
**VOLUME 10 ENVIRONMENTAL
DESIGN AND
MANAGEMENT**

**SECTION 4 NATURE
CONSERVATION**

PART 5

HA 97/01

**NATURE CONSERVATION
MANAGEMENT ADVICE IN RELATION
TO DORMICE**

SUMMARY

This Advice Note provides guidance on reducing the impact of new schemes, improvements and routine highways management operations on dormouse populations.

INSTRUCTIONS FOR USE

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THE HIGHWAYS AGENCY



**THE SCOTTISH EXECUTIVE DEVELOPMENT
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**THE NATIONAL ASSEMBLY FOR WALES
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THE DEPARTMENT FOR REGIONAL DEVELOPMENT*

Nature Conservation Management Advice in Relation to Dormice

* A Government Department in Northern Ireland

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Amend No	Page No	Signature & Date of incorporation of amendments	Amend No	Page No	Signature & Date of incorporation of amendments

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CHAPTER 1 INTRODUCTION

1.1 The hazel dormouse *Muscardinus avellanarius*, is a fully protected mammal under both United Kingdom and European law. It is classed as vulnerable and locally endangered (Morris, 1993) and is given unfavourable conservation status in Europe (HMSO, 1995). It is included in the UK Biodiversity Action Plan (1995-1999) as a priority species due to its rapid decline in numbers.

1.2 The main distribution is south of a line drawn from Clwyd to Suffolk with isolated populations in Cumbria and Northumberland (Figure 1). Although rare in northern and some central counties, re-introductions have occurred so dormice should still be taken into account in the whole of England and Wales. They have not been recorded in Scotland, Ireland or the Isle of Man.

1.3 The distribution and ecology of the dormouse is still not fully understood, but the species is likely to be affected by road schemes that impact upon a wide range of habitats. Where populations affected by the scheme are small and isolated, effects such as habitat loss and fragmentation could create conditions where local extinctions may occur. In areas where there is a sizeable and/or stable population of dormice, the effects may be short term if the correct mitigation measures are implemented.

1.4 This advice note has been compiled using best available knowledge and information gathered during a review of existing procedures for minimising the impact of road schemes on dormice. It applies to all highways in the UK, and is relevant to both new roads due for construction and existing roads undergoing improvement and routine maintenance. As dormice habitat varies considerably in its requirements for long term conservation, this guidance should be used in conjunction with other advice (eg that provided in DMRB Vol. 11 (Environmental Assessment) on individual site assessment). Advice should also be sought, where appropriate, from the relevant Statutory Nature Conservation Organisation (SNCO), and the appropriate voluntary bodies and specialists (see Annex D).

1.5 A second species of dormouse (the fat or edible dormouse *Glis glis*) was introduced to Britain in 1902. It is grey, the size of a small squirrel, and largely confined to the Chilterns area, where it often enters houses and can become a nuisance. *Glis glis* is included in Schedule 9 of the Wildlife and Countryside Act 1981 under Section 14: Introduction of new species. This advice is only concerned with the native species *Muscardinus avellanarius*.

2.1 The dormouse is a nationally important species which is very vulnerable. To date, few highway schemes have taken them fully into account due to the lack of data on their distribution and the limited understanding of the range of habitats they can use.

2.2 The dormouse has suffered a rapid decline in range and probably numbers, due to a variety of factors including direct loss of habitat, isolation and other effects associated with the increase in habitat fragmentation. These are all potentially reversible and every opportunity should be taken, during both new construction and road improvement schemes, to increase the amount of dormouse habitat available and to ensure appropriate long-term management. Even where dormice are not present within the route corridor, consideration should be given to enhancing local populations by extending and linking existing patches of habitat.

2.3 It is essential to employ an experienced dormouse ecologist to undertake the surveys using the appropriate survey methods (see Chapter 6). In some circumstances it may be necessary to employ best practice methodologies and assume dormice are present. This includes circumstances where there are no definitive results, or where no dormice are present within the route corridor but local populations could be enhanced through extending and linking habitat.

2.4 Licences will be required for the different methods of survey and the onsite work. These should be obtained from the appropriate licensing authority (see Chapter 8). Licences for disturbance in connection with the destruction of sites, and for translocation are obtained from DETR or the appropriate Government licensing authority. Advice from the appropriate Statutory Nature Conservation Organisation (SNCO) ie English Nature or the Countryside Council for Wales, should always be sought for any operations that may affect dormice. Non-statutory bodies eg local wildlife trusts and local record centres, also hold valuable information and can provide advice at a local level.

2.5 It is essential that new procedures are followed, where possible within the statutory process, to reduce the short-term impact of highway works on dormice. The greatest effects are caused during the advanced works and initial contract phases, when the vegetation is removed. Substantial efforts must be made at the earliest opportunity to increase the habitat quantity and quality, thus minimising unnecessary impacts. Such improvement works can be carried out as advanced works or included in the main contract. The use of land purchase for mitigation should be considered at the earliest possible phase to reduce this impact.

2.6 Long term management plans for sites are essential for ensuring that the habitat (both existing and newly created) is managed appropriately for dormice.

UK LEGISLATION

3.1 The hazel dormouse is afforded full protection under the Wildlife and Countryside Act 1981 (as amended) and by The Conservation (Natural Habitats &c.) Regulations 1994.

3.2 The dormouse was added to Schedule 5 of the Wildlife and Countryside Act in 1988. This states that it is an offence to intentionally kill, injure, or take any animal. It also makes it an offence to damage, destroy or obstruct access to any structure or place that the animal uses for shelter and to disturb the animal whilst it is in occupation. The Act should be referred to for the definitive text.

3.3 The dormouse is included on Schedule 2 of The Conservation Regulations, which are the UK Government's response to the Council Directive 92/43/EEC (c) on the Conservation of Natural Habitats and of Wild Fauna and Flora. This states that it is an offence to deliberately capture, kill or disturb an animal. It is also an offence to damage or destroy a breeding site or resting place of the dormouse. The Regulations should be referred to for the definitive text.

3.4 The dormouse is incidentally protected by The Hedgerow Regulations (1997), which aim to prevent the removal of "important" hedgerows including those supporting Schedule 5 species of the Wildlife and Countryside Act (1981). If dormice are known to be using the hedgerows, or have done so in the last five years, they are afforded some protection. There are exemptions including permitted works, dwelling boundaries and Hedgerow Removal notices granted by the local planning authority.

3.5 Environmental Assessment for new road development and existing road improvement is required, under European Directive 85/357/EEC (as amended), where the proposals are considered to have 'significant environmental effects'. The Directive is enacted in the UK by the Highways (Assessment of Environmental Effects) Regulations 1988 (as amended) for motorways and trunk roads, and the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 (as amended) for local authority, private roads and associated works. Specific guidance on detailed dormouse survey methodology for new road, and significant road improvement, schemes at each stage of the Environmental Assessment process is given in The Design Manual for Roads and Bridges (Volume 11: Environmental Assessment).

NON-STATUTORY GUIDANCE

Biodiversity

3.6 The UK Government, as a signatory to the Rio Convention on Biological Diversity, is committed to conserving and enhancing biodiversity. This commitment is further enforced in the Countryside and Rights of Way Act 2000 (Section 74). The dormouse is a priority species in the UK Biodiversity Action Plan (see Annex A). The primary objective is to maintain and enhance the existing dormouse populations in all counties and to re-establish self-sustaining populations in at least five counties from where they have been lost. Other dormouse action plans have also been produced at local, county and regional scales and these should be referred to, as agreed with Overseeing Organisations. Under the Countryside and Rights of Way Act 2000, a list of habitats and organisms which are of principal importance in conserving biodiversity is due to be published. This list may possibly include the dormouse, thus increasing its conservation status further.

Planning Policy Guidance

3.7 Planning Policy Guidance 9 - Nature Conservation sets out Government Policy as it relates to nature conservation in England, and although advisory in nature, it may be enforced by legislation where necessary. PPG 9 gives guidance on the roles and responsibilities of the local planning authorities and SNCOs with regards to development control affecting SSSIs and other designated and important sites. PPG 9 has particular relevance for local authority road schemes and ancillary developments such as Motorway Service Areas/Motorway Maintenance Areas which are governed by the Town and Country Planning Act (1990). PPG 9 embodies the Government's commitment to conserving biodiversity and states that 'the presence of a protected (under the Conservation (Natural Habitats & c.) Regulations (1994)) species is a material consideration in considering a development proposal'. Although the concept of 'material consideration' does not apply to Highway schemes, Planning Policy Guidance can be seen as providing good practice advice. Planning Guidance (Wales), Technical Advice Note (TAN) 5 - Nature Conservation and Planning is the equivalent document in Wales.

4.1 The hazel dormouse has an orange-brown coat with a thickly furred tail. The head and body length are between 60-90mm and the tail between 56-70mm. The fur of the young is greyer, and there are variations between individuals eg tail tip colour. There are insufficient guard hairs to provide a waterproof coat. They have large black eyes and fine black whiskers. Both front and back feet, but not the tail, are prehensile. This flexibility enables a stronger grip, making the dormice more agile in its habitat. The adults normally weigh between 15-20g (but weights up to 43g pre-hibernation have been recorded in captivity).

4.2 The animal is nocturnal and only active between May and early October, the rest of the time is spent in hibernation. During the summer the animal leaves its nest about one hour after sunset and returns in the hours before dawn. Rain and cool temperatures can reduce activity and summer torpor (an energy-saving mechanism which enables the animal to slow down its bodily functions) is common. They are primarily arboreal and rarely travel far from their nests in one night (70-152m, with the males reported to travel further than the females). They occur at low densities, usually between 3-10 per ha. Male territories partially overlap female ones and males are territorial during the breeding season.

4.3 Dormice have a specialised diet consisting of flowers, fruit, pollen, insects and nuts. They have also been reported eating fungi, bird's eggs, conifer seeds and leaves. The dormouse lacks a caecum, part of the digestive system which enables the exploitation of low-grade foods eg leaves, thus restricting its diet. Work on broadleaved woodlands demonstrates that four principle plants for dormice are bramble, oak, honeysuckle and hazel. However, not all sites which support dormice contain all these species, thus indicating that other plant species and food sources are also utilised. Some species of plant may also provide nest material, or be associated with insects which are an important food source. These include rose, sweet chestnut, sycamore, clematis, bracken, ivy, hornbeam, Scot's Pine, broom and crab apple (see planting list, Annex B).

4.4 Dormice have three nest types: summer shelter, breeding; and winter hibernation. The summer nests are normally 9cm in diameter and tightly woven without an obvious entrance. They are made of grasses, honeysuckle strips and leaves including hazel and bramble. The breeding nests are larger, 15 cm diameter. They are normally situated in tangles of vegetation, hedgerows and tree holes but have also been found in buildings and undesirable sites such as plastic bags. Dormice may use several nests in one season. They will use purpose made nesting boxes and have used bird and bat boxes. The winter hibernation nests are often found at ground level under leaf-litter, old stools, moss, wood piles and rocks.

4.5 Dormice have average litters of 4 young born between June-September, with a peak in August. Second litters are fairly common but the young are less likely to survive unless there is a prolonged feeding season. The gestation period is 22-24 days, and there is a high maternal input with the young staying with the mother for 6-8 weeks. Dormice breed in the year following birth. Their life span is up to 6, but rarely more than 2-3 years.

4.6 Hibernation (a long period of torpor) begins with the first frosts when food supplies dwindle, usually in October. However, hibernation will occur earlier if dormice reach their pre-hibernation weights. During hibernation, the animals require enough fat reserves to survive the seven months to early summer. In winter torpor the body temperature is normally maintained between 3-5°C. This deep sleep is broken every 8-10 days, but the animal does not feed or leave its nest during this time. It is extremely vulnerable to disturbance and predation at this time, and if woken (due to mild temperatures or disturbance) will lose valuable fat reserves. There can be high mortality during this period.

4.7 Predators include foxes, weasels, stoats, owls, woodmice and domestic cats. Grey squirrels, whose population expanded rapidly between 1930 and 1945, compete with dormice for important pre-hibernation food such as hazelnuts. Grazers such as deer and domestic stock prevent the development of a good shrub layer, thus reducing the value of the habitat for dormice. Diverse, well-developed shrub layers provide more effective foraging habitat for dormice.

5.1 Records from England and Wales demonstrate a wide range of habitats are used by dormice (see Annex C and Figures 2-6). However, the relative values of some of these habitats is still unknown. Previous work has concentrated on deciduous woodlands in the southern counties. To conserve a species or to mitigate the effects of development it is necessary to know: the areas of habitat used; the area of habitat needed to retain a viable population; and the best habitat management for that site.

5.2 Early work demonstrated that the three most important habitats for dormice are: deciduous woodland with scrub; hedgerows; and old coppice. As the dormouse is an 'edge' species, it requires a diverse, well-developed shrub layer. Heavy shading results in poorer shrub structure, and reduced flowering and fruiting. Coppiced woodland with a low density of standards is a valuable habitat, providing there is a well developed shrub layer. Research shows that the value of habitat for dormice is generally thought to be related to tree species diversity, which needs to be such that it provides the range of necessary foods within a small area.

5.3 Dormice are known to be strongly associated with ancient woodlands (those with a continuous cover since at least 1600 AD) and where they occur in newly planted woods, or have recolonised woodland, they are often adjacent or connected to ancient sites. Some of the hedgerow systems are relics of ancient woodlands and these can support dormice. Dormice have even been recorded in heavily managed, low hedgerows which probably link more valuable sites.

5.4 Dormice also occur in almost pure sessile oak woods, ancient replanted conifer plantations, pure beech woods, gorse and bracken scrub, coastal scrub, alder/reed beds, bramble thickets and overgrown gardens. They are also known to inhabit many sites with relatively poor scrub layers and low species diversity. This may be due to the presence of another more important food source such as insects, or suggests that they are in sub-optimal habitats. The value of these sites has yet to be qualified; factors such as density have not been studied in most of these habitats.

5.5 Other important factors include the continuity, history, structure and management of habitats. Poor historical management of woodlands may have led to changes in the distribution and number of dormice and in some areas caused local extinctions.



Figure 2 *Dormouse Habitat – Hazel coppice*



Figure 3 *Dormouse Habitat – Ancient semi-natural woodland*



Figure 4 *Dormouse Habitat - Scrub*



Figure 5 *Dormouse Habitat – Conifer plantation adjacent to broad-leaved woodland*



Figure 6 *Dormouse Habitat – Ancient semi-natural woodland re-planted with alder, oak, sweet chestnut, and white poplar*

6.1 A summary of survey methods is given in Table 1. No single survey method is suitable for all types of site so they should be used in combination. There is a need to ensure that sufficient time and resources are available and that rights of access to the land have been obtained before a scheme starts. The effectiveness of all methods of survey depends on their timing and on exploiting windows of opportunity (periods of time when they can be undertaken). Most of these are during the active period (May-October). Working outside of these periods will reduce the feasibility of applying the techniques and will compromise their effectiveness at providing reliable information. Where evidence of the presence of dormice is not proven best practice methods should be adopted. This is essential in the areas of main distribution (Figure 1), where isolated or reintroduced populations are known to be present, and if suitable dormouse habitat is available.

NUT SEARCHES

6.2 This is the most economic and practical method of survey for determining the presence or otherwise of dormice (Table 1) and does not require a licence. Dormice nibble hazelnuts in a distinctive way (see Figure 7). In areas of fruiting hazel, quadrats of 10x10m are searched systematically for 20 minutes each. Five quadrats are usually sufficient to establish dormice presence, but in areas with poorer hazel coppice even individual plants may need to be searched. Nut searches are best undertaken between September and December (nuts begin to deteriorate in the winter and can be misleading).

6.3 The advantages of the nut search method are that they can provide definitive proof of presence and show the range of habitat types used. The limitations to this method include the lack of hazel. Even with hazel present there are still reduced crops due to shading and poor fruiting years. The lack of evidence does not confirm absence and therefore other methods (eg nest box schemes and hair tubes) should be used.

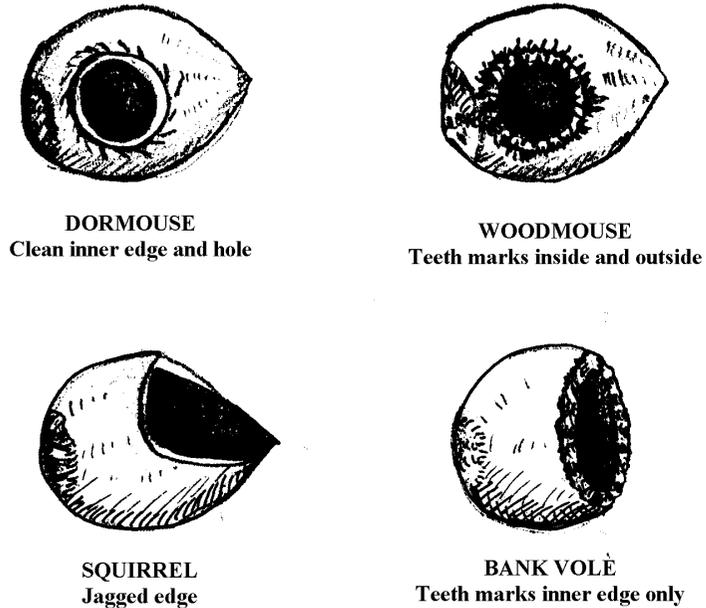


Figure 7 *Gnawed nuts – the distinctive signs left by different species*

NEST BOXES

6.4 Dormouse boxes (see Figure 8) are commonly used as a survey method to detect presence, to estimate population size and as a capture method for translocation (Table 1). At least 50 boxes need to be installed in a grid system 20 metres apart, and in densities of 30 per ha. They should be placed at a height of 1.5 metres and preferably on hazels with a good tangle of honeysuckle. They should be clearly numbered and in place before April of any year. A licence is needed to check them (see Chapter 8) if dormice are likely to be present. In urban situations it may be necessary to place them higher, (>3m) to prevent theft and excessive disturbance. The dimensions of the box are not critical, but the access hole should be about 35mm in diameter and the spacing bars deep enough to provide a minimum 20mm gap between the tree trunk and entrance.

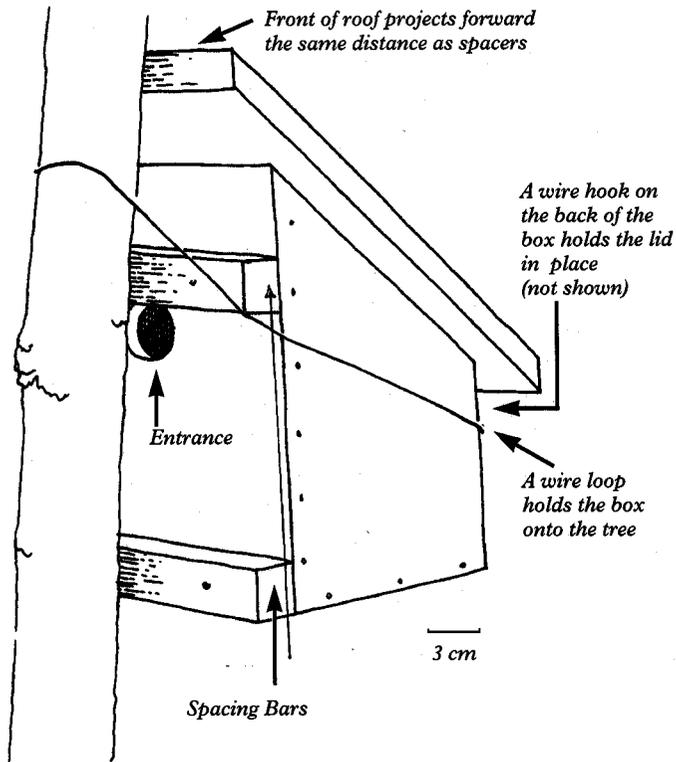


Figure 8 Dormouse Nest Box (Courtesy of English Nature)

6.5 Construction material for dormouse nest boxes has included untreated soft woods, 30mm thick, and marine ply, 10-30mm thick. The soft wood boxes have been successful but have a limited life, often only ten years. The marine ply is more waterproof and should have a longer life. There is also the possibility of using 'woodcrete' boxes (a mixture of sawdust & concrete). These are long-lasting and have been successfully used for other animals, but a specific dormouse 'woodcrete' box is not yet available (although tit boxes can be adapted). The success of these would need to be tested.

6.6 The advantages of using nest boxes are that they can provide definitive proof of presence, they provide a conservation benefit and allow biological data to be collected, and can contribute to the national recording scheme (see Annex D). The limitations are that absence does not provide proof that dormice are not present (there is evidence from other schemes that dormice do not always use boxes but the reason for this is unclear). Permission from landowners is required to access nest boxes sited on their land, and planning needs to allow for a long lead-in period to the scheme to allow time for dormouse occupation (>1 year).

HAIR TUBES

6.7 Plastic piping tubes, 35mm diameter, are placed parallel on branches likely to be used by dormice and attached with parcel tape (see Figure 9). They are useful primarily for determining presence (Table 1). Small sections are cut away and sticky tape put in the roof to trap hairs. They can be baited with peanuts and sunflower seeds. This method is appropriate during the active period (May-October), with the tubes left in place for at least six days. Tubes can be checked regularly, depending on results. The hairs should be set in nail varnish and checked using a microscope to identify the distinctive larger guard hairs of the dormouse.

6.8 The advantages are that they can be used in areas where other techniques are unsuitable. The limitations include the need for expertise in identifying the hairs, the low catch rates and the lack of tape stickiness in wet weather.

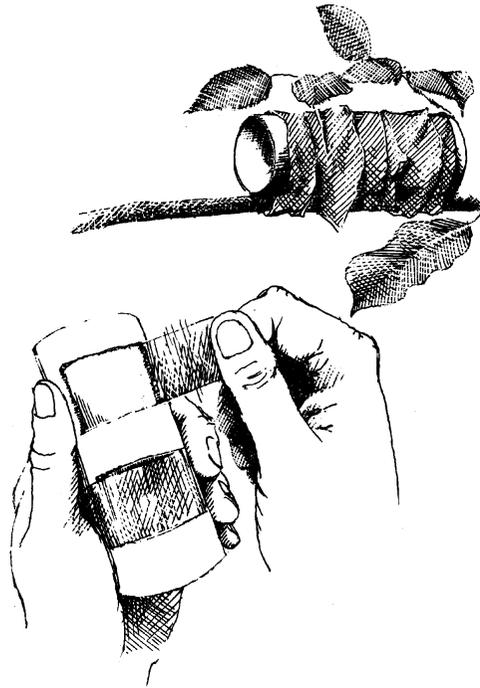


Figure 9 Hair Tube (Courtesy of English Nature)

TULLY TUBE NEST BOXES AND PIPE TRAPS

6.9 The original trap design (J. Messenger) was made of drainage piping, 80mm x 80mm wide, and 300mm long (see Figure 10). One end is blocked with half inch weld mesh. The trap end is also made of weld mesh with a simple trip mechanism set to close once the animal enters. They are set out in the evenings and checked in the early morning for each day they are laid out. Traps can also function as nest boxes, if the end is blocked with a pin to prevent the trap mechanism working. The nest tubes (P. Bright and P. Morris) are similar, but 150mm in length and with one end blocked off to provide a dark nest site. An inner wooden section with an overlap of 30-40mm provides an internal frame big enough to allow the animals to enter. Boxes are installed and left *in situ* during the active season (May - October) in shrubs, hedgerows and tree layers. The numbers of boxes used per survey will depend on the site, but they should be set out in woodland or shrub in a grid system (as for nest boxes) and in hedgerows at approximately 10 -20m intervals.

6.10 The advantages of tully tubes and pipe traps are that they are easy and cheap to construct. The trap has been useful in proving presence where other methods are unsuitable. The limitations for the traps are that few females are caught, a licence is required, and ideally they need to be monitored for several weeks and over several seasons (1-3) to provide sufficient evidence. For these reasons they are unlikely to provide an efficient method for translocation purposes. The nest boxes are still in the early stages of trial, but should be beneficial in establishing dormouse presence in hedgerows and woods where other methods fail.

CAGE TRAPS

6.11 Cage traps can be used for determining presence, and have been occasionally used for the capture of animals during translocation. Traps are made of half-inch weldmesh, measuring at least 100x100x300mm, baited with apple and hazelnuts and laid out in grid lines with 10m gaps. They are installed above ground usually between 1-2m (depending on the habitat structure) and used during the active season. The animals need to have shelter installed, preferably leaves, and be monitored for several nights. They should be closed during the day and checked daily at dawn.

6.12 The advantage of cage traps is that more than just presence can be established. The limitations include varied success (in field trials so far), the need for a licence, and the expense involved.

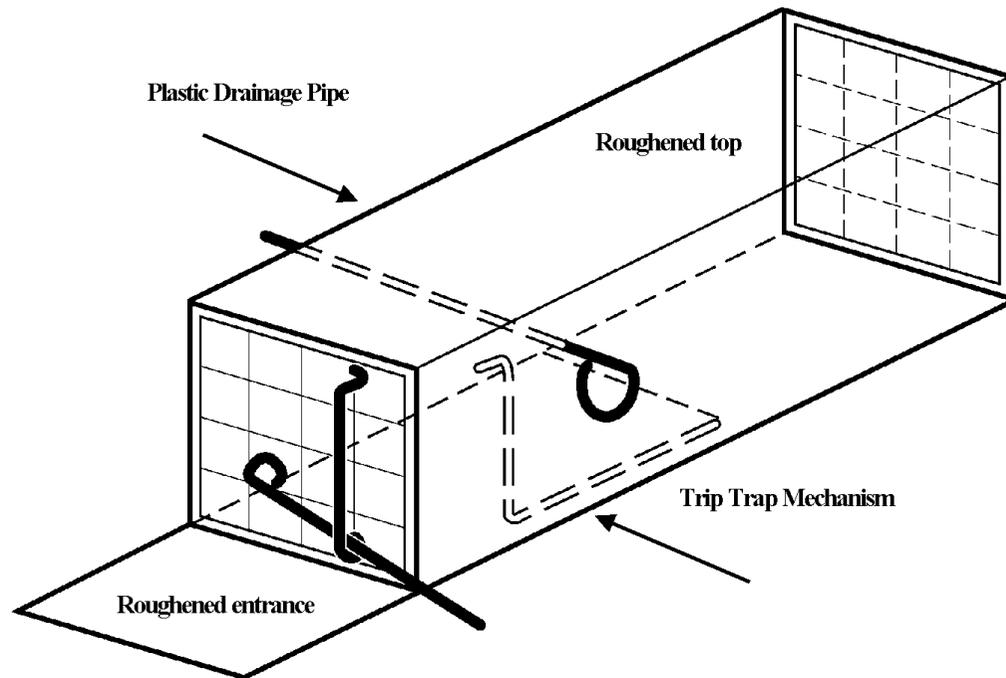


Figure 10 Pipe Trap (adapted from J. Messenger's design- with 0.5 inch weld mesh)

RADIO-TRACKING

6.13 This research method, which provides the most detailed biological information, involves placing a radio transmitter collar around individual animals and tracking them by fixing their location using a receiver and antenna. The collars weigh 1.2-1.6g, so only animals weighing 14.5g or more can be tagged. Transmitters and antennae are available from a number of suppliers. Animals are usually collected from nest boxes in the morning and returned with their collars within the hour. Their locations are fixed hourly during the night. This is used in conjunction with visual observation and red filtered lights. Night sights and zero lux video cameras can also be used to gain valuable additional information. Animals are fur clipped to identify individuals, and the collars removed at the end of the study (self-detaching collars are advisable to prevent animals being left at a disadvantage).

6.14 The advantage of radio tracking is that it is valuable for gaining ecological data on how dormice use their habitat. It is also a very effective way of monitoring the movement and behaviour of translocated animals in their new habitat. The main disadvantage is that few people are experienced enough in radio tracking to meet EN/CCW's licensing requirements. In addition, if the animals are to be anaesthetised it may be necessary to gain a licence from the Home Office and for a veterinary surgeon to be in attendance.

NEST SEARCHES

6.15 Summer nest searches, to detect presence, are best undertaken during the winter months when the vegetation has died back. All potential nest sites in tangles of vegetation should be searched. The advantage of this method is that a licence is not necessary but the limitations include the time involved, and the limited success rates.

HABITAT SURVEYS

6.16 Habitat surveys should be undertaken in all habitats of potential value to dormice. The surveys should be detailed enough to provide specific advice on mitigation design. They should include survey of the route corridor and, where necessary, further investigation at least to the nearest large, ancient woodland complex if outside the route corridor. All habitat types should be recorded on at least field-by-field scale. In woodlands, details on each compartment or stand type should be collected. Ride vegetation can be important and should be recorded separately. A species list should be provided for the sites, with particular attention given to plants of known or potential value for dormice as food or nesting material. A relative abundance figure should be assigned to these in each habitat type (eg DAFOR). This is a system to determine relative abundance of species using the classifications: D = dominant; A = abundant; F = frequent; O = occasional; and R = rare. The level of information required is greater than that produced during a Phase 1 survey, but less than that required for a Phase 2 survey (see Chapter 7). The structure of the habitat is also important. Aerial route ways are essential for effective feeding, so continuity in the shrub and tree layers should be recorded.

6.17 Shading is an important factor affecting the suitability of habitat for dormice as it partly determines productivity and structure. The presence of grazers eg domestic stock and wild animals such as deer, should be noted (see Section 4.7).

6.18 The presence of potential summer and winter nest sites (eg tree holes, deep litter layers, wood piles, hedgerow bottoms and tangles of suitable vegetation such as bramble, rose, ivy and honeysuckle) should also be recorded.

6.19 Hedgerows must be assessed fully and information including species, age, management and continuity recorded. Important links with existing dormouse habitat should also be noted, as should key potential future links (ie where suitable habitats are isolated and could be improved through mitigation).

TABLE 1: DORMOUSE SURVEY METHODS

Method	Timing	Objective	Advantages	Limitations/Requirements
Nut searches	Sept-Dec (optimum) Jan-March (possible)	Presence	Definitive (if presence) Economic No licence needed Standard methodology	Absence of hazel Poor fruiting (weather, shading)
Nest box schemes	April-November	Presence Breeding Population Estimate Translocation	Definitive (if presence) Standard methodology Conservation benefit Multi-purpose	Licence (EN/CCW) cost Land owner's permission Absence (not negative confirmation) Time needed for occupation
Hair tubes	May-September	Presence	Economic Definitive (guard hairs) No licence needed	Skill/training microscope Effects of weather Low catch rates
Tulley tube nest boxes and pipe traps/nest boxes	May-September	Presence Biological Information	Economic Definitive	Licence EN/CCW Early stages of use Land owner permission
Cage traps	May-September	Presence Translocation	Definitive Standard methodology Multi-purpose	Expense - time, expertise Licence EN/CCW
Radio-tracking	May-September	Detailed biological information Research	Unique information gained Multi-purpose	Cost/Licence EN/CCW + possibly Home Office (limited to a few personnel)
Nest searches	Sept-March (optimum) April-August (possible)	Presence	Simple No licence needed (unless disturbs nest in occupancy)	Time consuming Limited success

Nb. For all of these techniques ensure sufficient time is available and access rights to land have been obtained

GENERAL

7.1 For proposed new highway schemes in areas within the main dormouse distribution and in adjacent counties (Figure 1), dormouse surveys (as described in Chapter 6) should be undertaken over the entire route corridor. Where dormouse populations are isolated (eg in the North) and where there is the possibility of future introductions, more detailed surveys should be undertaken (Stages 2 and 3 below). All potential dormouse habitats should be included in the surveys (see Sections 6.16-6.19). Major improvements to existing routes should also follow these stages of assessment. Account should be taken of any possible effects including any past mitigation work that will be affected by the proposed improvements.

7.2 This note follows the advice in the Design Manual for Roads and Bridges (DMRB) Volume 11 (Environmental Assessment), but strongly recommends changes where the objectives cannot be met for dormice.

STAGE 1

7.3 This stage is concerned with the route corridor and aims to identify ecological constraints and survey requirements through consultation and collation of existing information. The consultation exercise should include the statutory and non-statutory bodies listed in Annex D. Other consultees may include the Biological Records Centre, Mammal Society Recorders and County Councils. Such consultation should identify any records of existing populations, re-introductions and recent surveys.

7.4 A desk study will require the collation of data from several sources. Phase 1 Habitat Data (usually held by EN/CCW and Wildlife Trusts) will indicate the potential habitats, Ancient Woodland Inventories (EN/CCW) will list all ancient woodlands larger than 2 hectares, and First Series Maps will show areas of woodland and scrub in the late 1880's early 1900's. These sources will assist in the identification of potential dormouse habitat and from this specific survey sites can be established.

STAGE 2

7.5 This stage concentrates on identifying the nature conservation value of the route corridor and on assessing the significance of the potential effects of the various route options on these values. It normally involves a more detailed desk study to evaluate the ecological interest and a preliminary walkover survey to confirm the presence or otherwise of dormice.

7.6 In many cases, a desk study and walkover survey may not provide sufficient evidence to allow the nature conservation values and the significance of the potential effects on these values to be accurately assessed. Under these circumstances, it will be necessary to undertake more detailed surveys of all potential dormouse sites identified at Stage 1 using the recommended methods described in Chapter 6 and detailed in Table 1. Ideally, the population size should be established at this stage by installing nest box schemes at key sites.

7.7 Using the evidence from the detailed desk study and surveys, the potential effects on dormice of each route option should be identified as far as possible. Indirect effects such as the severance of connections between populations, and the potential for land use changes adjacent to the route should also be identified.

STAGE 3

7.8 If Stage 2 indicates that dormouse populations will be adversely affected by the preferred route, the detailed potential impacts of the scheme/works should be identified and the appropriate mitigation measures designed accordingly. It should be established at this stage whether the population is of local, regional or national importance. Relevant survey methods (Chapter 6) should be used to estimate and monitor the dormouse population of concern. Detailed surveys are likely to include nest box schemes, which when monitored over several (1-3) years, can provide an estimate of the population size likely to be adversely affected. Additionally, an assessment of the effects of the proposal on the linkages between dormouse sites (eg hedgerows and scrub belts) should not be overlooked.

7.9 The impacts on habitats of value should be assessed and the information gathered at Stage 3 should be used to guide the design of the mitigation package associated with the scheme.

7.10 Detailed habitat assessment should evaluate the quality of the habitat within the landscape and identify any potential for improvement. The monitoring programme, to assess the success or otherwise of the mitigation, should be detailed in the Environmental Statement.

CONSTRUCTION AND POST CONSTRUCTION MONITORING

7.11 During construction of both advanced and main works, further checks should be made for the presence of dormice before and during site clearance operations. Pre-construction and site clearance surveys may be formally required as part of contract specific environment action plans and/or environmental management systems (as is standard practice in Wales).

7.12 Monitoring the effects of the road scheme and the success of the mitigation measures is essential. Monitoring data will serve to improve the currently limited knowledge base on dormouse ecology and their response to disturbance impacts. A programme of monitoring should begin as soon as mitigation works are initiated. It will need to assess dormice numbers, their distribution and their use of any mitigation measures. The appropriate methods for monitoring are detailed in Chapter 6 and Table 1. These should be employed consistently throughout the monitoring programme to maximise data reliability..

CHAPTER 8 LICENSING REQUIREMENTS

8.1 Licences for survey, research, education, conservation and photography are issued through English Nature and the Countryside Council for Wales. Some work requires training from an expert. Personal references for competence are necessary. Licences are needed for checking dormouse boxes, tube nest boxes and traps.

8.2 Where construction work is not conservation related or part of a scheme of national importance, licences can be issued by the DETR to permit otherwise prohibited acts. Three tests must be satisfied before DETR can issue a licence:

1. Regulation 44(2)(e) states that licences may be granted by DETR to “*preserve public health or public safety or other importance reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment*”.
2. Regulation 44(3)(a) states that a licence may not be granted unless DETR is satisfied “*that there is no satisfactory alternative*”.
3. Regulation 44(3)(b) states that a licence cannot be issued unless DETR is satisfied that the action proposed “*will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range*”.

These tests apply equally to the issue of translocation licences, where a population is threatened.

8.3 Re-introductions need licences where the animals are taken from the wild, but not when they are captive bred young. The re-introduction of dormice taken from the wild as mitigation for impacts associated with a highway scheme, requires a licence from the DETR (or the appropriate Government licensing authority). However, if the work is for scientific or conservation purposes, the licence is issued by EN/CCW.

CHAPTER 9 EXISTING ROADS

9.1 Major or minor works to existing roads in areas of known dormice distribution (see Figure 1) can potentially affect dormice. The appropriate survey methods (Chapter 6 and Table 1) and mitigation measures (Chapter 11) should be used to minimise any impacts. The Trunk Roads Maintenance Manual (TRMM) should be consulted in relation to Landscape Management Works as it provides guidelines for work involving protected species and habitats. Environmental Assessment should be undertaken to an appropriate level for the works concerned and in accordance with DMRB Volume 11. A survey of the area and consideration of the potential effects of the works should be carried out to an appropriate level (see Chapter 7). Major works affecting potential dormouse habitat (eg improvements or upgrading) can cause significant effects but even minor works (eg cutting visibility splays and cable-laying) could result in the increasing isolation and fragmentation of populations. Every opportunity for improving the habitat structure and continuity should be undertaken.

9.2 Habitat destruction, whether it is a single old tree or scrub clearance, should be assessed by an experienced ecologist. Old trees with holes may support a nest site and these should be checked prior to any works. Habitat clearance should only be undertaken using the methods described in Chapter 11 and in the presence of a licensed ecologist.

9.3 Mitigation should include Landscape Management Works to retain habitat continuity. In areas with significant potential impacts, large-scale habitat quality improvement and engineering measures eg green bridges (where land is available) should be considered as part of the mitigation package.

DIRECT LOSS OF ANIMALS

10.1 Even by exercising extreme care during translocation and manual clearance of habitat, it is rarely possible to avoid the loss of some individuals.

DIRECT LOSS OF HABITAT

10.2 The landtake for road schemes and major maintenance works can affect dormice through the direct loss of habitat. This includes the loss of woodlands, hedgerows, scrub and other habitats of value to dormice. The reduction in area available to animals will increase their vulnerability, and in some areas may reduce the habitat to below a viable level to support the existing population. Genetic diversity may also be reduced.

ISOLATION

10.3 Dormice are poor re-colonisers and therefore isolation will increase their vulnerability, and decrease the genetic diversity of the population. Isolation can result from small habitat losses, such as the removal of a hedgerow connecting suitable habitat, or from major losses of large areas such as woodlands.

10.4 Dormice are primarily arboreal and are reluctant to traverse wide road systems (at present they are known only to cross single-track roads). Aerial routeways (eg green bridges and ropeways (Chapter 11, Sections 11.5 and 11.16)) may be proposed in an attempt to mitigate against the isolation effect. At present little research has been undertaken into the effectiveness of such measures for dormice. Even if successful, it would not always be possible to retain the previous connections between territories.

FRAGMENTATION

10.5 Fragmentation of habitat can seriously affect the existing populations by increasing vulnerability and likelihood of local extinctions. These effects can reduce both numbers and distribution of the species. Many strong populations of dormice are in areas of large ancient woodland or old hedgerow systems. The more fragmented the landscape, the larger the area needed for a sustainable population. Thus a 40ha woodland fragmented into two woodlands of 20ha is likely to sustain a smaller, and more vulnerable dormouse population.

INDIRECT EFFECTS

10.6 After-use of the land surrounding new or improved roads can result in infilling with housing etc which could further reduce habitat availability, and reduce links between sites. Cat predation could also have a significant effect on some populations. Other indirect effects of infill development and urbanisation include the deterioration of habitats due to increased disturbance and pollution, a possible change in the micro-climate of woodlands, and the risk of vandalism to nest boxes.

11.1 The dormouse is a fully protected, vulnerable species which is undoubtedly seriously affected by fragmentation of existing habitat and by disturbance. It is recommended that no new routes dissect existing habitats and known populations, unless DETR determine that there are over-riding circumstances for choosing such a route. If the schemes and maintenance works do affect dormice, then appropriate mitigation should be designed and approved by English Nature or the Countryside Council for Wales. The development of specific dormouse mitigation measures are in the early stages, and few schemes have had sufficient initial assessment or monitoring to determine their success. Therefore the monitoring of the effectiveness of the measures should be undertaken as a priority and the results recorded to guide future designs.

11.2 Mitigation measures should seek to minimise losses by re-creating valuable habitats lost to the scheme, restoring links between existing sites and managing habitats to improve the quality. Every attempt should be made to strengthen populations and allow re-colonisation. Where possible, dormice should remain within the area and translocation should be seen as a last option and even then only used in small isolated areas. Where dormice are being encouraged to occupy adjacent land, habitat improvement works (in terms of quantity and quality) should be carried out as advance works at the earliest opportunity to cope with the increasing numbers using the remaining habitat.

11.3 The Highways Act 1980, Section 253, allows for work to be carried out on third party land for the purpose of mitigation. These areas should have been identified during the environmental assessment process. It is particularly relevant where dormice populations are small and isolated. The aims should be to replace at least the equivalent area of habitat lost, and to provide links between suitable sites (see Figures 11-13). Sympathetic land-owners may give permission for mitigation work to be carried out before the start of the main contract (before Compulsory Purchase Orders are issued).

A local authority may enter into an agreement under the provision of S.96 of the 1980 Highway Act. This allows the local authority to plant trees and shrubs within the highway boundary. Such planting should, indirectly, create suitable habitat for dormice.

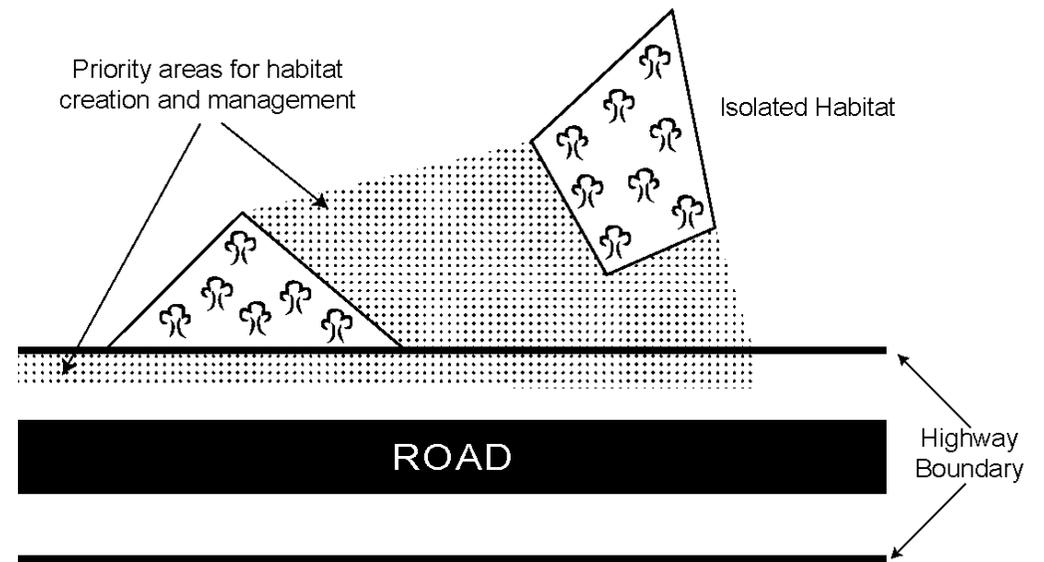


Figure 11 Linking Isolated Habitats

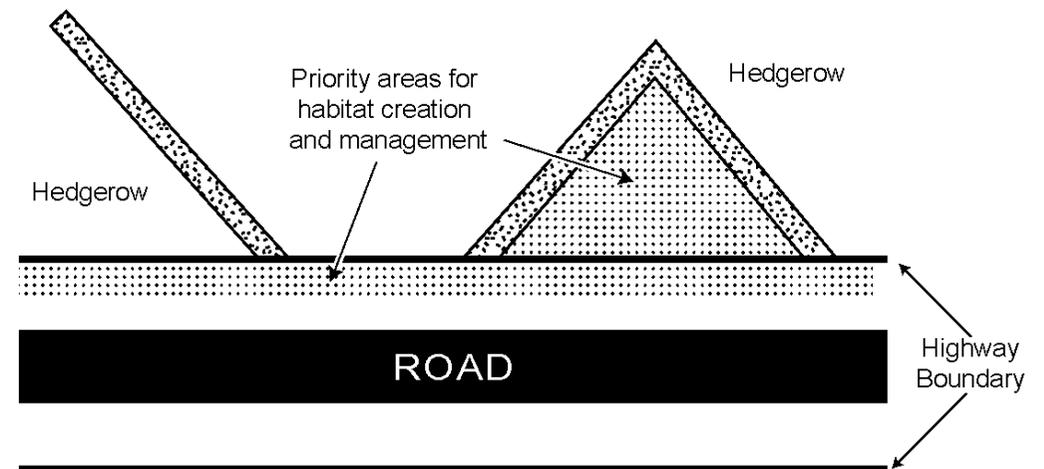


Figure 12 Reconnecting Hedgerows

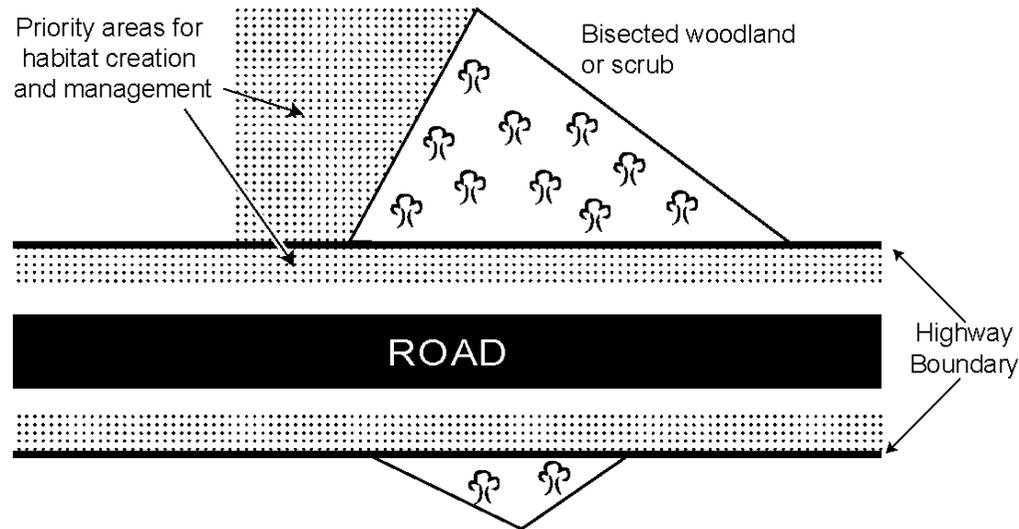


Figure 13 Re-creating Viable Habitat Size

VEGETATION CLEARANCE - TIMING OF WORKS

11.4 With fully protected species, no work should be undertaken during their vulnerable periods such as breeding and hibernation. This only leaves small windows of opportunity for works (ie May and September to early October). The exact dates of the autumn period will depend on the onset of cold weather and the possibility of second litters. There are potentially two time periods for staged vegetation clearance (See Fig. 14), early summer and winter. This method aims to deteriorate the habitat to such an extent to make it unsuitable for dormice, and to encourage them to relocate independently to nearby suitable habitats. It involves the manual clearance of the vegetation, preferably with hand tools and over several years if possible. A licensed ecologist must be present at all times of disturbance. If this is undertaken during the summer, May is the only month when it is possible to avoid disturbance to pregnant females or those with dependent young.



Figure 14 Vegetation clearance on the route of the Silverstone bypass

11.5 Autumn has been the time when habitat clearance has been undertaken for the majority of road construction schemes. The areas should be checked in September and October for dormice by clearing litter and moss, and checking the base of old boles, tree holes and hedgerow bottoms. This has to be undertaken by experienced, licensed ecologists. Small sites connected to suitable habitat which will remain, should be cleared by hand. When covering large areas it is not possible to clear manually using hand tools. In such cases selected haul routes should be chosen using old tracks and the least valuable habitat. No machinery should be allowed off this route. The vegetation should be stripped and the wood taken manually to the haul routes. The main stools should be left *in situ* until at least May, to allow the animals to relocate when they awake. Animals which are found during this time, if of sufficient weight should be removed to a safe area ie translocated. Due to the change in surface vegetation, the remaining animals are unlikely to remain in hibernation until Spring. However, there are no records to provide evidence of this.

11.6 In less dense areas such as immature planting, clearance should also be undertaken in autumn by a licensed ecologist. The area should be checked for animals, with the branches removed manually from the site to an area of no value to dormice or transported off site for chipping.

HABITAT CREATION

11.7 New woodland (see Fig.15), scrub and hedgerows should be planted with a suitable species mix of known value to dormice (see Annex B) and connected with suitable habitat that will remain. Ideally, mixed species hedgerows should be planted throughout the scheme in areas with dormice. The translocation of existing hazel stools provides greater potential for earlier food sources once they become established. Pollarding is another useful method for providing both age structure and food sources in new plantings. Where honeysuckle is rare, then plants should be translocated. Long-term management plans are needed to ensure that the habitat is managed appropriately for dormice.

11.8 Existing hedgerow and scrub can be improved by 'gapping up' to increase continuity and diversity. A reduction in management can promote flowering and fruiting, thus providing a good temporary food source while the new planting develops. Even linear strips of grassland, if uncut, could provide some form of food and routeways for dormice, if allowed to develop over several years. Such works could be carried out in areas within the land take or on additional land acquired for mitigation purposes.



Figure 15 Newly planted woodland connecting to existing woodland

HABITAT MANAGEMENT

11.9 Areas for habitat management (both within the highway boundary and outside) should have been identified and prioritised during the environmental assessment process. High priority areas will be those with the greatest potential for improvement and for linking existing sites eg isolated sites, stock grazed woods and poor hedgerows. The management of these will obviously depend on land agreements.

11.10 Habitat management is essential, particularly in woodland, to retain a good, continuous and diverse shrub layer. Each woodland needs to be surveyed individually to identify management requirements but some general principles (below) should be followed. Woods should be managed in small areas over long periods, and in perpetuity. When coppicing regimes commence, both in young and mature woodland areas, it should be site specific, taking into account the plot size and surrounding habitat. It should only be carried out in small areas (0.1-0.3 ha) and in non-adjacent blocks. The size and structure of the woodland will partly determine the amount of coppicing that should be carried out each year. The cyclical period of coppicing plots will be partly determined by growth and fruiting rates. Within coppiced and newly planted areas, standard trees should be low in number (10-15 per ha). Small areas of non-intervention woodland should be maintained. The pollarding of certain tree species eg hazel, can also be a useful management tool for encouraging the fruiting of trees. Woodland should always be fenced to prevent deer and domestic animals from damaging the young plants.

11.11 Costs, and the presence of other species of conservation value, may mean coppicing is impractical. In such cases, glade and ride management become important. Scalloping rides in conifer woods and creating glades in high deciduous woodland are two methods for improving the value of shrub layers.

11.12 Some dead wood and brash should be left onsite. The former can provide shelter for nest sites and the latter can be used to protect coppice regeneration. Bramble, ivy, honeysuckle, rose tangles and old trees with holes should be left, or allowed to develop. Non-native trees such as sycamore, sweet chestnut and some conifers are food sources for dormice so clear felling should be avoided. Coppicing some species will prevent heavy seed production. Pure conifer should be managed in a similar way to deciduous woodlands until their value is determined.

11.13 Shrubs should be managed to encourage the best fruiting regime. Most fruit is produced from the previous year's wood. This may involve cutting small, non- adjacent areas on a cycle, and pruning individual plants to achieve a matrix of age structure throughout the planting. Hedgerows should also only be managed in short lengths, and on one side in any one year. Ideally, sections of hedgerows should be allowed to become overgrown, as such habitats have more value for dormice. Where necessary, hedgelaying should be avoided in long continuous stretches where dormice are thought to be present. Hedgerows should only be cut outside the dormouse active season and preferably once every three years.

NEST BOX SCHEMES

11.14 Nest boxes, as a survey method have been discussed in Chapter 6, but they can also be a valuable conservation tool, providing shelter for dormice from poor weather conditions. There is evidence that the use of nest boxes increases the carrying capacity of the habitat (probably due to the limited number of natural tree holes). Nest boxes should be installed before April in grid lines of 10-20m apart, and at a height of 1.5m. Ideally they should be on hazel stools with honeysuckle tangles, but dormice are known to use them even in pure conifer stands. Their use should be monitored regularly, with the results sent to the national recording scheme (see Annex D). In urban areas, or where disturbance is likely, then boxes should be installed at a height of at least 3m. This makes monitoring more difficult but protects the animals.

GREEN AND ROPE BRIDGES

11.15 Green bridges can be used where areas of suitable habitat are divided, especially if the resulting habitat fragments are below the size necessary for viability. Green bridges can be up to 200m wide and planted with scrub and grass. No work has yet been undertaken to find out if dormice use them but there is evidence that a wide range of other small mammals eg hares, badgers, foxes and bats have utilised them.

11.16 On certain single carriageway roads where temporary breaks in the habitat occur, then thick ship's rope suspended between the tree canopies could provide a link for dormice between sites at crucial points. New field entrance gateways should preferably be wood to encourage dormice to cross them. Alternatively the tops of metal gates could be covered with hessian.

TRAPPING AND TRANSLOCATION

11.17 Where dormice are to be adversely affected by a highway scheme, and it is not possible to provide alternative dormouse habitat on site then translocation may be considered as a last option. The appropriate SNCO (EN/CCW) must be consulted for specialist advice (EN already have a re-introduction programme). Local groups should also be informed if appropriate. Animals can be trapped during their active season (May to early June) using a combination of the methods discussed in Chapter 6 (and Table 1). Nest boxes must be installed before the active season and inspected every week until there are no more animals present, and then checked every 2 weeks. Other methods such as cage traps and pipe traps should be considered to increase the capture rate. These methods should be avoided however, when there are pregnant females or dependent young around (births peak in August in UK). In exceptional circumstances, animals of sufficient weight found during September and October during staged clearance could be translocated if there is insufficient habitat nearby.

11.18 There are strict guidelines for translocation, and any such work must be licensed by DETR. It is essential that the receptor site is large enough to support a viable population, and that the reasons for dormice absence at that site are known and corrected. The habitat management programme must be appropriate and long-term. At least 100 nest boxes should be installed prior to moving the animals. A viable group (>20) of sufficient weight should be moved in early to mid June. They should be installed in pre-release cages constructed of 10mm weld mesh situated preferably in hazel stools 0.5m above ground. Each cage should contain a nest box with some nesting material such as leaves, and a single animal or social group. Adult males should be kept at least 100m apart. They should be kept in the cages with fresh branches for 10 days and supplied with food and water. After 10 days a small opening (30x30mm) should be made to allow dormice to exit and return. Release should take place during good weather, with food supplied until August when natural supplies become available. Cages should then be removed.

11.19 It is essential that the translocated animals are monitored. A detailed monitoring programme should begin in the first year (during September and October) and continue until at least the group is established (reaching numbers above the original size of the group). If numbers are too low then additional animals, either captive bred or wild caught animals from threatened sites, should be moved with the appropriate licences. EN or CCW and local groups should be informed and if possible involved in long-term monitoring.

CAPTIVE BREEDING PROGRAMME

11.20 The mortality rate of animals kept in captivity can be high and this, in association with the isolation of re-introductions in counties where they are believed extinct, should make captive breeding a last resource option.

CHAPTER 12 CONSTRUCTION

(See also Chapter 7, Section 7.11)

12.1 It is essential that a best practice system such as certification is established prior to the commencement of works. Each contractor should be informed of their obligations as regards landscape maintenance eg grass cutting, and advised of the procedures to be employed in order to minimise the impact of these activities on dormice. In addition, any mitigation measures constructed as part of the scheme should be continually safeguarded. It is important that accidental damage to any valuable habitat or advanced works should be prevented through appropriate marking such as Eurotape. In some circumstances where the habitat development and value is not obvious, more solid boundaries such as chestnut pale fencing should be installed and clearly marked on the site plans. This will be necessary in important link areas such as hedgerows and scrub. Experience in Wales has shown that contract specific environmental action plans and/or environmental management systems are effective tools for regulating pre-construction, construction and post-construction activities.

12.2 New site compounds, outside the highway boundary, should be located away from areas of value (both existing and new potential sites).

13.1 The Project Manager, the Environmental Clerk of works (or equivalent onsite representative) and each contractor should be made aware of their responsibilities. It is essential that a professional ecologist is employed to provide advice on any works such as habitat disturbance or removal throughout the length of the contract. This professional should also monitor any mitigation measures that are installed to assess and maximise their effectiveness. Nest box schemes will have to be monitored, cleaned out and repaired.

All information on schemes, where relevant, should be sent annually to the National dormouse monitoring scheme (see Annex D).

CHAPTER 14 MAINTENANCE OPERATIONS

14.1 Scheme environmental data should be provided to the Managing Agent, with details of the mitigation and maintenance requirements. Data on key sites will be fed into the HA environmental database. Additional areas such as habitat links must be noted and safeguarded, to prevent accidental severance by maintenance operations (maintenance contract specifications may not include instructions to this level of detail).

14.2 All landscape designs and management operations should follow the general guidelines given in this document, and advice sought from an experienced ecologist if necessary.

CHAPTER 15 POST CONSTRUCTION MONITORING

15.1 It is essential that the mitigation measures, their successes and failures, are closely monitored in order to provide feedback to the relevant design authority. These should aim to promote the continued development and expansion of linear features, and increase the area of scrub and woodland habitat suitable for colonisation by dormice.

15.2 Items such as nest boxes, ropeways, green bridges will also need to be monitored and maintained. The boxes need to be cleared annually by a licensed ecologist. Management plans affecting dormouse habitat should be reviewed and updated annually. This includes the development of linear features, scrub development and woodland habitat.

1. CURRENT STATUS

1.1 The dormouse does not occur in Scotland or Northern Ireland. In Wales, there are few known populations and in England it has become extinct in up to 7 counties (comprising half its former range) in the past 100 years. It is absent from the north, except for small populations in Cumbria and Northumberland, and although dormice are still widespread in southern counties (Devon to Kent), they are patchily distributed. Population densities everywhere are less than 10 adults per ha, even in good habitats.

1.2 The dormouse is listed on Appendix 3 of the Bonn Convention and Annex IVa of the EC Habitats Directive. It is protected under Schedule 2 of the Conservation (Natural Habitats, etc) Regulations, 1994 (Regulations 38) and Schedule 5 of the Wildlife and Countryside Act 1981.

2. CURRENT FACTORS CAUSING LOSS OR DECLINE

2.1 Changes in woodland management practice, notably cessation of hazel coppicing and stock incursion into woodland.

2.2 Fragmentation of woodland, leaving isolated, non-viable populations. Short distances, possibly as little as 100m, form absolute barriers to dispersal, unless arboreal routes are available.

3. CURRENT ACTION

3.1 Ecological research has led to practical proposals for conservation management. A nestbox scheme has been established, aimed at collating data on breeding and population density from sites throughout the present range.

3.2 *A Practical Guide to Dormouse Conservation* was published by the Mammal Society in 1989, and EN are preparing a manual of dormouse conservation management.

3.3 In 1992 the dormouse was added to English Nature's Species Recovery Programme, with the aim of protecting and consolidating the species at selected sites where it still occurs, and developing methods to re-establish dormice in counties from which they have been lost. Trial re-introductions have been undertaken in Cambridgeshire and Nottinghamshire.

3.4 A major public participation exercise - the Great Nut Hunt of 1993 - aroused considerable interest and prompted many local surveys which improved knowledge of dormouse conservation status.

3.5 Developments which fragment habitats and break up natural features which link wildlife sites (notably road building) have a significant impact on dormouse populations. The importance of retaining and managing natural features linking wildlife sites was emphasised in DoE's Planning Policy Guidance Note on Nature Conservation (PPG9), published in October 1994, which covers England, and the equivalent Planning Guidance (Wales), Technical Advice Note (TAN) 5 - Nature Conservation and Planning in Wales.

4. ACTION PLAN OBJECTIVES AND TARGETS

4.1 Maintain and enhance dormouse populations in all the counties where they still occur.

4.2 Re-establish self-sustaining populations in at least 5 counties where they have been lost.

5. PROPOSED ACTION WITH LEAD AGENCIES

5.1 Policy and legislation

5.1.1 Seek to ensure that PPG9 guidance issued by DETR and the NAW is taken into account by the Highway Authorities and LAs.
(Lead Organisations with responsibility for Action: DETR, Local Authorities (LAs), National Assembly for Wales (NAW))

5.2 Site safeguard and management

5.2.1 Sites supporting dormice should be identified and advice provided to land managers on appropriate management.
(Lead Organisations with responsibility for Action: DETR, LAs, NAW)

5.2.2 Grant-aid and incentive schemes (such as the Woodland Grant Scheme) should be used to encourage owners to manage suitable habitat sensitively.
(Lead Organisation with responsibility for Action: Forestry Authority (FA))

5.2.3 Manage woodlands and hedgerows to maintain current populations and prevent further habitat fragmentation.
(Lead Organisations with responsibility for Action: FA, Ministry of Agriculture, Fisheries and Food (MAFF))

5.3 Species management and protection

5.3.1 Continue the programme to re-introduce dormice in 5 counties (Cambridgeshire, Nottinghamshire and 3 others yet to be selected) where they are currently absent. Reinforce populations in at least 3 counties where they are scattered (eg Bedfordshire, Northamptonshire and Berkshire).
(Lead Organisation with responsibility for Action: EN)

5.3.2 Establish by 1996 a co-ordinated programme of captive breeding to support the re-introduction programme, including research into the long term survival of captive bred individuals.
(Lead Organisations with responsibility ACTION: EN)

5.4 Advisory

5.4.1 A new manual on dormouse conservation will be published in 1995.
(Lead Organisation with responsibility for Action: EN)

5.4.1 Supporting training in conservation of dormice both for land managers and advisers.
(Lead Organisations with responsibility for Action: MAFF, FA, Welsh Office Agricultural Department (WOAD as was), CCW, EN)

5.5 Future research and monitoring

5.5.1 Continue research into dormouse ecology, with particular emphasis on the ecology of dormice in hedgerows or conifer sites, the analysis of existing population data, hibernation requirements, and the effects on populations of isolation.
(Lead Organisation with responsibility for Action: EN)

5.5.2 Promote research on methods of conserving dormice which are consistent with various silviculture systems.
(Lead Organisations with responsibility for Action: EN, FA)

5.5.3 The National Dormouse Monitoring Scheme should be maintained and extended to 25 counties. Methods of survey or monitoring should be further developed and standardised to obtain sufficient long-term data on which to assess the effects of site management and successional development.
(Lead Organisations with responsibility for Action: CCW, EN)

5.5.4 Surveys of sites identified in the Great Nut Hunt of 1993 should be repeated at 5-10 year intervals to provide data on changes in distribution and abundance.
(Lead Organisations with responsibility for Action: EN)

5.5.5 Carry out a survey of dormice in Wales to assess the range and habitat use and identify necessary conservation measures.
(Lead Organisation with responsibility for Action: CCW)

5.5.6 Encourage research on the ecology and conservation of this species in an international context.
(Lead Organisations with responsibility for Action: CCW, EN, Joint Nature Conservation Committee (JNCC))

5.5.7 Pass information gathered during survey and monitoring of this species to JNCC in order that it can be incorporated in a national database and contribute to the maintenance of an up-to-date Red list.
(Lead Organisations with responsibility for Actions: CCW, EN)

5.6 Communication and publicity

5.6.1 Ensure that landowners, agencies and local authorities are aware of the requirements of the dormouse, especially the impact woodland and hedgerow management may have, and the effects of habitat fragmentation.
(Lead Organisations with responsibility for Action: CCW, EN)

5.6.2 Ensure continued public awareness of this species as a key indicator of desirable woodland and hedge conditions.
(Lead Organisations with responsibility for Action: CCW, EN, FA, MAFF, WOAD (as was))

ANNEX B PLANTING LIST

VOLUME 10 SECTION 4
PART 5 HA 97/01

The main species in this list are those of known food value to dormice. Variation in site characteristics eg soils, climate, conservation value and existing species diversity due to geographical location mean that not all species are appropriate to all sites. Whilst some conifers and non-native species do have a value to dormice it would be more prudent to plant a mix dominated by native broad-leaved species. The list also does not include species such as bramble, which are of known value but are likely to colonise the majority of sites naturally. Honeysuckle may need to be planted in areas without a local source. The percentage mix of the species listed below will vary but should always include those of known, high value such as hazel, oak and honeysuckle.

Common Name	Scientific Name
Alder	<i>Alnus glutinosa</i>
Ash	<i>Fraxinus excelsior</i>
Beech	<i>Fagus sylvatica</i>
Birch	<i>Betula sp.</i>
Blackthorn	<i>Prunus spinosa</i>
Broom	<i>Sarothamnus scoparius</i>
Cherry	<i>Prunus sp.</i>
Crab apple	<i>Malus sylvestris</i>
Dogwood*	<i>Cornus sanguinea</i>
Field maple	<i>Acer campestre</i>
Gorse	<i>Ulex sp.</i>
Guelder rose*	<i>Viburnum opulus</i>
Hazel	<i>Corylus avellana</i>
Hawthorn	<i>Crataegus monogyna</i>
Holly	<i>Ilex aquifolium</i>
Honeysuckle	<i>Lonicera periclymenum</i>
Hornbeam	<i>Carpinus betulus</i>
Oak	<i>Quercus sp.</i>
Privet*	<i>Ligustrum vulgare</i>
Rose	<i>Rosa sp.</i>
Rowan	<i>Sorbus aucuparia</i>
Spindle*	<i>Euonymus europaeus</i>
Sweet chestnut	<i>Castanea sativa</i>
Sycamore	<i>Acer pseudoplatanus</i>
Wayfaring tree	<i>Viburnum lantana</i>
Whitebeam*	<i>Sorbus aria agg.</i>
Willow	<i>Salix sp.</i>
Yew	<i>Taxus baccata</i>

* Not recorded in text references but probably of value

Common Name

Scientific Name

Conifer Trees

Larch	<i>Larix sp</i>
Spruce	<i>Picea sp</i>
Scot's Pine	<i>Pinus sylvestris</i>

HABITAT TYPE	HABITAT AGE	DOMINANT SPECIES	MANAGEMENT
1. Woodland			
1a. Broadleaved	Ancient/New	Oak, Ash, Beech, Birch, Alder, Sweet Chestnut	Coppice with standards, high forest, young plantation.
1b. Conifer	Ancient/New	Larch, Spruce, Scot's Pine	
2. Mixed Scrub	Ancient/New	Bramble, Gorse\Bracken, Blackthorn, Hawthorn	
3. Hedgerows	Ancient/New		
4. Gardens *			Neglected/overgrown
5. Orchards*			
6. Alder/reed beds*			
7. Mires			
8. Tall herb*			

* Usually connected with other good habitats such as hedgerows, scrub and woodland

For the addresses of local offices of the statutory nature conservation organisations and wildlife trusts contact the appropriate main office.

COUNTRYSIDE COUNCIL FOR WALES

CCW Headquarters
Plas Penrhos
Ffordd Penrhos
Bangor
Gwynedd. LL57 2LQ

Tel: 01248 370444
Fax: 01248 355782

ENGLISH NATURE

English Nature Headquarters
Northminster House
Peterborough. PE1 1UA

Tel: 01733 455000
Fax: 01733 568834

FORESTRY COMMISSION

Headquarters England

Forestry Commission (England)
Great Eastern House
Tenison Road
Cambridge. CB1 2DU

Tel: 01223 314546
Fax: 01223 460699

Headquarters Wales

Forestry Commission (Wales)
National Office
Victoria Terrace
Aberystwyth
Ceredigion. SY23 2DQ

Tel : 01970 625866
Fax : 01970 626177

FOREST ENTERPRISE

Forest Enterprise (England)
340 Bristol Business Park
Coldharbour Lane
Bristol. BS16 1AJ

Tel : 0117 906 6000
Fax : 0117 931 2859

Forest Enterprise (Wales)
Victoria Terrace
Aberystwyth
Ceredigion. SY23 2DQ

Tel: 01970 612367
Fax: 01970 625282

NON – STATUTORY BODIES

The Mammal Society
Cloisters Business Centre
8 Battersea Park Road
London. SW8 4BG

Tel: 020 7498 4358
Fax: 020 7622 8722

ANNEX D SOURCES OF FURTHER INFORMATION

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National Dormouse Monitoring Programme
School of Biological Science
Royal Holloway
University of London
Egham
Surrey. TW20 0EX

The Vincent Wildlife Trust
3&4 Bronsil Courtyard
Eastnor
Ledbury
Herefordshire. HR8 1EP

Tel: 01531 636441
Fax: 01531 636442

The Wildlife Trusts – National Office
The Kiln
Waterside
Mather Road
Newark
Notts. NG24 1WT

Tel: 01636 677711
Fax: 01636 670001

SUPPLIERS OF DORMOUSE BOXES

Alana Ecology Ltd
The Old Primary School
Church Street
Bishop's Castle
Shropshire. SY9 5AE

Tel: 01588 630173
Fax: 01588 630176

Supply wooden and 'woodcrete' boxes

Indigo Green
Belmont Station Road
Caersws
Powys. SY17 5EQ

Tel: 01686 688667

Supply wooden boxes

Jacobi Jayne & Company
Hawthorn Cottage
Maypole, Hoath
Canterbury
Kent. CT3 4LW

Tel: 01227 860388
Fax: 01227 860521

Supply 'woodcrete' boxes

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ANNEX F **ACKNOWLEDGEMENTS**

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Catherine Turtle and Alana Ecology are grateful to the following individuals and organisations for providing information useful in drafting this advice: Elizabeth Barratt, Paul Chanin, Sue & Roy Eden, Dai Jermyn, the Mammal Society, John Messenger, Tony Mitchell-Jones, Geoff Woods, Michael Woods, Stephanie Wray, all the County Wildlife Trusts, English Nature offices & Countryside Council for Wales offices who responded to our questionnaires.

16. ENQUIRIES

All technical enquiries or comments on this Advice Note should be sent in writing as appropriate to:

Divisional Director
The Highways Agency
St Christopher House
Southwark Street
London SE1 0TE

M A GARNHAM
Divisional Director

Chief Road Engineer
The Scottish Executive Development Department
National Roads Directorate
Victoria Quay
Edinburgh EH6 6QQ

J HOWISON
Chief Road Engineer

Chief Highway Engineer
The National Assembly for Wales
Cynulliad Cenedlaethol Cymru
Crown Buildings
Cathays Park
Cardiff CF10 3NQ

J R REES
Chief Highway Engineer

Assistant Director of Engineering
Department for Regional Development
Roads Service
Clarence Court
10-18 Adelaide Street
Belfast BT2 8GB

D O'HAGAN
Assistant Director of Engineering