature conservation organisations. Schedule 6 relates to provisions of the Act restricting methods used to kill or take the species listed under this schedule.

Convention on the Conservation of Migratory Species of Wild Animals, 1979 (Bonn Convention). This provides strict protection to endangered migratory species listed in Appendix I. The UK has ratified other legally binding mammal agreements under the convention i.e. the **Conservation of Populations of European Bats (EUROBATS)**.

Convention on Biological Biodiversity, 1992. This provided a legal framework for biodiversity conservation. The UK established Biodiversity Action Plans to help conserve its most threatened species, working towards the aim of halting the loss of these species by 2010. The UK Post 2010 Biodiversity Framework, published in July 2012, now succeeds the UK Biodiversity Action Plans.

Offences in England and Wales differ to those in Scotland (see www.legislation.gov.uk). For example, bats are not included on Schedule 5 in Scotland. As EPS, in Scotland, all bats, the wild cat and otter are protected under the Habitats Regulation 1994 provisions, Schedule 2. The water vole receives only partial protection on Schedule 5 in Scotland.

Table 1. Species for which SACs are designated under the Habitats Directive (currently excludes marine mammals).

Common name	Scientific name	Annex II species
Barbastelle bat	<i>Barbastella barbastellus</i>	✓
Bechstein's bat	<i>Myotis bechsteinii</i>	✓
Greater horseshoe bat	<i>Rhinolophus ferrumequinum</i>	✓
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	✓
Otter, European	<i>Lutra lutra</i>	✓
Beaver, Eurasian	<i>Castor fiber</i>	✓

Table 2. International and national legal protection that applies for the species listed in these guidelines.

Common name	Scientific name	Schedule 5 WCA ¹	Schedule 6 WCA ²	Schedule 2 Habs Regs ³	Schedule 4 Habs Regs ⁴
Bats, horseshoe (all species)	Rhinolophidae	✓*	✓*	✓	
Bats, typical (all species)	Vespertilionidae	✓*	✓*	✓	
Cat, wild	<i>Felis silvestris</i>	✓*	✓*	✓	
Dormouse, common	<i>Muscardinus avellanarius</i>	✓*	✓*	✓	
Marten, pine	<i>Martes martes</i>	✓	✓*		✓
Otter, European	<i>Lutra lutra</i>	✓*	✓*	✓	
Polecat	<i>Mustela putorius</i>		✓*		✓
Squirrel, red	<i>Sciurus vulgaris</i>	✓	✓		
Vole, water	<i>Arvicola amphibius</i>	✓			
Beaver, Eurasian	<i>Castor fiber</i>			✓	

* England and Wales only

¹ Schedule 5 of the Wildlife and Countryside Act (1981)

² Schedule 6 of the Wildlife and Countryside Act (1981)

³ Schedule 2 of the Conservation of Habitats and Species Regulations (2017), applies in England and Wales and the Conservation (Natural Habitats and c.) Regulations 1994 as amended, applies in Scotland

⁴ Schedule 4 of the Conservation of Habitats and Species Regulations (2017), applies in England and Wales.

4 Site selection requirements

4.1 The mammal species mentioned below are those meeting the conditions listed in 2.1. Where site protection is an appropriate conservation measure, the presence and abundance of these species should contribute to site evaluation but it is necessary to provide species specific guidance and criteria because of different factors to be considered for mammals. Species which may be of conservation concern, but which are not mentioned below, will, in most cases, be represented within the range of sites selected for habitat interests or other species interests and their presence will contribute to the complement of biological diversity.

4.2 It is usually not appropriate to use a generalised scoring procedure for mammals (as is the case with birds) according to protected status, geographical restriction, qualifying population size or class or Area of Search (AoS). This approach would lead to the selection of an impossibly large number of sites for some species or to an unnecessarily all-embracing attempt to protect entire populations.

4.3 Otter

4.3.1 The otter (*Lutra lutra*) population had been in a state of rapid and serious decline when the first version of the Guidelines for Selection of Biological SSSIs – Mammals (1989) was written. In the early 1980s it was thought that the otter might have become completely lost from England.

4.3.2 Given the current status of the otter population and its legal protection there is no requirement to notify any new sites for otter. Existing SSSIs for the species, which in many cases receive extra protection as they are also SACs should be maintained and protected to the same extent. While no new site protection is required, otter presence and abundance will continue to be monitored and new sites could be designated for otter in the future if this was deemed necessary to protect the favourable conservation status of the species. In such a case, amended guidance would be issued.

4.4 Water vole

4.4.1 The latest results from the National UK Water Vole Database and Mapping Project summarising results from 2007-2011 (McGuire *et al.* 2014), shows a continuing decline of the species.

4.4.2 The species is most closely associated with static or slow-flowing waterways with steep banks and a dense fringe of emergent and riparian vegetation but it is also found in sites as diverse as large reedbeds and upland peatlands and exceptionally occurs in grassland habitats away from water courses and water bodies. Many sites that retain populations are those where the voles have been able to avoid predation by the introduced American mink. This can be either because of the structural diversity of the site (e.g. reedbeds), or because the low productivity of the site means there are few opportunities for mink to occupy the area permanently (upland sites). Other sites that have retained good populations of water voles include rivers with significant trout or salmon fishing interests and hence a high level of mink control.

4.4.3 Up to two sites per AoS should be considered for notification, with preference being given to sites that have already been selected for habitat interest. Water voles exist as metapopulations, showing local extinctions and recolonisations. Water vole SSSIs thus need to take account of this and cover a sufficient number of colonies and areas large enough to maintain a complete metapopulation.

- 4.4.4 Lowland sites should be selected on the basis of the size of their water vole population and, where linear, should include a minimum of 2km of suitable bankside vegetation and widespread signs of water voles. For waterways more than 3m wide, the length of each bank may be considered separately towards the total required length. For non-linear sites, such as large reedbeds, site boundaries should follow the natural edge of the habitat. For waterways or grazing marsh, boundaries should follow, where possible, a surface feature lying a minimum of 5m from the water's edge. Overall, it is important to consider site quality, presence of sign, etc.
- 4.4.5 Upland sites should be selected to cover the upper catchments of river systems where surveys have shown that water voles occur widely, even though they may be at low overall densities. Boundaries should not be constrained by watersheds, as a single water vole metapopulation may occupy the headwaters of more than one river system.
- 4.4.6 Some sites of particular significance for water voles in England and Wales have already been identified as National Key Sites (NKS) because of the size of the populations and their expected resilience (Strachan *et al.* 2011). It is recommended that all NKS should be notified as SSSIs. Several of the best surviving water vole metapopulations in Scotland are within existing extensive SSSIs, notified for other features. So, provided the management objectives of these sites do not conflict with the habitat requirements of water voles, they can also provide the necessary protection for the voles.
- 4.4.7 Sites at which water voles have been reintroduced or where populations have been reinforced should not be considered for designation until it can be demonstrated that the species is well-established with self-sustaining populations that fulfil the water vole criteria.

4.5 Bats

Designating roosts alone offers only partial protection for bat species as they are reliant on feeding areas and commuting routes within their territories. When designating new sites for bats, efforts should be made to include key feeding areas and commuting routes where possible. This approach should also be taken to extend existing SSSIs for bats where these habitats were not protected at the time of designation. Roost choice is influenced by the quality of their foraging grounds and their ability to provide bats with food and shelter from environmental conditions and predators, along with addressing their physiological and social requirements. Buffer zones around roost sites based on average foraging areas and habitat preferences for the species relevant to usage of the site should be considered to protect these resources. In some cases, there will be site-specific survey information available but in others it will be necessary to rely on published studies to determine the area required for designation. Site boundaries should be features that are identifiable on the ground though this may mean the inclusion of some sections of land that are of less importance for bats.

4.5.1 Greater horseshoe bat

- 4.5.1.1 The greater horseshoe bat (*Rhinolophus ferrumequinum*) has a restricted and fragmented distribution in Britain, with populations scattered across south-west and southern England and south and south-west Wales. Individuals and small groups have been recorded more widely in recent years, particularly in Wales and the Welsh borders. Such individuals could be vagrants, though there is a possibility that they are colonisers. Horseshoe bats in Britain are thought to be amongst the species likely to

benefit from climate change i.e. warmer winters, enabling greater numbers to survive through the winter to breed.

4.5.1.2 Greater horseshoe bats mainly occupy lowlands, usually below 800m. The species requires a mosaic of grazed pasture and woodlands within a radius of 4km (their usual foraging range) from maternity roost sites. The ideal habitat for these species is a richly structured landscape mosaic of permanent pasture and deciduous woodland linked to an abundance of tall bushy hedges with a good supply of insect food (Ransome 1997, 2000). Greater horseshoe bats spend about half their peak activity time within a 1km radius of their maternity roosts.

4.5.1.3 All breeding roosts as well as all hibernation roosts containing 50 or more adult greater horseshoe bats should be selected (or 20% of local, small sub-populations, where numbers are known, as these may be colonisers). Key habitat surrounding the roost should be included in the site designation, for example, vegetation immediately surrounding the roost, woodland or hedgerows used as commuting routes and associated sustenance zones around breeding sites (e.g. deciduous woodland, cattle-grazed pasture and meadows).

4.5.2 Lesser horseshoe bat

4.5.2.1 The lesser horseshoe bat (*Rhinolophus hipposideros*) has a restricted distribution in Britain, with populations found across south-west, southern and western England and most of Wales. The population appears to be increasing and spreading across western England. Horseshoe bat species are thought to be amongst the species likely to benefit from climate change i.e. warmer winters, enabling greater numbers to survive through the winter to breed.

4.5.2.2 Lesser horseshoe bats are found predominantly in lowland wooded valleys. The sheltered vegetation and woodlands in lowland areas provide favoured foraging areas for the species and hunting grounds are usually within 2.5km of the roost, with linear structures acting as preferred commuting routes.

4.5.2.3 Historically, the species is believed to have roosted throughout the year in caves, surrounded by extensive woodland providing a central refuge with suitable foraging habitat. Such woodland would support large numbers of bats that could form large clusters during the summer thus modifying the micro-climate of the cave and offsetting some of the energy costs of roosting in a cool, cave environment. Lesser horseshoe bats continue to use caves and other underground sites e.g. mines, ice houses and unheated cellars as hibernation roosts and a few summer colonies can still be found in underground sites, although most summer roosts are now found in buildings (Schofield 2008).

4.5.2.4 All breeding roosts containing 200 or more adult lesser horseshoe bats and all winter roosts containing 100 or more adult bats should be considered for selection. The notified sites should include the breeding roosts, grouped with associated satellite roosts and important night roosts where known. Due to the metapopulation structure of lesser horseshoe bat populations, areas of high population density may include several large main breeding roosts that individually fall below the threshold of 200 adult bats. In these areas it may be necessary to notify a cluster of large breeding roosts (and

their associated other roosts) as one site. Key habitat surrounding the roost should be included, for example, vegetation immediately surrounding the roost, woodland, hedgerows or water courses, *etc.*, used as commuting routes, and associated sustenance zones around breeding or hibernation sites (e.g. deciduous woodland, grazed pasture).

4.5.3 Barbastelle bat

- 4.5.3.1. The barbastelle bat (*Barbastella barbastellus*) is rare with few known roosts. Currently records are scattered but are distributed throughout lowland areas of Wales and England, south of a line from the Mersey to the Humber.
- 4.5.3.2. The species requires a complex mosaic of habitats - in particular, large areas of mature woodland or well-connected smaller woodland patches and riparian habitat. Mature trees with cracks and loose bark provide important summer and winter roosting opportunities for this species (Dietz *et al.* 2009). Within woodlands, a high structural diversity with different age groups and edge structures is important. Woodlands containing roost trees tend to be broadleaf or mixed with a diverse range of age and structure. Barbastelle bats forage within woodlands close to their roosts before commuting to core foraging areas, hence the importance of a closed canopy within the woodland and connectivity outside the woodland provided by tree lines.
- 4.5.3.3. Foraging areas are predominantly in woodlands and parkland together with edge habitats including forest edges, tree lines, hedges and waterways. In southern England, riparian zones and broad-leaved woodland were habitats most strongly selected for foraging and unimproved grassland and field margins were also important components of the foraging (Zeale *et al.* 2012).
- 4.5.3.4. The home range extends up to 8-10km around the roost. Summer and winter roosts seem to be a maximum of 20km apart (Boye & Dietz 2005). Radio-tracking of bats in southern England suggests that an area of up to 7km radius around maternity roosts should be considered when designing and implementing management plans for the species (Zeale *et al.* 2012).
- 4.5.3.5. Tree roosts are frequently changed, often daily. SSSI selection for this species should combine several tree roosts within a main breeding/hibernation site or complex. All main breeding roost complexes containing 20 or more adult barbastelles and all hibernation roosts containing 20 or more bats should be considered for selection. Site boundaries for breeding sites in tree roosts should include the identified roost trees together with a sufficient area of woodland to act as a buffer to maintain the microclimate of the roost tree/s and an area of the surrounding woodland where this provides other suitable roosting opportunities. Important flight corridors from the woodland and key foraging areas should be considered for inclusion. Boundaries for roosts in buildings or underground sites should include any adjacent habitat features that help to maintain habitat connectivity to the roost.

4.5.4 Bechstein's bat

- 4.5.4.1 Bechstein's bat (*Myotis bechsteinii*) is a rare species found only in central and southern England, with a few records in south Wales.

- 4.5.4.2. Bechstein's bat requires a complex mosaic of habitats to support foraging, roosting and commuting behaviour. Maternity roosts tend to be found in tree cavities within ancient or semi-natural deciduous woodland, which have a high number of mature oaks in the tree species mix and a dense, mixed species understorey. The nursery colonies subdivide frequently, recombine and subdivide again (fission-fusion societies). Roosts are changed every 2-3 days (Dietz *et al.* 2009).
- 4.5.4.3. Both breeding and non-breeding Bechstein's bats may roost in trees in hedgerows or riversides close to high quality woodland. Foraging areas tend to be within 1.5km of roosts.
- 4.5.4.4. All breeding roost complexes containing 20 or more adult bats and all hibernation roosts containing 20 or more bats should be considered for selection. SSSI selection for this species should combine several tree roosts within a main breeding/ hibernation site or complex. Site boundaries for breeding sites should include the identified roost trees together with the surrounding woodland or a group of woodlands and the connecting habitat.
- 4.5.5. Grey long-eared bat
 - 4.5.5.1. The grey long-eared bat (*Plecotus austriacus*) is a rare species with a restricted range in Britain and few known roosts. The species has been found along the southern coast of England with records in Devon, Dorset, Somerset, Hampshire, Isle of Wight and Sussex although new locations are still being found. The distribution of the grey long-eared bat is limited by low winter temperatures, high summer rainfall and the availability of grasslands.
 - 4.5.5.2. The foraging area for the grey long-eared bat is important for its survival; the species preferentially forages in semi-improved lowland grasslands, woody riparian vegetation and broadleaved woodland. Foraging habitats tend to be within 5km of roosts. The species seems to select relatively warm hibernacula.
 - 4.5.5.3. All breeding and hibernation roosts should be considered for selection.
- 4.5.6. Natterer's, Daubenton's, Whiskered, Brandt's, Serotine, Noctule, Leisler's and Nathusius pipistrelle
 - 4.5.6.1. Natterer's bat (*Myotis nattereri*), Daubenton's bat (*M. daubentonii*), whiskered bat (*M. mystacinus*), Brandt's bat (*M. brandtii*), noctule bat (*Nyctalus noctula*), Leisler's bat (*N. leisleri*) and Nathusius' pipistrelle bat (*Pipistrellus nathusii*) are reasonably widespread species and it would be difficult to justify the notification of breeding roosts except in the most exceptional circumstances. These might include exceptionally large colonies with a long history of usage at a particular site. Specialist advice should be sought in such cases. In general, protection of roosts of these species should come from the relevant species protection provisions of the legislation.
- 4.5.7. Common and Soprano pipistrelle and Brown long-eared bat
 - 4.5.7.1. The common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*) and brown long-eared bat (*Plecotus auritus*) are more widespread and more common than the species listed above and protection should rely on the relevant legislation, as noted above.

4.5.8. All bat species – mixed assemblages – hibernacula

4.5.8.1. This selection criterion is primarily designed to cover those species noted in 4.5.6. Hibernacula for bat species for which independent criteria have been set (i.e. Greater and Lesser horseshoe bat) should be assessed against those criteria.

4.5.8.2. Large hibernacula of mixed species are very important. There are few sites which can offer stable temperatures, humidity and air flow that can also accommodate large numbers of bats. On a national basis, all hibernacula containing: (a) four or more species of 50 or more individuals; or (b) three species of 100 or more individuals, should be considered for selection.

4.5.8.3. In some parts of Britain, sites with multiple species and such large numbers of individuals are unknown, so alternatively in these areas one hibernaculum site per AoS containing 50 or more bats of two or more species may be considered for selection.

4.5.9. All bat species – mixed assemblages - autumn swarming

4.5.9.1 Autumn swarming takes place between August-November when large numbers of bats from several species gather, generally around the entrances to and outside underground sites, such as caves, mines and tunnels. Although, this behaviour has been recorded around other structures. They are dominated by the *Myotis* species and appear to be important mating sites with some bats travelling many kilometres (known to be more than 60km) to reach these areas (Rivers *et al.* 2005). Peak activity occurs between mid-August-September but varies by species (Parsons 2003). A proportion of the bats that travel to these sites will remain to hibernate.

4.5.9.2 Ringing studies have shown that bats remain faithful to swarming sites (Rivers *et al.* 2005, 2006; Glover & Altringham 2008). Sites may be visited by several hundred bats, others by small numbers, the numbers of bats visiting any swarming site can vary dramatically across the autumn swarming period. Swarming sites are very important for the exchange of genetic material. Networks of sites and/or individual sites should be considered for selection where it can be demonstrated that regionally significant levels of swarming activity for multiple species have been recorded. Where appropriate key supporting habitat and habitat features which maintain connectivity throughout the landscape to swarming sites should be considered for inclusion within the designation.

4.5.10 Special note – bats

4.5.10.1 The difficulty of notifying sites in buildings must be considered. Due to the complications associated with building notifications, the appropriate Statutory Nature Conservation Body (SNCB) mammal specialist should be consulted over the selection of all such sites.

4.6 Common dormouse

4.6.1. The common, or hazel, dormouse (*Muscardinus avellanarius*) is widespread across southern England and Wales and is often associated with ancient semi-natural woodlands, especially the early successional stages provided, for example, by hazel coppice. Dormice require high structural and species diversity to provide a continuous food supply during their active season. Dormice hibernate over the winter and need to put on sufficient weight during the autumn to avoid winter mortality. Loss of traditional woodland

management has reduced the quality of woodland habitats for dormice as closing of the woodland canopy leads to the loss of the shrub layer and key species such as honeysuckle, bramble and hazel. Dormice are also found in other habitats such as hedgerows and scrub, and in conifer woodlands where they might previously have been overlooked, possibly due to the absence of hazel and reliance upon survey methods based on analysing signs of feeding on hazelnuts.

- 4.6.2. Up to two sites per AoS within the geographic range of the dormouse in England and Wales should be selected for notification. Only exemplar sites which have evidence of a substantial and self-sustaining dormouse population that is likely to be resilient in the long term, should be selected. Such sites should have diverse, high quality habitat and be connected to the wider landscape. Dormouse populations may already be present on sites notified for other features, particularly woodland, and should be added as a feature to such sites where they meet the above criteria.
- 4.6.3. Reintroduction sites should not be considered for designation until it can be demonstrated that the species is well established with self-sustaining populations and fulfils the criteria set out above.

4.7 Red squirrel

- 4.7.1. The decline of the red squirrel (*Sciurus vulgaris*) throughout large parts of the UK is directly linked to the introduction of the North American grey squirrel (*S. carolinensis*). Red squirrel populations are adversely affected by the presence of grey squirrels due to food competition, resulting in reduced red squirrel juvenile recruitment, and the spread of squirrelpox virus which grey squirrels can carry but which causes significant mortality in red squirrel populations. Suitable red squirrel habitats include conifer and broadleaved woodlands, but competitive exclusion is much greater in areas of large-seeded broadleaves such as oak and hazel. Where grey squirrels are widespread, red squirrels are usually restricted to upland conifer habitats. The most effective conservation measure is grey squirrel control, but habitat management can contribute to red squirrel conservation by reducing attractiveness of forests to grey squirrels whilst maintaining sufficient suitable habitat for red squirrels. Red squirrel reserves and strongholds have been promoted as part of regional or national conservation plans and these have enabled strategic co-ordination of conservation efforts at a landscape scale.
- 4.7.2. Where they are most threatened by the presence of grey squirrels, red squirrels are unlikely to be present in sites notified for other features because in such situations they tend to be restricted to commercial conifer forests. Consideration should be given to notifying sites for red squirrels (up to a maximum of two sites per AoS) where doing so would contribute to conservation efforts in the region by protecting important or threatened habitat.

4.8 Wildcat

- 4.8.1. The current distribution of the wildcat (*Felis silvestris*) is currently restricted to Scotland in the Highlands generally north of the Highland boundary fault and not including the islands. There are currently no agreed national population estimates with figures ranging from 30-430 (Breitenmoser *et al.* 2019). They are considered extremely rare and a conservation action plan was instigated in 2013. Wildcats are typically a species of the woodland edge or scrub and adjacent rough grasslands, riparian habitats and moorland fringes. Home range size can vary depending on prey and mate availability, with recent

research estimating 15-25km² (Campbell 2015; Kilshaw, K. unpublished data in Breitenmoser *et al.* 2019). They are an Annex IV species and are fully protected as a European Protected Species. As part of the Scottish Wildcat Conservation Action Plan (SNH 2013), priority areas were identified as the focus of efforts to reduce the threats to wildcats; principally from hybridisation with domestic cats, feline disease and persecution. These priority areas range from 20,000 to 50,000ha and were judged theoretically capable of supporting a viable population of wildcats. However, more recent work carried out through the Scottish Wildcat Action project has led to the view that there is currently not a viable wildcat population in Scotland – the number of cats is too small, hybridisation too far advanced and the population too fragmented (Breitenmoser *et al.* 2019). A new phase of work is about to begin that will involve the release of captive bred and translocated animals to the 'Cairngorms Connect' area. Given their wide-ranging behaviour, current threats and status, a range of conservation approaches (in addition to the protection afforded by EPS status) will need to be applied to restore the species. In most cases at present, site designation will not be an effective conservation tool. However, it is likely that new phases of wildcat restoration will involve government-approved conservation translocations to specific, geographically discrete areas where site designation may have a role.

4.9 Species not currently being considered for SSSI selection

- 4.9.1 These species are the pine marten (*Martes martes*), yellow-necked mouse (*Apodemus flavicollis*), harvest mouse (*Micromys minutus*), polecat (*Mustela putorius*), Orkney vole (*Microtus arvalis*), greater mouse-eared bat (*Myotis myotis*), Alcathe bat (*Myotis alcathoe*), lesser white-toothed shrew (*Crocidura suaveolens*) and Eurasian beaver (*Castor fiber*). It is difficult to characterise any particular site because these species occur at low densities, and / or are highly mobile, and / or occupy a range of different habitat types and / or have been subject to recent policy changes.
- 4.9.2 The SSSI mechanism is not designed to address the needs of such species where protected area boundaries would need to be continually reviewed to take account of changes in their distribution and/or abundance. Instead, these species should be regarded as attributes which enhance the value of sites assessed mainly on habitat or botanical features – notably woodland, grassland and upland sites. Therefore suitable means of achieving the minimal representation of these species is to ensure that, within the geographical range of each species, at least one site with a known recent occurrence per AOS is selected (although note the specific situations that may apply for the release sites of government-approved conservation translocations of wildcat). In practice, most species will be much more frequently represented than this because of their occurrence in sites selected on other grounds.
- 4.9.3 Greater-mouse eared bat. Only one resident specimen of the greater-mouse eared bat (*Myotis myotis*) appears to survive still in England. Other individuals recorded are rare vagrants. Consequently, sites should not be notified for this species.
- 4.9.4 Alcathe bat (*Myotis alcathoe*) was confirmed in England in 2010 from wing biopsies collected primarily at swarming sites between 2003-2009. The known sites in England are 350km apart. It is very similar in appearance to whiskered and Brandt's bat and it is clear that it has been misidentified and under recorded for many years on the Continent. However, it is rare in Europe and

associated with riparian habitat in old, unmanaged woodlands (Dietz *et al.* 2009) so on current information, it is also expected to be rare in Britain. The ecological requirements of this species in the British context need to be more thoroughly understood before consideration can be given to setting criteria for designation of sites for the species. However, it may be one of the species included in assemblages for autumn swarming or hibernacula (see 4.5.9 and 4.5.8 respectively).

- 4.9.5 Eurasian Beaver (*Castor fiber*) has only recently been made a European Protected Species in Scotland, being added to Schedule 2 of the Conservation (Natural Habitats, & c.) Regulations (1994) (as amended) on the 1st May 2019. This species is listed on Annexes II and IV of the Habitats Directive (1992). Due to this recent policy change, which currently only applies to Scotland following a trial reintroduction of the species, they are not considered for notification in these guidelines.

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