

# The dormouse conservation handbook

second edition



working towards *Natural England*  
for people, places and nature

# 5 Development and mitigation

## 5.1 Legal background and licensing

The dormouse is a European protected species. It is protected from deliberate killing, injury or disturbance and its breeding sites and resting places are absolutely protected with no requirement to show that their destruction was deliberate or reckless. Exactly what constitutes a breeding site or resting place for a dormouse has not been defined in case-law, but a narrow interpretation might include nests (summer or winter) currently in use or, perhaps, built or used during the current season. Because the dormouse is so embedded in its habitat and nests are difficult to find, a pragmatic approach is to treat any dormouse habitat as though it is protected and develop mitigation based on this assumption. This approach is also compliant with the duty to have regard to the conservation of biodiversity imposed on Government Departments by S74 of the Countryside and Rights of Way (CROW) Act 2000.

If operations are proposed that would deliberately disturb, injure or kill dormice or destroy their breeding or resting places, protection against the possibility of legal proceedings can be obtained in two ways:

- 1 Ensure that the work meets the requirement of the defence that it was the incidental result of a lawful operation and could not reasonably have been avoided. Only a court can decide what is reasonable in any set of circumstances and readers may wish to seek their own legal advice as to the applicability of this defence. However, following the good practice guidance contained in this manual could help to demonstrate that reasonable steps had been taken to minimise any harm.

- 2 Obtain a licence from Defra (or the Welsh Assembly Government) to carry out the work. Licences can be issued where the work is for imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance to the environment. A licence cannot be granted unless there is no satisfactory alternative and the action

authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range. In England, licences are issued by Defra's Rural Development Service (RDS); this will be replaced by a new agency, Natural England, in October 2006.

In order to obtain a licence, it must be demonstrated by the applicant that all reasonable steps have been taken to minimise the impact of any disturbance, and that any damage will be adequately compensated. In practice, this means that a mitigation scheme will be required.

### 5.2 When is a licence required?

English Nature and Defra are frequently asked by consultants whether a Defra licence is required for a particular activity. Ultimately this is a decision to be made by the consultant and client. A licence permits an action that would otherwise be unlawful. To minimise the risk of illegal activities being undertaken, it is recommended that a licence is applied for if – on the basis of survey information and specialist knowledge – it is considered that:

- The site in question is demonstrably a breeding site or resting place for dormice.
- The proposed activity is reasonably likely to result in an offence being committed.

In addition, works can only be licensed when they meet the purpose and conditions set out in section 5.1(2) of this manual.

No licence is required if the proposed activity is unlikely to result in an offence. The advice given in this document should assist a consultant in arriving at a decision on this matter, though it must be recognised that determining whether a particular site is used as a breeding or resting place can be problematic. Note that if the proposed activity can be timed, organised and carried out to avoid committing offences, then no licence is required.

Examples of works that are likely to need a licence include:

- Clearance of woodland inhabited by dormice for development or road schemes.
- Removal of hedgerows inhabited by dormice for pipeline schemes or building works.

### 5.3 Possible impacts from development

Dormice may be threatened by destruction of their habitat, for example when woodland is cleared for development or conversion to other uses. Hedgerows may be removed as part of such developments or in the course of farm management. Radiotracking and surveys have demonstrated clearly the importance for dormice of linear features in the landscape, especially hedges. The loss of hedges, leaving remnant groups of dormice isolated in the landscape, can be very damaging. A typical example may be where a small copse is protected from development but is left isolated from larger areas of habitat and useful food resources. New roads and the widening of existing ones are also a threat, not just because of the destruction of dormouse habitat (for example, by removal of roadside hedges), but also because a new road is likely to be wider than the old. This constitutes a greater barrier to dispersal and will probably reduce movements between local populations. In the long term, this fragmentation of habitat and reduction of dispersal potential may be a greater danger than the more obvious threat posed by the destruction of a woodland site.

The long-term impact of increased human activity should also be considered when deciding on appropriate mitigation, particularly where high density housing is being built adjacent to habitat that previously was rarely visited by people.

Direct modifications to sites, including the felling of trees or scrub clearance, can have a significant impact on dormice. Even where trees and shrubs remain largely unaffected, or where work is done in winter, there may still be significant implications for hibernating dormice and the places where they overwinter.

Activities associated with development works are likely to lead to an increase in human presence at the site, extra noise and changes in the site layout and local environment. All these may have a detrimental effect on dormice, their needs for particular environmental conditions (such as specific temperature and humidity regimes), and a stable landscape that allows them to follow established routes to feed (see below). Sometimes it may be possible to lessen the impact, or measures may be taken to help the dormice through a difficult period.

### 5.4 Predicting likely impacts

The task of determining the impact of a proposed development is made easier by good survey information and detailed plans, showing pre-development and post-development site layout in relation to the places where evidence of dormice has been found. Sometimes called ‘impact assessment’, this is a critical phase of mitigation planning. This assessment can also help in considering alternative sites or alternative site layouts. For certain types of project, listed in schedules of the *Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999*, impact assessments are mandatory (Schedule 1) or discretionary (Schedule 2). Even when a statutory impact assessment is not required, Local Planning Authorities do have powers (for example, under the *Town and Country Planning (Applications) Regulations 1988*) to direct developers to provide any information the Authority may reasonably require to enable it to determine the application. The High Court has ruled (*R. v. Cornwall County Council ex parte Jill Hardy*, 22 September 2000) that for developments requiring an Environmental Impact Assessment (EIA), where there are grounds for believing that protected species

may occur, environmental information (primarily survey results) has to be provided to the Local Planning Authority before determination. Initial surveys to determine the presence of protected species should not be a condition of the planning permission. It seems logical that these principles should also apply to non-EIA developments, since the guidance in the legal circular accompanying *Planning Policy Statement 9: Biodiversity and Geological Conservation* (PPS9) regarding protected species being a ‘material consideration’ is difficult, if not impossible, to implement where no survey information exists. Ideally, an impact assessment should inform the drawing up of detailed development plans, so that impacts can be avoided where possible. It is therefore important that a survey is undertaken as early as possible in the planning process.

It is desirable to consider direct and indirect impacts, both at the site level and in a wider perspective. The latter relates to the assessment of the overall importance of the site, and the broad context of the site should also form part of the impact assessment.

Timing should also be considered. If the site is part of a larger phased development, the potential consequences for the affected population(s) during later stages of the work also need to receive attention. For example, planting new habitat, only to have it destroyed during a later phase of development, does not constitute mitigation.

### 5.5 Roles and responsibilities

It is the responsibility of the organisation or individual wishing to carry out the development to make sure that they comply with the law. In practice, developers may wish to employ a specialist environmental consultant to carry out any survey, make



recommendations and, if necessary, apply for a licence. The statutory nature conservation organisations (English Nature or the Countryside Council for Wales) can provide general advice on protected species, advise Local Planning Authorities on specific planning issues and assist the licensing authority with the determination of licence applications. Further information about the roles of the organisations involved is given in Chapter 10.

## 5.6 Planning mitigation and compensation

### 5.6.1 Why mitigate?

Minimising the impact of development on dormice is fundamental to meeting the requirements of the licensing regime with its tests of **no reasonable alternative** and **imperative reasons of overriding public interest**.

The aim of the consultant and developer should be to achieve one of the following outcomes, in decreasing order of preference. Each of these scenarios should be designed to satisfy Regulation 44(3)(b) (see Section 6.1):

- **Most preferable.** Avoidance of impact; no negative impact on dormouse populations.
- **Minimisation of impact with on-site mitigation;** compensation by the improvement of existing nesting and feeding sites or the provision of new opportunities (such as nest boxes) within the site. Maintenance or reinstatement of hedges and tree lines linking wooded areas.
- **Minimisation of impact with off-site compensation;** where on-site mitigation is not possible, new habitats should be created nearby.
- **Least preferable.** In some situations, translocation of dormice may be needed.

The potential impacts of the development should be considered at the outset, so that, where possible, plans can be modified in order to achieve the preferred outcome listed above. This could entail the development of alternative sites, or the repositioning of structures to avoid impacts. Note that Defra licences to destroy breeding or resting places can only be obtained where there is no satisfactory alternative to that course of action. If impacts can be avoided completely the Habitats Regulations are not contravened and no licence is required.

### 5.6.2 Key principles of mitigation

Strictly speaking, there are two elements to the broader mitigation process:

- Mitigation – in the strict sense, refers to practices that reduce or avoid damage (for example, by changing the layout of a scheme, or altering the timing of work).
- Compensation – refers to work that offsets damage caused by a development (for example, by the creation of new habitat).

Both these elements need to be considered, the overall aim being to ensure that there will be no detriment to the conservation status of dormice. In practice, this means maintaining and, preferably, enhancing populations affected by development.

The following points should be considered when planning mitigation:

- **Mitigation should be proportionate.** The level of mitigation required depends on the size and type of impact, and the importance of the population affected. This is a complex site-specific issue. For example, a minor car park extension in an area of Kent where dormice are widespread would require less investment in mitigation than a

major road driven through one of the few dormice sites in northern England.

- **Plans should be based on adequate knowledge.** Thorough surveys, site assessments and impact assessments are essential. The development plan should consider each predicted impact and suggest how it can be avoided, lessened and/or compensated for. The seasonal nature of dormouse activity may mean that survey work lasts for more than one year.
- **Mitigation should aim to address the characteristics picked up by the site assessment.** There should be minimal net loss of suitable habitat. Where significant impacts are predicted, compensation should offer more than has been lost. The reasoning behind this concept is that the acceptability of newly created habitat to dormice is not predictable. In addition, not all the new habitat may be immediately available due to the time it takes for planted shrubs and trees to bear fruits and flowers. Plans should aim to create similar habitat types (for example replace hazel coppice with hazel, not sweet chestnut) though it must be recognised that ancient woodland is irreplaceable. Compensation measures should ensure that the affected dormouse population can function as before. This may require attention to the environment around the development site, such as planting hedges to link adjacent habitats.
- **Preparing a site or appropriate replacement may require considerable time and effort.** For high impact schemes, additional land may need to be purchased, increasing the costs of compensation. Depending on circumstances, a long period of time may be needed to develop new plantings into suitable habitat for dormice.

- **The long-term security of the population should be assured.** Mitigation should aim to ensure that the population will be free from further disturbance, and will be subject to adequate management, maintenance and monitoring. Any proposals should be officially confirmed – ideally by a legal agreement or planning obligation – and not left as open-ended options.
- **Mitigation plans will be open to public scrutiny.** English Nature and Defra will make plans available to third parties on request wherever possible, as required by freedom of information legislation. If submitted as part of a planning application, plans will also be held on file by Local Planning Authorities and be available for public viewing.
- **Mitigation plans should address the impacts of all stages in phased developments.** Individual phases will normally be mitigated for individually, but there should be an overall plan that takes the impacts for the entire scheme into consideration.

Precautionary mitigation (that is, going ahead with mitigation before a proper survey has been undertaken) is not normally acceptable. An exception might be where there is good evidence to indicate that the site is of very low importance and there will be negligible impacts.

## 5.7 Mitigation and compensation methods

### 5.7.1 Introduction

This section gives advice on the methods commonly used for mitigation and compensation, paying particular attention to effort and timing. These are not the only methods that could be used, but they are generally effective and should be considered as good practice applicable to the majority of development schemes. As sites

vary in their characteristics, and will have different impacts, the information presented here is generic rather than prescriptive; licence applicants may make a case for different techniques and levels of effort on a site-by-site basis.

It is the responsibility of the applicant (normally the consultant and their client) to make sure that any proposed mitigation meets other legal requirements.

### 5.7.2 Avoidance of disturbance, killing and injury

The Habitats Regulations and Wildlife & Countryside Act are constructed to give protection to individuals as well as breeding sites and resting places. This means that precautions must be taken to avoid the deliberate killing or injury of dormice, an action that is most unlikely to be permitted under the terms of a licence. Disturbance of dormice or destruction of their nests may be permitted under licence, but conditions are likely to apply.

Where habitat suitable for dormice would be unavoidably lost as a result of development, the extent of this loss will determine the appropriate course of action. Where habitat loss can be limited to a strip of woodland or scrub less than 50 m wide, or its equivalent, (less than the radius of a typical dormouse home range) and this strip remains linked to a larger continuous area of dormouse habitat, then displacement of the resident animals is the most appropriate option. This is also the most appropriate option where less than 100 m of hedgerow would be removed. Where greater areas (or lengths of hedgerow) need to be removed in any one location and in any one season, then translocation of the animals should be considered (see below).

### 5.7.3 Clearing dormice from a site prior to development

If an area of dormouse habitat needs to be cleared for development (for example, in a road widening

operation), its type, size and position relative to other habitat are key issues in determining the most appropriate mitigation strategy. If the site is large or isolated, or perhaps only linked to one small hedge, then the dormice may have to be translocated, otherwise persuasion (see below) is the method of choice, provided that it does not result in more than doubling the spring population density in the remaining habitat.

### Persuasion

If the land to be cleared forms part of a larger continuous area of dormouse habitat (a strip along the edge of a wood for example), then persuading the animals to leave by progressively clearing narrow strips of habitat is recommended. Each strip should be narrower than the radius of a typical home range for that habitat (an average of 50 m) encouraging the dormice to leave the area as the habitat becomes unsuitable. The dormice will then relocate of their own accord into the adjacent undisturbed habitat, especially if attractive features such as nest boxes are present there. However, deploying nest boxes between October and April will have no useful effect until the following summer as dormice do not normally use them during the winter.

### Clearance in winter

This should remove sufficient vegetation to persuade dormice emerging from hibernation in April or May to move to more appropriate habitat nearby. Once emergence is complete, by the end of May, full clearance of the area can continue. Winter clearance should thus be planned as a two-stage process.

Trees and shrubs within the area in question should be cut down between November and March inclusive, to avoid both the bird nesting season and the majority of the period when dormice might be found in nests above ground. Clearance should be done by hand and in a sensitive

manner, to minimise the likelihood of disturbing or killing hibernating dormice. Similarly, the process of removing the cut material should, as far as possible, be designed to protect dormice hibernating on the ground. This can involve such techniques as:

- sacrificing a single ‘haul-route’, which has first been cleared by hand if necessary;
- using a long-reach mechanical grab and/or limiting the number of ‘drag-lines’ along which stems are removed; and/or
- directional felling to minimise the ground impact.

In some cases it is possible to leave felled stems until later in the year (brash should however be removed or chipped to avoid subsequent constraints associated with nesting birds). There will always be some parts of the site where hibernating dormice will be more at risk. In these situations, careful raking over of leaf litter and moss on the ground and the hand-clearance of log piles may help to find a few hibernating dormice before the machines move in. However, searching large areas is impractical.

In parallel with clearance operation, work should be undertaken within the retained woodland, hedgerow or scrub to increase its carrying capacity for dormice. This can include careful felling or coppicing work to increase the fruiting of selected understorey shrubs. Similar operations can also help form a new woodland ‘edge’ in situations where previously sheltered trees become exposed to wind-throw. Where there are few opportunities to improve adjacent areas for dormice, consideration should be given to advance planting of new areas nearby, or reducing the level of management in any adjacent hedgerows. The provision of nest-boxes can also be helpful.

Dormice emerging from hibernation in cleared areas will tend to move into the nearest retained vegetation. The coppiced stools in the cleared areas should then be dug up (usually in parallel with other earthworks), but this should be done no earlier than May of the following season. At this point consideration could be given to translocating some of this material to create new habitat, as explained below.

Even if quite small areas of habitat need to be cleared, the positions of these relative to other suitable habitat is a key issue. If parts of the site are so isolated that dormice hibernating there would not be able to reach areas of retained habitat, measures need to be taken to catch and remove these animals; either well in advance of clearance or from those fragments of habitat that remain following the coppicing works.

If larger areas of woodland are to be cleared for development, it may be necessary to repeat the above over more than one winter. Care should be taken to ensure that dormice displaced over one winter are not displaced again the next year.

Similar principles apply to hedge clearance, where clearance by hand or with hand-held machinery should avoid disturbance to the base of the hedge, where dormice may hibernate. Using heavy machinery to grub out hedges is likely to destroy dormice in their hibernacula.

### Clearance in summer

Summer clearance is suitable for small areas of dormouse habitat (for example, less than 50 square metres of high quality woodland, larger areas of low quality habitat and short lengths of hedge). This may be done by taking out small amounts of vegetation on successive days at a time of year

when the animals are active and able to respond immediately. Such clearance should be done by hand and should be combined with searches for nests. Clearance in May will avoid separating females from dependent young, but there may be a conflict here with nesting birds, at least up until about July. After early June, female dormice are likely to have young in their nests until about late September (depending on latitude and weather).

Whichever season is chosen for clearance, care should be taken to ensure that the number of animals displaced does not result in unnaturally high densities in the remaining woodland. As a rule of thumb, clearance of more than 10 per cent of any woodland (or woodland complex if well-connected) should be avoided. For example, a 10 ha wood may be capable of supporting a post-breeding population of 10 dormice per ha. Clearance of a single hectare (10 per cent) of this woodland over the winter might displace five dormice in the spring (allowing for 50 per cent mortality over the winter), resulting in a total population in the remaining 9 ha of 50 dormice or 5.5 per ha, well within the carrying capacity of the woodland.

### Translocation

Where persuading dormice to relocate from a site is inappropriate, either because of the scale of the proposed operation or the lack of suitable adjacent habitat, the only remaining solution is to translocate the animals. This is the least favoured option because of the difficulty of catching all the animals and establishing them at an appropriate site elsewhere. Where a large area of dormouse habitat has to be removed in a single season, translocation is the only option, but a suitable recipient site must be identified in advance.



## Persuasion – good practice summary

- For areas of up to one dormouse home range (approximately 1 to 1.5 ha of woodland or 300 m of hedge) clearance of bushy vegetation and tree felling in winter (November to March inclusive) is recommended as the least-damaging option. At this time, dormice will be hibernating in nests just below ground level and are vulnerable to crushing so every reasonable effort should be made to minimise disturbance to the ground. Clearance should therefore be planned as a two-stage operation, with removal of surface vegetation in winter followed by stump extraction and earth removal in the following summer.
- For smaller areas – including short lengths of hedgerow – clearance in summer is an acceptable alternative. Small amounts should be taken out each day to allow animals time to escape, and a search should be made for nests. The best times for this work are May and late September, when there is less likelihood of young being present in nests.
- Whichever method is used, care should be taken that the clearance does not result in an unnaturally high population density in the remaining area.

Guidance on translocation (and reintroduction) is given elsewhere in this manual, but it should be noted that translocation requires much preparatory work and finding suitable release sites can be difficult. Releasing translocated dormice into sites with existing populations is unlikely to be acceptable to the licensing authorities.

Dormice may be trapped for removal, but this requires large numbers of suitable traps as the animals live at low densities. The traps need to set off the ground and inspected twice a day, a labour intensive and costly process. A better method is to put up nest boxes at a density of at least 30 per ha. These should be in place well in advance of work at the site, preferably a year or more beforehand if possible. As a minimum, the nest boxes should be put up by early May and left in place until late October. The dormice should then use the boxes and be easily caught. Nest boxes should be left in place and inspected frequently until no more dormice appear in them. This will only be successful when the dormice are active (May to October) and it may take many weeks before the animals begin to use the nest boxes. Capture efficiency varies seasonally,

and there is generally a dip in nest-box usage in June and July (see Table 5). Nest tubes may also be used for this purpose and there may be benefits in using a combination of tubes and boxes to maximise the number of dormice caught.

It is difficult to know when all the dormice are likely to have been caught, especially as others may move into the site during a removal operation. Table 2 gives an indication of the population density associated with different habitats, though these are spring pre-breeding densities. In late summer, good woodland habitat may have more than 10 individuals per ha and large hedgerows may have up to one adult pair per 300 m. Clearing a 50 m length of hedge where it adjoins other dormouse habitat may reduce recolonisation while removal operations are in progress.

### 5.7.4 Minimising and repairing habitat damage

So far as possible, removal of hedges should be avoided, as should the removal of large fruiting hazels and oaks. Removal of other species from a mixed woodland (for example, ash, holly, conifers) is unlikely to have significant effect except where their

removal breaches access points and disrupts the continuity of dispersal routes. Planting hedges, particularly with a variety of shrubs, links up isolated copses and individual trees, thus helping the exchange between small dormouse populations and providing access to a wider range of food sources. This may be a valuable conservation option for new road construction, which often leaves small hedge and woodland fragments isolated from each other. Planting should begin as early as possible, preferably before other operations begin and not after clearance has been completed. This is to allow the new shrubs time to flower and fruit before the old habitat is removed. Planting bramble and other useful food plants is valuable if they fruit within the first year. Dormice cannot wait five years for hazel to mature!

Where heavy machinery is already on site, transplantation of vegetation (especially hazel stools) that would otherwise be uprooted and chipped or burnt can be a helpful and cost-effective measure.

Transplanting during the winter may achieve 100 per cent survival, even without watering, but after about May watering will be necessary or survival rates will be reduced. Shrubs moved in this way will fruit much earlier and more heavily than new saplings. In addition, transplanted shrubs will enhance arboreal connectivity, again at a much earlier stage, and particularly if combined with the ‘dead-hedging’ of cut material. If this is seen as a key aspect of a mitigation scheme, it should be done sensitively and with appropriate aftercare, in order to maximise the likelihood of survival and vigour of the transplanted material. Transplants may also reduce the visual impact of new developments. See Anderson & Groutage (2003) for guidance on habitat translocation.

Where strips of woodland edge are removed, or mature woodland is bisected, a ‘wall’ of high trees remains at the edge of the cleared area. In these cases it is better to

clear a few extra metres, then plant a fringe of species-rich shrubs. These will grow quickly, healing the visual scar and providing abundant food and shelter for dormice and other species.

Where possible shrubs and trees should be planted to fill in small gaps or to link habitats, in particular to link new plantings with existing areas of dormouse habitat. The Highways Act 1980, Section 253 allows for work to be carried out on third-party land for mitigation purposes, at least in respect of road developments. Again, such work should be started as soon as possible to allow time for maturation, and some landowners may be sympathetic to an early start in advance of the main operations.

#### 5.7.5 Dormouse bridges and tunnels

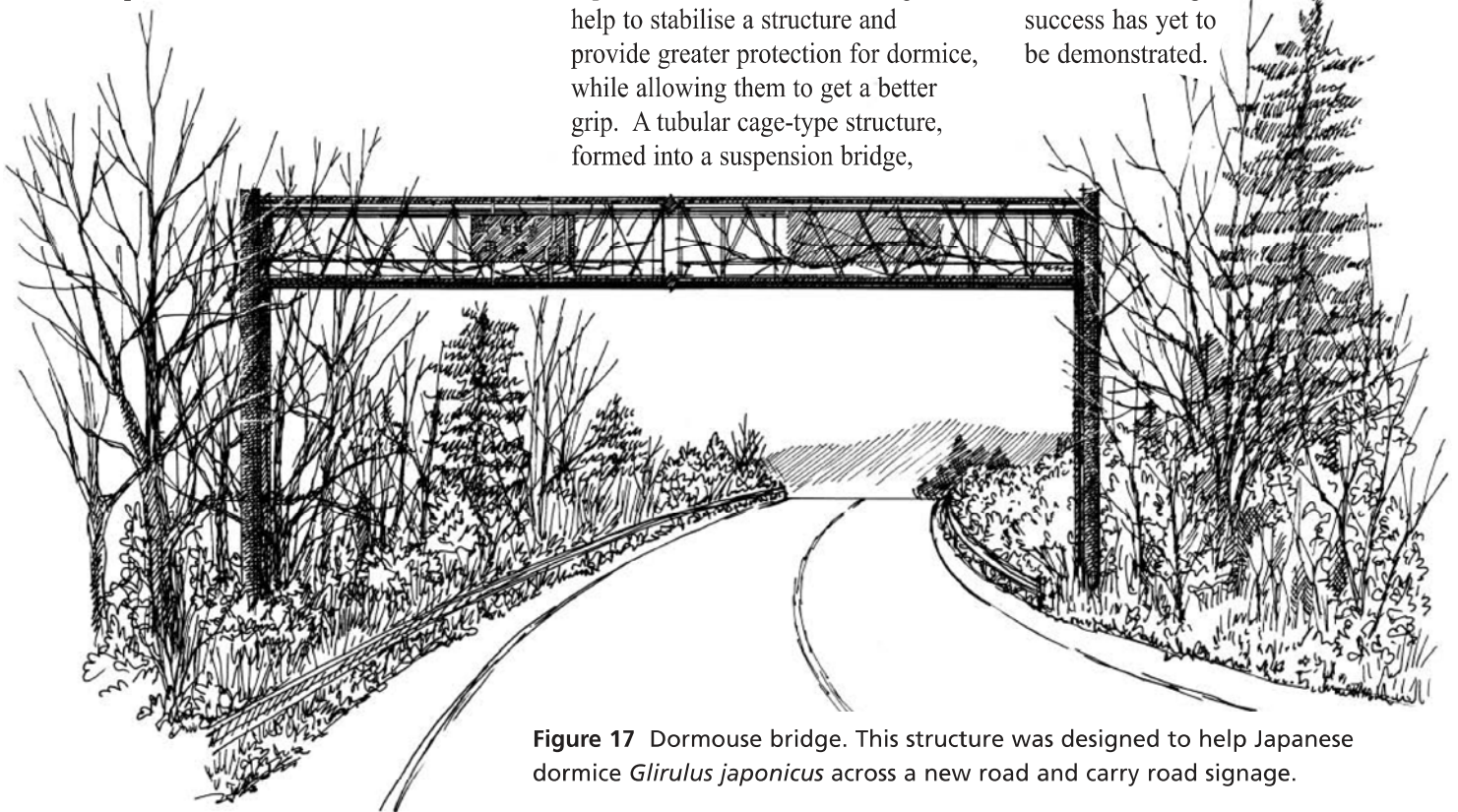
Roads and other developments can cause significant incidental damage to populations of dormice by fragmenting habitats and creating barriers to natural movement. This is a particular problem for dormice because of their reluctance to cross open ground, but it is also an impediment to the dispersal of many other animals, for example reptiles, spiders and molluscs.

Habitat continuity and natural dispersal movements can be retained by building 'green bridges' to permit animals to cross roads and other newly-constructed barriers. For dormice, the cheapest form of overhead link is a pole or rope stretched between two substantial trees. Whilst this might be a feasible option within a wood (for example to temporarily bridge a narrow ride while arboreal links regrow) it is probably not applicable to larger scale situations. Although ropes have been suggested as a mitigation measure (Highways Agency 2001) there appears to be no published scientific evidence that dormice actually use them, but it remains a possibility. Ropes will be used (over short distances) by squirrels, and wooden structures (such as horizontal ladders) have been used elsewhere to assist monkeys to cross roads. If ropes are to be tried for dormice, they should be taut and stabilised by lateral supporting ropes leading to adjacent habitats at 5 m intervals. It is very unlikely that dormice will often venture more than a few metres on such an exposed structure, as radiotracking shows that they are normally only active within cover.

A cylindrical wire cage around the rope, made of welded mesh, might help to stabilise a structure and provide greater protection for dormice, while allowing them to get a better grip. A tubular cage-type structure, formed into a suspension bridge,

might also offer a way forward and should be tested for use by dormice. It is likely that short bridges, whatever their construction, will be more likely to be used than longer ones and that attempting to bridge gaps of more than 100 m will be largely ineffective.

In Japan, a dormouse bridge has been built, based on a welded steel frame of the sort normally used for supporting road navigation boards. It is about 50 m long and there is clearance for large lorries to pass below. The bridge itself is about 1 m wide x 1.5 m high, and is encased in welded mesh to protect the animals. The floor is made of wooden boards along which lie a selection of branches cut from nearby trees. At each end, ropes and planted climbing vegetation link the bridge with the adjacent forests. The bridge was used within a few weeks by Japanese wood mice and within a year by Japanese dormice. The bridge was custom-made and expensive but a similar bridge might be constructed more cheaply, based on a standard overhead gantry used for highway signboards. Alternatively, suitable facilities might be built into existing gantries or as 'add-ons' to planned structures. Some structures of this type are currently being trialled in Britain, though their success has yet to be demonstrated.



**Figure 17** Dormouse bridge. This structure was designed to help Japanese dormice *Glirulus japonicus* across a new road and carry road signage.



In some parts of Europe, concrete ‘green bridges’ have been constructed with shrubs and other natural vegetation planted on top of them. In Germany, dormice have been shown to use such structures. However, much would depend on the nature of the shrub layer and how effectively it was integrated with the natural habitats at either end of the bridge. Some details and illustrations of habitat bridges are given in Iuell and others (2003), and one has been built over the Lamberhurst bypass (A21) in Kent and opened in 2005. Such bridges are expensive, but may benefit a variety of species, particularly those with low dispersal potential such as reptiles and invertebrates.

As an alternative to bridges, it may be possible to maintain habitat connectivity by planting shrubs in tunnels and culverts. This is only likely to be successful where the tunnel or culvert admits enough light enough to sustain plant growth. An example is shown on the cover, though the success of this form of mitigation is unknown.

## 5.8 Nest boxes

Provision of suitable nest boxes will help dormice adjust to newly created or modified habitats, particularly where new plantings mean a scarcity of natural tree hollows. Nest boxes appear to increase the ‘carrying capacity’ of the habitat, sometimes doubling the population density (Morris and others 1990). In addition, nest boxes benefit other species, including many invertebrates. Other mammals may also use them including bank voles, shrews and bats. Clearly provision of nest boxes is helpful in a broader sense than just dormouse conservation. However, this applies to boxes, not nest tubes. Plastic nest tubes are not adequate compensation for the loss of permanent nest sites.

## 5.9 Hibernating dormice

Sometimes hibernating dormice are disturbed accidentally during hedging, woodland management operations or site clearance. If possible, the animal should be quickly wrapped up in its nest and replaced, perhaps with a light

covering of leaves, moss or twigs. If the site is to be destroyed or extensively trampled, transfer the nest and its occupant – with plenty of damp padding – to a more secure place within 100 m, on the ground (for example, tucked under the curve of a large log) or between the roots of a tree or bush. A large roof tile or suitably supported paving stone may be placed to cover the nest, protecting it from predators and helping to maintain moist and cool conditions. It is harmful for hibernators to be exposed to extreme frosts, but it is also damaging, and more common, to become too warm. This would be the case if the sun shone on a hibernation nest for an hour or so. The animal should only be removed as a last resort. If it is taken away, or caused to arouse fully, it should be kept in captivity and not returned to the site until the summer. On return it should be released within 100m of its origin. Dormice should not be released at a site unfamiliar to them without full support (see Chapter 7).

## Reducing site damage: good practice guidance

In some cases, site destruction is unavoidable, but the damage may be reduced by:

- Limiting the use of heavy machinery for site clearance in winter, when dormice will be helpless in their hibernacula on the ground. They will be easily crushed, and in their inactive hibernating state, unable to help themselves.
- Carefully raking over leaf litter and moss on the ground in winter and clearing log piles by hand may find a few hibernating dormice.
- When clearing small sites, carrying out site activities in spring or late summer when the risk to dormice is reduced. Moreover, if clearance proceeds progressively from one edge of the site it may be possible to persuade the animals to move away into refuge areas over several days.
- Putting up nest boxes in refuge areas may entice at least some animals away from danger, but only in summer.
- Leaving mature oaks and other valuable trees wherever possible, and then using shrubs to link trees to each other and to areas of remnant woodland.
- Planting species-rich hedges to link isolated woodland remnants or reconnect remnants of damaged hedgerows. In the long term, this will allow the interchange of small mammals (including dormice), so reducing the dangerous effects of isolation.