

CAPTIVE BREEDING AND REINTRODUCTION



THE HAZEL DORMOUSE *Muscardinus avellanarius*

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Captive Breeding of the Hazel Dormouse *Muscardinus avellanarius*

Introduction

The hazel or common dormouse *Muscardinus avellanarius* is the only native species of dormouse found in Britain. Dormice are a predominantly woodland species, particularly associated with broad-leaved coppice.

Dormice are a 'flagship species'; by managing habitat for dormice, a range of other species will benefit. They are also important as 'bio-indicators' as they are particularly sensitive to habitat and population fragmentation¹. Their presence should indicate that the area can sustain populations of other sensitive species.

Current Status

Total population size can only be assumed, based upon results from trapping, nest box surveys and reintroduction numbers. Dormouse distribution in Britain has only been determined recently, mainly based on two surveys; the



Dormice asleep in nestbox

Great Nut Hunt of 1993 and a survey by the Mammal Society in the early 1980s.

Once widespread over most of England and Wales, dormice are now restricted to the south, with large numbers occurring on the Isle of Wight. Although dormice are widely distributed in Wales, individual populations are small, scattered and isolated from each other. They

do not occur in either Scotland or Northern Ireland. Dormice occur mainly in the southern counties, especially Kent, Sussex, Devon and Somerset. They are widespread in Kent's semi-natural ancient woodlands, in both east and west Kent.



Dormouse feeding on blackberries

Dormice are present in parts of the Lake District, with some scattered populations in Wales and small populations in some northern counties such as Cumbria and Northumberland.

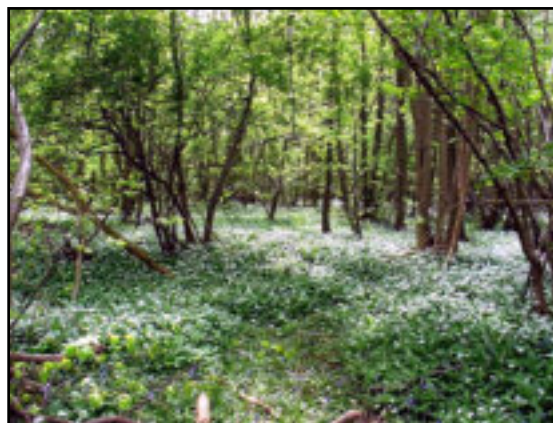
Over the last 100 years the hazel dormouse has declined in both numbers and distribution and is thought to have become extinct in about half its former distributional range¹. The total adult population is now thought to number about 45,000, distributed among a variety of widely fragmented sites¹. The UK Mammal Society Dormouse Survey in 1984 showed it has disappeared from seven counties in north and east England in the last hundred years. Even in optimal habitats, population densities are less than 10 adults per hectare.



Reasons for Decline

Hazel dormice have often been lost in the past as a result of inappropriate woodland management. They are an arboreal species and rarely descend to ground level apart from during hibernation. Factors associated with their decline include:

- Loss and fragmentation of ancient woodland, leaving isolated, non-viable populations, where even short distances form barriers to dispersal.
- Clearance of hedgerows, especially after the Second World War, dramatically reduced the number of habitat corridors that were used by dormice to travel between adjacent areas.
- A decline in traditional woodland management has led to a lack of coppicing areas or inappropriate coppice which can greatly reduce species numbers. Coppiced areas should create a patchwork mosaic of different ages throughout the wood, with an adequate diversity of woody plant species, predominantly hazel coppice. Coppice in irregular patches is essential, to allow some shrubs to be flowering or fruiting whilst others are maturing². This is essential between April and November, when dormice are awake after hibernation.
- Damage to the scrub layer and coppice re-growth by large mammals such as deer and livestock, reduces the supply of particular foods necessary to dormice, as well suppressing natural regeneration.
- Climate change has had numerous effects on dormice, due to their specialised feeding requirements. During warm winters dormice awake from hibernation more often, wasting energy as their body temperature warms, causing an increase in metabolic rate. It is also thought that warmer autumns lead to fruit ripening at an earlier stage, sending dormice into hibernation earlier as their food reserves dwindle. Wetter summers prevent dormice from foraging.



Suitable dormouse habitat has declined dramatically

- Plantations of evenly spaced, same aged trees provide uniform conditions which are unsuitable for dormice³.
- Dormice will travel extremely long distances in trees to avoid coming down to ground level. A barrier between two areas of adjacent woodland, such as a road, will decrease the potential for distribution.
- Grey squirrels, an introduced species, consume autumn nuts at an earlier stage, leaving none for the dormice.

Legal Status

Dormice are fully protected under law and may not be disturbed, injured or killed in their nests, collected, trapped or sold without a licence. The hazel dormouse is protected under the following legislation:

- Schedule 5 of the Wildlife and Countryside Act, 1981
- Conservation Regulations 1994, Schedule II (EC Habitats Directive)
- CROW Act 2000

Their priority status places them on the IUCN Red List of Threatened Species, under the category of near threatened.

They are a UK Biodiversity Action Plan Priority Species and a Local Priority Species in over forty counties in Britain including Kent.

Action Plan objectives involve maintaining and enhancing dormouse populations in all counties where they still occur and re-establishing self-sustaining populations in at least five counties where they have been lost.



Captive Breeding

Suitable housing

All hazel dormice used for captive breeding at Wildwood are housed in outside enclosures which are not accessible to the general public. This is to avoid unnecessary disturbance, especially during hibernation.

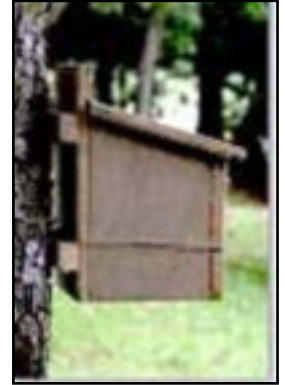


Outdoor dormouse enclosure

A typical enclosure is 1.8 x 1.8 x 1.8m, constituting a wooden frame covered with mesh. This has a 1.6cm² mesh size, small enough to avoid the dormice escaping. Only half of the roof is solid and the nest boxes and food hoppers are placed under this to prevent them from getting too wet during periods of prolonged rain.

The nest boxes are placed inside the enclosures at approximately 1.5m off the ground, where they hang from the mesh by a wire loop. The entrance hole is set facing the wire mesh, in the same manner as if the box were attached to a tree. At least one nest box should be provided for each individual. A plywood screen is placed on the outside the of enclosure, behind the nest box, to prevent attacks on the dormice from external predators.

One enclosure can house single sex groups of up to three individuals or a breeding pair and their offspring of less than a year old. All individuals are left in their summer groupings in the same enclosures to over-winter. Potted native shrubs and tree saplings are placed inside the enclosure, as well as freshly cut branches placed standing in corners or suspended from the roof or sides. These provide nest material and structures for climbing. The enclosures have a mesh floor, covered by a deep layer of leaf mould and leaf litter.



Dormouse nest box

Additional straw, hay, leaves and leaf mould are added in the autumn to provide both nest material and a substrate to hibernate in. Dormice hibernate at ground level, as the air temperature here is not as variable as at the higher point where the nest boxes are placed, and the humidity is high.

Underweight or sick animals are moved into a permanent building where they are provided with a nest box within their cage and low heating. An underweight animal not suitable for reintroduction would have a weight of less than 20g and its chances of surviving hibernation would be greatly reduced.



Dormouse pair in nest box

General Ecology

The hazel dormouse is a strictly nocturnal and arboreal species, which rarely descends to ground level except to hibernate. It is a very distinctive rodent with a thick furry tail, big black eyes and golden, sandy coloured coat. Dormice are usually about 7cm in length, with a tail of similar length, and weigh from 15g-20g. They raise one or on rare occasions two litters a year, of on average four young, who remain with their mother for 6-8 weeks. Dormice hibernate from late October or November to April or May. They hibernate at ground level, in a tightly woven nest about the size of a cricket ball. Summer breeding nests are grapefruit sized, produced of various materials such as honeysuckle bark and leaves.



Breeding

The first studbook for dormice was produced in 2006, to keep track of all animals kept by members of the Common Dormouse Captive Breeders Group (CDCBG). The main aims of the studbook are to limit inbreeding, to facilitate the pairing and breeding of wild caught or first generation individuals, to facilitate the transfer of genetically important animals between collections and to provide support to the CDCBG. The studbook aims to enable more selective breeding when choosing animals to breed from, and will help to reduce the possibility of one particular lineage of related animals dominating the gene pool of the captive population, thus enabling the release of healthier unrelated animals back into the wild³. A licence is necessary to keep and breed dormice in captivity.

Breeding stock is usually obtained from wild individuals weighing less than 15g during nest box checks in November. These will have a reduced chance of surviving winter hibernation. Others are orphaned or injured animals, or those handed into rescue centres or vets. Permission is sometimes granted from Natural England to take dormice from the wild.

It is particularly important to maintain blood lines, thus expanding the gene pool and producing more unrelated individuals suitable for release. Each individual when born is allocated a stud book number (provided by the studbook keeper at Paignton Zoo) and a local ID which is allocated by the breeder.



Weighing a dormouse

Selection of individuals for breeding and the choice of how many are bred annually is always carried out by the CDCBG, so as to maximise new blood lines. At present there is only one reintroduction a year, as the criteria which need to be fulfilled for a suitable site are extensive and complicated. Individuals are paired up for breeding once they have emerged from hibernation.

Food allocation

During the spring, summer and autumn seasons, dormice require an active diet of dry feed and fresh fruit. As their diet in the wild is dependent upon not only season but food availability, a wide range of seasonal fruits and flowers are offered. The dry food consists of equal parts of hamster mix, wild bird seed and parrot seed, placed in a food hopper. A second food hopper is required for pieces of fresh fruit, usually consisting of apple, banana, orange, melon or carrot. In addition to this standard diet they get treats of seasonal fruits such as rowan berries, blackberries, chestnuts, green hazelnuts, rosehip and elderberries as well as native flowers including honeysuckle, elder, rowan and hawthorn. Prosecto insectivore supplement is sprinkled on top of the dry mix once a week.



Seasonal fruit of blackberries

During the winter a passive diet is required, as some feeding activity is seen throughout the hibernation period. Long lasting fruits such as apple and carrot as well as the dry mix are always available.

Water is provided in bowls placed on the floor but water bottles are being trialled as this would simulate wild conditions more accurately.



Seasonal fruit of hazelnuts



Food hoppers inside enclosures



Reintroductions

Health screening

A pre-release health screening protocol is necessary and should be carried out in the seven week period prior to release as recommended by the IUCN. This is usually carried out by the Zoological Society of London at Whipsnade Wild Animal Park in Bedfordshire, as they have suitable quarantine facilities.

Screening of animals before they are transferred for release reduces the possibility of introducing undesirable disease-causing agents into wild dormouse populations. It is also important that released animals are disease free as they could be subject to stress of movement to new surroundings which could result in immunosuppression.

Detailed health examinations are carried out to determine if the proposed dormice are suitable for reintroduction.

This involves tests for:

- pathogenic bacteria
- cestodes (tapeworms)
- strongyles (roundworms/tapeworms)

- tuberculin test (for tuberculosis).

Faecal testing for parasites and tests for oxyurids eggs (nematodes) using the perineal smear technique (a smear taken from the region between the anus and the genital organs) are also essential.

The general condition of the dormouse should be observed in detail, paying particular attention to the state of the coat, skin, external genitalia, eyes, ears, nose, feet, legs and incisor teeth.



Isolation cage



Perineal check

A release weight of 18-24g is required for reintroduction in spring or summer (based on wild weights). Those which are underweight will not be released as their chances of survival especially over winter are greatly reduced. Other reasons for not releasing individuals into the wild include overgrown incisors, alopecia, tumours, fungal infections, enlarged kidneys, obesity and truncated tails.

Suitable sites

Selecting suitable sites for reintroduction requires a great deal of thought and consideration. There are numerous features that are necessary in order for a site to be considered. Deciduous woodland, with a high diversity of tree and shrub species, is a necessity. There has to be lots of fruiting hazel that is coppiced regularly but not too often. The whole site must be at least twenty hectares in size (large enough to support a population), connected by hedgerows and numerous arboreal links between the trees themselves and between the trees and shrubs.

A potential reintroduction site should preferably not contain any already established dormice populations, as resident males may kill those released. However, the site does have to be within the dormouse's previous range. At least one hundred nest boxes should be in place in the surrounding woodland; up to two hundred are often used. When looking at a potential release site, which at present is not home to a dormouse population, it must be considered whether the habitat and its management are suitable. If they are, then why are there no dormice already present, and will the site therefore support a viable, long term population? A site management plan is essential to a secure future.



Preparation of Sites and Soft Releases

Before reintroduction, the relevant Statutory Nature Conservation Organisation needs to be informed; either Natural England or the Countryside Council for Wales. The Common Dormouse Captive Breeders Group has captive bred dormice since 1983 and carried out its first trial reintroduction in 1992. Releases have now taken place at 14 sites.

Releases should take place no later than early July, preferably in mid to late June. If the dormice are released too late in the summer there will be a plentiful supply of food, but any offspring will not have enough time to fatten up for hibernation¹.



Pre-release cage

Dormice are placed in pre-release wire cages at first to allow them time to acclimatise to their new surroundings. These should be prepared for the reintroduction in advance and attached to a stand of trees, preferably hazel.

Each cage should contain two to three nest boxes, preferably with a male and female pair, as they are more likely to stay

together. Release cages containing adult males should be placed at least 100m apart to avoid territorial aggression on release¹. For the first two to three weeks after reintroduction all cages are supplied on a daily basis with fresh food. This is done during the daytime to avoid disturbing the dormice. A small amount of leafy branches are placed on top of release pens to provide extra shade and protection from predators.



Dormouse in pre-release cage

After a week to ten days, a small opening is made in the top corner of the release pen, which is no more than 3cm² to avoid

entry by squirrels and birds. This allows dormice to explore outside the cage. Frequency of feeding should be reduced gradually, so that by the middle of September feeding can cease as dormice locate natural food supplies. Nest box checks should be carried out in October to note weights and numbers of young, after which point they should be left alone until May the following year¹.

Microchips

All dormice are fitted with 8mm Pet-ID microchips during preparation for release. The dormouse is anaesthetised first and the microchip is then inserted subcutaneously in the side of the abdomen. When a chip reader is passed over this area, a particular dormouse can be identified. These transponders should be re-checked during the week prior to release, to ensure they are working.



Anaesthetising before inserting chip subcutaneously



Inserting the Pet-ID microchip



Identifying a dormouse using a chip reader



Monitoring

Dormouse monitoring sets a framework on which other species reintroductions should be based. They have been monitored in the wild on a regular basis for the past twenty years. The basis for long term monitoring of reintroduced individuals should be set out before the release occurs.

Nest boxes need to be monitored regularly after release. The majority of monitoring is carried out by trained and licensed volunteers. From April to October, all nestboxes on the reintroduction site need to be checked on a monthly basis, between the 15th and 25th of every month. Checks should be carried out in the morning, preferably before midday, so that torpid dormice can be observed. A National Dormouse Monitoring Programme record form must be completed. The programme is co-ordinated by the Peoples Trust for Endangered Species (PTES).

The number of dormice present in a nest box, as well as the sex of each individual and weight (to the nearest 0.5g), should all be noted. Also required are the breeding condition, whether they are torpid or active and information on the young. Any extra information that is believed to be valuable should also be noted, e.g. if part of the tail is absent. Recording data on litter sizes and weights of young is extremely important as it provides information on how dormice are faring in different habitats and regions. If no dormice are present, this should still be noted. Dormice boxes should be cleaned during winter.

Released individuals can be recognised by scanning for implanted microchips. Monitoring can also be carried out by identifying field signs of dormice such as remains of food and nests. Dormice open nuts in a characteristic manner not used by any other small rodents. The surface of the cut rim appears smooth or has very faint tooth marks running around it, following the edge of the hole¹.



Dormice leave distinctive toothmarks on hazelnuts

Criteria for success

1. The release must be accomplished by July
2. Young born by September of first year
3. Some animals still alive in nest boxes after the first winter
4. Second generation young born in the second summer
5. In third and fourth summers more adults present than originally released
6. Evidence of dispersal

True success is achieved when the colony is self-sustaining in the long term (still present in a hundred years' time).

References

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3. Chapman, J. (2006) *Biaza Studbook 2006, Hazel Dormouse (Muscardinus avellanarius)*, CDCBG, Biaza and Paignton Zoo Environmental Park

Further Reading

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