The Dormouse Monitor

WINTER
2017/ 2018

people's trust for endangered species

Returning dormice to woods in Warwickshire

Ruth Moffat & Debbie Wright report on their status in the county, and an exciting reintroduction project.

Investigating diseases Inez Januszczak explains how she and her team check the health of hazel dormice before they are released into the wild.

From black to gold Do black hazel dormice have black offspring? Can black dormice moult their black and become gold? Gerhard Augustin investigates.

Buy your 2018 dormouse calendar today. Fantastic photos of the four dormouse species found on the continent: hazel, forest, garden and *glis*.

In this issue

Welcome

Over the past couple of years we have commissioned and funded several projects looking at different aspects of hazel dormouse ecology and conservation. We hope to better understand how and where they hibernate. Investigations have been underway, looking into what types of woodland they do best in, and how mangement impacts on their numbers. And results from footprint tracking trials are ready to be analsyed. This year we should be in a position to share the results of some of these studies with you, and really begin to understand why dormice are still declining and what we can do to halt that decline. With this knowledge and your help, we hope to begin to reverse the fortunes of hazel dormice in the UK.

We hope you enjoy reading all the articles here - do feed back and let us know!

Nida Al-Fulaij & Susan Sharafi

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South Brent Wood Fair

Tom Maddock reports on the Sustainable South Brent wood fair 2017, where he promoted the work of the Hurrells and PTES in conserving hazel dormice.

South Brent is a thriving Devon village on the southern edge of Dartmoor, between Exeter and Plymouth. Sustainable South Brent (SSB) was set up in 2006 by a group of enthusiastic locals, all actively involved in woodwork, wood-related skills, crafts, local produce, stories, traditions and the rich heritage of trees, woods and hedges. This year the Wood Group of SSB, co-ordinated by Robin Toogood, organised a wood fair, at the local village hall.

I only heard about the fair three weeks before it was due to occur. I applied for a space, but they were full. There were 30 stalls, including the Forestry Commission, Devon Rural Skills Trust and Dartmoor National Park Authority, and a full programme of events, including walks, talks, storytelling and music throughout the day. The best offer I had was to share space with Devon Wildlife Trust (DWT). One of my nest box sites is at the DWT Reserve, Andrew's Wood, downstream from Brent, so I was in with a chance. I arrived early. One stall away from the DWT stand, next to local company One joiner, One Engineer, was the Woodland Trust table. Their display had not arrived, so I acquired their table - a prime site in the main hall. Thank you Woodland Trust! Moor Trees, which has an office and tree nursery in Brent, also had a stand. They plant native trees on Dartmoor and in the South Hams using seed collected locally. Since 2001 their volunteers have planted 60,000 trees in 66 hectares. That's the equivalent of 110 football pitches. A fantastic amount of habitat for dormice.

My display told a very local story of the Hurrell family's pioneering work with dormice around their home, within sight of this very hall, in the 1960s. This included H.G. Hurrell's discovery of the diagnostic appearance of a dormouse-opened hazel nut; his daughter Elaine's use of this discovery to investigate the UK distribution of dormice, and their early design for a dormouse nest box. Elaine subsequently wrote two further monographs about the hazel dormouse.

I gave out numerous dormouse-opened nuts and explained the current work of NDMP. *The State of Britain's Dormice 2016*, produced by PTES, proved invaluable. And several people took photographs of the PTES display material. People had come from all over the county, and beyond. It was non-stop from 10am until close at 5pm. I was grateful to Celia Ralph of Brent DWT for a chance to grab a coffee in the cafe.

H.G. Hurrell, MBE, was a founder member of both DWT and the Woodland Trust. Without his pioneering efforts our knowledge of hazel dormice would be considerably limited in comparison to our knowledge today. His legacy was very much felt at the wood fair. Without Hurrell it would have been a very different day.

Tom Maddock

Investigating diseases in hazel dormice

Inez Januszczak, Pathology Technician for the Disease Risk Analysis and Health Surveillance programme (DRAHS), Zoological Society of London, details how post mortems help us learn more about the health of dormice.

For over 20 years, PTES has led reintroductions of hazel dormice - an incredibly charismatic species that some say represents the British countryside. It has been in decline probably in part due to the fragmentation of woodland and the decrease in hedgerows, thus reintroductions are being used to bolster populations. The Zoological Society of London and Natural England have been supporting those reintroductions through health and disease monitoring for the last 18 years, with assistance from Paignton Zoo and Environmental Park and the Wildlife Trusts. Over time, the aim is for a self-sustaining free-living wild population, which longer requires human intervention.

Zoological Society London

The process of a dormouse reintroduction includes breeding them in captive collections after which they are quarantined for up to three months. This quarantine period is crucial to ensure the dormice are as healthy as possible at the time of release and to try to ensure that they can be released into the wild free from any non-native diseases that could impact wild populations. During quarantine, the dormice are microchipped which means any dormouse found after the release can be identified. Similarly, if non-chipped dormice are found, this indicates that the reintroduced dormouse have produced viable offspring.

However, where there is life there is also death – and on occasion dead dormice are found. But this presents a unique opportunity to investigate the threats to dormice present today. The Disease Risk Analysis and Health Surveillance programme (DRAHS), based at the Zoological Society of London, and a partnership with Natural England, with support from PTES, carries out post-mortem examinations of dormouse carcasses found at reintroduction sites and also elsewhere in the countryside – a kind of 'CSI' for rodents.

DRAHS works with a network of volunteers across the country that submit dormouse carcasses for post mortem examination – and they are accepted in any condition, whether they are freshly dead or mummified. We can collect valuable information on fur quality, bone and skeletal health even from mummified carcasses which increases our understanding of their health. There are numerous reasons why a dormouse could die in the wild – from bacterial sepsis to acute respiratory

failure. At DRAHS the aim is to have a record of diseases found, which is achieved through a detailed post mortem examination protocol involving not only external examinations but inspection and sampling of organs (to search for viral, bacterial, fungal, and other parasites) and measuring of body parts.

These investigations increase our understanding of the threats to dormice, and when assessed in the context of the population dynamics in the woodland of concern, can give us a potentially valuable insight into the viability of both reintroduced and other populations of dormice. These insights can then aid future reintroductions, as well as acting as a map of potential diseases which can point to improving reintroduction methods in the future.

It's important to approach post-mortem examination in a methodical way using the same sequence of inspections to ensure nothing is missed. The first step of a post mortem examination is to look at the external body and look closely for any abnormalities. If the potential contributor of death was a physical one, such as a head collision or predation, this may be visible in the first stages of the examination. Sometimes detritivores are also found on the carcass; these can range from maggots to beetles, which can also act as a guide to how long the dormouse has been dead if other factors such as location of finding and ambient temperature are taken into account.

The next stage is to remove the skin and look at the internal organs. The inside of the skin is noted (any internal bruising becomes more evident at this stage) as well as the amount of sub-cutaneous fat seen around the organs. The levels of sub-cutaneous fat as well as the elasticity of the skin is seen is an important measure of how healthy the dormouse was at the time of death, as any signs of starvation or dehydration would become apparent at this point.

The organs are then carefully removed and looked at individually. The heart, lungs, digestive tract (including stomach and spleen), liver, kidneys and sexual organs are all dissected and analysed, sometimes even under a microscope. Depending on the freshness of the carcass, this can be harder to do – each organ has a particular colour and texture it maintains after death, and the more decomposed the carcass the harder it is to pick up on any irregularities. However, current analytic methods mean swabs or glass slides of organs can be taken to look at any microorganisms that could be present – organisms that are too small to be spotted with the naked eye. Pieces of organs can also be sent for histological analysis – where the tissue can be examined more closely. This can give us a better idea of the state of the organs at the time of death, and can further determine whether there were any signs of disease.

Parasites such as nematodes might be found within the internal organs, especially in the digestive tract. Although a certain number of parasites may be acceptable, a large burden of parasites can cause disease. What the appropriate number is would not only depend on the animal but the type of parasite itself.

The first step of a post-mortem is to look closely for any abnormalities on the external body

Finally all parts of the body are saved, in either formalin or a -80 freezer archive to ensure we can gain the most from further tests, future advanced tests or evaluate any diseases in the future when new information becomes available.

Over 120 dormice have been examined post mortem by DRAHS. Important findings have included respiratory and eye disease. One dormouse was found with severe eye disease which was shown to be associated with nematode worms. By finding out the life cycle of these worms we were able to show that a damp environment in a nestbox had enabled the worms to make contact with the dormouse. Consequently, we have been able to advise nest-box checkers of the importance of removing damp material during routine nest-box checks

DRAHS enters the information from every examination into a database, and holds an archive of all carcasses. Together these represent a valuable resource for further investigation of dormouse health, which means if more information on the health of a certain population is required the archive can be referred to at any time. It is through this kind of monitoring that we are able to try to ensure the reintroductions taking place are successful for the reintroduced animals themselves and the surviving population.

DRAHS is always interested in receiving dormouse carcasses so that we can continue our monitoring work. Please contact DRAHS@zsl.org if you would like to know more about submitting dormouse carcasses to be examined post mortem.

Food for thought: my view from the woods of Dartmoor

Matt Parkins, who lives and works on Dartmoor, shares his thoughts about what makes the woods such a special place.

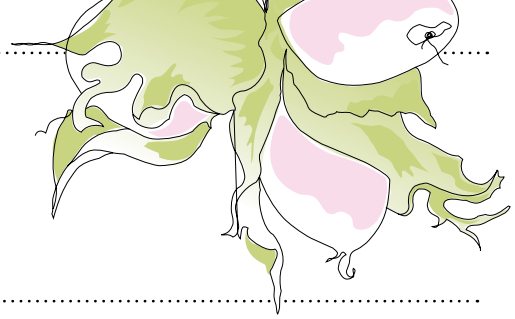
I feel right at home in the woods. For me, the protective canopy of trees provides the perfect shelter with endless opportunities for my inquisitive mind to go exploring. Many times, I have considered building a log cabin and moving in. As John Muir, the 19th century conservationist said, "I only went out for a walk and finally concluded to stay out till sundown, for going out, I found, was really going in." I take every chance I can to immerse myself in the woods, absorbing the atmosphere, studying the scenes and describing the detail.

Nothing in the woods can be seen in isolation. Each and every living thing is a part of the big picture. Each tree, flower, bug and bird performs its role in the spectacular stage-show of life. Charles Darwin observed "It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us."

One of these woodland characters is the dormouse and, for several years, I have been fortunate enough to get up close to this endearing creature. Being licensed to monitor the little hibernator is always an adventure and each time a nest box is examined it's like opening up a miniature woodland world and peering in. Is there a dormouse in there, or a wood mouse? Bees, wasps or hornets? Are there birds nesting in there? Blue tits or wrens? Or is it one of the usual suspects; millipedes, woodlice or slugs? If it is a dormouse, the thrill of discovery never subsides. The honey coloured fur and deep, dark eyes squinting up at me each time have created a bond between us. Not only am I on their side, to stand up for them, I am in complete admiration of them. We humans regularly disturb their habitat, causing their numbers to fall and, in some counties, to disappear altogether. They show adaptability, resilience and a great will to survive and, in Devon the diversity of connected wild flora and food sources has allowed them to hang on. They are often described as an indicator of a good habitat but they are more than that, they are torch bearers, flag wavers for the protection of our precious woodlands.

Scanning the woodland floor for the remains of hazelnut shells you can get an idea of which species has been responsible for eating the nuts. While nut shells with the trademark neat, smooth hole made by the dormouse can be found beneath the hazel

Matt Parkins



shrubs in Dartmoor's woods, the majority, in no uncertain terms, have been opened by the more powerful jaws of the grey squirrel, and a series of national *Great Nut Hunts* have confirmed this. Among the many thoughts and theories rolling round in my head, I am constantly questioning whether the introduced grey squirrel is out-competing the dormouse for both food and habitat. While there are many other climatic and human influences that have a negative effect on dormice, I feel the greys have got a lot to answer for. After they were brought to the UK, the expansion of their range and the spread of the squirrel pox virus they brought with them has decimated our native red squirrel population. The reds have been driven out to a few distant strongholds including the Isle of Wight and some of Scotland's forests.

Though many people have never seen one, a few red squirrels are still around and volunteers and conservation groups are making a huge effort with various captive breeding and reintroduction projects. One of the most successful of these has eradicated grey squirrels from Anglesey where today, the red squirrel population is doing well across the island.

Between Cumbria and Cornwall, red squirrel conservation and grey squirrel control projects are showing some good results. The habitat strongholds around the country are being protected while the range of the reds is, very cautiously being expanded. Constant monitoring continues; checking that the reds can establish themselves in the woods of mainland UK, but there is a long way to go.

If this work continues I am hopeful that, in time, we can see the results; perhaps greater quantities of food available for dormice and less damage to trees from bark stripping – a regular accusation made of the greys.

Worrying levels of damage to broadleaved tree growth and regeneration isn't entirely the preserve of grey squirrels. It is widely reported that, in the absence of natural predators, the UK mainland population of deer is at such a high level, the pressure they put on the recovery of woodlands is immense. On a recent trip to the Isle of Wight I took a walk in a few of the woods there. The island is a haven for red squirrels and the deer numbers are very low. Cut off from the mainland, the island habitats show what the UK's woods could be like if there were red squirrels without greys and if deer lived at sustainable levels. The first striking difference hit me where the People's Trust for Endangered Species is managing a private woodland at Briddlesford. Hazel coppicing work is done there without the threat of heavy deer browsing. The new shoots require no protection and eagerly grow to form a lush understorey below the oak canopy; perfect for dormice. Consequently, there is a high population in this wood and they exist happily, side-by-side with the red squirrels.

Walking in other publicly accessible woods on the island, the woodland character continued to show the differences to the mainland woods. Undisturbed fresh growth of broadleaved species was everywhere, hazelnuts were abundant and bark stripping was virtually non-existent.

This was not a scientific study but I wonder whether the Dartmoor woods could be more like this. Woodlands that are more in balance in this way feel right; more like Darwin's tangled bank of interdependent species in action. As a bit-part player in some of the most exciting woodland regeneration projects around Dartmoor, I will continue to champion the cause for the red squirrel. Over the coming decades, the large woodlands along the Teign and Bovey river valleys are likely to provide the perfect habitat for them; habitats on a landscape scale with a healthy mix of conifer and broadleaved trees. In reality, it's not going to be just as simple as that, though. As demonstrated by projects across the country, volunteers need to put in many hours of coordinated effort and trapping greys will probably make the fur fly, but everything is possible. With the wide-open spaces of Dartmoor to the west and Devon's coast to the east there are ready-made grey squirrel barriers already in place so, who knows? In time, with willing and committed conservation groups, we could create that tangled bank, clothed with plants, with birds singing, insects flitting about, worms crawling through the earth and dormice living cheek-to-furry cheek with red squirrels in the arboreal world above our heads.

Matt Parkins

Securing a future for Warwickshire's dormice

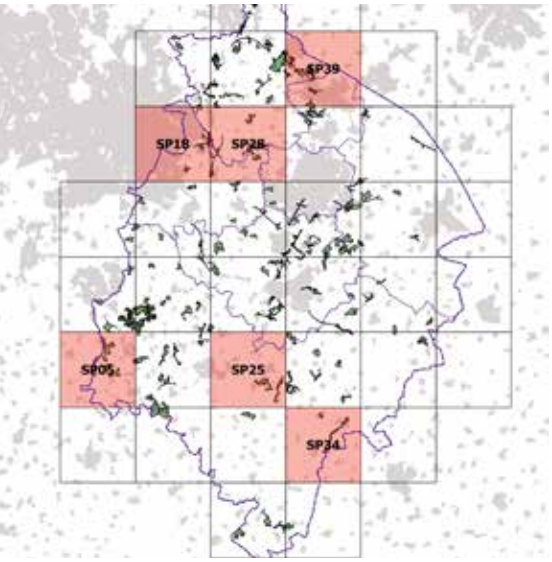
Ruth Moffat, Dormouse Conservation Warwickshire, reports on the dormouse work that has been carried out throughout the county over the past few years.

The release of 38 dormice into ancient woodland in Warwickshire on June 20th 2017 was the fourth attempt to bring back a much loved animal to the heart of England. Years of surveys and monitoring, and several earlier releases spanning more than two decades – including the first release of wild dormice, at Bubbenhall Wood, in 1998 – have gone into trying to repopulate the Midlands with this charismatic, squirrel-like rodent, sadly better known in literature than in the wild. In Shakespeare's *Twelfth Night*, the dormouse is an adjective: 'Awake your dormouse valour', says Fabian, meaning sleepy, dozing or slumbering. In *Alice in Wonderland*, a sleeping dormouse is used as a cushion by the March Hare and the Mad Hatter when Alice arrives at the tea table. This lazy, slightly hopeless depiction seems to have made the attractive little animal a popular pet; in the late 19th century the species was common, indeed it was known in almost every English and Welsh county.

The dormouse is distinguished from other mice by its furry tail and its habit of sleeping through the winter – strictly speaking, it hibernates. The name perhaps comes from the French dormir, meaning to sleep, or the Middle English dormous, meaning sleepy. Regional names reflect this sleepiness: dory mouse, derry mouse, dozing mouse, sleep-mouse, sleeper and seven-sleeper. In the north of England the name 'dozy mouse' may come from the Old Norse dusa, and in Devon the species acquired the curious name of 'chestlecrumb'. In 1993 the *Great Nut Hunt*, organised by Royal Holloway College, London, to find and identify hazelnuts eaten by dormice, suggested that in the hundred or so years since Alice's trip to Wonderland this once common mouse had disappeared from about half of its former range, and was now concentrated in southern England and Wales.

Warwickshire is one of a band of six Midland counties from Staffordshire to Hertfordshire where dormice are now rare. Records began in 1871 with the report of a single dormouse in the Rugby area, at a location now in the centre of the town. There is a record from 1885 of a stuffed specimen caught at Edge Hill, near Stratford-on-Avon, and another of similar date of a live animal from Yardley Wood, now part of Birmingham. The 1904 Victoria County History for Warwickshire is equivocal: 'The dormouse has been said to occur in the county though the writer has not met with it.' Between 1999 and 2000, English Nature conducted a survey of dormice in Warwickshire, in recognition that the county was at the northern edge of the animal's contemporary range and it was known from only a few sites. The survey, which covered 27 woods and relied on searching for nuts eaten by dormice, found evidence of the animal in only five places.

In 1991, a hibernating dormouse had been found at Weston Wood (not included in the English Nature survey), close to Bubbenhall Wood, after which nest-box monitoring, a more efficient technique than nut searches, was established by the Forestry Commission. Records were erratic for a time, with a productive year in 2009 when 25 nests were found – including nine animals in one month. Sadly, dormice were last recorded there in 2013, but the decline may be just a natural dip; the number of nest boxes has since been doubled in order to see if the population has moved within the wood. Weston Wood and neighbouring Waverley Wood, managed by the Commission as one unit (the latter was also not included in the English Nature survey), remain the only place with a confirmed natural population in Warwickshire. Our only other known dormouse population is at Windmill Naps, the only successful introduction in the county so far, which seems to thrive; since 2009, annual counts of individuals have built up to 82 captures in 2016, although numbers recorded may



Map of woodland over 20ha in size in Warwick, Coventry and Solihull.

include repetition since dormice can be very mobile and found in more than one box during the checking season, hence the term 'captures'.

The loss of coppiced woodland and hedgerows, and the fragmentation and deterioration of remaining woods and hedges, contributed to the dormouse's decline, with the rate at which suitable habitat was being destroyed a very significant factor. A Mammal Society survey in the 1970s showed that the most important habitat for dormice was deciduous woodland with scrub, hedgerows and old coppice; at the time, 30–50% of semi-natural woodland and 140,000 miles of hedgerows had been lost from Britain since the 1940s, while coppiced woodland was largely a thing of the past. The decline was thought to have been due also to inappropriate management of the remaining hedgerows and a changing climate, the latter resulting in cooler mean temperatures and higher rainfall in the summer when dormice are active . Climate change can also disrupt the hibernation cycle, causing dormice to wake too often in warmer winters and use up fat reserves, while they can be short of food in cooler summers, when there are fewer insects, fruits and flowers. These food sources are a vital part of their diet early in the year, before berries and nuts become available. The presence of hazel, however, seems not to be essential, as evidenced by a population at Ribbesford Wood, in Worcestershire, a conifer plantation that apparently provides good habitat. In such woods, dormouse food is likely to consist of aphids, caterpillars and pollen, all containing high levels of calories, while nests have been found in deciduous woodland, made entirely of pine needles, instead of the usual honeysuckle bark and fresh leaves.

This latest release is a true reintroduction, rather than an introduction - the site has past records of dormice although surveys by the WDCG in 2012-13 indicated a current absence; a second release into an adjacent wood is planned for 2018. Both woods have good dormouse habitat and fit the recommendations for suitability, being more than 20ha in area and having appropriate management. The Natural England requisite that reintroduction sites should be in clusters to create viable meta-populations, rather than one large woodland, is also met by these and other woods in the area. Dormice thrive in low-growing woodland, with a diversity of tree species, and with continuous above-ground routes which these arboreal animals can use. The long-rotation hazel-coppicing that is taking place here should create more than 150ha of dormouse-friendly habitat, all well connected by good quality hedgerows. Over the next two years Dormouse Conservation Warwickshire (DCW) and the Warwickshire Mammal Group (WMG) will help to establish these new populations by feeding the newly released animals and checking nest boxes for survival and breeding. For many members, this will provide their first sight of a dormouse.

Since 2009 DCW (then known as the Warwickshire Dormouse Conservation Group) has carried out surveys with nut hunts, nest tubes and nest boxes in 16 woodlands but has so far drawn a blank. However, we remain hopeful ... a map of

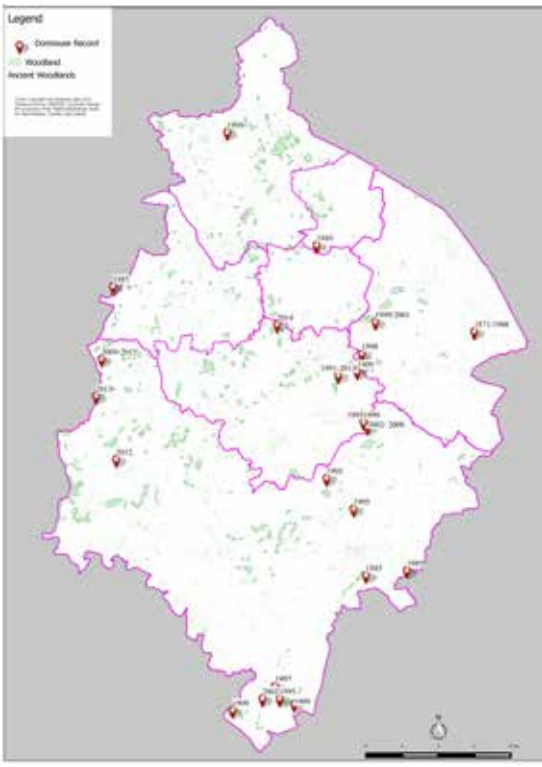
records for dormice since 1871, admittedly some unconfirmed, (Chris Talbot, HBA, Warwickshire), shows that they come from all corners of the county indicating that at one time the species existed throughout Warwickshire. Including anecdotal records, these add up to 23 sites where we either know that dormice exist or there is evidence that they may still exist.

Looking for evidence of dormice along the proposed HS2 route through Warwickshire by consultants for Arup and Adkins between 2012- 14 was no more successful. Potential dormouse habitat within 100m of the line was identified by aerial photography, followed by site visits to assess their suitability for supporting a population. No dormice, or evidence of their presence, was found despite nut searches and the installation of a total of 2755 nest tubes and 135 boxes at 24 sites over two years. These were left for only one season, not the best way of surveying for dormice, as they can often take a season to find them; however, they have been known to build a nest in a tube within two weeks of its installation. This survey effort was vastly in excess of that of DCW and yet no dormice were found, possibly explained by the fact that only three of the woods were of a suitable size; 20ha is considered the critical size for the sustainable survival of a dormouse population by Bright et al. 2006 (The Dormouse Conservation Handbook).

Members of DCW and the WMG will continue the search in other potentially 'dormouse-friendly' areas of the county. The second map shows all areas of woodland of 20ha and over, many of which are agglomerations of very small woods and wooded strips along roads and canals, and others have already been checked for dormice. It is clear, however, that there are six clusters of woodland (marked red) that could be investigated, for which we have no records or only very old ones.

This article contains edited extracts from 'Much Ado about Something - securing a future for Warwickshire's Dormice' which appeared in the August issue of British Wildlife 2017, vol.28, no.6: p.399-404.

A 45-page report of the search for Warwickshire's dormice since 2009 "The status of the Hazel Dormouse (*Muscardinus avellanarius*) in Warwickshire, Coventry & Solihull in 2016' - can be viewed on the PTES website.



Above: Warwickshire dormouse records.

Below: a traditionally layered hedge.

International Dormouse Conference, Belgium

September 2017 was the occassion of the tenth International Dormouse Conference, in Liege Belgium. Nida Al Fulaij, PTES, attended as part of the UK contingency.

Every three years, dormouse researchers, conservationists and enthusiasts from around the world gather to share ideas, stories and results from current research. The conference took place over five days in Belgium, Liege. Organised by Alice Mouton and Goedele Verbeylen, the conference focused on research and conservation methods for five different European dormouse species, as well as other dormouse species from around the world.

Talks were given on camera-trapping, modelling work, the use of footprint tunnels, detailed genetic analyses, and feeding studies. Results were presented from work in many countries including Germany, Belgium, Japan, Bulgaria, UK, Russia, France. The first evening, the delegates were welcomed with an introductory dinner at the University of Liege. The university then hosted the next few days of talks, which were followed by an excursion to Voeren. Here we had a chance to walk through varied dormouse habitat, home to both hazel and garden dormice. The landscape was a variety of farmland, woodland and railway verges. A fantastic landscape home to high densities of hazel dormice. We had a chance to look for natural nests amongst great swathes of clematis. It was surprising how many wild nests we found along the roadside, and just how difficult they were to spot.

We will report in more detail about many of the talks that were given at the conference in future articles, as the research is published. In the meantime, if anyone is interested in receiving a copy of the proceedings please visit the conference website http://dormouseconference.net/index.html

From black to gold

Gerhard Augustin has been investigating whether black dormice will have black or golden offspring, and if they will moult back to a natural colour.

Black hazel dormice were found in Schleswig-Holstein in North Germany in September 2015. The group consisted of a golden coloured mother, with a litter of four juveniles, approximately four weeks old. The juveniles, both male, were the colour of normal hazel dormice. However the other two, both females, were both black with a white patch on their throats.

The animals were taken into captivity and observed to see what happened to the colour of their pelage as they developed. Would the colour persist or change when they moulted? Was the colour inherited? Would they pass the trait on to their offspring? A licence was obtained from the Nature Conservation Agency and the two black sisters and one of the golden males were taken into captivity.

Both black sisters retained their dark fur colouring after two hibernation periods, and after moulting. The first female became slightly lighter over the years but is still darker than normal coloured hazel dormice at two years old. The second female is still nearly black. Their brother has moulted and retained his golden coloured fur throughout.

The animals were paired up with normal coloured animals from the same region and bred, to see what colour traits their offspring would display. In total 15 young were born during 2016 and 2017. The first lighter coloured female gave birth to two litters, one of five and one of four babies. Her sister had one litter of two young. Their brother sired four offspring. None of the young produced by any of the siblings were black. All the offspring were released back to the site of origin when they became independent.

It appears that the gene for black fur colouring is recessive. Although the black offspring remained dark throughout their lives, the did not pass the feature on to their offspring.

2018 dormouse calendar available to purchase now

The new 2018 dormice calendar is now available. It is high quality print and is available in large format A3 and extra large A2. The price is €19,99 for A3 and €25.00 for A2. Postage is €6, for A3. Please ask about shipping costs for A2. To order a calendar, or for more information, please contact Kerstin Hinze by email on niatu@gmx.de

The much anticipated return of hazel dormice to central Warwickshire

Debbie Wright , Warwickshire Wildlife Trust, Warwickshire Mammal Group and Dormouse Conservation Warwickshire, describes the much anticipated release in 2017.

June 20th marked an important day for conservation in Warwickshire: Thirty eight dormice were released into an ancient woodland near Leamington Spa. The release was the result of years of hard work and preparation, which eventually came together with the first of two planned reintroductions by PTES, Warwickshire Wildlife Trust and other partners. The reintroductions form part of the Princethorpe Woodlands Living Landscape Scheme (supported by the Heritage Lottery Fund), in which ancient wooded landscapes are being restored and connected across part of Warwickshire.

Two years prior to the release, 150 nest boxes were erected on trees in the woodland and monitored for their use by bird and mammal species. In April this year a further 150 nest boxes and 18 large mesh release cages were put up in preparation for the new arrivals. Members of the Common Dormouse Captive Breeders Group were busy looking after the chosen dormice, which were quarantined prior to the release for six weeks at Paignton Zoo and ZSL to conduct health checks and reduce any threat of disease. Each dormouse was PIT-tagged, to enable identification using a portable reader in the field.

When the big day came, the dormice were placed in pairs or trios into the release cages, with the hope of encouraging breeding. They were provided with food and water in the cages and given time to acclimatise themselves with their home. For many, especially dedicated volunteers from Warwickshire Mammal Group and Dormouse Conservation Warwickshire, this was their first sight of the charismatic small mammal that they had longed to see return to the area. The volunteers took part in a feeding rota for the next 10 days. Each day, the dormice were given water in the cages, the amount of food they had eaten was recorded, and a new portion of dried food and fresh fruit was provided.

Ancient wooded landscapes are being restored and connected

After 10 days, the dormice were checked by a team of licenced and supervised non-licenced staff and volunteers. Boxes from the cages were opened in large plastic bags, and the dormice inside were scanned with a PIT tag reader. Their sex, breeding status, weight and overall condition were then

checked and recorded. The dormice appeared to be in generally good condition. Although some had lost weight since the introduction day, they had been pretty well fed to start with! After being returned to their boxes and cages, a small door was then opened on each cage, enabling the dormice to leave and explore their new woodland surroundings. A remote camera was set up near one of the cages, to see if we could catch a glimpse of any activity.

Volunteers continued to feed the dormice but less frequently, initially every two days and then every three days. With less food disappearing from the cages, it was hoped that the dormice were finding their own natural food source. Some hazelnuts left in the cages appeared to have been unsuccessfully gnawed on. It is thought that the characteristic way that dormice open nuts may be shown to young mice by their mothers, and so there were concerns that the dormice would not know how to eat the nuts, having been captive bred. However, during the feeding schedule, some open nuts with the tell-tale dormouse nibble were found.

In early September, Warwickshire Wildlife Trust staff and a group of volunteers went to check all of the

dormouse boxes erected in the woodland. On approach, the hole to each box was quickly blocked and the lids carefully slid to one side to see if anything was inside. If a dormouse or a nest was visible, the lid was returned and the box removed from the tree and placed inside a large plastic bag. Each corner of the box was then checked for signs of warmth or an entrance hole to the nest. If a dormouse was found, it was placed into a small plastic bag, before being scanned using the PIT tag reader (if adult) and weighed. Dormice were aged (using cues such as colour, tail furriness, size and whether their eyes were open), sexed, and the breeding condition, status and overall condition recorded, before being returned to the box. When very young dormice were found (pink or grey eyes closed), they were weighed together and an average weight was recorded. Dormice were recorded quickly and efficiently so as to minimise any distress, especially when a mother and young were present.

It was hoped that the dormice were finding their own food sources

Li Li Williams

The results of the box check were highly encouraging with 38 live young and 11 adult dormice found. An additional 16 dormouse nests were found in the boxes. Interestingly, despite having being captive bred, many dormice had made nests that appeared to be 'text book', with a clear woven structure mixed with deciduous leaves. Eight litters of dormice were found, ranging in age from new borns, to those with grey fur and closed eyes, those slightly larger with open eyes, and juveniles. Five adult females were found in the boxes along with litters, three of these were lactating and two post-lactating. Two smaller litters comprising six new borns had died in the boxes. The adult dormice appeared to be in good overall condition post-release. They weighed an average of 19g, which was thought to be sufficient given the time year, with time still left to build up fat reserves before hibernation. There certainly did not seem to be a limited food supply, with a plethora of ripe blackberries to be found throughout the woodland.

Monthly box checks by Warwickshire Mammal Group in the future will follow the progress of these dormice and their young. A second reintroduction will also take place in a nearby woodland next year, with the hope of creating viable meta-populations across clusters of suitably managed habitat. Hazel dormice are often found in long-rotation hazel-coppiced woodland, with diverse tree and shrub species that provide varied food throughout the year, and a continuous 3D structure that suits their arboreal lifestyle. Both reintroduction sites have past records of dormice that appeared to go locally extinct and could now comprise more than 150ha of connected dormouse-friendly habitat. With only two natural populations known in the county, and one introduced population, it is hoped that these reintroductions will bring back an expanding population of hazel dormice to central Warwickshire.

A 45-page report of the search for Warwickshire's dormice since 2009 'The status of the Hazel Dormouse (*Muscardinus avellanarius*) in Warwickshire, Coventry & Solihull in 2016' can be obtained from Ruth Moffatt at rmof22@yahoo.co.uk.

Faulty dormouse nest boxes create death traps, Germany

Sven Büchner & Johannes Lang, Institute for Animal Ecology and Nature Education, Germany, tell a tragic tale about faulty nest boxes.

There are different methods available to detect evidence of hazel dormice. One of them is monitoring using wooden nest boxes, either built for birds or specially designed for dormice. Translocating animals out of an area to be developed, into other appropriate habitat is a suitable conservation measure to avoid the loss of hazel dormice. In many cases, nest boxes are used for this purpose too. The animals can easily be trapped in these boxes and they help to facilitate the animals' establishment in the resettlement area since they will have built their nests in the boxes and have somewhere familiar and safe.

Last year, reports about three major transactions in two federal states reached us, concerning dead hazel dormice in nest boxes. Since we have substantial experience using nest boxes for establishing, monitoring and resettling hazel dormouse populations, we were asked to estimate plausible causes of death.

Unfortunately, the cases were not documented sufficiently which makes determining the root cause almost impossible. Yet the descriptions we received in each situation suggest that all the animals died in identical circumstances. The empty nest boxes contained dormice in different states of decay. The animals had no or marginal nest building material in the boxes with them. The inner walls always featured obvious gnaw marks, clearly indicating that the dormice had been unable to leave the box after they first entered it.

There is one plausible explanation: All the nest boxes were, contrary to the common design, built from flat-planed shelves. To the best of our knowledge, only the bottom and the lower parts of the side panels were gnawed– up to a level that the dormice were able to reach from the bottom of the box. This indicates that the planed shelves were too unruffled for the dormice to climb back the walls to the exit hole. To prove that this is what had happened, we simulated the situation with four hazel dormice (two male and female each) using a nest box of the same design. Only the biggest male succeeded in reaching the height of the entrance hole by clambering up the side. The remaining three animals failed and slid down the smooth inner wall.

Luckily we've been able to identify one producer of these boxes to point out the construction fault. The boxes that they have already produced will now be roughened on the inside so that any animal using it will be able to climb easily up the sides.

A season of monitoring dormice in nest tubes

Michelle Tyrrell reports on research she carried out at Norsey Woods in Essex dring 2016, looking at how hazel dormice used nest tubes and the types of nests they built.

Nest tubes are one of the easiest and most common tools we can use to determine if hazel dormice are present in an area. Paul Chanin and Michael Woods calculated the level of survey effort needed to find dormice in any given month or season, based on a study they carried out in south-west England. In 2016 the Essex and Suffolk Dormouse Group replicated this study across 20 sites to investigate nesting patterns in the East of England. Michelle Turrell and Kate Mann put up nest tubes in Norsey Wood SSSI/LNR in South Essex. Nest tubes were installed at 15-20m intervals and photographs were taken monthly of all nests that were found.

The results were valuable in revealing dormouse nesting activities throughout a season. Surveys early in the year are considered to be unreliable so it is recommended that surveys are undertaken regularly, monthly if possible. If there are small populations of dormice in an area it is possible that their presence might only be detected late in the year. Therefore, it recommended that surveys are carried out throughout the full active season to be as certain as possible whether dormice are present or not.

During the active season, dormice build grapefruit sized nests with an entrance hole on one side, either in dense vegetation, tree crevices, nest tubes or nest boxes. Individual animals are known to have multiple nests at any one time. The nests built by dormice can vary quite substantially. They can be classified into different types. Mixed nests consist of woven leaves of trees or shrubs, interspersed with grasses. Layered nests have two distinct layers: an outer layer of tree or shrub leaves, and a woven inner layer of finer, softer materials. Grassy nests consist of a dense sphere of dry leaves of grasses and are more prevalent in coniferous woodlands. Foliar nests are plaited from dry or fresh tree or shrub leaves, with some supplementary grasses.

Fifty nest tubes were installed in March 2016 in a copse of Norsey Wood. The 70ha woodland is an NDMP site which contains 100 nest boxes. The tubes were installed at 15-20m intervals on suitable horizontal vegetation. The copse was chosen as suitable habitat because it has a good three-dimensional habitat structure, comprising hornbeam, bramble and honeysuckle. The tubes were checked each month from April to December and photographs taken of any nests present.

Between April to December 2016 a total of 19 nests were recorded in the 50 tubes. Of these, nine were selected from eight tubes for displaying interesting insights into dormouse behaviour and nesting activity.

A layered maternity nest was recorded in tube 9 in September. It contained three young pink dormice, less than a week old and their mother. The female initially escaped but was soon captured and successfully returned to the tube. Dormice were not recorded in the tube for the rest of the year so it is highly likely that she moved her young to a nest nearby. There were no changes to the nest in October but it had been maintained in November and remained in the same state in December.

An unstructured nest comprising mainly dry leaves and a little shredded material was recorded in October in tube 10. Inside was an 11g juvenile dormouse. Surprisingly in November the nesting material had been entirely removed.

A nest with a distinctive inner and outer layer was recorded in tube 11 in August, inside which was a 17g female dormouse. The nest was maintained and still in good condition by September but had been

Tube 10, October. Dry leaves, shredded material and a juvenile dormouse.

A 17g female dormouse was found in a distinctively layered and woven nest in tube 11, in August.

The same nest in tube 11 was still being used a month later. It had been well maintained and kept its shape.

Tube 11 still contained a dry nest in October and a 19g female dormouse was found in the nest.

By November the nest in tube 11 was still present and had been enlarged. The impression of a small mammal was visible.

This nest was still being used by a male dormouse in November, although the nest was becoming wetter,

damaged by October, though a 19g female dormouse was using it. By November the nest had been enlarged and had a small mammal impression in it. This was no longer visible by December when the nest had less structure/material.

Inside tube 12 was a layered nest comprising dry leaves with a woven chamber in November. However, the tube was particularly wet by December and interestingly lacked most leaves. The beginnings of a woven nest with fresh leaves was recorded in October in tube 21. The nest was being used by an 11g juvenile male dormouse. By November, the nest was completed and being used by a 21.5g male dormouse. In December the nest contained more fresh leaves but was particularly wet.

The start of a nest was recorded in tube 22 in June, comprising fresh, dry leaves. By July a woven nest had replaced the previous materials. In August the nest had become unstructured. However, a lactating female 17g dormouse was recorded with five grey babies (6 - 20 days old) in September. In October a 20g female and 11g male dormouse were recorded in the slightly more maintained nest, which remained in a similar state but empty in November and December.

A potential nest was recorded in September in tube 26, comprising both fresh, dry leaves. However, in October the tube was empty.

A male and female dormouse were recorded in torpor in May lying on an unstructured nest of dry leaves and fresh grasses in tube 38. The nest would not be considered to be a dormouse nest if found with no animals present. The sodden remains of the nesting material were still there in June. But by November a new nest of dry leaves has been constructed and the nest contained a 20g male dormouse. In December the nest had been reduced to a cluster of leaves, lacking structure.

In total five of the nests were layered, one created from foliage and three classified as unknown because they were incomplete. The majority of nests were layered, mainly with dry leaves. Current best practice guidance describes dormouse nests as being commonly made with fresh, green leaves taken directly from the trees. But this was not the case for a large number of nests recorded. Furthermore, the nest in tube 38 in May was atypical for dormice. Dormouse presence would not have been confirmed if the dormice themselves had not been present. No other nests or dormice were

This same nest in tube 21 had more fresh leaves in December but was incredibly wet.

The beginnings of a nest were found in June, with fresh, dry leaves.

The same tube, 22, contained a fully woven nest by July with dry leaves on the outer layer.

recorded in April or May, suggesting surveys early in the active season can be unreliable in determining presence or absence based on field signs alone.

Three potential nests that were predominantly made of leaves were removed from the nest tubes after one month. The dormouse recorded in tube 10 was found with this type of unstructured nesting material. Both potential nests in tubes 10 and 26 were removed in September, and no further nests or small mammals were recorded in them for the rest of the year. However, the potential nest in tube 22 was replaced with a structured woven nest in July which became a dormouse maternity nest. It is unlikely that human interference is the cause of these disappearing nests as the tubes were well camouflaged by dense vegetation when removed. Therefore, it is more likely that either dormice or other small mammals, such as wood mice or yellow-necked mice, both recorded at the site, recycled the materials. Dormice are known to have multiple nests but other small mammal species are also known to have unstructured, leaf-dominant nests. Therefore, it is unclear which species would recycle or remove the vegetation. However, it does prove significant when surveying for dormice. Thus, it is recommended that tubes are surveyed regularly to increase chances of recording dormouse field signs, in accordance with guidance from Natural England.

A large proportion of nests were built between September to November, and many were actively maintained during this period. This is unsurprising when comparing nesting activity to records of dormouse populations in south-east England, which are highest later in the year. However, discovering new nest building in November was surprising, and challenges best practice guidance for the timing of habitat management. Ultimately this indicates that tube surveys could falsely conclude an absence of dormice if surveying isn't carried out later in the year. Therefore, it recommended that surveys are undertaken throughout the full active season.

Four tubes contained nests for long periods: three to six months, requiring periodic maintenance. The longest inhabited nest became a maternity nest and as the young grew the nest became unwoven due to the limited space in the tube. Other nests were also found damaged or unwoven by the end of the active season which could impact the certainty of dormouse field signs later in the year, if not surveyed regularly (depending upon the individuals experience). Therefore, regular surveys are recommended both commercially or voluntarily to increase the probability of recording dormice more accurately.

Caroline McDonald

Tube 22 was still being used by September. This time a 17g mother and her litter of five young were present.

By October, tube 22 was still being used but now by a 20g female and an 11g male.

The nest remained in tube 22 in November and December but no animals were present on either check.

In May two animals, a male and female, were found in torpor in a very unstructured nest.

The following month, June, this was all that remained of the leaves that the torpid animals had been found in during May.

However by November a fresh dry nest was found in tube 38, containing a 20g male.