

SUBJECT TO REVISION

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**Guidelines for the selection of biological SSSI's
Part 2: Detailed guidelines for habitats and species groups**

13 MAMMALS

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13 MAMMALS

13a MAMMALS - GENERAL

1 Introduction

- 1.1 The British mammals (Corbet & Southern 1977 and Table 26) present varied problems for conservation. Some are regarded as game animals and are protected and managed accordingly. Some are viewed as pests, and there is pressure from some quarters for eradication or at least control. A few can be in both categories according to different circumstances. Populations of some species have importance on a western European scale (e.g. otter). For those mammals posing an undoubted conservation need, the practical difficulties of applying site-based measures are often considerable. Many mammal species are highly mobile creatures, and their dependence on fixed and restricted locations is limited to breeding and resting or roosting sites. On the other hand, those species in which individuals from large areas congregate at very few sites for breeding and/or hibernation (e.g. seals and bats) are very vulnerable at that time, and protection of those sites is then important for their conservation. At the population level, most British mammals will remain dependent on 'wider countryside' conservation policies, but where site selection is an appropriate conservation measure it can be used as described below.
- 1.2 Of the marine mammals, only the two native seals have some dependence on land. Both grey and common seals come together in groups on land or in shallow water at certain seasons for breeding and moulting. They are then vulnerable to disturbance, and both have been subjected to culls, both commercial and for fisheries protection, at this time. Both species are protected under the Seals Act 1970, but protection is limited to close seasons covering the pupping period unless this is extended by order. The killing of seals is permitted even in the close season under licence or to prevent damage to fishing nets.
- 1.3 The grey seal is an internationally rare species, for which the United Kingdom has some conservation responsibility, as about half of the world population of 200,000 animals breed around its coasts. This species nevertheless poses special problems because of its increasing population in relation to allegations of damage to sea fisheries. Estimates of numbers have risen from 500 in 1914 to 92,000 individuals in 1985 (Anon. 1987), and the population is still increasing owing to legal protection. However, recent studies of food and feeding habits have not substantiated claims of fisheries damage, and culls have been suspended.
- 1.4 The British population of the common seal forms only about 5% of the world population and is much smaller than that of the grey seal, being estimated at

24,700 individuals in 1985 (Anon. 1987). Although small, this population may make up half of the numbers of the Eastern Atlantic subspecies Phoca vitulina vitulina, so it is of some importance on a western European scale. This subspecies is under considerable threat from pollution on the eastern coast of the North Sea and the Baltic and has recently suffered an epidemic which has reached British waters and killed many seals. It has been culled in the past in Britain, and uncontrolled commercial pup-hunting in the 1960s caused local declines (e.g. in Shetland, where the species is now protected throughout the year by the Conservation of Seals (Scotland) Order 1973).

- 1.5 The otter has undergone a serious decline over most of England and Wales and in parts of Scotland (Chanin & Jefferies 1978). In many districts it is now either absent or present only in small numbers in isolated pockets. Only in certain remote districts, mainly coastal, of northern and western Scotland and the Northern and Western Isles has it remained at all numerous. It is a fully protected species through Schedule 5 of the Wildlife and Countryside Act 1981, but conservation requirements show a geographical gradient of importance across Britain, with measures needed most urgently at present in lowland districts of the south and east.
- 1.6 The red squirrel has also declined seriously in England and Wales and has been widely replaced by the introduced grey squirrel (Lloyd 1983). Only isolated populations remain in the south (for example in Breckland, the Isle of Wight, Cannock Chase, the Suffolk coast, Dyfed/Powys and North Wales including Anglesey), but red squirrels still occur in many places in northern England and they are widespread and locally numerous in Scotland. The species is fully protected through Schedule 5, but, as with the otter, the need for other conservation measures shows a decreasing trend from south to north.
- 1.7 The badger has been given special protection under the Badgers Act 1973, the Wildlife and Countryside Act 1981 and later amendments because of the cruelty of 'badger-digging'. Despite control programmes concerned with eradication of bovine tuberculosis (of which the badger is a suspected transmitter) in certain southern districts, this remains a widespread species with a large population apparently limited mainly by its territorial demands. The pine marten and wild cat have recently been given full protection through Schedule 5 of the 1981 Act. Both have a very restricted distribution, mainly within the Scottish Highlands. They appear to be extending southwards very slowly in parts of Scotland, and the pine marten still exists in very small numbers in northern England and North Wales. The greatest conservation problem for the wild cat is that of hybridisation with feral domestic cats, and the status of true Felis silvestris within the extension of range is not known. The polecat is largely restricted to central Wales and the English counties on

the Welsh Borders but is reasonably numerous in some areas and evidently spreading.

- 1.8 The common dormouse is a highly localised species found largely in the southern half of England and Wales. The yellow-necked mouse is also restricted to southern England, though more abundant within its range. The Scilly shrew and Orkney vole are usually regarded as subspecies of continental species which in Britain are confined to island groups. Insular subspecies are also distinguished of the bank vole on Skomer, Mull and Raasay, and island races of the wood mouse on Rhum, St Kilda, Shetland and other islands. Of these rarer small mammals, only the dormouse is regarded as a declining and threatened species; as such it has now been accorded full protection through Schedule 5 of the 1981 Act.
- 1.9 The bats have become a major focus of conservation concern in Britain, and all 15 species are protected through Schedule 5 of the 1981 Act. The mouse-eared bat is now virtually extinct in Britain (see 3.3.3), and other species, most notably the two horseshoe bats, are threatened. Some species, for example the barbastelle, are so rare that little is known about their conservation status, but other species appear to be declining in numbers (see Table Z6). All bats are vulnerable, through their use of a relatively small number of sites for communal roosting and breeding, often in buildings; so legal protection against disturbance and taking has been an effective conservation measure. Enhancing the protection of key sites through the SSSI mechanism can be helpful, but the notification of sites in buildings, particularly domestic dwellings, needs to be considered carefully if it is to have the desired effect.
- 1.10 The mammal species mentioned above are those especially in need of conservation measures and hence are the ones to be considered especially in relation to SSSI selection. Where site protection is an appropriate conservation measure, their presence and abundance should contribute to site evaluation, but it is necessary to provide fairly specific guidance because of the different factors which have to be considered within this group. The more common species which are not mentioned above will in most cases be represented within the range of sites selected for habitat or other species interest, and their presence will - except in the case of pest species - contribute to the assessment of biological diversity.
- 1.11 It is not appropriate to use a generalised scoring procedure for mammal species according to specially protected status (Schedule 5 species), geographical restriction (based on Arnold 1984) or qualifying population size class. Such an uncritical 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 the whole of quite large populations.

2 International importance

- 2.1 Britain's mammalian fauna is naturally impoverished in species through its early post-glacial isolation as an island from the continent of Europe. Man-induced extinctions have also reduced faunal variety, especially among the more spectacular species. Many species occurring on the continent do not occur in Britain, whereas no naturally occurring full species is found in this country but not elsewhere in Europe. Again, distribution of many of our mammals is limited, and the largest number of species occurs in the south. Many of the bats and the common dormouse, for example, do not occur in Scotland. On the other hand, Britain's long shoreline and many small islands provide breeding sites for internationally important populations of both grey and common seals (see 1.3 and 1.4). The Northern and Western Isles support one of the strongest remaining populations (albeit mainly marine) of the otter in north-west Europe outside Ireland. The British population of the wild cat is one of the few of those remaining in north-west Europe to show some signs of recovery. The long isolation of some of our offshore islands has allowed the evolution of unique subspecies and island races of continental mammals. Moreover, Britain has its own subspecies of the red squirrel, Sciurus vulgaris leucourus. The maintenance of island faunas, of which Britain has many, has some international importance for students of historical zoogeography and evolution.
- 2.2 The populations of the pine marten, polecat, common dormouse and red squirrel are much stronger elsewhere in western Europe than in Britain. However, the bats are threatened in many countries of Europe (Stebbing & Griffith 1986) and, although little information is available for comparison, the status of Britain's limited bat fauna is probably no better or worse than that of the same species elsewhere in western Europe, apart from the near-extinction of the mouse-eared bat.

3 Site selection requirements

3.1 Seals

3.1.1 Grey seal

Some protection is needed for this species, particularly because of the important international status of the British population. The stocks are small in England and Wales and so additional protection is needed there to maintain numbers. Some NCC control over possible future culls would be desirable, and this is possible on National Nature

Reserves and other SSSIs by virtue of section 10(3)(b) of the Conservation of Seals Act 1970 (as amended in 1973 and 1981).

3.1.2 The British grey seal population consists of six main stocks, with breeding centres in (i) south-west Britain (Scilly, Cornwall, Wales), (ii) the Inner Hebrides and west mainland coast of Scotland, (iii) the Outer Hebrides, (iv) Orkney, (v) Shetland and (vi) the Farn Islands and Isle of May. This division correlates with differences in timing of the breeding season. There are two landfall periods when the grey seal population should be given protection from disturbance on some of the sites concerned - during the occupation of breeding sites and during the use of moulting haul-outs, which may consist of quite different sites.

3.1.3 **The two largest breeding sites** (size being based on pup production) **and the two largest moulting haul-outs** for each of the above stocks of grey seals **should be selected** as SSSIs, except that the south-west Britain stock should be divided into one for Wales and one for south-west England, giving seven in all. These are minimum requirements, and, if other factors such as vulnerability of sites give cause for increasing the number, additional cases should be discussed with the appropriate CSD mammals specialist. Counts are to be based on data from the last five years, where available.

3.1.4 Common seal

This species has six main areas of population around the British coasts - (i) the Inner Hebrides and west mainland coast of Scotland, (ii) the Outer Hebrides, (iii) Shetland, (iv) Orkney, (v) the east coast of Scotland and (vi) the Wash and east coast of England. It is less dependent on land for breeding than the grey seal and, although haul-outs are to be found in all months of the year and particularly during the moulting period, it does not form such large rookeries. Nevertheless, there are important sites (in some cases groups of small sites) for each population which should be considered for protection. So, as for the grey seal, **the two largest pupping sites and moulting haul-outs** (which may be the same) for each population area **should be selected** as SSSIs. Numbers should again be based, when possible, on counts over the last five years.

3.1.5 **For both grey and common seals**, if the total number in any one stock protected on NNRs or other SSSIs selected for other reasons is already greater than that in the two largest pupping sites, there may be no need for further protection for that stock. Similarly, if haul-out sites have been protected elsewhere or are the same as the pupping sites, no further such sites may be necessary.

3.1.6 Sites for both grey and common seals should not be denotified or exchanged because of slight changes in seal numbers shown by new five-year counts. (Some will, in any case, be islands or rocky shores selected as SSSIs on other grounds.) There have been some problems with the counting techniques for common seals, and it should be remembered that old counts may therefore not be comparable to recent ones.

3.2 Otter

3.2.1 The basis for any conservation plan for this species is habitat protection, including cover, holt sites, food and water quality. These are best protected in the long term by notifying whole catchments or rivers as SSSIs. However, the number of rivers likely to be notified as SSSIs on other grounds will be strictly limited (see C.6, 6) and, as otters range over some 25 miles of waterway, each river may hold only three or four adult animals; so other techniques will be necessary to help to maintain a viable population. An individual otter uses over 30 different holts in its range. These all receive some protection against disturbance, obstruction or destruction under section 9(4) of the 1981 Act, though this is weaker than that afforded to an SSSI. Many of these resting places may be replaceable, but the most important ones are those used as breeding holts, which are traditional because secure sites are scarce. Females with cubs are very sensitive to disturbance. Where already known, these breeding holts or holt complexes should be considered for selection, together with the immediate surroundings and cover used by the mother and cubs for playing and for swimming and fishing lessons.

3.2.2 In Scotland, some holts will be represented in large sites selected for other attributes, but holts are too numerous to justify additional selection. **In England and Wales, up to five important breeding holts or holt complexes per AOS should be considered** for selection, with each site including the surroundings such as carr or other woodland of up to a hectare and/or 100 m of bank on either side of the holt if it is at the water's edge. The appropriate CSD mammals specialist should be consulted over the selection of otter holts. (See also 3.4.2.)

3.3 Bats

The selection of bat roosts is on a national basis except for certain mixed hibernacula in AOSs where large roosts are unknown (see 3.3.7).

3.3.1 Greater horseshoe bat

There are only 11 known main breeding roosts for this species and not many more main hibernation sites, though there are many others with only a few individuals. The eventual aim should be an integrated system of site protection, including this bat's feeding areas, as the designation of roosting sites alone will not produce the desired effect. A few old riparian pastures with large beetle populations may already be SSSIs for other reasons. In the mean time, **all main breeding roosts and all winter roosts containing 50 or more adult bats** (or 20% of local small 'edge' sub-populations, such as in Dorset, where numbers are known) **should be selected**. This should give a total of about 22 sites nationally.

3.3.2 Lesser horseshoe bat

All breeding roosts containing 100 or more adult bats and all winter roosts containing 50 or more bats should be considered for selection, though the difficulty of notifying sites in inhabited buildings must be taken into account. This should give about 13 and nine sites, protecting about 50% and 30% of the known population respectively.

3.3.3 Mouse-eared bat

Only one specimen appears to survive. **All breeding and hibernation sites for this species should be selected.**

3.3.4 Barbastelle, Bechstein's and grey long-eared bats

All of these are rare species with no or very few breeding roosts known. Any **traditional breeding roosts should be considered** for selection if found.

3.3.5 Natterer's, Daubenton's, whiskered, Brandt's, serotine, noctule and Leisler's bats

These species are reasonably widespread 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 of a particular site. In general, **protection of roosts of these species should come under section 9 of the 1981 Act.**

3.3.6 Pipistrelle and brown long-eared bat

These two species are widespread and more common than the above. **Protection should rely on section 9 of the 1981 Act.**

3.3.7 All bat species - mixed assemblages

Large hibernacula of mixed species are very important and sometimes spectacular, but perhaps number only 20 sites in total. On a national basis, all hibernacula containing (a) four or more species **and** 50 or more individuals, (b) three species **and** 100 or more individuals or (c) two species **and** 150 or more individuals should be selected. In some parts of Britain such large sites are unknown, so alternatively in these areas one hibernaculum site per AOS containing 30 or more bats of two or more species may be considered for selection.

Because of the complications associated with the notification of sites in buildings, the appropriate CSD mammals specialist should be consulted over the selection of all such sites.

3.4 Other considerations

- 3.4.1 Pine marten, wild cat, polecat, red squirrel, common dormouse, yellow-necked mouse, Orkney vole and Scilly shrew should be regarded as attributes which enhance the value of sites being assessed mainly on habitat or botanical features - notably woodland and upland sites (see C.2 and C.9). The number of such species is too small and the species are too differently distributed for a qualifying score procedure to be appropriate, and it is seldom that any site can be characterised as being especially good for any particular species. The best 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.** In practice, most species will be much more frequently represented than this because of their occurrence in sites selected on other grounds. Only if they do not occur in any of these should an additional site be considered.
- 3.4.2 As well as the above species, otters and otter bolts or bats and bat roosts are to be regarded as attributes enhancing the value of sites being assessed on habitat or botanical features; this applies in Scotland as well as in England and Wales (see 3.2.2).
- 3.4.3 The more common species in Table 26 will inevitably be so frequently present in sites selected for other features that no special measures need be taken to ensure their representation.

4 References

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SUBJECT TO REVISION**For further information see <http://jncc.defra.gov.uk/page-2303>****Table 26 Status and distribution of British mammals** (with nomenclature based on that of Corbet & Southern 1977)

Species	Protective legislation	Believed status	Change	Distribution: England (E), Scotland (S) and Wales (W)
<u>INSECTIVORA</u>				
HEDGEHOG <i>Erinaceus europaeus</i>	*	Very common	-	Widespread; E, S, W
MOLE <i>Talpa europaea</i>		Very common	-	Widespread; E, S, W
COMMON SHREW <i>Sorex araneus</i>	*	Abundant	-	Widespread; E, S, W
PYGMY SHREW <i>Sorex minutus</i>	*	Very common on	-	Widespread; E, S, W
WATER SHREW <i>Neomys fodiens</i>	*	Common where it occurs	-	Widespread hut local; E, S, W
LESSER WHITE-TOOTHED SHREW <i>Crocidura suaveolens</i>	*	Common where it occurs (island subspecies)	-	Very restricted distribution; Isles of Scilly (Scilly shrew)
<u>CHIROPTERA</u>				
GREATER HORSESHOE BAT <i>Rhinolophus ferrumequinum</i>	*	Endangered	Declining	Restricted distribution; E, W
LESSER HORSESHOE BAT <i>Rhinolophus hipposideros</i>	*	Endangered	Declining	Restricted distribution; E, W
WHISKERED BAT <i>Myotis mystacinus</i>	*	Vulnerable	Declining	Widespread; E, W
BRANDT'S BAT <i>Myotis brandtii</i>	*	Vulnerable	Declining	Widespread; E, W
NATTERER'S BAT <i>Myotis nattereri</i>	*	Vulnerable	Declining	Widespread; E, S, W
BECHSTEIN'S BAT <i>Myotis bechsteinii</i>	*	Rare	-	Restricted distribution; E
MOUSE-EARED BAT <i>Myotis myotis</i>	*	One individual	Virtually extinct	Very restricted distribution; E
DAUBENTON'S BAT <i>Myotis daubentonii</i>	*	Vulnerable	Declining?	Widespread; E, S, W
SEROTINE <i>Eptesicus serotinus</i>	*	Vulnerable	Declining	Southern England and Wales
LEISLER'S BAT <i>Nyctalus leisleri</i>	*	Rare and vulnerable	-	Widespread; E, W
NOCTULE <i>Nyctalus noctula</i>	*	Vulnerable	Declining	Widespread; E, S, W
PIPISTRELLE <i>Pipistrellus pipistrellus</i>	*	Vulnerable	Declining	Widespread; E, S, W
BARBASTELLE <i>Barbastella barbastellus</i>	*	Rare	-	Widespread; E, W
BROWN LONG-EARED BAT <i>Plecotus auritus</i>	*	Vulnerable	Declining	Widespread; E, S, W
GREY LONG-EARED BAT <i>Plecotus austriacus</i>	*	Rare and vulnerable	-	Very restricted distribution; E
<u>LAGOMOPHA</u>				
RABBIT <i>Oryctolagus cuniculus</i>		Very common; introduction (12th century)	Increasing	Widespread; E, S, W
BROWN HARE <i>Lepus capensis</i>		Common	Declining	Widespread; E, S, W
MOUNTAIN HARE <i>Lepus timidus</i>		Common where it occurs	-	

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Species	Protective legislation	Believed status	Change	Distribution: England (E), Scotland (S) and Wales (W)
<u>RODENTIA</u>				
RED SQUIRREL <i>Sciurus vulgaris</i>	*	Common in Scotland, but vulnerable in England and Wales	Declining	Widespread, S; fragmented and discontinuous, E, W
GREY SQUIRREL <i>Sciurus carolinensis</i>		Very common; introduction (1876)	Increasing	Widespread; E, S, W
BANK VOLE <i>Clethrionomys glareolus</i>		Abundant (with island subspecies)	-	Widespread; E, S, W
FIELD VOLE <i>Microtus agrestis</i>		Abundant (with island subspecies)	-	Widespread; E, S, W
COMMON VOLE <i>Microtus arvalis</i>		Very common where it occurs (island subspecies); introduction?	-	Very restricted distribution; Orkney (Orkney vole)
WATER VOLE <i>Arvicola terrestris</i>		Common	Declining?	Widespread; E, S, W
WOOD MOUSE <i>Apodemus sylvaticus</i>		Abundant	-	Widespread; E, S, W
YELLOW-NECKED MOUSE <i>Apodemus flavicollis</i>		Common where it occurs	-	Restricted to southern E & W
HARVEST MOUSE <i>Micromys minutus</i>		Common but local	-	Restricted to E & W
HOUSE MOUSE <i>Mus musculus</i>		Very common; introduction (pre-Roman)	-	Widespread; E, S, W
SHIP RAT <i>Rattus rattus</i>		Vulnerable; introduction (Roman)	Declining	Restricted; fragmented distribution
BROWN RAT <i>Rattus norvegicus</i>		Very common; introduction (18th century)	-	Widespread; E, S, W
FAT DORMOUSE <i>Glis glis</i>	*	Uncommon; introduction (1902)	-	Very restricted distribution; E
COMMON DORMOUSE <i>Muscardinus avellanarius</i>	*	Uncommon; local	Has declined	Restricted distribution; E, W
COYPU <i>Myocastor coypus</i>		Virtually extinct; introduction (1930s)	Severely controlled	Restricted distribution; E
<u>CARNIVORA</u>				
FOX <i>Vulpes vulpes</i>		Common	-	Widespread; E, S, W
PINE MARTEN <i>Martes martes</i>	*	Uncommon; low density	Increasing range	Restricted distribution, S; fragmented, E & W
STOAT <i>Mustela erminea</i>		Common	Increasing	Widespread; E, S, W
WEASEL <i>Mustela nivalis</i>		Very Common	-	Widespread; E, S, W
POLECAT <i>Mustela putorius</i>	*	Common where it occurs	Increasing	Restricted distribution; largely W
BADGER <i>Meles meles</i>	*	Common	-	Widespread; E, S, W
OTTER <i>Lutra lutra</i>	*	Endangered in England and Wales; vulnerable in Scotland	Has declined	Widespread, S; fragmented, E & W
WILD CAT <i>Felis silvestris</i>	*	Uncommon; low density	Increasing range	Restricted distribution; S
<u>PINNIPEDIA</u>				
COMMON SEAL <i>Phoca vitulina</i>	*	Locally common; small population overall	Increasing?	Widespread on coasts; E, S, W
GREY SEAL <i>Halichoerus grypus</i>	*	Locally common; rare internationally	Increasing	Widespread on coasts; E, S, W

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Species	Protective legislation	Believed status	Change	Distribution: England (E), Scotland (S) and Wales (W)
<u>ARTIODACTYLA</u>				
RED DEER <i>Cervus elaphus</i>	*	Common	Has increased	Widespread; largely S, but also E
SIKA DEER <i>Cervus nippon</i>	*	Common; introduction (19th century)	-	Widespread but discontinuous; S, E
FALLOW DEER <i>Dama dama</i>	*	Common; introduction (Norman)	-	Widespread; E, S, W
ROE DEER <i>Capreolus capreolus</i>	*	Common	Increasing	Widespread; S, E
MUNTJAC <i>Muntiacus reevesi</i>		Common where it occurs; introduction (c. 1900)	Increasing	Restricted distribution; E and a few in W
CHINESE WATER DEER <i>Hydropotes inermis</i>		Uncommon and local; introduction (c. 1900)	-	Restricted distribution; E

This list of British mammals includes all those species breeding on land in the British Isles, excluding the Channel Islands. It excludes all the Cetacea, Marsupialia, vagrants and introductions, unless prior to 1950 and now a permanent part of the fauna. The asterisk in column 2 marks all those species named in some protective legislation covering England, Scotland and Wales (ranging from a close season to full protection). Population estimates based on recent counts are only available for very few mammalian species (red deer: 270,000 (1970; grey seal: 92,000 (1985); common seal: 24,700 (1985); greater horseshoe bat: 2,200 (1984)), so the information on status is very approximate and relative. Distribution information is largely from Distribution maps of the mammals of the British Isles (Arnold 1984), with additional information from single species surveys; a dash means that there is no recent information.

13b WATER VOLE

1.9A The water vole has shown the most rapid decline recorded for any mammal in the UK and strong populations are now distributed patchily across Great Britain. 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 found in sites as diverse as large reedbeds and upland peatlands. Many sites which 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 (eg reedbeds) or because the low productivity means there are few opportunities for mink to occupy the area permanently (upland sites).

3.3A *Water vole*

3.3A.1 In the lowlands, large reedbeds appear most likely to retain populations in the long-term. Other sites which have retained good populations include rivers with significant trout or salmon fishing interest and hence a high level of mink control. Up to two sites per AOS should be considered for notification, with preference being given to sites that have already been selected for their habitat interest. Sites should be selected on the basis of the size of their water vole population and should have a minimum of 2 km of suitable bankside vegetation with widespread signs of water voles. For waterways more than 3 m wide each bank may be considered separately.

For large reedbeds, boundaries should follow the natural edge of the habitat. For waterways or grazing marsh, boundaries should follow, where possible, a surface feature lying 5 – 10 m from the water's edge.

3.3A.2 In the uplands, it appears that water voles occur as metapopulations, showing local extinctions and recolonisations. Water vole SSSIs in such areas thus need to take account of this and cover areas large enough to maintain a complete metapopulation. Up to two sites per AOS should be considered and 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.