CONSERVATION & MONITORING REPORT 2020: 3

An Assessment of the Supplementary Re-introduction of Dormice into the Yorkshire Dales National Park in 2016



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July 2020

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Summary

A reintroduction of Hazel Dormice *Muscardinus avellanarius* was undertaken in a 16.48 ha woodland near Carperby in the Yorkshire Dales National Park, to supplement an initial reintroduction undertaken at nearby Freeholders' Wood in 2008. On 23 June 2016, 21 female and 17 male captive bred Dormice were released into the woodland with post-release monitoring undertaken in accordance with the National Dormouse Monitoring Programme.

The 2016 release was undertaken as a precursor to the Wensleydale Dormouse Project, a partnership between People's Trust for Endangered Species (PTES) and the Yorkshire Dales National Park Authority to create a contiguous network of appropriately managed woodlands and hedgerows in the mid-Wensleydale area, to facilitate the expansion of the Dormouse population from the successful reintroduction site at Freeholders' Wood.

The results of the monitoring programme showed that 33 Dormice were found in 11 nest boxes during the first nest box checks after release on the 15 September 2016. A total of 31 Dormice were found in 12 nest boxes on 18 October 2016, with juveniles found in seven nest boxes. Subsequent monitoring between 2017 and 2019 has shown the population has been maintained, with breeding occurring each year. Dormice were also found to have dispersed into the western end of the wood, *c*. 400 m from the nearest nest boxes located in the original release area in the central section.

These data have been cross-referenced against the Natural England assessment criteria for reintroduction projects and show that the scheme has met the short-term success targets of surviving the first two winters and breeding by the third year.

This report details the results of the post-release monitoring including the dispersal of micro-chipped animals within the wood and breeding success.

Introduction

Hazel Dormice *Muscardinus avellanarius* (hereafter Dormice) were historically found right across Yorkshire but, by the time Victorian naturalists began recording, it is likely that the population was already in decline in many areas of the county. In North Yorkshire, Howes (2004) concluded that Dormice were still present in lower sections of all the major Dales and the Dales fringes of the Vale of York, possibly up to the first quarter of the 20th century, since when there have no been confirmed records and the population was considered to be extinct in the county.

In order to return Dormice to Yorkshire there have been three previous reintroductions into the county. The first was into a private woodland near Helmsley in the North York Moors National Park in 1998 (Oxford, 2007), followed by one in another privately owned woodland near to Masham, Nidderdale in 2004 (Beer, 2004). More recently a further reintroduction took place in 2008 at a site at Freeholders' Wood near Aysgarth in Wensleydale owned by the Yorkshire Dales National Park Authority (White and Court, 2012).

Although some new woodland and hedgerow planting was instigated by the Yorkshire Dales National Park Authority adjacent to the reintroduction site, it became clear that a more coordinated approach with additional resources was required to create a network of inter-connected woodlands and hedgerows that would enable Dormice to disperse into the wider mid-Wensleydale area.

Two different strategies facilitated the development of a landscape-scale project to increase the Dormouse population in mid-Wensleydale. Firstly, a strategic review of the Dormouse reintroduction scheme was undertaken by White (2014) that made a number of recommendations, including a change from range expansion to consolidation of existing populations. It also recommended that further supplementary reintroductions should look to deliver small clustered groups in order to create viable metapopulations, rather than have multiple widely dispersed sites.

In addition to this, the Wensleydale Strategy was developed by a partnership of organisations, businesses, individuals and groups brought together by the Yorkshire Dales National Park Authority (YDNPA) and the Yorkshire Dales Rivers Trust. The strategic

vision was to identify the key issues affecting the Wensleydale catchment and their potential solutions. One of the main nature conservation aims was to improve the environment of Wensleydale and its tributary dales for the benefit of people and nature.

This opportunity to facilitate the expansion of the Dormouse population from the successful reintroduction site at Freeholders' Wood led to the development of the Wensleydale Dormouse Project, a three year partnership between the YDNPA and People's Trust for Endangered Species (PTES). The main objective of the project was to create a contiguous network of appropriately managed woodlands and hedgerows in the mid-Wensleydale area to facilitate the expansion of the Dormouse population from the successful reintroduction site at Freeholders' Wood. In addition, a supplementary Dormouse reintroduction close to the existing populations at Freeholders' Wood was proposed.

To help deliver the revised national reintroduction strategy and Wensleydale Dormouse Project, a woodland site close to Carperby was assessed and deemed to be suitable for a supplementary reintroduction. This paper details the supplementary reintroduction scheme that was undertaken in June 2016 and the results of the subsequent monitoring work.

Supplementary Reintroduction Methodology

A 16.48 ha broad-leaved woodland close to Freeholders' Wood was selected as a supplementary reintroduction site, as it is comprised predominantly of Hazel *Corylus avellana* that had historically been coppiced. Although all the woodland has significant potential for Dormice, it is on a steep sided slope with loose scree in places making some parts of the site difficult to access. Given this constraint, consideration had to be given to the accessibility of release cages and nest boxes by fieldworkers undertaking monitoring work.

In early summer 2016, 17 release cages measuring approximately 600 mm x 600 mm x 1000 mm were fixed to trees using cable ties at a height suitable for accessing feeding tubes as shown in figure 1. Also, 111 standard Dormice nest boxes as per specifications detailed in the Dormouse Conservation Handbook (Bright *et al.*, 2006), were put up in the surrounding woodland. Where possible nest boxes were spaced between 10-20 m apart but, due to the steep slope and scattered loose limestone scree across some of the site, this was not always possible.

The initial release protocol was in accordance with the methodology established by Bright and Morris (1994), with Dormice captive bred under the scheme administered by the Common Dormouse Captive Breeders Group. Dormice for this release came from the Zoological Society of London (ZSL) and Paignton Zoo in Devon. All the animals were kept under quarantine conditions for ten weeks prior to release, and were treated in accordance with the Dormouse disease risk management and post-release health surveillance (DRM-PRHS) 2016/17 protocol (Jaffe, Sayers, & Sainsbury, 2016). In addition, following the quarantine period there was a full vetinary examination to ensure that they were in were in good health and to reduce the risk of them carrying any non-native pathogens. They were also implanted with a micro-chip prior to release so that each individual animal could be identified during and after the reintroduction.

On 23 June 2016, 38 captive bred animals (21 females and 17 males) were brought to the reintroduction site near Freeholders Wood. There were eight females and 11 males brought from ZSL, and nine males and ten females from Paignton Zoo. They were separated in to male/female pairs and four trios (one male and two females) at the

respective captive breeding centres, and placed in the release cages in the individual Dormice nest boxes that they were transported in.

Figure 1. A standard Dormouse release cage located at the reintroduction site.



The release cages were visited daily by YDNPA staff and volunteers for 11 days to provide food and fresh water. The food was a mix of dried dog food, a very small amount of sunflower hearts and five small pieces of fresh fruit. On day 12 after the release all Dormice were checked and weighed, with all the animals found to be in in good condition. A small door at the base of the release cage was then opened (see figure 2) to allow a 'soft release', into the wood, with animals still being able return to the release cage to access food and water if required. The food and water continued to be provided on a daily basis for seven days, until the monitoring indicated that the food consumption had reduced.

Figure 2. Dormouse release cage showing the small opening allowing a soft release from the cages.



Supplementary food and water continued to be provided every other day for a 22 day period, and then reduced to every three days over a 28 day period until it became clear that food was not being taken at all from any release cage. The feeding completely ceased on 30 August.

The post-release monitoring was undertaken in accordance with the National Dormouse Monitoring Program survey guidelines (PTES 2011), with nest boxes checked by licenced fieldworkers once each month in September and October 2016. In subsequent years, the boxes were checked monthly from May to October. On each survey the numbers of dormice found were recorded, and simple biometric data collected. These included sex, weight, breeding condition, number of young and in addition, each animal was scanned to determine whether it had a micro chip. Each animal was also aged as either an adult (i.e. an animal that has survived at least one winter) by the orange-brown colour of the fur, or as a juvenile (i.e. independent young in their first year with a weight of >10g) with more brownish – grey fur than an adult. Any young were classed as pink (no fur), grey (grey fur and eyes still closed) or eyes open (with grey-brown fur and eyes open).

Following the release, the nest cage and nest box locations were plotted on the QGIS Geographical Information System (GIS) programme, with the straight line dispersal distance between the release cage(s) and subsequent location of the Dormice in nest boxes measured.

The monitoring results have been used to determine whether or not the scheme has met the Natural England (2014) success criteria for assessing the progress of a reintroduction where Dormice have survived the first two winters and bred in the third year.

Results

The results of post release health surveillance have previously been detailed by Januszczak *et al.* (2016). It was the first year that body weights had been collected during the soft release stage, with Januszczak *et al.* (2016) concluding that although the body weight on average fell during the soft-release stage, it did not fall below the normal range expected for this species at a comparable time of year. A total of 11 microchipped dormice were detected after release was the highest recorded number of chipped dormice detected since post-release monitoring of reintroduced dormice in England began (Januszczak *et al*., 2016).

During the supplementary feeding programme two cages were presumed to have been interfered with by members of the public. When the nest boxes in cage 4 were checked prior to the initial soft release (i.e. opening the small door) they were found to be empty. No Dormice escaped during the feeding programme and as the release cage did not appear to have been damaged in any way, it is assumed that the cage and nest boxes had been interfered with at some point during the release. The male from this box (chip number 956000003555586) was, however, found on both the September and October monitoring dates when it weighed 18g and 24.5g respectively. It moved a straight line distance of 119.2 m from the release cage to a nest box on the September monitoring date, and a further 13.3 m to a different nest box on the October date.

In addition, the small door on cage 12 was found to have been opened on the soft release date, and so must have been opened after the previous days monitoring visit when it was still closed. The male from this box (chip number 941000016510576) had moved a

straight line distance of 53.5 m from the release cage to a nest box on the September monitoring date and weighed 16.5 g.

The interference at two of the release cages was disappointing but, given the re-capture of an adult from each of these, did not appear to be detrimental to the release programme.

Post-Release Monitoring

A total of 33 Dormice were found in 11 nest boxes on the 15 September monitoring date. This included a total of seven litters: two litters of age class pink (each with three young), one litter of age class eyes open (five young) and four litters of juveniles (four, four, one and three young respectively. A total of 31 Dormice were found in 12 nest boxes on 18 October with juveniles found in seven nest boxes (two litters of five, one litter of four, four litters of one). In addition, a litter of five freshly dead age class pink were found in one of the original nest boxes put into release cage one. This was the only evidence of use of these original nest boxes during any of the monitoring work. Unoccupied Dormice nests found were found in a further 19 nest boxes.

In order to give an indication of the condition of the Dormice released in 2016, mean weights were compared to dormice found in Freeholders' Wood as the weather conditions and food availability were likely to have been very similar. At the 2016 reintroduction site the mean October weight of adult females was 21.6 g (n=5 Dormice, SE ± 1.47) and adult males 21.7 g (n=3 Dormice, SE ± 1.42). In comparison, the mean weight of adult females at Freeholders' Wood was 17.4 g (n=7 Dormice, SE± 1.43) and 22.0 g for adult males (n=6 Dormice, SE ± 2.86).

The straight line dispersal distances between the original release cage and location of a nest box on the September and October monitoring dates are shown in tables 1 and 2. In addition, the weights of each Dormouse are also shown. In order to give some context to movements, the mean nightly maximum horizontal straight line distance moved from the nest by adult dormice was found to be 67 m for males and 51 m for females (individual maximum distance = 152 m) in a woodland dominated by 50 year old hazel coppice (Bright & Morris, 1991). At this reintroduction site the maximum distance between any two nest boxes is 408 m.

Table 1. The straight line dispersal distances of Dormice between the original release cage and nest box location in September.

Chip No.	Sex	Weight in captivity	Weight on release	Release Cage No.	Nest Box No.	Weight (g)	Distance moved (m)
95600000 3442344	F	23	20.5	1	2	19	11.3
9410000 17907508	F	24	22	13	43	19	147.2
95600000 3471480	F	23	17.5	3	42	23	94.5
9410000 16510576	M	23	Cage opened	12	23	16.5	53.5
95600000 3482589	M	31	26	8	50	21.5	63.5
9410000 16510584	M	24	27	17	16	17	112.4
95600000 3555586	M	26	No dormice	4	45	18	119.2

The mean straight line dispersal distance between the release and September monitoring were 84.3 m for females (n=3 Dormice), (range 11.3 m to 147.2 m) and 87.2 m for males (n=four dormice), (range 53.5 m to 119.2 m).

Table 2. The straight line dispersal distances of Dormice between the original release cage and nest box location in October (when there was no recapture in September).

Chip No.	Sex	Weight in captivity	Weight on release	Release Cage No.	Nest Box No.	Weight (g)	Distance moved (m)
95600000 3556443	F	24	16	5	15	18	57.6
9560000 16510580	F	26	24.5	14	2	21	195.1
9410000 17907507	F	28	21.5	15	T8	21	337.1
9410000 17907506	M	29	28.5	11	L6	20.5	215.4 m

The mean straight line dispersal distance between the release and October monitoring were 196.6 m for females (n=3 Dormice), (range 57.6 m to 337.1 m). Only one male was recaptured in October and had moved 215.4 m from the release cage.

Four chipped Dormice were re-caught in both September and October, with the distances moved between September and October shown in Table 3.

Table 3. The straight line dispersal distances of Dormice between the nest box locations in September and October.

Chip No.	Sex	Release cage No.	Sept Nest Box No.	Oct. Nest Box No.	Weight change Sept to Oct (g)	Distance moved Sept-Oct (m)
956000003471480	F	3	42	45	-2	31.7
941000017907508	F	13	43	50	8	54.7
941000016510584	M	17	16	14	3	7.5
956000003555586	M	4	45	46	6.5	13.3

There were six chipped Dormice recaptured in 2017, with the weights and nest box numbers shown in table 4.

Table 4. The number of chipped dormice, nest box numbers and weights recaptured in 2017.

		22-May-17		19-Jun-17		17-Jul-17		18-Sep-17		18-Oct-17	
Chip No.	**Release Cage No.**	**Nest Box No.**	**Weight (g)**	**Nest Box No.**	**Weight (g)**	**Nest Box No.**	**Weight (g)**	**Nest Box No.**	**Weight (g)**	**Nest Box No.**	**Weight (g)**
Males											
1	2			N1	18	28	17	46	18		
2	4	47	18.8								
Females											
3	5	18	15.5								
4	10							26	22		
5	13	48	17.5			48	17.5			46	36
6	14			N1	18						

Chip No.: 1 = 956000003447332, 2 = 956000003555586, 3 = 956000003556443, 4 = 941000016510585, 5 = 941000017907508, 6 = 95600001 6510580.

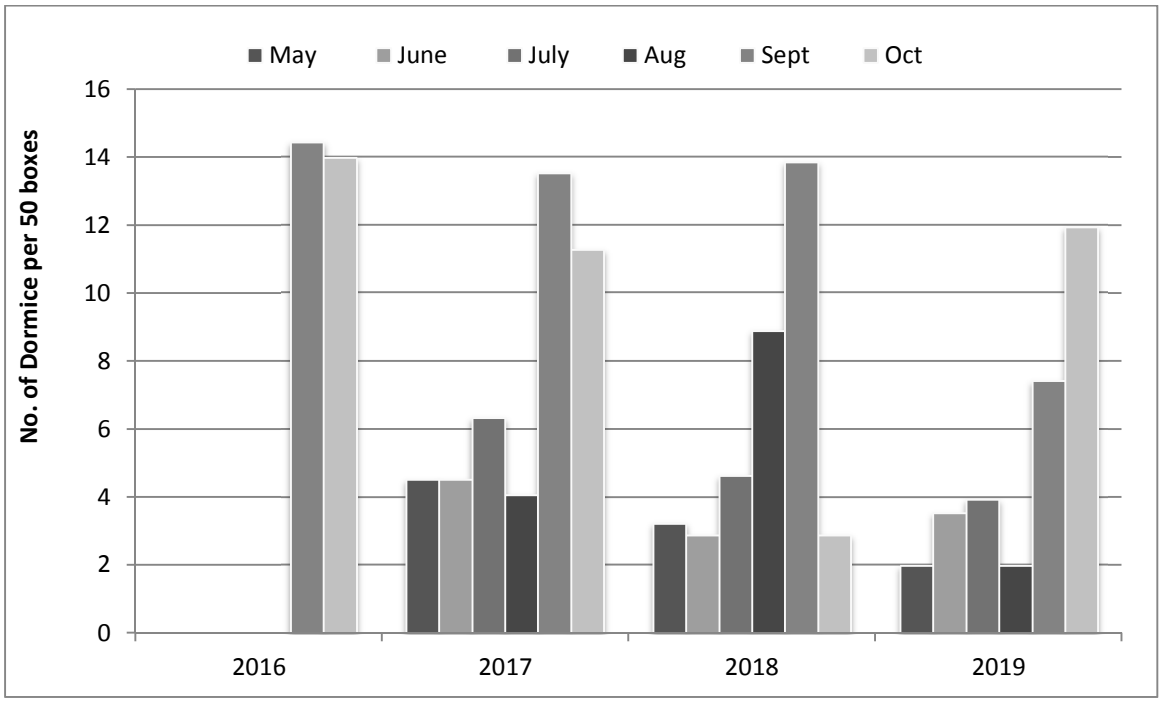
The only chipped animal re-caught in 2018 was a female (chip number 9410000 17907508) that had been recaptured on both monitoring dates in 2016 and three monitoring dates in 2017. The original release was from nest cage 13 with a pre-release weight of 22 g. There was no evidence of any breeding activity when captured but this could have occurred at a natural nest site in 2017 during July, August or September. The recapture dates, nest box numbers and weights are shown in table 5.

Table 5. The recapture history of dormouse chip number 9410000 17907508 between September 2016 and October 2018.

Date	Nest Box No.	Weight (g)
15-Sep-16	43	19
18-Oct-16	50	27
22-May-17	48	17.5
19-Jun-17	48	17.5
18-Oct-17	46	36
18-May-18	48	18
21-Jun-18	48	18
19-Jul-18	46	19
16-Aug-18	47	17
18-Oct-18	46	36

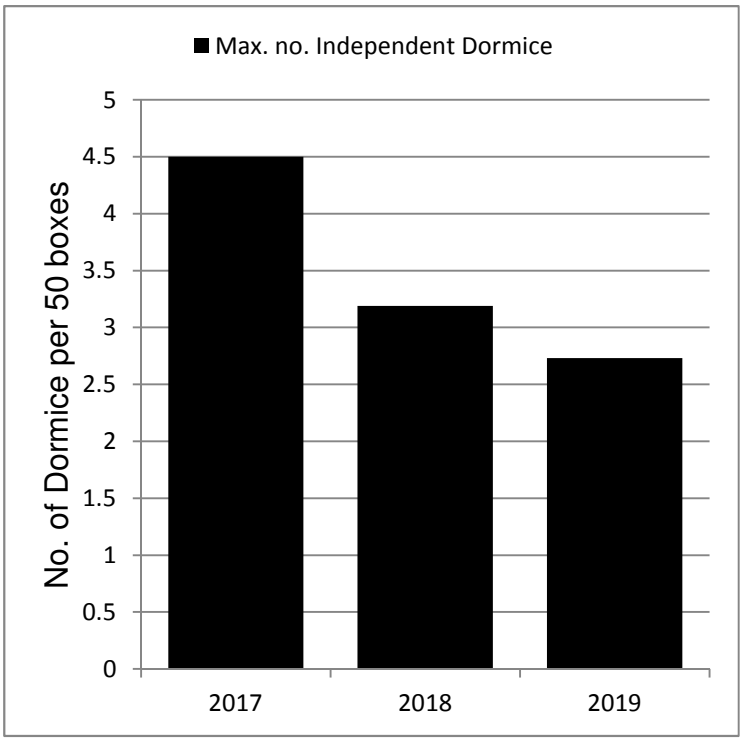
The number of Dormice found per 50 boxes is used to compare annual totals, with the total numbers of dormice found per 50 boxes during monthly counts following the reintroduction shown in Figure 3.

Figure 3. The total numbers of dormice found per 50 boxes during monthly counts following the reintroduction.



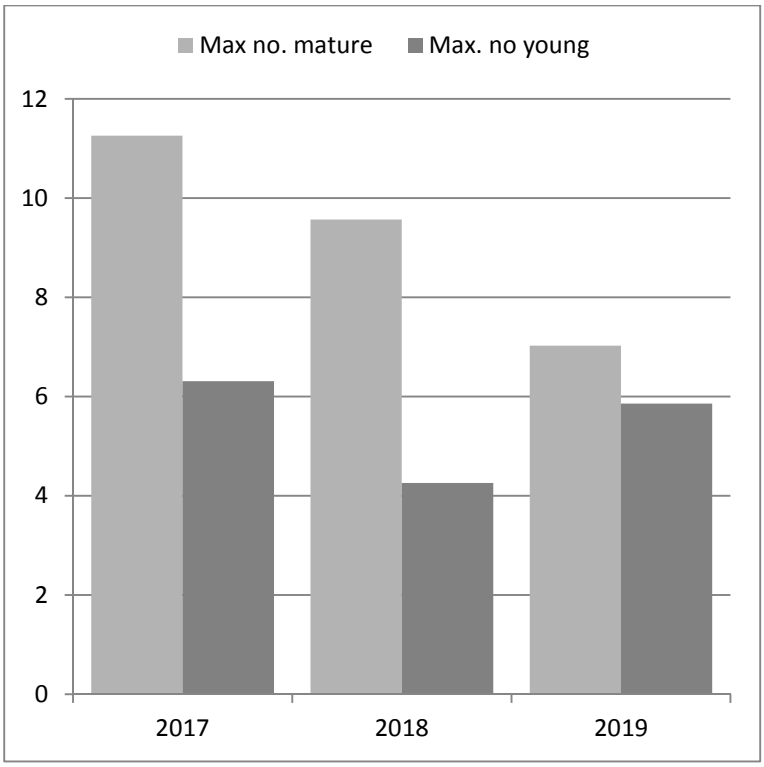
The peak counts of adult Dormice in the May and June period, excluding any young animals borne in that year, expressed per 50 boxes is thought to be a good measure of over-winter survival rates and are shown in Figure 4.

Figure 4. The maximum number of adult Dormice per 50 nest boxes in May and June 2017 to 2019.



The peak counts of mature (adults and juveniles) and young (any aged as pink, grey or eyes open) Dormice in September and October are used to give an indication of breeding success. The annual totals of independent and dependent Dormice are shown in Figure 5.

Figure 5. The maximum number of mature (adults and juvenile) and young (any aged as pink, grey or eyes open) Dormice in September and October between 2017 and 2019.



The number of litters of different age class recorded annually between 2017 and 2019 are shown in table 6.

Table 6. The age class of Dormice litters recorded annually between 2017 and 2019.

	2017	2018	2019
No. litters of Pinks	1	4	2
No. of litters of Greys	0	0	0
No. of litter Eyes Open	4	3	8

Discussion

The steep slope and uneven ground within large parts of the wood makes access difficult in some places, particularly in wet weather. Therefore it was not possible to put up rows of consecutive boxes from the area of reintroduction cages that were evenly spaced throughout the wood in the release area. In order to try and assess dispersal into other areas of the wood, an additional 30 nest boxes were put up in early 2018 at the western edge of the wood away from the release area. On the August 2018 survey date two of these boxes were occupied by Dormice, with an adult female with three pinks found in one and, an adult male in another. In addition, two unoccupied Dormice nests were found in other boxes. These occupied boxes were *c.* 400 m from the nearest nest boxes located in the original release area in the central section of the wood, and shows that Dormice have successfully dispersed into other areas of the wood.

The eastern section of the release woodland is under different ownership and so no nest boxes were put up as part of the initial reintroduction monitoring programme. Given the homogeneity of the age structure and species mix throughout the wood, it is considered likely that Dormice have also spread to the eastern end of the wood, *c.* 500 m from the release area in the centre of the wood.

The monitoring results show that Dormice have survived the first two winters and bred in the third year after release, and so have met the short-term success criteria used by Natural England (2014) to assess the progress of reintroduction schemes. Undertaking additional monitoring in areas of adjacent hedgerows and woodlands will enable the medium-term success criteria of maintaining a stable population over ten years and dispersal outside the original wood to be determined.

Acknowledgements

The Dormouse reintroduction was undertaken as part of Natural England's Species Recovery Programme, and would not be possible without the work of all the partners involved in the different stages of the reintroduction process including Natural England, Zoological Society of London, Paignton Zoo and the Common Dormouse Captive Breeders Group.

The YDNPA and PTES would like to thank the Bolton Estate, in particular Simon Brown and Tom Orde-Powlett for their assistance and continued support for the Dormouse conservation work being undertaken in the mid-Wensleydale area. We would also like to thank Richard Dimmon at Natural England, Geoff Garrett (YDNPA Trees and Woodlands Officer) and Nigel Metcalfe (YDNPA Area Ranger Lower Wensleydale) for their assistance in the development of and delivery of the reintroduction.

We would also like to thank the following YDNPA staff and volunteers who volunteered their time to help with the supplementary feeding: Suzannah Barningham, Cathy Bergs, Hannah Fawcett, Geoff Garrett, Clive Herdman, Phil Hibbs, Marnie Peacock, David Preston and Rosalind Radonicich. In addition thanks to Phil Hibbs, Meghann Hull, David Preston and Tony Serjeant for their assistance with the monitoring work and Josie Wilson for proof-reading the report.

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