The dormouse in Brampton Wood, Cambridgeshire

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Introduction

The Mammal Society Dormouse Survey of 1975-79 (reinforced by English Nature's Great Nut Hunt of 1993) suggested that the dormouse had become extinct in seven counties where it was present 100 years ago. This represents a loss of about half the species' range. Cambridgeshire was one of those counties, where the last published record seems to be from near Fulbourne prior to 1904. English Nature, through its Species Recovery Programme, is committed to defending dormice where they still occur and attempting their reintroduction to five of the counties from which they have been lost. It is in connection with the latter aim that Brampton Wood was selected as the site for the first full scale trail reintroduction of the dormouse in 1993.

The reasons for the decline of the dormouse are varied and complex. There are climatic problems in more northerly sites, but the main difficulties are associated with habitat loss, fragmentation of woodlands and lack of appropriate management, leading to unsuitable habitat qualities. The dormouse has very complex ecological requirements and simply releasing them into an unfamiliar site results in early death. Our preliminary studies, conducted in Somerset, radio tracked released animals to establish how they coped with new surroundings. Without extra food, the animals tended to scatter and also lost much weight. Captive bred individuals fared less well than wild-caught animals, but releases in future will have to consist mainly of the former because wild caught animals are not available in sufficient numbers. Releases in late summer coincided with maximum natural food supplies, but left the animals unable to breed until the following season, by which time many may have been lost in hibernation. Early releases give time to breed, but entail animals adapting to a new site at the very time that food resources are minimal.

These background studies are the basis for a compromise procedure, which is to keep the animals in pre- release cages for at least week in May- June, to adjust to their new surroundings. They should then be released, but supported by continued provision of food in the cages. The animals can then return for supplementary food if necessary. The food also acts as an attractant, helping to avoid dispersal and maintain a cohesive population until the animals have had time to meet up and breed. A further complication is that aggression between apparently territorial male dormice in breeding condition means that released males have to be spaced out, but not too far or they might never meet females to breed.

Cambridge was selected as the first target county for a reintroduction as there was a good working relationship with the County Wildlife Trust, a large site (140ha) available at Brampton Wood, with many excellent habitat features and the county lies within the existing distribution limits for the dormouse, suggesting that climatic problems should not be extreme. During the summer of 1993 a trial dormouse reintroduction was initiated at Brampton Wood. This was designed as both a full scale test of release methods, especially a comparison of the behaviour of dormice of wild or captive origin, and an attempt to establish a new viable population. We aimed to establish whether dormouse

reintroductions were practical and if so, to provide a model for further reintroductions to other counties where dormice have become extinct.

The release was conducted in a 600m by 300m area in the north east corner of the wood. This area has an exceptionally diverse tree and shrub flora, including patches of old and heavily fruiting coppiced hazel. There are dense thickets of blackthorn, stands of young ash and aspen and other species including hawthorn, field maple, crab apple, some oak and an abundance of honeysuckle. Most large trees were removed earlier this century, so the woodland is mainly low-growing and the shrubs fruit profusely. There is rather little bramble (an important dormouse food source), perhaps owing to browsing by muntjac deer. Over 260 nestboxes were put up in this part of the wood, providing security for the dormice and a means for monitoring their future success.

Dormice were either first generation captive-bred, born during 1992, or captured in nestboxes at sites in Somerset. All had reached adult body size. Both types of dormice were maintained on a diet of fresh fruits (apple, banana, grapes) and sunflower seed, peanuts (unsalted) and digestive biscuits. Animals were fed each day (in late afternoon) and the mass of food previously eaten recorded. Food was provided until mid-August when naturally occurring sources of food became abundant.

Dormice were held at Brampton in weld mesh cages, measuring approximately 0.5m by 0.45m by 0.9m. These were individually built around a single hazel stem at the release point. Animals were kept in these for eight nights prior to release. After six nights they were fitted with radio transmitter collars, weighed and returned to their pre-release cages. They were also individually marked with ear tattoos. After two further nights a hole was opened in the top of the cage through which the animals could leave. This procedure constituted a soft release and was exactly the same as that used in previous translocation trials.

Dormice were released in the groups (one or two animals) in which they had been living in captivity or in which they had been found in nestboxes. Male dormice were released from cages 100m apart. Female dormice not already living with a male were released close to one (within 20m). All release points were at least 100m from a woodland edge or a major ride and were chosen because they appeared to be in particularly good patches of dormouse habitat.

All dormice were radio tracked for 10 nights after release and a sample of them for a second period of 10 nights, starting 6 weeks after release. Locations were determined by reading coordinates off lines of wires marked at 5m intervals laid out on the woodland floor. Over 6km of marked wires had to be laid out along paths specially cut for radio tracking. This was a huge task made possible by much voluntary assistance. These wires were removed in October 1994, and the grid coordinate marker tags affixed to nearby trees to help in future with locating the nestboxes.

In June and early July 1993, 11 wild-caught and 8 captive-bred dormice were released (A further five dormice had been taken to the site but not released. Four of these were wild-caught dormice, all males, which died in their pre-release cages prior to release, probably

because of particularly cold and wet weather that coincided with the release period). Radio tracking confirmed that the animals quickly learned their way about, visiting neighbour's cages and using nearby nestboxes. In some cases animals would undertake a lengthy excursion, then return to their cage by the shortest direct route, passing through areas never previously visited. This suggests a high degree of navigational skill, especially in Brampton Wood where it is so easy to get lost!

Captive-bred dormice were initially heavier than wild-caught dormice, and tended to lose more weight, but by the autumn, there was no significant difference between the two groups. At first, wild-caught dormice travelled further than captive-bred dormice, but six weeks after release there were no significant differences in distances moved by wild-caught or captive-bred dormice. As time went by, both groups increased the distances travelled each night. All dormice remained close to their release points, except for two male captive-bred animals which dispersed up to 150m, perhaps as a result of (unavoidably) being released without females or other dormice closely. The dormice, particularly captive-bred animals, relied heavily on supplementary food until mid-August when ripe tree fruits became available.

At least 36 young were born on site in 7 litters, 3 litters to captive-bred females and 4 to wild-caught ones. These are probably the first dormice to be born in Cambridgeshire this century. Captive-bred dormice produced more young per female released (4.25 young per released female) than wild-caught dormice (3.16 young per released female). Although these figures are suggestive of earlier and better breeding performance by captive-bred dormice, sample sizes are too small to allow statistical comparisons to be made. Litters from both types of dormice were mostly larger than the normal mean litter size recorded in nestboxes elsewhere (normal mean litter size: 4.8; sizes of litters born at Brampton: 7, 5, 2, 5, 6, 6, 5; mean = 5.1). Two females, one wild-caught one captive-bred, each produced two litters in the course of the summer, though in each case the first litter was abandoned (and died) apparently due to particularly wet and cold weather.

In August, September and October 1993 nestboxes were checked for surviving dormice. Warm, mostly dry weather encouraged some dormice to nest away from nestboxes at this time. This meant that not all of the animals were found, resulting in a falsely low estimate of survival rates. Beginning on the 15th October there were a series of unusually early frosts, which probably stimulated four or five larger dormice, already fat in September, to hibernate. This again meant that some surviving dormice were not found on the October visit because they had already left the nestboxes to hibernate elsewhere.

Thus the minimum overall survival rate in 1993 for released wild-caught dormice was 45%, compared with 22% for captive-bred dormice. If the animals which are thought to have been alive in October, but not found at that time are included, the survival rates increase to about 60% and 30% respectively. There were no detectable differences in the survival rates of young born to wild-caught or captive-bred dormice, and equal numbers from each lineage survived to October.

Both captive-bred and wild-caught dormice relied very heavily on supplementary food until mid-August, provision of new food each day was therefore essential. Feeding visits

could not have been reduced without compromising the condition of the dormice. Despite the expense of supplementary feeding, early releases were clearly cost-effective because they resulted in breeding in the first year. Furthermore, young were apparently born at Brampton earlier in the summer than young at other sites, potentially increasing their prospects for survival over the ensuing winter. The literature on reintroductions suggests that successful establishment of new populations is usually associated with an early, rapid phase of population size increase. Such an increase took place during the present study and at least partially compensated for the fairly high mortality of founder animals.

However, only 22% of captive-bred dormice survived until October, compared with 45% of wild-caught dormice. This difference was not due to differential feeding success, as supplementary food was available to all dormice and most mortality occurred within a month of release. We suspect that higher predation rates of naïve captive-bred dormice may account for the difference. Two captive-bred dormice were frequently seen on open branches and three other captive-bred animals often crossed open woodland rides on the ground (something which dormice usually avoid doing). Both situations would have made them vulnerable to tawny owls, two pairs of which were present in the release area.

1994- The Follow-up

The 1993 release had worked well, despite very unfavourable weather. However early frosts deprived young animals of an opportunity to fully fatten up before hibernation and the wettest October this century must have made hibernating on the ground (the usual place) unusually hazardous.

Brampton was revisited on May 26th 1994 (PB, TM-J, PM, RM) and 200+ nestboxes were checked in the release area. Five dormice were found:

box A	Female	24.5g	pregnant	Active
box 101	Male 11	18.7	scrotal	Active
box 101	Female 18	21.0	pregnant	Active
box I	Male 15	18.6	non-breeding	Torpid
box 168	Female 16	21.2	pregnant	Active

All three females were in a late stage of pregnancy, suggesting that there had been activity by both sexes during a brief spell of fine weather about 3 weeks earlier. This is early for such pregnancies. All 5 were in good condition and at leats 4 of the 5 were originally wild translocates, not captive bred. Bad weather preceding the visit meant that the population was almost certainly undersampled because some animals are likely to have been still using their hibernacula not nestboxes. This was so only a few days previously in Kent, and on the day of the visit a ground frost was forecast and parts of Brampton wood were still very wet. Subsequent visits found at least 5 more marked animals which must have been alive at the time of the May visits, but were not found then. Thus the May check located only 50% of the minimum population present, perhaps even fewer.

Birds and bumble bees occupied over 30% of the nestboxes, a potentially serious level of competition for them. Most of the birds (tits) had well grown young which are likely to have fledged before all the dormice emerged from hibernation, leaving the boxes free. At least 25 boxes were occupied by bumble bees (*Bombus pratorum*). This has rarely been

observed before and seems to be unusually common in Brampton Wood. Bees would probably be a more serious nest competitor than birds and are likely to be actively attracted by the presence of dormouse nests left over winter.

Two nestboxes contained weasel (?) faeces which subsequently proved to contain dormouse hair. This has not been previously observed and represents another problem for dormice at Brampton. However, the faeces were old, perhaps reflecting use of the boxes during wet periods and the weasels returned to ground level later. There was no sign of weasel predation on the nestling birds, so perhaps they were not systematically plundering nestboxes and the threat to dormice is not great. However, if weasels did learn to visit nestboxes, dormice and their young would be highly vulnerable. Since a high proportion of the population may use nestboxes at some time, there is the potential for significant losses.

Thirty more dormice, all captive bred, were taken to Brampton in late June and released in the first week of July. Supplementary feeding continued for 6 weeks. Nestboxes were checked in summer 1994 with the following results:

July 1st

Box 101	Five dead young, weighing c2g each.
Box I	Female 11 with Male 15, both in breeding condition.
Pen 9	Female 25 with 4 pink nestlings
Pen 1	Female 30 with Male 37
Pen 2	Female 27 with Male 11
Box 27	Female unmarked
Pen 4	Female 20 dead
Box 226	Female 17 unmarked

August: 4th

Box 132	Female 11 with 4 young averaging 8.1g
Box 163	one unidentified dead dormouse (putrefied)
Box 6	Female pregnant, no tattoo
Box 223	Female 17 with 5 young averaging c5.4g

September 6th

Box 81	Female 28, previously unmarked
Box 142	Female 11 with 4 young averaging c5.25g each
Box 221	Female 17
Box 239	Male 28, previously unmarked

In addition, empty nests were found in 13 boxes in these 3 visits.

The summer nestbox checks of 1994 show :

1. Evidence of unusually early breeding (late pregnancies in May) even though the animals did not have the benefit of being well fed in captivity beforehand.
2. At least 5 previously unmarked animals were found most (all?) of which must be young born at the site which had successfully overwintered. This confirms overwinter survival of young, when the May visit had suggested none had survived.

3. Female 17 was first generation site native, born at Brampton in 1993 to Female 1 who had been originally wild-caught. In August she had young with her, the first confirmed second generation, site native animals.
4. Female 11 appears to have had two litters in 1994, only a month apart.
5. Only 4 males were found in total, giving a very skewed sex ratio, yet the fact that so many females were pregnant or with young, widely scattered on the site suggests that either these males were highly active or that others were present but not found during the census.
6. In May two females were found (16,18) and 2 males (11,15). Subsequently two more females (5,11), released in 1993 and some unmarked animals were seen. Thus there must have been at least 2 extra dormice present during the May check of the nestboxes, but not found. This confirms that the nestboxes at Brampton are likely to underestimate the population size at any given time. It is not clear why this should be. It could be due to the particular weather conditions in 1994 or perhaps because there is an abundance of alternative nesting sites (eg bird nests) or because even 260 nestboxes is insufficient in such a large area to guarantee that the dormice manage to locate them.
7. The calendar of captures for 1994, shows which animals were alive, even if not found on some visits. This suggests that the overwinter survival rate from 1993 was at least 16% of the original releases (F11, capt bred; M11 and M15, wild ct.), plus at least 4 (=11%) of the site-native young, born in 1993.

Was the reintroduction successful?

It is clear that the nestboxes are not a reliable way of censusing the population at Brampton because the numbers of dormice using them is much influenced by the weather preceding nestbox checks. However, there is no other method. This means that we cannot know how successful the dormice have been and it will be several years before we can be certain that a secure population has been established. Similarly, if the population declines, this too may not be accurately monitored. Population modelling of small populations suggests that the risk of extinction is perhaps 6 times higher for a group of 20 animals than one of 50. Clearly, despite our attempts to put as many dormice as possible into Brampton Wood, the population is still dangerously small and its persistence is far from certain.

Nevertheless, there are a number of short term criteria of success:

1. Successful transport to the site and subsequent release.- attained by June 1993
2. Successful breeding within the first summer.- attained by July 1993
3. Survival beyond withdrawal of supplementary food.- attained by September 1993
4. Survival over the first hibernation. -attained (despite highly adverse circumstances) by May 1994, including not only released adults but also offspring born at the site.
5. Breeding in the second year.- attained by May 1994, early, suggesting healthy overwintering adults.
6. Birth of second generation, site-native offspring. - attained by August 1994.
6. Survival of animals over a second winter
7. Survival of population for a 3rd summer without more introductions or additional food.

All these criteria have been met, except 6 & 7, for which we must wait until 1995.

The Future

Brampton wood was selected for this release, for the reasons given above, and on the assumption that its continued suitability for dormice would be safeguarded. A reintroduction could be compromised by inappropriate management and would be a waste of resources without some guarantee of suitable management being undertaken in the future. We have been given assurances in this area, and the wood is large enough to avoid conflicts of use. The management plan should ensure that the special needs of the dormouse are catered for.

With the onset of winter 1994, the research period of this project is at an end and only monitoring will now continue. This will be coordinated by Dr Tony Mitchell-Jones of English Nature. Assistance will be provided, where necessary, by Paul Bright and/or Pat Morris. It is hoped that the Wildlife Trust will retain an active interest in the future of this colony of dormice and assist in the regular monitoring of nestboxes.

Aspects of this project will be written up for formal publication in the scientific literature, and this is already in progress.

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