Common Standards Monitoring Guidance

for

Mammals

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COMMON STANDARDS MONITORING GUIDANCE FOR MAMMALS

1. INTRODUCTION

This chapter deals with Common Standards Monitoring (CSM) for mammals other than marine species on designated sites, including SSSIs, ASSIs and Special Areas of Conservation (SACs). It provides guidance on the identification of attributes, targets and methods of assessment for mammals where these are notified or qualifying interest features. Separate guidance will be provided for cetaceans and seals.

2. MAMMAL INTEREST FEATURES

The *Guidelines for the Selection of Biological SSSIs* (Chapter 13) concluded that SSSIs have a limited value for mammals because of their wide ranging habits and guidelines were proposed for a limited number of, mainly colonial, species. Mammal interest features (not marine) include:

2.1 Maternity colonies of greater horseshoe bats *Rhinolophus ferrumequinum* and lesser horseshoe bats *Rhinolophus hipposideros*

The greater horseshoe bat occurs in the UK in south and west Wales and south-west England. There have been documented population declines in the UK in the early 1960s and 1980s probably caused by unfavourable climate factors and, perhaps, loss of roosts.

The lesser horseshoe bat also occurs throughout Wales and south-west England but is more widespread than the greater horseshoe bat. Since 1950 the species has disappeared from much of the north of its European range and colonies appear to be declining. However, there have been some documented increases in range and population size in the UK.

Both species requires warm, dark places with minimal disturbance to raise their young and many maternity colonies use caves, mines, barns, cellars or attic spaces as suitable locations. Maternity roosts are usually found in buildings in the UK, which may bring them into conflict with humans and increase the chances of disturbance. The two species are conspicuous in both summer and winter roosts and thus highly sensitive to disturbance. Dereliction or renovation of old buildings may result in the loss of roost sites.

Lesser horseshoe bats forage within or along the edges of broadleaf deciduous woodland and where habitat is fragmented loss of linear landscape features, e.g. hedgerows and tree lines, may isolate colonies from potential foraging areas.

Almost all greater horseshoe maternity colonies with 50 or more adult bats and many lesser horseshoe maternity colonies with 100 or more adult bats have been designated as SSSIs.

SACs have been selected to include large populations of both species, covering their geographical range. Sites have been selected, where possible, as composites of maternity and hibernation sites considered to belong to a single population or group of closely-associated populations.

2.2 Maternity colonies of barbastelle bats *Barbastella barbastellus* and Bechstein's bats *Myotis bechsteinii*

These are two of the rarest bat species in western Europe. They are endangered in several countries and are rare in the UK, being found only in England and Wales. Population decreases have been reported in most of the European range for both species.

Although few sites are known, barbastelles and Bechstein's appear to select cracks and crevices in wood for breeding. These are mostly located in old or damaged trees, but cracks and crevices in the timbers of old buildings may also be used. Both species are very sensitive to disturbance.

Barbastelles tend to roost in old/ancient woodlands with lots of dead trees, stumps and storm damage. An intact understorey is often present (Greenaway, 2001). They appear to prefer loose bark on dead trees but can also be found in splits in dead or nearly dead stumps. Bats can occasionally be seen in these roosts, so they are quite well lit by bat standards, with little protection from the external temperature and humidity. When having their young they tend to use cracks in the large boughs of ancient trees, such as oaks, which offer more protection than tree roosts generally used. Bats also seem able to make do in considerably less than optimum conditions but have even smaller colonies than the normal 20-35. These colonies are normally subdivided amongst a local matrix of roosts, only very occasionally coming together.

Bechstein's nursery roosts in natural sites are often in woodpecker holes in old oaks. The cavity is large within and rises in the rotten core of the tree. Roosts are very dark, and hot with 100% humidity and occasionally over seventy bats packed in a small hole. Woodland of around 50 hectares seems to be the minimum requirement and is usually quality old growth /ancient with an intact under storey

Most traditional breeding roosts for both species have been selected as SSSIs and SACs.

2.3 Hibernating populations of bats – greater horseshoe, lesser horseshoe, barbastelle, Bechstein's and mixed species assemblages of bats

All bats in the UK enter an extended period of torpor or hibernation, commencing from the end of October to the beginning of April, depending on autumn and spring weather conditions. Different species have different microclimate requirements during hibernation and the ability to survive the winter may depend to a large extent on finding suitable hibernacula. In the UK bats tend to hibernate in places with cool stable temperatures and high humidity, such as caves, mines, the cellars of buildings and disused railway tunnels, but have been found under skirting boards, roof tiles and in the hollows or under the bark of trees. Bats tend to move between hibernacula during the winter responding to changes in ambient temperature.

Greater and lesser horseshoe bats roost mainly in underground sites during winter, often communally. They are usually found in hibernation sites with relative humidities over 90%. Barbastelles and Bechstein's tend to hibernate in hollow trees but have been recorded hibernating in caves, bunkers, tunnels and cellars, especially when the ambient temperature is cold, usually solitary or in small groups.

Many greater and lesser horseshoe winter roosts containing 50 or more bats and all known traditional hibernation sites for both barbastelles and Bechstein's bats have been selected as SSSIs

Large hibernacula of mixed species assemblages of bats are very important. The majority of hibernacula containing four or more species and 50 or more individuals, 3 species and 100 or more individuals and two species and 150 or more individuals have been selected as SSSIs, and incorporated into SACs as appropriate.

2.4 Populations of otters

The otter is an indicator of the quality of wetlands and waterways. UK populations are internationally important, especially since otter populations have declined across much of their western European range. The otter was considered common throughout the UK in the 1950s, but declined from about 1957 in mainland GB due to poisoning by organochlorine pesticides. A series of surveys carried out since the late 1970s indicate that the otter population is recovering and is now widely, though unevenly, distributed across the UK.

Otters occur near fresh water with suitable cover. Optimal habitat includes lakes, rivers, streams and marshes with secure lying-up places and breeding sites and good fish populations. Otters are also found on coasts and estuaries with fresh water nearby, particularly on rocky shores where population densities can reach their highest in Britain.

In freshwaters, fish such as eel, perch, pike, Cyprinids and Salmonids dominate the diet, with an otter consuming approximately 12-20% of its body weight daily. Dependence on water makes otters vulnerable to interference from river management, human recreational activities and water pollution.

Protected sites for otters have been selected as a representative sample of good otter habitats supporting apparently healthy otter populations. This is demonstrated by a known record of continuous occupation of the site, even, in England, during the period of population decline.

2.5 Populations of water voles

Water voles are found throughout England, Scotland and Wales except most Scottish islands. There has been a long-term decline in this species since 1900, which accelerated during the 1980s and 1990s. As a result they are now patchily distributed and sparse or absent from many areas.

Loss of suitable habitat is probably the underlying cause of the slow decline that has been continuing since the early part of the 20th century. This has been greatly exacerbated in the last 20-25 years by the spread of the introduced American mink, a predator against which the water vole has little defence. Populations are now fragmented, leading to isolation of small populations.

The species is largely confined to riparian habitats and occurs at higher population densities in slow-flowing lowland rivers with extensive emergent vegetation, than upland areas. However, the uplands may represent vital refugia for the species and so the importance of these populations should not be underestimated. The species also inhabits ponds, reedbeds

and peat bogs. In the lowlands, large reedbeds appear most likely to retain populations in the long-term. Exceptionally, the species may live entirely underground where no surface water is present, as on several small Scottish islands. This behaviour is more typical of the species in parts of continental Europe.

The water vole is a recent addition to the list of mammals for which SSSIs can be selected and so there may be few sites with water voles listed. Recommendations for site selection include 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.

2.6 Other species of interest

The mouse-eared bat, although listed in the SSSI guidelines for site selection has gone extinct in the UK. Other species such as pine marten wild cat, polecat, red squirrel, common dormouse, yellow-necked mouse, Orkney vole, Scilly shrew and the other resident bat species are regarded as attributes that enhance the value of sites but have not been listed as interest or qualifying features in their own right.

3. ATTRIBUTES, TARGETS AND METHODS OF ASSESSMENT

This section gives guidance on setting conservation objectives for monitoring each of the mammal interest features described in sections 2.1 to 2.5 above. The guidance below should be used in conjunction with the relevant attribute tables (see section 7) and with reference to the information provided for individual species to set targets for each of the listed attributes. The guidance is also intended to assist those carrying out monitoring of interest features to assess whether targets for particular attributes are being achieved and thus make a decision on the overall condition of the interest feature (see also section 4). Recommendations are given on suitable methods to be used for monitoring each target. Appendix I includes examples to illustrate how various aspects of the guidance can be applied in practice.

3.1 Bats

The attributes that are considered of particular importance to bats include:

- Security of the roost
- External and internal condition of the building/underground site or of the woodland containing tree roosts
- Condition of the access used by bats
- Level of disturbance both external to the roost and within the roost area
- The condition of the habitat surrounding roosts
- Continued use by bats

These are considered in more detail below and in tables 2-4. More detailed guidance for surveying bat roosts and for assessing population change is given in Appendix II. Monitoring forms are included in Appendix III. Appendix I includes a worked example for a lesser horseshoe bat roost site.

The attribute tables for bats (see section 7) give recommendations on the frequency of monitoring of bat interest features. For the majority of habitat features, once in a six year cycle will be sufficient, although the condition of roost sites can deteriorate very rapidly and

more frequent monitoring is preferable. However, in order to assess species population trends, annual counts at both maternity roosts and hibernation sites are recommended (see 3.1.7), with a minimum of once every two years if annual monitoring is not possible. Information is already collected on an annual basis for some greater and lesser horseshoe SSSIs or SACs, including emergence counts during the summer and hibernation site visits. It may be possible to request that a simple assessment of the roost and habitat attributes is carried out at the same time, thus boosting the value of information collected from existing voluntary and professional survey work. This will require liaison with the relevant organisation.

3.1.1 *Security*

Site security can be a significant issue to minimise disturbance. For monitoring purposes grilles, gates, fences, doors etc. should be intact and secure with no evidence of damage or forced entry. For management purposes, underground sites can be securely grilled, but this should not be done without agreeing an access policy with appropriate interest groups, or ensuring that the grille is appropriate for the species of bat using the site.

3.1.2 *External and internal condition of the building / underground site*

For bat roosts in buildings, abandoned mines or caves, particularly where roosts are located in inaccessible crevices, site attributes are defined mainly in terms of the physical condition of the site and a series of dated photographs and sketches, with critical measurements would provide essential supporting information.

External conditions of the roost, whether building or underground site, will largely determine the internal conditions and is therefore a very important attribute. Buildings should be sound with a weather-proof exterior. External inspection will give an overview of the state of the building, the bat access points and the possibility of shading of the roof by overhanging trees.

Internal conditions for maternity roosts need to be dark and warm, with heat coming from the sun or from artificial sources (boilers, specific bat roost heaters). For hibernation sites internal conditions need to be dark, cool and humid with stable temperature regimens. Factors likely to affect the temperature regimen in the roost area, such as artificial heaters or external shading of the roof area, should be monitored on a regular basis and temperature loggers may be used to assess the average temperatures that the bats are exposed to during important times of the year (breeding and hibernation). Internal inspection will be necessary to determine the state of the roosting area and this should be carried out by experts. Care should be taken at all times to avoid disturbing the bats.

Assessment of the state of unoccupied buildings may require particular expertise and the advice of a building's officer should be sought.

3.1.3 *Condition of woodland with tree roosts*

Individual breeding sites (tree crevices) associated with areas of woodland can be hard to find, thus most attributes relate to the condition of the woodland. Detecting and locating the bats in woodland may require specialist equipment, such as bat detectors. Known maternity roosts in trees should be inspected by appropriately trained and licensed people to establish if remedial treatment (by a tree specialist) is required to preserve the tree.

3.1.4 *State of entrance or access point*

Generally, the height and location of access points in relation to orientation of the roost and surrounding cover are important features for bats. Furthermore, greater and lesser horseshoe bats require relatively large access points because, unlike most bat species they prefer to fly into roost sites rather than crawl. Therefore, access points for maternity roosts should be monitored to ensure they remain unobstructed with no alteration to the size of the access hole. Photographs of access points should be taken on a regular basis and comparisons made with previous photos to assess change in condition. Trees or bushes that are growing close by should be maintained because bats often use these as part of flight lines or as immediate cover from predation, which can be a significant problem for emerging bats. However, the vegetation should not be allowed to obstruct access points or become overgrown to the point where they shade the roost from sunlight.

Caves and abandoned mines are generally stable underground but may require remedial attention to unstable entrances. This will require an assessment by an engineering geologist followed by appropriate remedial works to stabilise the entrance and maintain airflow. Many hibernacula have been lost through entrances being blocked or the dumping of domestic refuse. Health and safety issues may preclude some inspection work.

3.1.5 *Disturbance*

Disturbance can be a major problem for bats but can be difficult to define. The objective should be to ensure that the level of disturbance does not negatively impact on the bats. In practical terms this can be achieved by ensuring the site is secured against unauthorised access and that there is agreement in place to limit human access to sensitive areas. For monitoring purposes it would be useful to document current levels of disturbance so that future changes can be assessed against this baseline, which will vary from site to site. It seems logical that noise, vibration or other disturbing factors originating off-site could be taken into account if it has an effect on protected species occupying the site. This may have implications for development or land-use change proposals close to the site.

Bats are particularly vulnerable to disturbance when hibernating. Some will arouse in response to changes in light or noise levels and virtually all will arouse if touched, resulting in unnecessary energy expenditure and hence increased risk of over-winter mortality. Bats may move hibernacula in search of suitable temperature regimens or feeding sites.

3.1.6 *Condition of surrounding habitat*

The habitat surrounding roosts is usually not included in the site designation, except in the case of some sites in Wales, where flight lines and foraging areas are protected. In sites where the habitat is included there should be no degradation (change in the composition and

structure or reduction of the area or length) of the designated flight line (e.g. hedges, lines of trees, scrub) from the roost or in composition or size of feeding habitat. Maps and aerial photographs of the site will be particularly useful in making between visit comparisons.

3.1.7 *Population monitoring*

For maternity colonies a population size target should usually be set, as described in Tables 2 and 3. Where it is not feasible to make a direct count, either externally or internally, a target should be set for the presence of bats as indicated by droppings (see tables for details). For hibernating bat populations the mandatory target is only for bats to be present; population counts are recommended for providing useful information but should not be used directly as part of the condition assessment (see Table 4).

Population monitoring is important as it means that off-site activities, such as development, that might cause the bats to abandon the site, can be taken into account when carrying out an 'appropriate assessment' of the impact of the proposed development. It is also an important attribute when considering the relationship between protected sites and the wider countryside and in assessing the conservation status of the species involved.

In buildings, it may be possible to carry out internal counts of roosting bats during the summer, but care should be taken not to cause excessive disturbance and such counts should only be undertaken by trained and licensed bat workers. Dusk emergence counts are preferred and can be undertaken by non-specialists and carried out outside the roost access.

Bat hibernation sites should be inspected by appropriately trained and licensed people. Highest numbers of bats are normally present at the end of January, so a single annual inspection is best carried out at this time. Remote monitoring methods may be considered (e.g. bat detectors and tape recorders or sensors and loggers).

The National Bat Monitoring Programme, run by the Bat Conservation Trust, collects annual data across the UK on population trends for a number of species. Methods used include colony counts at known roosts and hibernation sites and bat detector transects across open country and in riparian habitats. There is, therefore, a source of annual data for some species, particularly lesser horseshoe bats. The standardised NBMP survey protocols (BCT, 2001) should be followed at all sites (see Table 1 for details of external data sources).

3.2 Otters

Sites chosen for otters have been selected on the basis of their current populations. The LIFE in UK Rivers Report has information on otter habitat requirements and monitoring otters in River SACs, and is an essential reference document.

The main attributes considered to be of importance are:

- Food availability
- Anthropogenic mortality
- Toxic chemicals
- Presence of otters

A factor which is sometimes considered to be important for otters is the presence of laying-up and breeding sites. However, there is no evidence that this attribute has any impact on otter

populations in protected sites, although in some areas the availability of resting sites may be a limiting factor. It would also be extremely difficult to decide on a reasonable target and a means of measuring the attribute. Therefore, presence of breeding sites has been omitted from the otter attribute table (Table 5). More detailed guidance for surveying inland otter populations is given in Appendix II.

3.2.1 *Food availability*

Studies have shown that once a river catchment is fully colonised by otters, the size of the population will be determined by the abundance of suitable prey. Monitoring of fish stocks in England and Wales is carried out by the Environment Agency and largely targeted at species of economic importance. The LIFE in UK Rivers Report (LRR) identifies four main categories of monitoring and lists SACs in England and Wales where fish monitoring occurs. In Scotland, most of the data on fish species are gathered by the various local fishery trusts or foundations. A broader regional/national picture of the data can be accessed through the Scottish Fisheries Co-ordination Centre (SFCC). The SFCC is based at the Freshwater Fisheries Laboratory at Pitlochry, which may also provide relevant data and advice.

The majority of protected sites will have some fish stock information, but some have no monitoring at all, and for most the information provided is unlikely to be adequate to assess total food availability. However, there is an obligation to monitor fish communities under the Water Framework Directive and a more comprehensive monitoring system is being instigated by the Environment Protection Agencies (EA, SEPA etc.).

3.2.2 *Anthropogenic mortality*

The impact of human activities also affects otter populations in some areas, e.g. deaths from road accidents, construction of new roads (resulting in habitat fragmentation), and incidental mortality in fishing gear, including lobster creels. Road casualty records are available from a number of sources (Country Agency mammal specialists can advise on these). High numbers of otter road casualties within or adjacent to SAC catchments will affect the condition of the population and mitigation measures should be instigated to reduce the levels as quickly as possible (see LRR for more details).

3.2.3 *Toxic Chemicals*

The main impact of toxic chemicals is likely to be through its effect on fish stocks, but direct effects through the improper use of pesticides are possible. The Environment Agency has an extensive and comprehensive monitoring scheme for pesticides and the LRR recommends that periodic reviews should be undertaken to identify potentially problematic pollutants and national trends. It should also be possible to obtain information for some individual SACs.

3.2.4 *Population monitoring*

The presence of otters can be determined by carrying out standard sign surveys. The main problem with monitoring otter populations is the lack of a clear relationship between the density of signs and the density of otters. There is currently no way of reliably estimating otter density, although the use of DNA extracted from spraints may provide a solution to this in the future. Coastal otter population density has been related to holt density in Shetland, but this relationship cannot reliably be applied elsewhere.

There has been a series of national surveys, commencing in the 1970's, taking place every seven years, noting otter presence/absence on selected survey sites across the UK. The data collected have provided information on changes in otter distribution and inferences have been drawn about changes in population size but there are no robust data on population trends.

The LRR recommends a monitoring protocol using natural and artificial sprainting sites that could provide population trend information on individual sites and that addresses the problem of sample sizes on small SACs (see LRR for details of monitoring protocol). This method should be used in SACs in England, Wales and Northern Ireland and the recommendation is annual monitoring for the first five years to test the effectiveness of the method. Monitoring otter populations in Scottish SACs is based on a slightly modified version of the method used in the national surveys (see Brewer *et. al.*, 2002 for monitoring protocol).

The site assessment can be carried out by anyone who can identify otter signs in the field and suitable habitats with the aid of a checklist. However, previous experience and/or practice in identifying both, particularly signs, is preferable and is likely to affect the results of the monitoring. Equipment required includes appropriate safety clothing, maps, a camera and binoculars and some sealable sample bags if spraints are being collected for confirmation of identification. Appendix I includes an example of the population monitoring procedure used on a particular riverine site

Signs include spraints, footprints, tracks and feeding signs. For descriptions and drawings of otter signs, refer to 'Otters and River Habitat Management' (Environment Agency, 1999), the 'Rivers and Wildlife Handbook' (RSPB, NRA, RSNC, 1994), which provides guidance on standard otter survey techniques, and How to Find and Identify Mammals (Sargent & Morris, 1997). As this monitoring is largely concerned with signs rather than sightings, it can be undertaken at any time of day, although dry weather conditions directly preceding and during the monitoring visit are vital, as heavy rain and floods can wash away spraints, footprints and other signs, which may give a false indication of otter absence. Ideally the weather should have been dry for at least a week before the monitoring visit.

Otters can be surveyed at any time of the year, but the best time of year is probably spring (provided river levels are not too high), before the vegetation becomes too dense to find otter signs.

3.3 Water voles

Attributes of importance include:

- Habitat quality
- Water levels
- Predation (presence of mink)
- Presence of water voles

Of these, habitat quality and the presence of mink are undoubtedly the most important in terms of conserving water vole populations. Two handbooks provide invaluable advice for water vole monitoring, The Water Vole Conservation Handbook (Strachan, 1998) (WVCH) and The Mink and the Water Vole: Analyses for Conservation (Macdonald & Strachan, 1999) (MWAC). Both contain information on water vole biology, habitat preferences and management, the effects of mink on water voles, mink signs, detailed survey methods for

habitat features and water vole and mink populations, and mink trapping procedures. The WVCH handbook provides examples of completed survey forms and in the Appendices survey forms that can be copied for use in the field.

3.3.1 *Habitat quality*

The quality of the habitat is important for water voles because they are herbivores, feeding mainly on reeds, sedges, rushes, sweet grasses and bur reeds (Strachan & Jeffries, 1993). Diet composition changes seasonally and pregnant water voles sometimes eat flowers, freshwater molluscs and crayfish (Strachan, 1997). Water voles also show high site specificity and require earth or clay banks or water meadows and wetlands with tussocks of grass, sedge, rush or reed where they can burrow or make dry nests above the water table. In upland areas, peat-rich areas on level or gently-sloping ground are preferred, enabling easy excavation of burrow systems.

Unlike otters, therefore, water voles rely on appropriate herbaceous bankside vegetation and other specific habitat features such as bank substrate and penetrability, so any level of change to the site could be detrimental. For large reedbeds, site, and therefore monitoring 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. In the uplands, it appears that water voles occur as metapopulations in the upper catchments of river systems even though they may be at low overall densities. Conservation strategies in such areas therefore need to be developed at a suitably large scale and may need to encompass the headwaters of more than one river catchment.

A site map should be used for habitat monitoring and if a River Corridor Survey or River Habitat Survey has been carried out on any part of the site then that information can be overlaid on the map. In addition to any existing habitat information, the protocol outlined in WVCH for collection of habitat data should be followed. The examples of survey forms in WVCH were used in the national surveys and some adaptation may be required for assessing percentage of particular habitats within a site.

3.3.2 *Water levels*

Long-term stability of water levels appears to be important for water voles and excessive flooding or drying of watercourses can make them unsuitable for water vole populations. Aquatic margins may be exposed to frost during dry winters and water voles may leave dried out sites in the summer. Sometimes water voles appear to like deeper water, up to 2m in depth. It is therefore, important to monitor on site water levels and ensure that fluctuations are not excessive. EPA data on water abstraction, measuring on site water levels and flow rate and undertaking management recommended in WVCH will help to maintain water levels within acceptable limits.

3.3.3 *Predation*

There is widespread agreement that predation by the introduced American mink is a significant factor in the current steep decline in water vole populations. Therefore monitoring the presence of mink on and around designated sites in conjunction with water vole monitoring is desirable. The main predation pressure arises when female mink are nursing their young and females may hunt 1.5km up and downstream of their dens every night during

this period (Strachan, 1998). The WVCH survey forms have space for recording information on rat, otter and mink signs.

3.3.4 *Population monitoring*

There have been two National water vole surveys in 1989/90 and in 1997/98 and some of the pre-selected survey transects may fall within designated sites, giving some background information. Furthermore, a series of national key sites for water voles has been set up and each site should have baseline information about water vole populations, appropriate management, and a commitment to long-term monitoring. Finally, many local and more detailed surveys have been undertaken across the country, so it is advisable to investigate appropriate local data sources before undertaking condition monitoring for this species.

Water voles form colonies during the breeding season with females setting up non-overlapping territories, ranging from 30-150m in length along a watercourse, marked by latrine sites. It is, therefore, possible to assess population density and trends from latrine counts. However, it should be noted that the relationship between population size and latrine counts varies according to habitat type and for the purposes of interest feature monitoring, presence or absence of the species in a site will be sufficient to assess whether populations are being maintained.

Periodic monitoring should be undertaken to ascertain the presence of the species. A monitoring protocol, detailed in Appendix II, has been devised for the national key sites and can be used to assess water vole presence.

4. ASSESSING FEATURE CONDITION

4.1 Determining Favourable/Unfavourable Condition

4.1.1 Habitat attributes

For mammal features the general rule is that all attributes must meet their targets for the feature to be in favourable condition, unless otherwise stated in the accompanying notes. This means that any one attribute failing to meet its target will result in an unfavourable condition judgement for the interest feature.

4.1.2 *Population monitoring targets*

Natural fluctuations in mammal populations may make it difficult to obtain statistically defensible population trends at individual sites. Methods and formulae for assessing population change in bats and water voles are set out in Appendix II of this document. Annual monitoring is recommended for both species. Annual monitoring is also recommended for the first five years of otter surveys in order to test the LRR method. Thereafter, less frequent monitoring, once every five or six years, should be sufficient.

In general, once population size and indication of trend in population numbers has been assessed, then a decision can be made on whether or not the target for the species population attribute has been met. If the target is not met and, subsequently, there are no signs of population recovery, or if the population has continued to decline since the last reporting

cycle, then the attribute will continue to fail to meet its target. If during a reporting cycle the population shows signs of increasing at a rate equal to or greater than those specified in the individual attributes tables, then the target will have been achieved. This is because the assumption is made that the population is recovering.

4.2 Assessing the Trend in Condition of a Feature in Unfavourable Condition

If an unfavourable condition judgement is made then on subsequent monitoring visits the trend in the condition of the feature has to be assessed. If the feature has returned to favourability it is reported as **favourable recovered**. However, if it is still unfavourable it is necessary to decide whether the feature condition is declining, has not changed or is recovering.

The number of attributes for each interest feature that fail to meet their targets can be an indication of trend in condition. This includes species population attributes (but see 4.1.2 above). For example, if an interest feature has 6 attributes and two of those attributes have failed to meet their targets in the first monitoring cycle, then the feature is **unfavourable**. If, at the next monitoring cycle, three attributes fail to meet the targets then the feature is **unfavourable and declining** in condition. If two attributes fail again then there is no change in the feature condition from the previous monitoring cycle, and the feature can be considered to be **unfavourable no change**.

Determining whether a feature can be classed as **unfavourable recovering** requires not only an assessment of the number of attributes failing to meet their targets compared with the previous reporting cycle, but also the effectiveness of management action taken. Only when appropriate management has been carried out on all attributes that failed in one reporting cycle and, as a result, they are likely to meet their targets in the next or subsequent cycles, can the interest feature be classed as **unfavourable recovering.** If management has been carried out so that one failed attribute meets its target in the next reporting round but there is no indication of improvement in another failed attribute then the interest feature will continue to be unfavourable no change regardless of the fact that there are actually less failed attributes than in the previous reporting cycle.

Trend in feature condition will be reported at the end of each (6-year) monitoring cycle. Different attributes failing throughout the cycle should not affect the final reporting outcome, because for the purposes of CSM all attributes have the same weighting.

4.3 Partially Destroyed and Destroyed categories

When considering these categories reference should be made to sections 17.5 and 17.6 of the general introduction. If a condition assessment for an interest feature on a site is unfavourable then a decision has to be taken on whether or not management action will address the problem. If no management action can be taken then a decision has to made on whether the interest feature is partially or completely destroyed at that site. An example of a destroyed feature would be the demolition of a building containing a bat roost or an earth movement collapsing a cave or tunnel being used as a bat hibernaculum. In these cases restoration in the foreseeable future is most unlikely and the interest feature, the bats, could no longer occupy the site. For monitoring purposes the feature would be considered to be destroyed.

The Partially Destroyed category is difficult to apply directly to species interest features, but could be applied to habitat attributes that affect species. For example, part of a site occupied by water voles could be destroyed, resulting in a reduction in the total population in the site but not the complete loss of the population from the site.

5. UNDERSTANDING THE IMPLICATIONS OF CONDITION ASSESSMENT TO INFORM MANAGEMENT ACTION

Interest feature condition assessment may show that although a site appears to be in satisfactory condition, the feature is not using it to the same extent as previously. It is important to use feature assessment to guide management action and using contextual information from the wider countryside is an important part of that assessment. This is particularly true for mammals, because they tend not to be habitat specific and the species for which sites have been designated tend to be wide ranging. For example, bats use multiple roosts and forage in habitats that may not be included in the series of protected sites. Similarly, the territory size of otters may extend beyond the area of the designated site and a small SAC may only support one or two otters, which for monitoring purposes does not constitute a population. Therefore, numbers of mammals occurring on designated sites will be greatly influenced by changes in populations occurring across the UK, and understanding the significance of changes in numbers at a site depends crucially on the understanding of wider contexts.

Important factors influencing local population sizes include patterns of land-use change (such as agricultural intensification, upland over-grazing, afforestation, *etc*.) and more recent distribution shifts within the country that seem to be the early consequences of changing climate. National mammal monitoring schemes provide information on changes in population abundance and distribution of mammal species in the wider countryside. In particular, the National Bat Monitoring Programme, the series of national otter surveys, and the national water vole surveys referred to in Table 1, provide essential contexts for appropriate decision making and interpretation.

6. EXTERNAL DATA SOURCES

There are a number of national survey schemes in operation, collecting data on mammal numbers or trends in mammal populations both annually or on a regular cycle. In addition, many mammalogists collect data at a local scale for their own interest. This means that there are significant amounts of data being collected that may be useful for CSM. Finally, there are a number of surveys on associated habitat features, food sources and non-biological factors that can provide information for CSM assessment. Table 1 presents an overview of surveys throughout the UK that provide useful data for the relevant mammal species and should be consulted prior to organising additional survey on sites. Agency mammal ecologists will be able to provide specific advice on whether suitable data may be available for a particular species, how to obtain data and how to interpret them for CSM purposes. The availability of existing data should always be checked before time is spent on planning novel surveys at individual sites. Some of these data may be available through the National Biodiversity Network Gateway http://www.searchnbn.net/

Sites that are also nature reserves under the management of a non-government organisation (e.g. Wildlife Trusts, RSPB or National Trust) may also have additional data collected by

these organisations, and it would be worthwhile developing a link to the organisation and discussing data availability with them.

Finally, special surveys may have been conducted by your Agency on a site during the reporting cycle that you may not be aware of, and it may be worthwhile checking internal reports for such information. The available survey data for water vole and otter is generally insufficient for casework purposes and for undertaking appropriate assessments on SACs etc.– more detailed site-specific surveys usually need to be commissioned in these situations.

Table 1. Information on national mammal surveys and other relevant datasets for monitoring mammal interest features

Scheme	Organiser	Data	Geographical Scope
BATS			
National Bat Monitoring Programme	Bat Conservation Trust.	Colony counts of a number of bat species including Lesser horseshoe bats. Developing a protocol for Bechstein's and Barbastelles. Hibernation site counts for a number of species	Repeated sites across the UK. 34 Lesser horseshoe sites covered in England.
CCW lesser horseshoe colony counts	Countryside Council for Wales	Counts of > 100 roosts, both SSSI and SAC. Some roosts have automatic counters installed. Contact CCW Mammal Ecologist for details	Wales
Greater horseshoe colony counts	English Nature, CCW, VWT and others	Dated counts at sites	England and Wales
Bat colony site records	SNCOs	Record of roost location, bat species, possible colony size or colony counts, some habitat information and detail of building where roost located	At SNCO offices across the UK. Database of information for England up to 1990 held at EN Peterborough
OTTERS			
National otter surveys	VWT, EN, SNH, CCW, EA, Water UK, Wildlife Trusts.	Periodic countrywide surveys, every seven years, since 1970s, assessing otter presence on a selection of sites. Data on the surveys held at JNCC	UK wide on a country basis, sampling 600m transects of waterway.. Some transects may fall within designated sites.

Scheme	Organiser	Data	Geographical Scope
Site specific otter information	Local Record Centres – Wildlife Trusts, (Country Agencies)	Information on location of holts, otter sightings (Limited site-specific data held in some SNCO offices)	Patchy distribution and quality but worth investigating for local area.
Habitat information for otter sites	Environment Agency	River Habitat Survey	Countrywide. Good baseline data but unlikely to be a good monitoring tool because of patchy distribution and survey frequency.
Otter road casualty data	Welsh Roads and Otters Steering Group. Data held by Environment Agency Wales CITES database, held at JNCC. Data for Scotland not centralised, but contact relevant SNH specialist for contact details.	Information on otter road casualties, including location, date, sex, age etc	Wales UK Scotland
Electronic data sources for otter sites – OS maps and aerial photographs	EN CCW	1:10,000-1:50,000 OS maps of England. Aerial photographs Aerial photographs accessible through Get Mapping	England and Wales
Fish stock information for otter sites	Environment Agency Area Offices In Scotland: local fishery trusts and foundations. Also, the Scottish Fisheries Co-ordination Centre (Pitlochry)	Principally migratory salmonids	England and Wales Individual Scottish catchments and Scotland respectively
Pollution/water quality	Environment Agency SEPA	Chemical and biological water quality data. See also various institutions e.g. CEH, University College London for acidification data	GB
CAMS Catchment	Environment Agency	River reaches in a catchment are assigned	England, Wales

Scheme	Organiser	Data	Geographical Scope
Abstraction Management Strategy		a River Flow Objective or minimum flow regime, and abstraction should be managed to ensure that flows do not fall below it.	
WATER VOLES			
National water vole surveys	Vincent Wildlife Trust (Strachan & Jefferies, 1993, Strachan et al., 2000)	Two surveys 1989/90 and 1996/98 covering 2,970 600m riparian sites	GB
Site specific water vole information	SNCO Area offices Record Centres Wildlife Trusts	Information on local records of water voles and local/catchment based surveys	Patchy distribution and quality but worth investigating for local area.
Site specific survey protocols	Wildlife Conservation Research Unit, Oxford Strachan, 1998, Macdonald & Strachan, 1999	Two handbooks: *Water vole conservation handbook; The mink and the water vole: analyses for conservation,* providing information on habitat requirements, survey and monitoring protocols, predation pressure, threats etc.	UK

7. ATTRIBUTES TABLES FOR MAMMALS

This section contains the attribute tables for monitoring individual interest features. They should be used in conjunction with the relevant sections of the guidance above to set conservation objectives in the form of attributes and targets for monitoring as appropriate to each specific interest feature.

Table 2. Interest feature: Maternity colonies of horseshoe bats. Refers to greater horseshoe and lesser horseshoe bats

Reporting category: Mammals

If any targets for attributes have not been met then the interest feature is in unfavourable condition, unless indicated in the notes.

Attribute	Target	Method of Assessment	Comments
Site security[1]	Access to the site under control of the owner/occupier or site secured against unauthorised access.	▪ Ability to prevent unauthorised access. ▪ External inspection of security features (doors, gates, fences, grilles and any defects noted).	Unauthorised access refers to non-residential sites (unoccupied buildings, mines, caves, cellars etc.)
External condition of building[1]	Fabric of building sufficient to maintain roost conditions internally with: ▪ Weatherproof roof ▪ No holes allowing excessive heat loss or high light levels in the roost area. ▪ Walls sound, rainwater goods in adequate condition. ▪ Solar heating sufficient to maintain adequate roost temperature, with no significant shading of the main roost area by trees.	▪ Assess overall state of repair noting damage to roof, walls and guttering. ▪ Internal inspection required if damage suspected but not confirmed by external inspection[2]. ▪ Note orientation of the building (NSWE) and position, height and degree of overhang from trees close to the building in order to assess degree of shading from the sun.	Sound roof-covering (including roof fabric of cellars) essential to generate high internal temperature and low light level. If internal inspection required then should be carried out by a licensed bat worker[2]. Solar heating should provide high internal temperature.
External condition of underground site[1]	No recent falls or signs of geological instability.	▪ Damage to structure caused by tree root growth should be inspected. ▪ Geological stability. May require inspection by geologist or mine engineer.	

Attribute	Target	Method of Assessment	Comments
Roost access(es) –buildings and underground sites[1]	Roost access(es) in suitable condition to allow emergence by bats, with: ▪ Unobstructed roost access large enough for bats to fly through unimpeded. ▪ No reduction in access size. ▪ No artificial lights shining on access or associated flight paths. ▪ Access used by bats stable	▪ Close-up photographs required. ▪ Measure size, note position and accessibility of access(es) available to bats. ▪ Note presence of artificial lights, proximity to access(es). ▪ Geological stability. May require inspection by geologist or mine engineer.	Horseshoe bats prefer to fly through an entrance. Normal minima: greater horseshoes 400x300mm lesser horseshoes 300x200mm Bats may choose smaller entrances than recommended but changes to entrances are undesirable.
Disturbance[1]	Disturbance level acceptable to bats with: ▪ No increase since previous visit. ▪ Human access to roost area controlled and limited (e.g. grilles on underground sites).	▪ Degree of human activity around the roost area, particularly the access points. Look for public access near roost entrance, proximity to roads/tracks, level of use by people/vehicles etc. ▪ ▪ Degree of human activity within roost area, e.g. the number of times the roost area visited by humans during the breeding season. ▪ Baseline level will need to be established at first survey and then there should be no increase in that level thereafter.	Acceptable limits will depend on what the bats have traditionally accepted[1].

Attribute	Target	Method of Assessment	Comments
Internal condition of building/ underground site in roost area[2]	Internal fabric of building/underground site sufficient to maintain roost location, with: ▪ No significant water penetration. ▪ Low light levels with no through draught. ▪ No toxic substances present which would adversely affect the health of the bats. ▪ No recent falls or signs of geological instability	▪ Assess overall state of internal repair particularly near the roost location. ▪ Light levels should be low – as a guideline a torch should be required. ▪ Ventilation. Look for openings into the roost area allowing draughts. ▪ Question site owner/occupier regarding timber treatment. Note chemical smell from timbers, chemical containers, dead bats etc. ▪ Geological stability. May require inspection by geologist or mine engineer.	Can only be undertaken by a licensed bat worker[2].
Temperature of roost area (Discretionary)	Fitted heaters providing mean temperature in July greater than 20^0C	▪ Internal temperature logged continuously for the month of July. A minimum of two data loggers (e.g. TinyTalk loggers) should be placed in the roost area, one 3 feet from the roost location and one placed to log the general temperature of the site e.g. suspended from the roof apex of a building.	Heaters may be fitted to some roosts if solar heating is inadequate or unavailable (cellars, caves). Where heaters have been fitted in a roost temperature logging may give important management information.
Population size	Population maintained or increasing: ▪ An overall decline of 25% or more compared with population baseline at notification, would be unfavourable	▪ The NBMP colony count protocol should be followed and involves external counts of the number of adult bats emerging from the roost during the summer period before birth of young. ▪ Internal counts may be undertaken at certain roosts but require a licensed bat worker[2]. ▪ Annual counts preferable –minimum every 2 years. ▪ Follow recommended method in Appendix II of CSM guidance for assessing population trend.	Counts require specialist input. Information on annual counts may be obtained from local Bat Groups, SNCOs and the National Bat Monitoring Programme (NBMP).

Attribute	Target	Method of Assessment	Comments
Presence of bats (only required if it is not possible to count bats by other means)	Evidence of presence of bats in the roost area, with: ▪ Droppings pile beneath roost, with fresh droppings on top. ▪ No decrease in area covered by droppings.	▪ Undertaken by a licensed bat worker[2]. ▪ In buildings remove all droppings from site at beginning of season (April). At end of season (Sept/Oct) measure extent and depth of dropping area, then remove droppings. ▪ Annual counts preferable –minimum every 2 years.	Measuring dropping production can give an indication of roost usage.
Flight lines from roost in surrounding habitat and feeding habitat[3]	▪ No degradation (change in the composition and structure or reduction of the area or length) of the designated flight line (e.g. hedges, lines of trees, scrub) from the roost. ▪ No change in composition or size of feeding habitat.	• Use OS, phase 1 and site maps and aerial photographs to assess boundary and length of protected flight lines and area of foraging habitat. ▪ Use maps and site visit to note habitat composition, structure and cover (area and length).	

Notes.

1. The variation between maternity sites and strong adherence of the bats to their traditional sites makes it difficult to devise attributes that do not refer to the previous condition of the site; this emphasises the importance of keeping photographs and file notes on the condition of the site and making necessary comparison with previous reports and photographs.

2. Most condition attributes can be assessed from an external inspection. If condition assessment requires an internal inspection then a licensed bat worker should carry out the inspection and care should be taken to avoid disturbing the bats between June and September.

3. Not all greater and lesser horseshoe SSSI include flight lines and foraging habitat. Measurement of the attribute of flight lines and feeding habitat can only be undertaken at sites where these are included in the SSSI designation.

Table 3. Interest feature: maternity colonies of bats. Refers to barbastelle and Bechstein's bats

Reporting category: Mammals

If any targets for attributes have not been met then the interest feature is in unfavourable condition**,** unless indicated in the notes.

Attribute	Target	Method of Assessment	Comments
Site security[1]	Access to the site under control of the owner/occupier or site secured against unauthorised access.	▪ Ability to prevent unauthorised access. ▪ External inspection of security features (doors, gates, fences, grilles and any defects noted).	Unauthorised access refers to non-residential sites (unoccupied buildings, mines, caves, cellars etc.)
External condition of building[1]	Fabric of building sufficient to maintain roost conditions internally with: ▪ Weatherproof roof ▪ No holes allowing excessive heat loss or high light levels in the roost area. ▪ Walls sound, rainwater goods in adequate condition. ▪ No significant shading of the main roost area by trees so that solar heating can occur.	▪ Assess overall state of repair noting damage to roof, walls and guttering. ▪ Internal inspection required if damage suspected but not confirmed by external inspection[2]. ▪ Needs comparison with previous reports and photographs. ▪ Note orientation of the building (NSWE) and position, height and degree of overhang from trees close to the building in order to assess degree of shading from the sun.	Sound roof-covering (including roof fabric of cellars) essential to generate high internal temperature and low light level. If internal inspection required then should be carried out by a licensed bat worker.

Attribute	Target	Method of Assessment	Comments
Roost access (es) - building (if known)	Roost access(es) in suitable condition to allow emergence by bats with: • Unobstructed access points ▪ No change in size sufficient to affect air-flow and internal temperature. ▪ Vegetation providing sheltered flyways without obstructing access(es). ▪ No artificial lights shining on roost access(es).	▪ External inspection of the roost access(es). ▪ Size of access(es) available to bats. ▪ Presence of vegetation or artificial lighting around access(es). ▪ Needs comparison with previous reports or photographs ▪ Assess once in 6 years	Significant changes may require management. Appropriate management will depend on the history of the site.
Disturbance[1]	▪ No increase since previous visit. ▪ No new rights of way, paths or rides close to the roosting area(s) in woodland sites	▪ Degree of human activity around the roost area, particularly the access points. Look for public access near roost entrance, proximity to roads/tracks, level of use by people/vehicles etc. ▪ Use OS and site maps to note position of existing paths and rides. Baseline level will need to be established at first survey and then there should be no increase in that level thereafter.	Acceptable limits will depend on what the bats have traditionally accepted[1].
Internal condition of building in roost area	Internal fabric of building sufficient to maintain roost location, with: ▪ Roof timbers in adequate condition to support roof, with no significant water penetration. ▪ Low light levels with no through draught. ▪ No toxic substances present which would adversely affect the health of the bats.	▪ Internal inspection required. ▪ Assess overall state of repair by examining the structure of the building, particularly near the roost location. ▪ Light levels should be low – as a guideline a torch should be required ▪ Ventilation. Look for openings into the roost area allowing draughts ▪ Question site owner/occupier regarding timber treatment. Note chemical smell from timbers, chemical containers, dead bats etc.	Can only be undertaken by a licensed bat worker[2].

Attribute	Target	Method of Assessment	Comments
Temperature of roost area **(Discretionary)**	Fitted heaters providing mean temperature in July greater than 20°C.	Internal temperature should be logged continuously for the month of July[2]. A minimum of two data loggers (e.g. TinyTalk loggers) should be placed in the roost area, one 3 feet from the roost location and one placed to log the general temperature of the site e.g. suspended from the roof apex of a building.	Where heaters have been fitted in a roost or where temperatures are likely to be low (e.g. cellars, caves) temperature logging may give important management information.
Woodland site	Woodland maintained in suitable condition for bats with: ▪ No loss of ancient semi-natural stands ▪ At least the current level of structural diversity, including understorey. ▪ Canopy cover present over 50-90% of area. ▪ A minimum of 4 trees per ha allowed to die standing and not removed or cut down ▪ Signs of seedlings growing through at sufficient density to maintain required canopy cover over a 10-year period. ▪ No overall loss of open water.	▪ Extent/location of stands as identified on map. ▪ Note age/size class variation within and between stands. ▪ Random quadratting in area of roost site noting percentage cover and number of species in understorey. ▪ Use woodland guidance to assess % canopy cover and woodland structural diversity ▪ Note if standing dead trees present in site ▪ Random quadratting of gaps and edges in woodland to note and count successful establishment of young stems. Refer to woodland guidance. ▪ Note number and position of ponds or streams on OS, phase 1 or site maps.	A dense understorey around trees with crevices may be essential in some climatic regimes but less so in others.

Attribute	Target	Method of Assessment	Comments
Population size	Population maintained or increasing: ▪ An overall decline of 25% or more compared with population baseline at notification, would be unfavourable	▪ The NBMP colony count protocol should be followed. ▪ External counts of the number of adult bats emerging from the roost during the summer period before birth of young. ▪ Internal counts may be undertaken at certain roosts but require a licensed bat worker[2]. ▪ Annual counts preferable –minimum every 2 years. ▪ Follow recommended method in Appendix II of CSM guidance for assessing population trend.	Counts require specialist input. Information on annual counts may be obtained from local Bat Groups, SNCOs and the National Bat Monitoring Programme (NBMP).
Presence of bats (only required if it is not possible to count bats by other means)	▪ Droppings pile beneath roost, with fresh droppings on top. ▪ No decrease in area covered by droppings	▪ Undertaken by a licensed bat worker[2]. ▪ In buildings remove all droppings from site at beginning of season (April). At end of season (Sept/Oct) measure extent and depth of dropping area, then remove droppings. ▪ Annual counts preferable –minimum every 2 years. Assess once in 6 years.	Measuring dropping production can give an indication of roost usage.

[1] The variation between sites and the strong adherence of the bats to their traditional sites makes it difficult to devise attributes that do not refer to the previous condition of the site; this emphasises the importance of keeping file notes and on the condition of the site and photographs to allow comparison between assessments.

[2] Most condition attributes can be assessed from an external inspection. If condition assessment requires an internal inspection then a licensed bat worker should carry out the inspection and care should be taken to avoid disturbing the bats between June and September.

Table 4. Interest feature: hibernating populations of bats. Refers to barbastelles, Bechstein's, greater and lesser horseshoes, mixed assemblages

Reporting category: Mammals

If any targets for attributes have not been met then the interest feature is in unfavourable condition, unless indicated in the notes.

Attribute	Target	Method of Assessment	Comments
Site security[1]	Access to the site under control of the owner/occupier or site secured against unauthorised access.	▪ Ability to prevent unauthorised access. ▪ External inspection of security features (doors, gates, grilles, fences, and any defects noted) to ensure sound condition and able to resist unauthorised access attempts.	Unauthorised access refers to non-residential sites (unoccupied buildings, mines, caves, cellars etc.) Repairs should be made as soon as practicable.
Site access(es)[1]	Site entrance in suitable condition to allow continued use by bats with: ▪ Existing access(es) unobstructed. ▪ No unplanned new access(es) causing a change to ventilation. ▪ No change in size sufficient to affect air-flow and internal temperature. ▪ Access(es) used by bats stable. ▪ No recent falls or signs of geological instability. ▪ Vegetation present close to access(es) but not obstructing it (them). ▪ No artificial lights shining on access(es).	▪ A baseline level should be established on the first visit and there should be no change thereafter. ▪ Note size, number and location of access(es) available to bats. ▪ Damage to structure caused by tree root growth should be inspected. ▪ Geological stability. May require inspection by geologist or mine engineer. ▪ Note presence, position and extent of vegetation in relation to site access(es) ▪ Note presence and position of artificial lighting around access(es). ▪	

Attribute	Target	Method of Assessment	Comments
Conditions of site[1] (external and internal)	Site suitable to maintain hibernation conditions with: ▪ Roost area used by bats stable. ▪ Site cool (8-12^{o}C) and dark, once beyond the entrance zone. ▪ No significant unplanned change to ventilation or temperature regimen. ▪ No toxic substances present (dumping of oil or other substances).	▪ Refer to chapter 11 of the Bat Workers' Manual for information on internal conditions of underground sites. ▪ Light levels should be low – as a guideline a torch should be required. ▪ Ventilation. Look for new features in the roost area that could change the air flow (new grille or entrance obstructed, new openings etc.) ▪ Temperature may be taken once per visit and does not have to be a continuous reading. ▪ Humidity can be measured at each visit but should be taken in the same location each time as it is likely to vary within the site. ▪ Annual assessment preferable.	Depends greatly on history of the site. Requires internal inspection by a bat worker with a hibernation license[2]. Consider installation of data loggers if more detailed temperature information is required. Significant changes may require management.
Disturbance[1]	No effect on hibernating bats with: ▪ No significant increase since previous visit. ▪ Human access to site controlled and limited.	▪ A baseline level should be established on the first visit and there should be no change thereafter. ▪ External assessment for noise, human activity (fires in entrance, new buildings nearby). ▪ Internal assessment for human activity within the roost area (grilles destroyed, grafitti present, unauthorised access). ▪ Annual assessment preferable.	Acceptable limits will depend on what bats have traditionally accepted[1]. Requires internal inspection by a bat worker with a hibernation license[2].

Attribute	Target	Method of Assessment	Comments
Use by bats: Presence/absence	Bats seen on at least one occasion per winter.	▪ Hibernating bats present in winter. If **no** bats present during 6 year reporting cycle the attribute is unfavourable. ▪ Annual visits recommended- minimum every 2 years. ▪ Assess once in 6 years.	Requires internal inspection by a bat worker with a hibernation license[2]. Information can be obtained from other sources such as local bat groups, SNCO offices.
Use by bats: Counts [3]	Bats counted on at least one occasion per winter[4]	▪ NBMP hibernation count protocol should be followed. ▪ Annual visits recommended- minimum every 2 years. Assess once in 6 years.	Requires internal inspection by a bat worker with a hibernation license[2]. Information can be obtained from other sources such as local bat groups, SNCO offices.

[1] The variation between hibernation sites and the strong adherence of the bats to their traditional sites makes it difficult to devise attributes that do not refer to the previous condition of the site; this emphasises the importance of keeping file notes on the condition of the site.

[2] Should an internal inspection be required, avoid disturbing the bats, particularly between October and March.

[3] For mixed assemblages this includes the number of bats of different species and the total number of bats.

[4] The target to count the number of bats over time should not be an attribute that causes the site to be in unfavourable condition. Climatic factors could affect bat use of the hibernation site and bats may select to use other sites if the temperature is particularly warm or cold. If numbers are declining or are low over the six-year monitoring period, compared with previous monitoring periods, then site and climate factors should be checked, as well as relevant features external to the site in the wider countryside.

Table 5. Interest feature: otter populations

Reporting category: Mammals

If any targets for attributes have not been met then the interest feature is in unfavourable condition, unless otherwise indicated in the Table. Detail on the selection of attributes, methods of assessment and sample survey forms can be found in the LIFE in Rivers Report.

Attribute	Target	Method of Assessment	Comments
Food availability[1]	Fish biomass stays within expected natural fluctuations.	▪ EA, local fishery trusts and/or SFCC data	
Habitat requirements coastal areas: **Freshwater for rinsing sea salt from the fur**	No reduction in overall availability of freshwater.	▪ Number of streams or small pools on or near the site.	Freshwater may be outside the SSSI boundary. Due to the distance otters can range, this attribute can only be indicative for a site. Can be assessed on site and using map information.
Anthropogenic mortality [2] **(Discretionary)**	Otter populations not significantly impacted by human induced kills.	▪ Road and rail casualties. ▪ Deaths due to fishing gear etc. ▪ Any site where there is a feature causing otter mortality. ▪ Data from EA's reporting system. Obtain views from EA on implications of recent data. ▪ JNCC otter data on the CITES database.	Monitoring this attribute, where appropriate should provide data for installing mitigation.

Attribute	Target	Method of Assessment	Comments
Toxic chemicals	▪ No increase in pollutants potentially toxic to otters.	▪ Monitoring by relevant Environment Protection Agency. Specialist group to meet at intervals to identify national trends and extract information on individual SACs.	Liaison between Country Agency Staff and EA/SEPA essential.
Otter population - coastal	▪ No decline in otter distribution or abundance.	▪ Regular surveys. ▪ Follow the recommendations of the BioSS report.	
Otter population – inland waterways	▪ Otters present on site. ▪ Population maintained or increasing.	▪ Regular surveys. ▪ Use LRR SAC monitoring scheme for river SACs in England, Wales and Northern Ireland. ▪ In Scotland follow the recommendations of the BioSS report. ▪ Annual survey recommended for first five years of LRR method.	

1. Accurate information on fish stocks is difficult to obtain according to a recent review of data from England, produced by the Environment Agency (Research and Development Technical Report TR W256, Otters- Fish Prey Availability, Biomass and Sustainability) and may be extremely difficult to interpret. However, there is an obligation to monitor fish communities under the Water Framework Directive and a more comprehensive monitoring system is being instigated by the Environment Protection Agencies.

2. This attribute is not mandatory and should be assessed at a local level for individual sites where anthropogenic mortality appears to be a problem.

Table 6. Interest feature: water vole populations

Reporting category: Mammals

If any targets for attributes have not been met then the interest feature is in unfavourable condition.

Attribute	Target	Method of Assessment	Comments
Habitat quality	Habitat quality sufficient to maintain water vole populations with: • At least 60% bank-side ground cover, with tall, herbaceous riparian plants. ▪ No change in channel form or bank profile. Maintain other parameters in satisfactory condition: ▪ Grazing levels ▪ Poaching by cattle ▪ Bankside shading ▪ Area of open water, i.e., prevent succession to 'terrestrial' habitat types.	• Use methods described and field survey proforma provided in The Water Vole Conservation Handbook ▪ Use River Corridor and River Habitat Survey information from EA/SEPA. ▪ Length of channel/bank altered by engineering works. ▪ Evidence of changes in stock density, e.g. measurements of sward height etc. ▪ Length of bank damaged by poaching ▪ Measurement of tree/shrub % cover. ▪ Measurement of % open water within channel	Proforma may need adaptation for individual sites. See example form in Appendix II

Attribute	Target	Method of Assessment	Comments
Water levels	▪ Water levels in satisfactory condition with long-term stability maintained.	▪ Data from EA and SEPA ▪ Catchment Abstraction Management Strategies (CAMS) assessment	Agricultural activities out with the site e.g. improved grassland and tilled land where previously unimproved pasture and seasonal wetlands existed, plus removal of hedgerows and associated ditches can affect drainage systems. Management may be required to reduce fluctuations in depth of watercourses.
Predation	▪ Mortality due to predators not impacting the population.	▪ Survey for mink using standard methods from MWAC and survey proforma from WVCH (see guidance notes). Record numbers of scats and other signs. ▪ Refer to mink trapping data (where available) to derive population indices.	Ensure that trappers accurately record trapping effort etc.
Water vole populations	▪ Water voles present, with populations being maintained at viable levels.	▪ Survey for water vole presence using method described in Appendix II of CSM guidance.	Proforma may need adaptation for individual sites.

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Appendix I

Using the CSM Guidance
1. Bats

Glynllifon SSSI/cSAC for lesser horseshoe bats *Rhinolophus hipposideros*

1.1 Introduction

Plas Glynllifon is located in North Wales and consists of a mansion house surrounded by a recreational Country Park and farmland. To the west of the estate the landscape extends out onto flat marshland to the sea some 2 km distant. The farmland to the east of the estate comprises extensive small field systems surrounded by hedgerows. The main land use is grazing stock with small to medium scale farms The Plas was rebuilt after a fire in 1836 destroyed the previous 17th Century mansion house. The gardens are also of historic interest and are referred to in a Latin text of 1639. Both the Plas and the Gardens are listed. A wall was constructed around the Estate in the mid 19th Century enclosing the gardens, parkland and farmland.

In 1993 parts of the mansion were notified as a SSSI, called Coleg Glynllifon (it was a college at the time) because the building is used for both breeding and hibernation by a large colony of lesser horseshoe bats *Rhinolophus hipposideros*. The SSSI consists of the cellars used by the lesser horseshoe bat colony and a boiler room adjacent to the courtyard. The site qualifies both as a nursery roost and hibernaculum.

Coleg Glynllifon cSAC was first submitted to the EC in 1995. The boundary of the SSSI and cSAC consisted only of those areas of the building known at that time to be used by the colony. A larger site boundary (179.62ha), submitted to the EC in December 2000, included some foraging areas and commuting routes within and immediately adjacent to the estate. An extension was proposed in 2002 to include autumn and winter hibernacula, two further nursery roosts and some additional foraging areas and flight routes, taking the site to approximately 189ha.

The nursery roost at Glynllifon is, on present information, the largest nursery roost of this species in Europe, with counts over 500 adult bats during the Wales lesser horseshoe bat summer roost surveillance programme since 2001. Counts using an automatic counter suggest that emergence counts by observers may underestimate the total number (Halliwell & Matthews, 2002). Bats counted during May and June will be mostly female bats (Schofield 1996) and therefore the size of the lesser horseshoe population dependent on this one site will be significantly higher than the number recorded during the surveillance period

In addition to being such a key nursery roost, a proportion of the bats hibernate in the cool areas of the cellars, with anywhere between 300 bats early in the winter to 180 being counted during the coldest period. Survey work at other lesser horseshoe nursery roosts and hibernacula in North Wales suggests that the majority of the bats from a nursery roost utilise those underground features providing suitable conditions for hibernation that are closest to the nursery roost – usually disused mine systems. However surveillance counts at hibernacula in North West Wales cannot account for the majority of bats counted during the summer.

1.2 Results

A visit was made to Glynliffon SSSI/cSAC on 15 January 2002 using the CSM guidelines to assess interest feature condition.

Fig 1. shows how the example datasheet in Appendix II can be adapted for use at a particular site and how assessment of bat roost and surrounding habitat features can be used to inform the decision on condition of an interest feature during a reporting cycle.

1.2.1 Estimation of population trends

Using the Glynliffon data some examples have been produced to show how population trends can be assessed.

Site notified in 1993 – Baseline population 451 bats
Subsequent annual counts

1994	362
1995	257
1996	259
1997	322
1998	303
1999	427
2000	460
2001	576
2002	562

Ten years of data are available for this site and it is possible to make an assessment of population change over that period of time. For the purposes of this example the ten years of data have been divided into two, five year reporting periods.

The population change is assessed using the following formula;

$$\frac{\text{(Population mean for reporting period – population estimate at designation)}}{\text{(Population mean for reporting period)}} \times 100$$

Putting some figures in the equation for the first 5 years, 1993- 1997:

$$\frac{330-451}{330} \times 100 = -36.6.$$

This indicates a population decline of 36.6% compared with the population at notification and would be considered unfavourable.

Figures for the next five years 1998-2002:

$$\frac{466 - 451}{466} \times 100 = 3.21$$

This indicates that the population has increased by 3.21% compared with the population at notification and that over the 10 year period the population has been fairly stable.

Assuming that the figures for the next five years 2003 - 2007 might be 520, 480, 400, 390 and 350 the calculation would be:

$$\frac{428 - 451}{428} \times 100 = -5.4$$

This would indicate a decline of 5.4 % compared with the population at notification. However, as this is less than the 25% indicated in the attribute tables, the population attribute cannot be considered to be unfavourable. The decision, based on existing data for this roost, seems to be sensible, because the population counts are quite variable. This may not be the case for all lesser horseshoe maternity colonies or maternity colonies of other species and an understanding of population dynamics at individual roosts should be an important consideration when making decisions on interest feature condition.

2. Otters

Preliminary survey of the River Camel cSAC for otter Lutra lutra populations

2.1 Introduction

The river Camel cSAC is located in Cornwall and represents otter in its main stronghold in England in the south-west of the country. Surveys have indicated a dense population along this river. Records show that these populations persisted even during the period when the otter was in serious decline over much of the rest of its range in England, and this area has acted as a nucleus for recolonisation of other parts of England. The river and its tributaries represent the more upland as well as lowland habitat types utilised by otters, satisfying requirements for adequate food supply throughout the year. The wooded lower reaches of the river provide excellent habitat for resting and breeding.

The LIFE in UK Rivers Report recommends that approximately 60 sites should be monitored in each cSAC for signs of otters in order to assess population trends. It also recommends that large cSACs should be split into sub-catchments or sections and a total of 60 sites monitored in each of these.

Otters frequently deposit spraint under or near bridges and footprints are also frequently found at them. Since bridges are also easily accessible, most Monitoring Sites will consist of a bridge and the adjacent banks within 50m. The report recommends that a preliminary survey of each cSAC is carried out in order to:

a) assess how many bridges might be suitable as Monitoring Sites;
b) assess the practicality of installing artificial sprainting sites;
c) provide an indication of the time required to carry out surveys;
d) test the recording form.

In July 2002, two days were spent carrying out a preliminary survey of the river Camel. To ensure a useful sample in a short time, visits were briefer than would normally be required. In order to maintain a reasonably representative sample, all bridges on the main river, the Allen,

the De Lank and the larger tributaries were checked. Tributaries flowing direct into the estuary (e.g. Amble) and a few small southern tributaries were not surveyed.

2.2 Results

A total of 60 sites were checked over the two days, approximately two thirds of the potential sites identified on the river. The distribution of these (as well as those identified as suitable but not surveyed) are illustrated in Fig 2. This also shows the distribution of National Survey Sites, which should always be used as monitoring sites unless they are unsuitable.

Nine sites were considered unsuitable for use as Monitoring Sites, some because they were difficult of access, others were impossible to find and some had no suitable sprainting sites and could not be adapted (e.g. because they were tidal). Twenty one sites were considered 'possible' and artificial sprainting sites could have been provided at all but six of these. No signs of otters were found at these sites but it was considered that signs might be found at any of them (provided artificial sites were installed where necessary). Fig 3 shows the distribution of suitable and unsuitable sites including those that could be modified by the installation of an artificial sprainting site.

Signs of otters were found at 21 of the remaining 30 sites (one of which could not be checked for signs). Fig 4 shows the distribution of sites where signs were found and those negative sites which were suitable for survey without modification.
At a few bridges it was not possible to carry out a survey because permission for access was needed and there was not sufficient time to obtain it.

The preliminary survey assessed up to three sites in an hour and suggested probably up to four an hour would be possible when monitoring, where access was easy and sites were not too far apart. The preliminary survey indicated that a sample size in excess of 60 sites was achievable on the Camel and similar sized rivers, providing artificial sprainting sites were installed at some bridges.

Following the preliminary survey, sites were plotted on a GIS and preparations made to carry out the monitoring surveys, following the instructions (see Appendix II for instructions and sample survey form).

Fig 1. CSM data sheet for Glynllifon				
Roost name: Glynllifon		**Date:**	**15/01/2002**	**Type: Maternity and hibernation site**
Attribute	**Target**	**Fav**	**Unfav**	**Comments**
Site Security	Access to site	X		Comment – main access secured by locked grille, but action needed to make sure internal door to be kept closed.
	Doors, gates, security fences	X		
External condition of building	Roof covering	X		
	holes	X		
	Walls, rainwater goods	X		Some repairs needed, but does not affect roost areas
	Overall building condition	X		Some deterioration of building as not used at present, but not yet significant.
External condition of underground site	Site stability/ tree root growth	X		Tree growing from wall by entrance has been pruned in past & needs pruning again. Will need to be removed at some stage with agreement of owner.
4. Roost access/es	Access point/s obstructed/ unobstructed	X		
	Access size	X		
	Artificial lights	X		
	Presence of vegetation	X		
	Access stability	X		
Disturbance	Change since previous visit	X		
	Human access	X		
6. Internal condition of building	Water penetration	X		
	Light levels	X		
	Ventilation	X		
	Toxic substances	X		

Temperature of roost area	Temperature range	X		Nursery roost area heated by tubular heaters. Electricity supply prone to frequent disconnection (– may be result of road works?). Consider back-up supply if situation likely to persist. Temp is logged continuously in different areas of roost, but computer also affected by disconnection.
9. Presence of bats	Population counts	X		Bats monitored continuously at emergence by automatic counter. Emergence counts undertaken by observers during lhb summer surveillance programme & additional occasions. For hibernation counts bats counted continuously at emergence by automatic counter. 2 internal counts undertaken by licensed bat workers following NBMP hibernation count protocol.
11. Flight lines from roost in surrounding habitat and feeding habitat	Composition of flight line	?		Changes to flight lines and feeding habitat caused by construction of new road. This has led to loss of known small area of feeding habitat, disruption to some known flight routes and loss of individual bats using these routes through collision with motor vehicles.Difficult to gauge significance of loss – monitoring of road casualties will continue. Mitigation is being upgraded and is under review.
	Composition of feeding habitat	?		
Interest feature condition		X		Feature in favourable condition, although some concerns regardingflight lines and feeding habitat - under review.

Fig 2. Distribution of potential SAC Monitoring Sites on the Camel (excluding some small tributaries) showing those checked in preliminary survey (filled) and those which are National Survey Sites (larger symbols). (Figures 2-4 from Chanin, 2003).

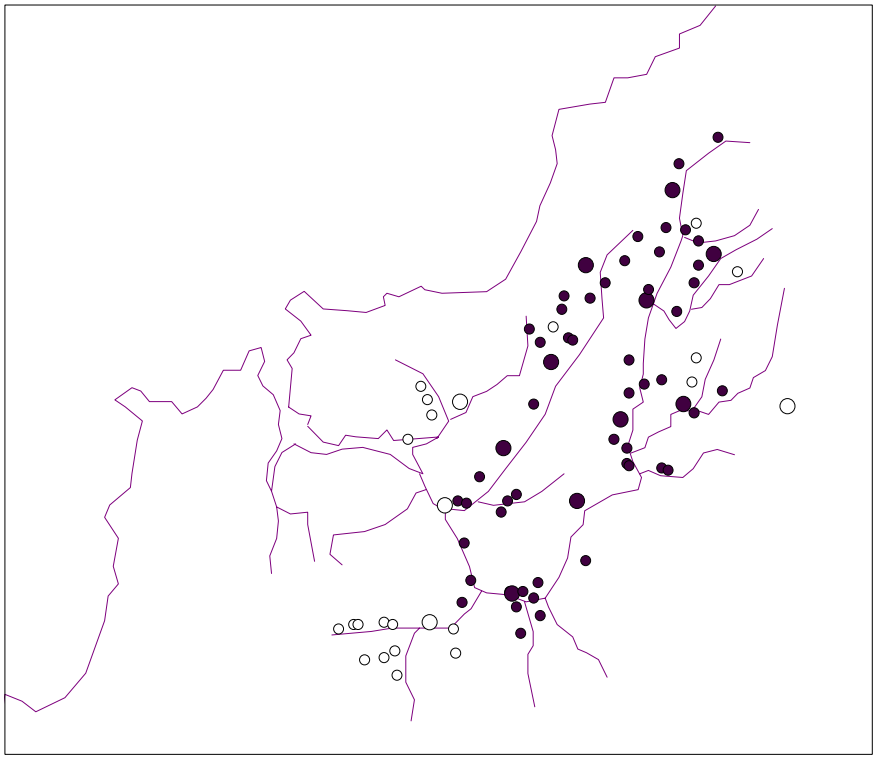


Fig 3. Potential for use as monitoring sites.

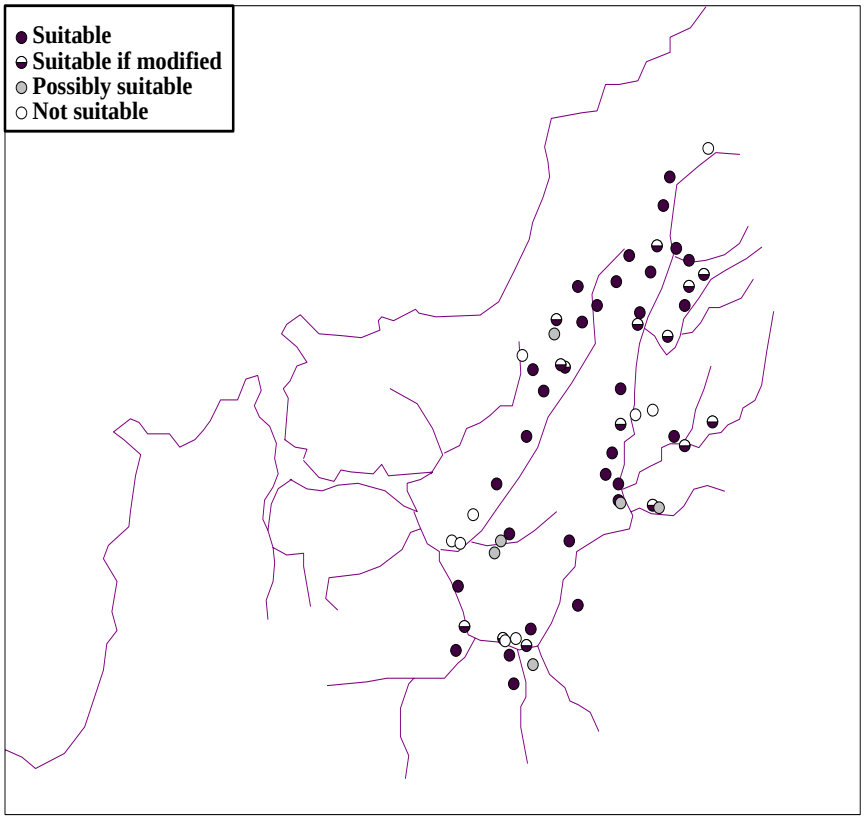
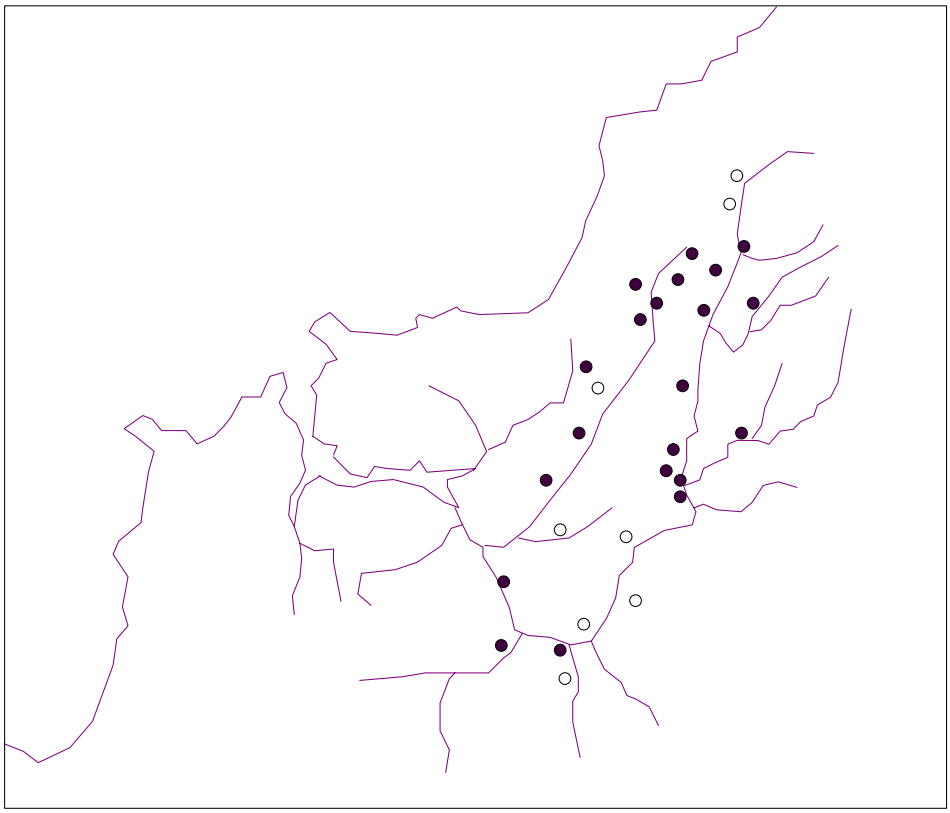


Fig 4. Distribution of signs (filled circles) at those sites suitable for surveying without modification.



Appendix II

Survey protocols

1. Bats

1.1 Assessing population change at individual roosts

It is assumed that the majority of bat SSSIs and SACs, other than hibernation sites, will have a figure for population size at designation. If this figure is available it should be used as a baseline against which to assess and compare subsequent population size.

There is a six year reporting cycle for the purposes of CSM and it is sensible, therefore, to assess time periods shorter than or equal to six years at individual sites, rather than the longer time periods used to assess overall population trends for species.

Population change is assessed using the following formula;

$$\frac{\text{(Population mean for reporting period – population estimate at designation)}}{\text{Population mean for reporting period}} \times 100$$

A worked example of this formula is shown in Appendix I

1.2 Protocol for maternity roost counts

1.2.1. Preparation

- If this is the first survey make an initial early evening visit to identify all exit points.

1.2.2. Count dates

- Two separate evening counts should be made: one in each of the survey date periods given below and at least five days apart.

Survey Dates	Period 1	**29 May – 7 June**
	Period 2	**8 – 17 June**

- Avoid making counts when the temperature is below 7^0C at sunset, in strong winds, in heavy rain or any combination of these.
- Please return your forms (with appropriate box ticked) even if:
  - You attempt to make a count but are unable to do so because the bats were not present during the survey dates
  - No bats were present at all this year
  - The bats were present but you were unable to make a count during any survey periods

1.2.3 When to start the count

Surveyors should try to be in position at sunset (or roughly 15 min before you expect to see the first movement of bats).

1.2.4. Counting/recording procedure

- Position yourself at an exit point, record air temperature and mark down the weather conditions while you are waiting for the first bat to emerge.
- For cloud cover: Clear = no cloud – 1/3 cover, Patchy = 1/3 – 2/3 thick cloud or 100% thin cloud cover, Full = 100% thick cover.
- Multiple exit points: Where possible, at least one person should survey each exit hole. Record the number of exit points and surveyors on your recording forms.
- Note down the time as the first bat emerges. Record the number of bats emerging (bats OUT) and re-entering (bats IN) at each exit point. The **TOTAL BAT COUNT** is the number out minus the number in.
- Record how long the count took and your reason for ending the count.

1.2.5 When to stop the count

There are 4 rules for deciding when to stop a count:

a) No further activity / activity ceased for ten minutes - When no bats emerge from the roost for ten minutes the emergence is considered to have finished. Occasionally, the first bat to leave the roost will emerge very early and this can leave a gap of more than ten minutes before the main colony begins to depart. Thus the 10 minute rule should only be used after the main exodus has begun.

b) Too dark - When it becomes too dark to see bats exiting or entering the roost. N.B. *At roosts with multiple exits all counts should stop at the same time if it gets too dark.*

c) Confusing behaviour of the bats / returning bats obscure emergence - Bats that have left the roost early may return before the whole colony has emerged. The behaviour of returning bats can sometimes make it difficult to assess whether more bats are emerging. If returning bats do not cause confusion keep counting, but if it becomes very unclear what is happening the count should stop.

d) Deterioration of weather conditions - Abort the count if the weather conditions deteriorate dramatically i.e. it begins to rain heavily or becomes windy. In this instance, a replacement count should be attempted on the next convenient date.

1.2.6 Reducing disturbance to colonies during counts

Surveyors should remain quiet while bats are emerging and avoid shining torches near roost entrances. If possible, use headphones to reduce noise from ultrasonic detectors and avoid standing too close to the roost entrance. **PLEASE DO NOT USE A TORCH TO COUNT THE BATS**; be aware that this can disturb bats and inhibit emergence. Observers should also avoid using torches as much as possible when taking notes, because night vision is impaired for up to fifteen minutes after exposure to light.

1.2.7 Useful equipment

- **Tally-counter** - Useful for 'clicking' up numbers of bats as they emerge.
- **Bat detector** - Useful to alert surveyors when bats are present. The detector should be tuned to 109 kHz. We recommend wearing headphones.
- **Thermometer**

- **Notebook/paper** Remember to take pens/pencils and a notebook or paper with you to record your results!

1.2.8 Guidelines for completing the Roost Count Form

NB: The forms are now pre-printed with both the address details ***and*** the roost details that we currently have on the database. If you are provided with a blank space or a choice of options (e.g. 'Pre-1945 / Post-1945' under 'Age of structure'), it means we do not have that particular information on record, so please fill it in.

- **Roost name:** An identifying name of the house, building or site. If there is no name, please fill in the house number and street name or structure type (*e.g*. tree, bridge) with the nearest village name.
- **Grid Reference (2-letter, 6-figure) of the roost:** This can be worked out from an OS map or we can calculate it for you if you supply us with a postcode.
- **Repeat site – any roost changes:** Note here if any structural changes have been made to the roost site itself since the previous year. This could include an extension being built, exit holes being blocked or a tree being cut back.

ANY DATA COLLECTED SHOULD BE COPIED TO: **The NBMP, 15 Cloisters House, 8 Battersea Park Road, London, SW8 4BG**

1.3 Protocol for hibernation site counts

1.3.1 When and how often to count?

Unpredictable weather conditions and the level of survey intensity can dramatically influence counts. It is recommended that **two counts (and no more)** are made at each site and that a standard search method is used. It is not essential that counts are made when the maximum number of bats are normally present, because we are looking at relative changes in numbers. What is essential is to ensure that when counts are made the conditions are as consistent as possible from year to year - so that the influence of date, weather and survey intensity is minimised.

Please make one count in **JANUARY** and one count in **FEBRUARY**. Try to ensure that there is at least **one week** between each count. If you cannot make a count between these dates choose the next closest date. Please mark it clearly on the count form.

1.3.2 Who counts at sites?

If you have a licence and want to survey a site that you know of, make sure that you contact your local bat group. As it is important not to duplicate counts, liaison with your local bat group is advisable. Unlicensed surveyors MUST be accompanied by a holder of a Scientific Licence (N.B this is different to a Conservation or Roost Visitor's Licence). For further information about the relevant licence required, please contact your SNCO headquarters or BCT.

1.3.3 Carrying out the survey

It is important that you gain permission in advance from any landowners or custodians if you are entering private property or sites with restricted access. Please fill in any landowner details in sections 2.14 & 2.15 on the Count Form.

Please try to use the same search method each year. At larger sites you may need to set out a transect route within the site rather than surveying the whole area. If the site is split into sections, attempt to count the separate sections on the same day. Try to keep the number of people searching the site constant for each visit.

1.3.4. Safety issues

- Underground sites can be dangerous. Please ensure your personal safety at all times
- Always inform someone of the survey details (site name and grid reference, surveyors' details and time that you are expected back). Ensure that a clear procedure is set out, which can be put into effect if anyone does not return on time
- Never survey alone
- Wear a hard hat
- Carry an extra torch and have spare batteries and bulbs at hand
- Do not attempt to survey sites which have become unsafe or where access has been denied
- Refer to BCT's Health & Safety Policy on Fieldwork if in doubt.

1.3.5 Temp (^{0}C)

Please record:

1. The **external air temperature** before you enter the site.
2. The air temperature at the **coolest** part of the site (usually near an entrance) = **T1**
3. The **warmest** point inside the site (usually at the furthest accessible point) = **T2**

1.3.6 Site Map

surveying a new site or a repeat site using a new route, please sketch a diagram of the site and in red ink, mark on the survey route. Also mark the two points where you took the temperatures T1 and T2, so that each year the temperature can be taken at the same place. You do not need to make a sketch if you are surveying a repeat site using the same method as in previous years.

2. Otters

2.1 LRR Survey protocol for England and Wales

2.1.1 Timing and frequency

Surveys should be carried out between May - September when water levels are less variable. In order to build up a baseline of data they should be carried out annually for the first five years and then at three year intervals.
Surveys should not be carried out during periods when there is heavy rain. Ideally there should be a period of at least five days without rain prior to surveying.

2.1.2 Preparatory work

Obtain copies of the recording forms filled in during the preliminary survey, selecting only the sites chosen for regular monitoring. Mark survey sites (including reference numbers) on 1:50,000 Ordnance Survey Map.
Print out recording forms (example appended).

2.1.3 Equipment and safety

As for preliminary survey except that copies of the original survey forms are required as well as monitoring forms.

2.1.4 Field work

For each site record only:

- site reference number;
- presence or absence of otter signs;
- number of otter spraints in 3 categories: Dried fragmented; Dried intact; Not fully dry;
- changes in circumstances since preliminary survey;
- any need for maintenance of artificial sprainting site if present.

Enter results into spreadsheet, recording each site as either 1 = positive or 0 = negative.

2.1.5 Interpretation and analysis

- Plot the distribution of positive and negative sites within the catchment using GIS.
- Examine the distribution of positive records and compare with previous surveys. Some changes in the distribution of positive and negative records are to be expected. If several sites in one part of the catchment change from positive to negative this should give cause for concern.
- Compare the proportion of positive sites with previous survey. It there has been a decline of 10% or greater, carry out statistical tests (see supplement). A significant decline of 10% or more should give cause for concern.

Where there has been a decline in the proportion of positive sites or an apparent change in the distribution of otters the first step should be to determine whether or not this might be due to survey circumstances. These include changes in surveyor experience compared to previous years and extreme weather conditions (drought as well as heavy rain or high water). It may be appropriate to resurvey some areas.
If these factors can be ruled out a review of the habitat features described below should be the next step.

2.1.6 Monitoring habitat

Being large, mammalian predators, otters are tolerant of a wide range of habitat conditions (Chanin, 2001). In order to determine whether their habitat is in favourable condition, only two main factors need to be considered: food supply and pollutants.

Food supply may be measured directly by monitoring fish populations. Populations of some species of fish are monitored by the Environment Protection Agencies in each country (together with the Scottish Fisheries Co-ordination Centre which co-ordinates the monitoring of salmonid fish in Scotland). Owing to the requirements of the Water Framework Directive policies and strategies for monitoring fish populations differ between countries and are currently under review.

It will be necessary to approach the local office of the appropriate agency to determine the nature and extent of fish monitoring within each SAC. The advice of local fish biologists should be sought to determine whether the extent of monitoring is adequate to detect significant changes in the food supply for otters. Where there are sufficient sampling sites within a SAC, monitoring the main fish species present data from the Agency's monitoring scheme should be used.

The Environment Protection Agencies monitor a wide range of pollutants at a large number of sites, generating considerable quantities of data. Analysis and interpretation of these data is best done by specialists. For example, the Environment Agency's National Centre for Ecotoxicology and Hazardous Substances produces an annual report on pesticides in the aquatic environment. On these grounds the impact of toxic chemicals on otters in SACs is best assessed at a national rather than a local level.

3. Water vole

3.1 National Key Sites for Water Voles – Monitoring Survey Protocol

At each site a minimum of twelve and a maximum of twenty-four 100 metre transects should be selected. These should be distributed as evenly as possible across the site. Each transect should begin or end at a recognisable landmark so it is possible to monitor the same transects each year to obtain an index of water vole abundance based on latrine counts. Surveys can be conducted anytime between late April and early October, but subsequent surveys on individual sites should be repeated at the same time as the first survey, to avoid data analysis being affected by natural within year population fluctuations. Latrine counts should not be carried out within 2 weeks of heavy rainfall. A water vole latrine is defined as an area that has been used to deposit droppings on more than one occasion (i.e. consisting of old and fresh droppings). Latrines are also categorised as 'trampled' or 'untrampled'. Droppings, latrines and feeding remains are classed as active signs, while burrows alone are classed as non-active signs, as empty burrows may persist for some years after they cease to be occupied. Surveyors are also asked to record any significant changes in management between years. Comparisons of water vole abundance between years at each site are based on percentage site or transect occupancy and indices of abundance.

Indices of abundance are calculated using the widely used regression equation $y=1.48+0.63x$, where y= number of water voles and x = number of latrines (Morris *et al*, 1998)

1. Locate the start of a transect from the map.
2. Ensure that the transect number you record on the data sheet is the same as that on the map.
3. Ensure that you are on the correct bank of the watercourse from the map.
4. Check the dates of the last survey and note if any modifications to the habitat have been carried out since then.
5. Look for any recent fluctuations in water level. If the water levels have receded it should be possible to tell from the bankside vegetation. Site staff will be able to tell you if water levels have risen considerably in the last 2 weeks. Record these as + or – on the data sheet.
6. Begin walking your transect. Walk as close to the water's edge as possible (while remaining safe). Carry out a continuous search on this bank only for field signs for a distance of 100 metres (paced out).
7. Look for any field signs of water voles such as droppings, feeding signs, woven nests or burrows. Keep a tally of feeding signs (each pile of chopped vegetation counts as one) on the data sheet. Also keep a tally of water vole latrines. A latrine is defined as more than one deposition. Tally these in the appropriate box according to the approximate number of droppings in the pile and whether the pile is trampled or not. (Trampled means that the water vole has trodden the pile flat). At the end of the transect record the approximate number of nests/burrows and runs.
8. Some transects will need to be surveyed by boat. If this is the case punt the boat along the specified bank or edge and part the vegetation every metre or so. Again record latrines, feeding signs and nests/burrows. You will have to estimate 100 metres as you cannot pace it out!

Proceed by a safe route to the next transect on the map and begin again.

Appendix III

Monitoring Forms

National Bat Monitoring Programme

Hibernation Count Form 2003

SITE CODE
Office Use

1. YOUR DETAILS

Name:			
Address:			
Postcode:		**Day Tel:**	
Email Address:			

2. SITE DETAILS

2.1 Site Name:	**2.2 Site Grid Ref:** (6 fig e.g. NK 234 875)
2.3 Nearest Village / Town:	
2.4 Locality Details (e.g. address of site, post code):	
2.5 County site is in:	

NEW SITE DETAILS – only fill in for NEW sites

2.6 Site Type (e.g. mine, ice-house, cellar):	**2.7 Number of entrances**	
2.8 Site **Size*** *(tick one)* ☐ Small ☐ Medium ☐ Large	**2.9** Site **Crevices*** *(tick one)* ☐ None/few ☐ Intermediate ☐ Many	**2.10** Site **Surveyability*** *(tick one)* ☐ Simple ☐ Medium ☐ Difficult

2.11 Site modified? ☐ **Year modified** _____
Description of type of modification (grilling, other):

2.12 Disturbance* level at site *(please tick **one** box):*

☐ Unknown ☐ None ☐ Occasional ☐ Regular disturbance

Do you wish the site details for this site to be classified as highly **confidential**? ☐ *(tick if Yes)*

2.13 Year 1st recorded as hibernation site_____

Land Class (Office use)	**2.14 Landowner's Name**	**2.15 Landowner's Contact Details (This will not be stored electronically)**

*** See the sheet 'Notes on Hibernation Sites'**

P.T.O.

3. SURVEY DETAILS

	1st COUNT	2nd COUNT
3.1 DATE of count	_____/Jan/2003	_____/Feb/ 2003
3.2 Number of surveyors taking part		
3.3 Number of surveyors holding a licence		
3.4 Time to Complete survey (min.)		
3.5 External air temp. (^{o}C)		
3.6 Internal temp. at coolest point (^{o}C) **T1**		
3.7 Internal temp. at warmest point (^{o}C) **T2**		
3.8 Internal Humidity (%)		
3.9 SPECIES	**NUMBER OF BATS SEEN**	
Greater horseshoe		
Lesser horseshoe		
Daubenton's		
Natterer's		
Whiskered/Brandt's		
Whiskered		
Brandt's		
Pipistrelle		
Brown long-eared		
Myotis Spp.		
Unknown		
Other (*Please specify*.....)		
Other (*Please specify*.....)		
3.10 SITE STATUS		
Site accessible to survey? Y / N (*specify if no*):		
Site destroyed? Y / N (*specify if yes*):		

Consent To Release Of Records

By returning this data sheet to the NBMP you consent to your data being accessible by the BCT, the JNCC and others subject to the approval of the JNCC and the BCT. Your intellectual copyright of the data will be recognised at all times. We will be entering your personal information onto a computerised database. Please let us know if you object to this.

Please tick here if you DO NOT wish this information to be passed to & held by a local bat group for monitoring purposes ☐

Please return completed forms to:

If you use a stamp you save us money

NBMP
FREEPOST LON10138
London SW8 4BR

Thank you for your valuable contribution to the Monitoring Programme!

CSM data sheet for monitoring bat roosts				
Attribute	**Target**	**Fav**	**Unfav**	**Comments**
Site Security	Access to site			
	Doors, gates, security fences			
External condition of building	Roof covering			
	holes			
	Walls, rainwater goods			
	Overall building condition			
	Vegetation/ shading			
External condition of underground site	Site stability/tree root growth			
Roost access/es	Access point/s obstructed/ unobstructed			
	Access size			
	Artificial lights			
	Presence of vegetation			
	Access stability			
Disturbance	Change since previous visit			
	Human access			
Internal condition of building/ underground site	Water penetration			
	Light levels			
	Ventilation			
	Toxic substances			
	Site temperature			
	Geological stability			
Temperature of roost area	Temperature range			
Presence of bats	Population counts			
Signs of bats	Droppings counts			
Flight lines from roost in surrounding habitat and feeding habitat	Composition of flight line			
	Composition of feeding habitat			
Interest feature condition				

Otter recording form.

Recording form for preliminary survey of potential spraint Monitoring Sites:

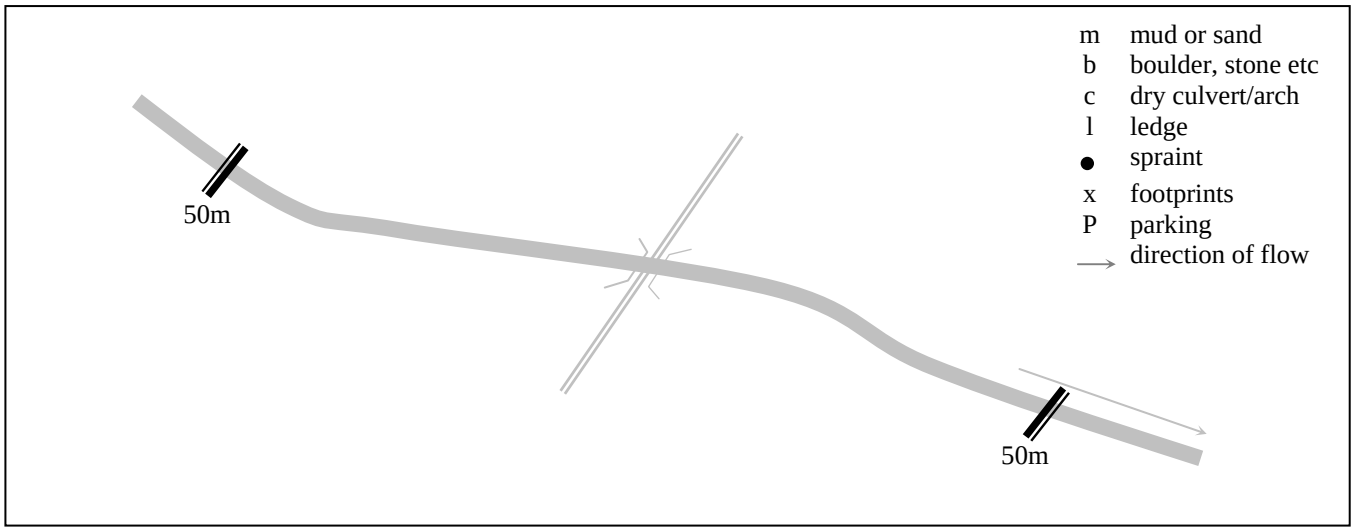
River:

Site ref number		Sub catchment	
Grid Ref.		Stream name	

Suitable for use?	Yes/No/Possibly	Width at bridge	>15m / 5-15m / <5m
Needs Artif. site?	Yes/No/Possibly	Max depth under bridge	<25cm / 25-75cm / >75cm
Permission needed?	Yes/No		

Spraints recorded	Dried Fragmented:	Dried intact:	Not fully dry:
Footprints found?	Yes/No		

Mark: nature and position of potential spraint sites; location and type of signs found; parking place.



Notes on:
Suitability; need for artificial spraint site:

Potential spraints sites:

Parking/Access:

Hazards:

Post survey notes:	Photograph refs:

Year: **Date of Survey:**

Site ref no.	1/0[1]	No. Spraints[2] Df	Di	Nd	Notes[3]

[1] Presence (1) or absence (0) of otters
[2] For: Dry fragmented/Dry intact/Not dry
[3] Are water levels normal? Have there been changes since prelim. survey? Need for maintenance of spraint site.

Water vole survey form

Site Name:	Transect No.	Bank surveyed (N/S/E/W)
Survey date:	Surveyor:	

Has any management been carried out on the transect since last survey? YES/NO/DON'T KNOW (If you don't know, ask the site manager/staff)
If yes, what has been done? (please tick all those that apply) 1 Re-profiling of bank (earth moving) 2 Vegetation cutting 3 Vegetation clearance 4 Scrub/tree removal 5 Ditch cleaned/slubbed out 6 Other (specify)
Approximately how much have water levels on the transect gone up or down in the last 2 weeks? (to nearest 5cm)

Tally of Water Vole latrines ("latrine" = more than one deposition)	
Number of trampled piles (trodden flat on top)	**Number of untrampled piles**
TOTAL:	TOTAL:
Water vole feeding signs (tally)	Burrows/nests (approximate no.)
TOTAL:	1 None 2 Less than 5 3 More than 5 less than 10 4 More than 10 less than 20 5 More than 20

Mink/otter signs (only record if you are *certain* of your identification)	
Mink	
Otter	