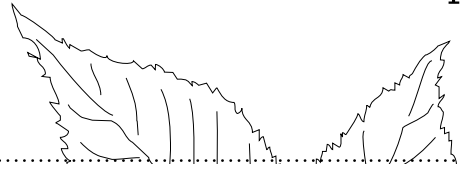


The Dormouse Monitor

WINTER 2015

people's
trust for
endangered
species



Black hazel dormice?

Initially discovered in Germany in the 1970s, Gerhard Augustin describes his long hunt for more black dormice, resulting in success this year.



Building bridges PTES Dormouse Officer, Ian White, has co-ordinated a dedicated team to build and test a dormouse bridge in Briddlesford Woods,.



Reproduction biology Goedele Verbeylen describes her long-term studies on hazel dormouse reproduction biology and what it can tell us..

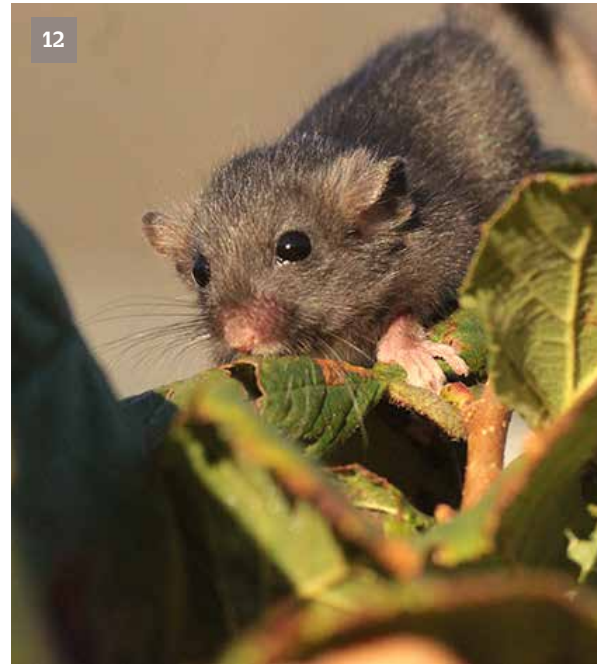
Do dormice eat insects? Paul Chanin and his team detail their study looking into what species of insect dormice are feeding on, at different times of the year.



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In this issue



Welcome



As we put together this edition of The Dormouse Monitor the winter is still so mild we have barely seen a frost, let alone any snow. How will this impact on our hibernating species - hazel dormice included? Is there sufficient food in the wider countryside to sustain these creatures? And will it get cold enough for a prolonged period of hibernation to occur - such

that they don't have to wake up and use up their valuable fat reserves? Let's hope so. Ian White, the PTES Dormouse Officer, takes a closer look at torpor and hibernation and how our milder climate might impact on this fragile species on the edge of its range.

We do hope you enjoy this edition. Clara Pietro has kindly allowed us to reproduce her wonderful infographics. And thank you kindly to all our other contributors - there is so much to keep you entertained and intrigued over the winter months.

Nida Al-Fulaij & Susan Sharafi

Nida Al-Fulaij Sharafi

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Building a bridge at Briddlesford Woods

Creating a dormouse bridge is one challenge; seeing whether dormice will readily use it is another. PTES Dormouse Officer, Ian White, has brought together a skilled team to determine whether hazel dormice will use this arboreal structure.

As we know, the fragmentation of our countryside can have a detrimental effect on many of our species. Roads and railways can carve up previously linked tracts of habitat, effectively stopping species being able to move as freely and safely as they did previously.

Across Europe and in Japan, wildlife mitigation measures have been tested and trialled with great success. Inspired by a bridge created in Japan by Shusaku Minato, Ian White has devised a structure to trial at the PTES nature reserve on the Isle of Wight. Created and built by a dedicated team, the bridge received its first airing on

Roads and railways can carve up previously linked tracts of habitat

Autumnwatch this year. Chuck Eccleston built the bridge in his garden, then with the help of Tony Ridd and his team, they erected the structure over the railway bridge that crosses the railway line which dissects the wood. The idea is to test the design, and also to monitor what crosses the bridge - compared to what crosses the railway line underneath. In spring 2016 the bridge will be put in place and newt netting will be put up along the railway line, with gaps everyso often. Camera traps will monitor activity in the canopy and on the ground to see which is preferred not just by hazel dormice but also by other arboreal species such as red squirrels.

As a country we spend millions on roads and railways to make our journeys faster. But Ian asks, "What value are you able to put on a structure that could reduce roadkill and enhance the genetic diversity of a range of species to enable populations to better survive in the future? They don't need to be expensive and we may be able to adapt existing structures."



This bridge is only a prototype. However, "if it is shown to work the aim will be to produce a commercial design that could be used to link areas where dormice are known to exist."

It's early days but there are encouraging signs as a dormouse and red squirrel have been caught on camera using the bridge.





A look at the reproductive biology of dormice

Goedele Verbeylen, of Natuurpunt Study, Flemish Mammal Working Group, in Belgium, has been studying hazel dormice to learn more about the life history of the species.

During our intensive capture-mark-recapture study over the last few years we have learnt a lot about determining the reproductive status of hazel dormice. In particular we have learnt that it is at all straight forward. Since we usually record the reproductive status during live-trapping and much less frequently during nest box and nest tube checks, we don't often find females together with their young, which would be the easiest way to determine when they gave birth. So we have to use a combination of weight and nipple size to work out the most likely time of birth.

We mark all the animals that we find so we are able to track individuals across the seasons. When females show a clear increase in weight, it is easy to work out when they

Adult females that are pregnant usually weigh well over 20g

are about to give birth. Adult females that are pregnant usually weigh well over 20g and about 25-30g right before giving birth. But, for example, when they have only one young, there may be almost no weight gain at all. When a female is not caught during one of the fortnightly trapping sessions, the weight increase may be missed. Some females stay quite heavy (e.g. 24 g) after giving birth, which also may lead to the wrong conclusions about the birth date. Also information about an individual's age is important in interpreting the weight data. For example on July 27 we caught a female with a bulky belly, clearly pregnant. She weighed only 19g, which is a normal weight for a non-pregnant adult. But this animal was a sub-adult, which we could tell by the relatively grey fur and thin tail (and the fact that she was unmarked, unlike all adults present), which also explains the very low weight while being pregnant.

Besides weighing the females, we also look at the nipples to determine reproductive status. During hibernation the nipples are retracted, and after waking up and getting pregnant, the nipples start to enlarge. When the first litter of the year is born, the nipples usually seem to remain very small (1 mm or less). They also may stay small the first few days after giving birth, which in the past sometimes made us wrongly think that the female didn't have young yet or anymore. After that, the nipples usually clearly enlarge to 2(-3) mm, and may stay quite large for weeks after the young have been weaned. If there are subsequent litters born in this period, it is often difficult to tell how many there are. Females may give birth immediately after the first litter is weaned (even when the female still has young of about one month old), or may lose a litter in between two other litters, and the nipples may stay enlarged throughout the whole period until weeks after the last litter is weaned. Without a clear weight increase it is often difficult to interpret the data during this period. Very useful additional information is whether some/all of the mammary glands are clearly enlarged (milk present) and whether the fur is flattened around some/all of the nipples (evidence of suckling young present) or not. With very small young, this "flattening of the fur" may only mean a very small space of 1mm around the nipples. Enlarged nipples but with no surrounding space (so completely hidden in the fur) usually means that the young have been weaned or lost, but may also sometimes occur when a female has been away (e.g. in a trap) from her young for quite a while.

Determining the males' reproductive status is not always clear-cut either. Sometimes the testes can be felt but are not descended in the scrotum, so are still abdominal. And sometimes it looks like the testes are descended because the scrotum is enlarged and darker but no testes can be felt, so they have returned to being abdominal after having been scrotal not too



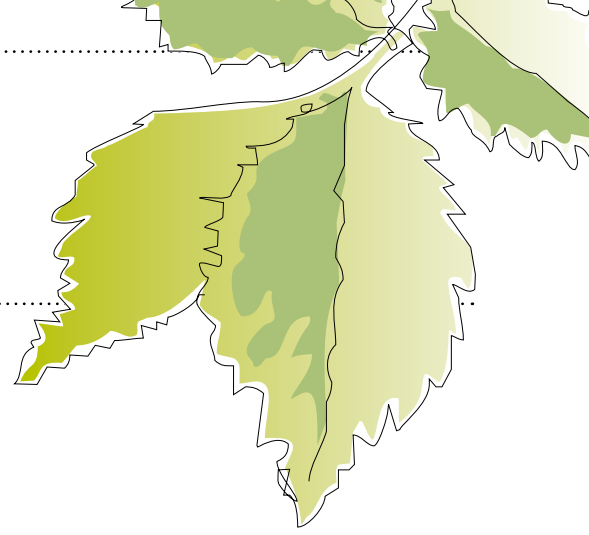
Catherine Hadler



long before. So from our experience, the best way to score male reproductive status is not only to look but also to feel for the presence of testes descended in the scrotum. Besides that, torpid male hazel dormice almost always have abdominal testes, even when they have scrotal testes when we find them awake a few hours or a day later or earlier. So torpid males seem to retract their testes, which is why we exclude them from analyses on reproductive status.

This has been our experience with determining hazel dormouse reproductive status up till now. If anyone has other experiences, we would like to hear about these, since more information will lead to a more reliable interpretation of the data.

Goedele Verbeylen (goedele.verbeylen@natuurpunt.be)



Dormouse bags & calendars for sale

What better gift for a dormouse enthusiast than a gorgeous canvas hazel dormouse bag or a 2016 calendar with 12 different, beautiful images of dormice? PTES is selling canvas bags with dormouse, hedgehog and water vole illustrations. Made from the best quality laminated



To order a copy of the 2016 dormouse calendar please email niatu@gmx.de. The calendar is A3 (29.7x42cm) printed on high quality paper. The price is 19,99€ + 4€ for international postage.



canvas, they measure 38 x 40cm. The bags are printed with water based inks and production is to a standard approved by 'Bags of Ethics'. Each bag costs £9 or buy one of each design for £21. To order please <http://ptes.org/product-category/christmas-gifts>.



Kerstin Hinze

Bilche

2016

Insects in the diet of dormice - how important are they?

Paul Chanin, a Devonshire ecologist, and his colleagues explain how they investigated whether or not it is possible to determine if dormice are eating insects, and if so - which ones and at what time of year?

Hazel dormice are named, here in the UK, for their close association with hazelnuts. The notoriously sleepy species is well known for feeding on the autumn glut of nuts and berries in order to put on enough fat to survive their long winter hibernation. And it is also known that hazel dormice lack a caecum. Most mammalian herbivores have a relatively large caecum, which enables them to breakdown and digest various plant materials – including cellulose. Since hazel dormice don't have this function they are more specialist feeders and rely on a variety of foods, throughout the spring, summer and autumn.

It has previously been debated whether or not dormice are completely vegetarian or whether in fact they are omnivorous. Several studies have confirmed the presence of insect remains – either in their faeces or in their stomachs. But could the presence of insect DNA give us more conclusive results? A similar study on bats, part-funded by PTES, was pioneered by Matt Zeale at the University of Bristol. He discovered that it was possible to use DNA barcoding to assess

the range and diversity of prey being taken by bats.

An interesting study has recently been published by a team looking into the possibility of whether insect DNA can be found and identified in hazel dormouse faeces in a similar way. Paul Chanin, an ecologist based in Devon and the president

It had previously been debated whether or not dormice are vegetarian

of The Mammal Society, worked with a team of experts in this study. Faecal samples were collected from seven different sites in southern England with the help of NDMP volunteers. The sites were in Cornwall, Devon, Somerset, Bristol and Buckinghamshire. All the samples were collected directly from live animals during handling, so there was no risk of the samples coming from another species, and the origin and date were precisely known.

Twenty six samples were collected in total, from every month between April and December.

All the samples were sent to The Waterford Institute of Technology for analysis and, of those, insect mitochondrial DNA (mtDNA) was recovered from half the samples. The faecal samples contained remains from between one and three insect species. Four species of Lepidoptera were identified and one sample included DNA from a species of Cecidomyiid fly. Nine of the samples contained Operophtera brumata - winter moth. Eupsilia transversa, commonly known as satellite moth, was the second most frequent species found, with it occurring in five samples. There was also one instance each of Blastobasis adustella and Panolis flammea, the pine beauty moth. All the 13 samples collected between April and July inclusive contained insect DNA but interestingly none was recovered from the 13 samples collected between August and December. These negative results were confirmed by a second attempt at extraction.

The team looked closely at the various life cycles of the insects identified and determined at what life stages they would be available as food for dormice. For example winter and satellite moths emerge as flying adults over winter whilst dormice are hibernating so they must have been taken and eaten by the dormice whilst they were in their larval or pupal stages. Since they were only recorded in dormouse faeces in the spring and summer months, and never later than July, then it's likely that the dormice must have been preying on the larvae. Other Lepidoptera species could have been taken as adults. On these grounds it is plausible to suggest that larval Lepidoptera are a significant source of food for dormice during the first half of the summer, at a time when high quality plant products consist mainly of nectar and pollen with few fruits or seeds available. Cecidomyiids are characteristically small





(0.5-3mm, rarely up to 8mm) and it is probable that dormice consume them when feeding on the galls that many species create.

It is interesting to compare the findings to previous studies carried out by Richards et al and by Morris. Richards also found lepidopteran larval remains in June and July samples, but he also identified adult remains in all months between May and October. Pat Morris also found insect fragments in dormouse faeces, mostly in August but also in May, June and July.

The team have successfully demonstrated that bar-coding insect mtDNA has a practical use in studying the diet of hazel dormice, and that in the areas from which they collected samples the dominant prey items were Lepidoptera, mainly at the larval stage. As yet the method is not precise enough to prevent species which do not occur in an area from being identified but such errors do not invalidate the procedure. DNA databases are still incomplete but more and more sequences are becoming available all the time. The collection of samples was difficult because dormice often don't provide faecal samples when they are being handled! Richards used a different method: he placed trays of food within known dormouse habitat and then collected the samples left every week. Using this method he managed to acquire 20-30 samples each month for most of the year. Ensuring that only dormouse faeces are analysed can be controlled by using molecular methods.

The standard sequencing technology used in this study was labour intensive and analysis costs £10 per sample. However, the next generation sequencing techniques now available, detailed by Pompanon et,



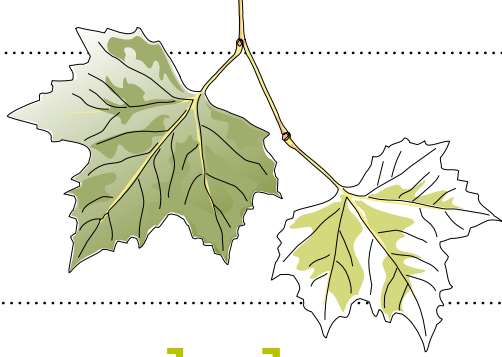
Hugh Clark

would provide a cost effective method for a large-scale study.

A further problem is that there is no simple molecular method for determining the number of prey items present in a dormouse faecal pellet. However, by combining it with conventional faecal analysis as practiced by Richards it may be possible to count the number of larvae present using hard parts. Richards could identify spiracles and crochets (gripping hooks on the prolegs) from larval Lepidoptera and it may be possible to devise appropriate multipliers based on

their density in scats, possibly informed by feeding experiments.

Thank you to the authors for allowing this study to be reproduced here in The Dormouse Monitor. For a full copy of the paper please visit http://mammalcommunications.com/wp-content/uploads/2015/04/28109-TMS-Scientific-Papers-Insects-in-the-diet-of-dormice_V4_seperate-pages.pdf



Hazel dormouse infographic

Clara Prieto has kindly allowed us to reproduce her amazing infographic of the hazel dormouse here.

Getting ready to hibernate

Hibernation begins when the nights become cool in the autumn. In reaction to this, the body temperature of the dormouse drops to approach that of its surroundings, and its **heart and breathing rate often drop by 90% or more**.

The beginning of hibernation

Fat reserves gathered in the summer and autumn. Dormice **have to be 15g - 18g to enter and survive hibernation**.



Avg: 20g



Example: Nuts and berries

Autumn

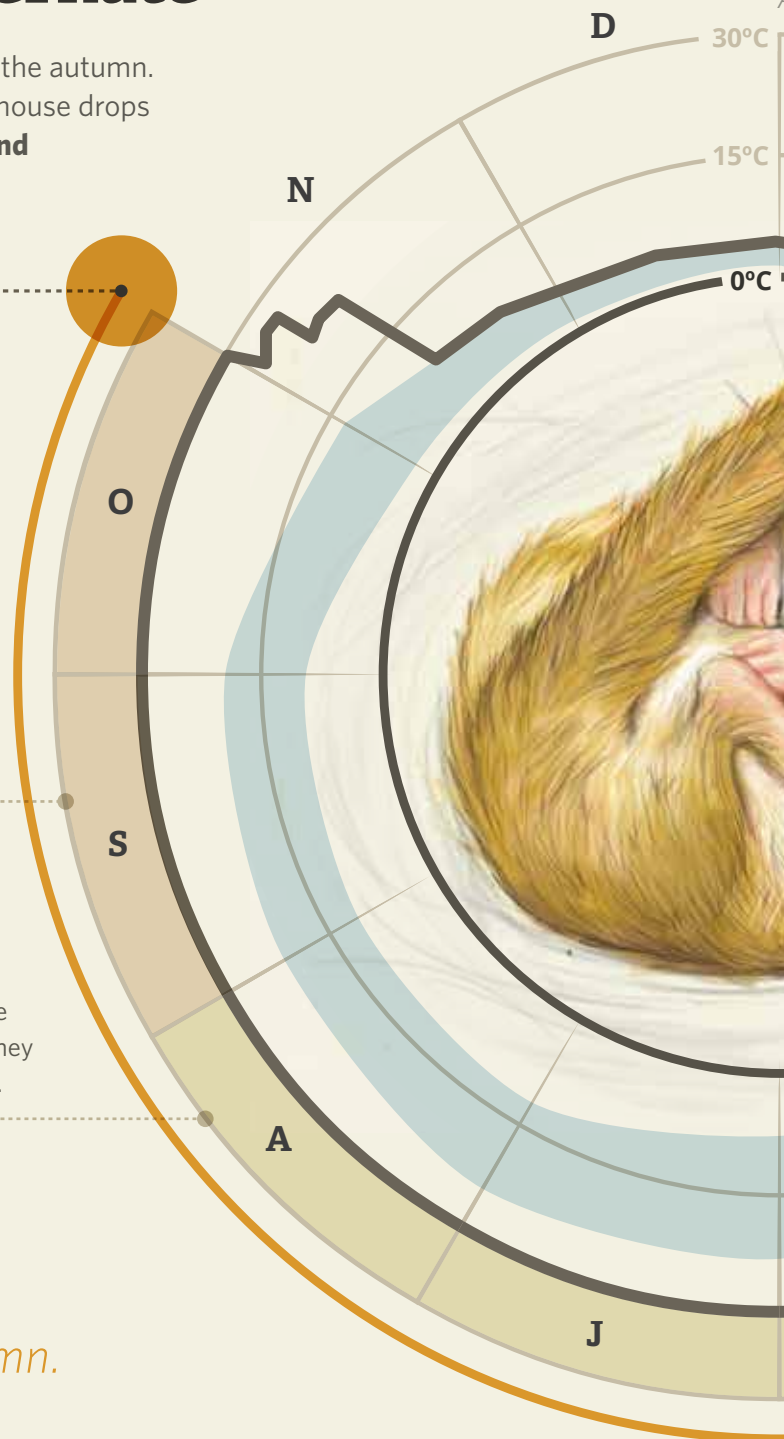
They eat fruit and seeds: Hazelnuts, blackberries, sloes, sweet chesnuts, elderberries, rose hipes, willow seeds, wayfaring tree, yew berries.



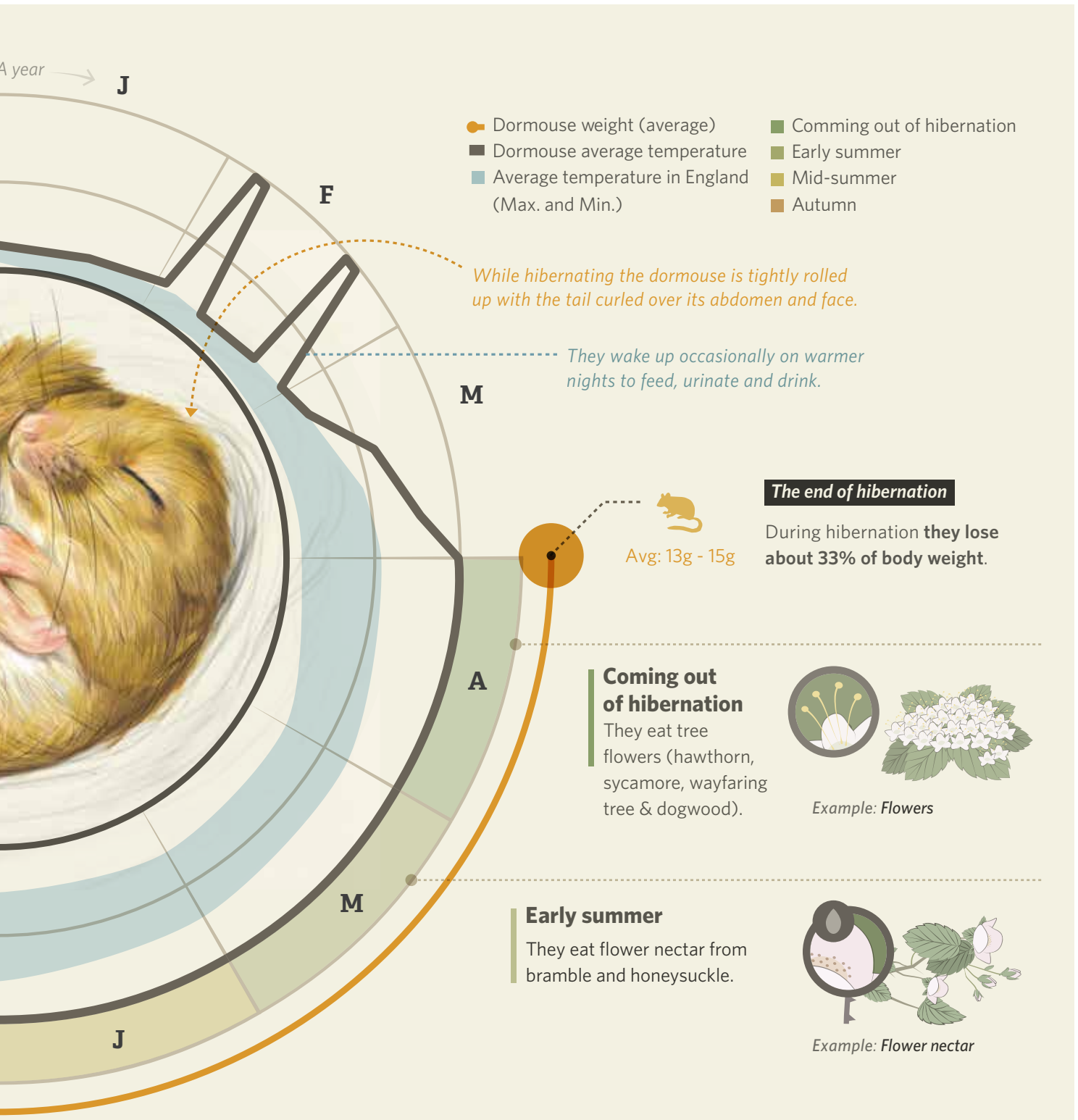
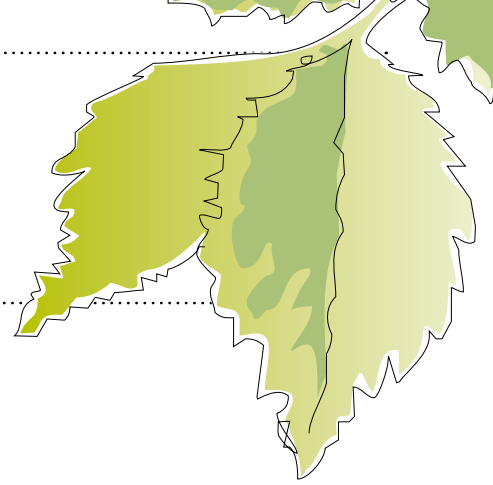
Example: Insects

Mid-summer

There're no flowers and the berries aren't ripe yet, so they eat aphids and caterpillars.



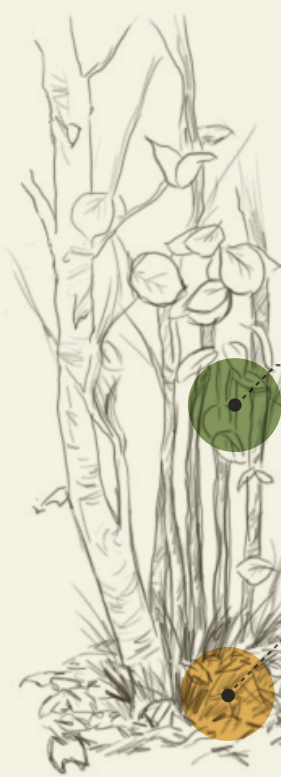
Hazel dormice diet varies with the availability of different foods from early spring until late autumn.





Dormouse nests

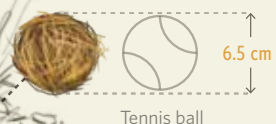
Dormice are mainly nocturnal and spend most of the time in the branches. In spring and summer, dormice weave their nest up in the branches where there's food available. Later in winter **they descend to the ground to hibernate**. The temperature here is low and fairly constant. Also, the air is always moist, reducing water loss and it prevents dormice from becoming dehydrated.



Summer nest

Shredded honeysuckle bark or other fibrous material is made into a ball, about the size of a grapefruit and can be found in bramble bushes.

■ Awake time



Winter nest

A tight woven fibrous nest, about the size of a tennis ball. They make them on the surface of the ground or in a small depression.

■ Hibernation time

TIME SLEEPING

The dormouse spends **40% of its year in hibernation**.

Main nest materials:
A few leaves are built into a loose outer layer.



Clara Prieto

Something that has always captured my imagination is nature and wildlife. Due to this I'm studying a course on Mammal Ecology and Conservation by the University of Exeter, which combined with my BA (Hons) in Graphic Design and Illustration, have led me to work in this specific area. In my spare time, I collaborate with the Oxon and Berkshire Mammal Groups creating educative infographics about British mammals. Working as a volunteer, I've been out in the field learning first-hand about the animals that we're sharing knowledge about. Luckily I've had the pleasure of working on projects for organisations such as UNFCCC, The World Economic Forum and The Wildlife Trusts.

My proudest moments and achievements include various Malofiej and ÑH awards which are given by the Society News for Design (SNDE), and the Grand Laus. My illustration on how harvest mice build their nests was one of the 40 works selected by Il·lustraciència 2015 jury. Il·lustraciència, International Award on Scientific Illustration, sponsored by the Spanish Ministry of Economy and Competitiveness and the Spanish Foundation for Science and Technology (FECYT).

www.claraprieto.com/hazel_dormouse.jpg



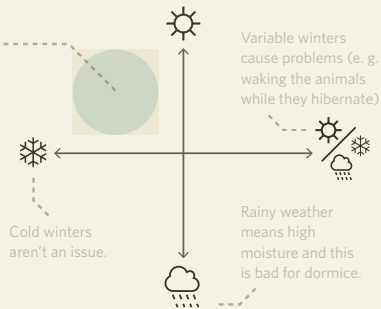
Clara Prieto - Information Graphics Editor and Scientific Illustrator.



WEATHER

Dormice live in areas where there's more sunlight. Sunshine opens flowers and helps insects to grow (both essential foods).

- Sunny & warm summer
- Cold winter
- Excessive rain
- Variable winter



OTHER MAMMALS

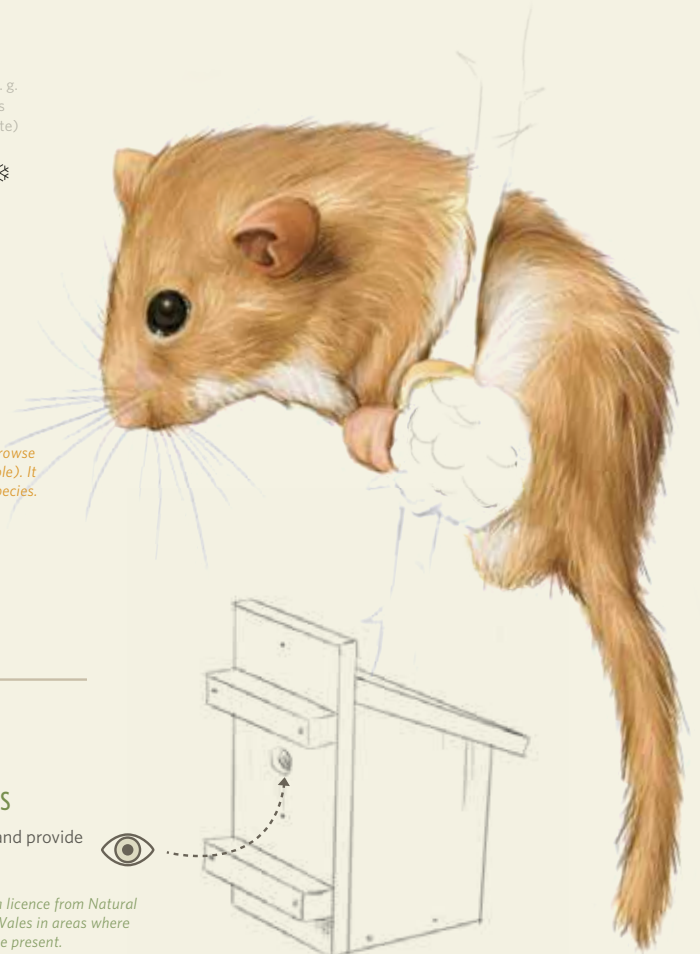
Grey squirrels

Grey squirrels are more abundant than red squirrels and they eat a similar diet to hazel dormice. As they're bigger than dormice, they need to take larger quantities of food.



Deers & rabbits

Roe, muntjac and fallow are all increasing in numbers and distribution. Deer and rabbits browse and reduce understorey (e.g. hazel and bramble). It tends to reduce the regeneration of all tree species.



Things to do

REINTRODUCTION

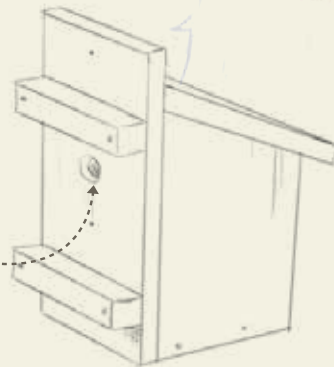
There is a desire to reinforce populations in areas where dormouse sites are few and widely scattered as a result of habitat fragmentation.

The first re-introduction took place in 1993 and since then 18 re-introductions have taken place throughout England.

PROVIDE NEST BOXES

They're good for dormice and provide information to ecologists.

Inspecting nest boxes requires a licence from Natural England or Natural Resources Wales in areas where dormice are already known to be present.



HABITAT MANAGEMENT

Conditions for dormice may therefore be improved by appropriate planting, coppicing, thinning or felling.

More info: greenboot.co.uk

Main objectives in a woodland managed for dormice and other wildlife:

- Create log piles and mini clearings in PAWS conifers.
- Small scale selective fellings every four years (max. 10%).
- Control invasive species.
- Retain some old fruiting hazel.
- Create and maintain glades and wide rides.
- Protect coppice stools from deer and rabbit browsing.
- Maintain arboreal connectivity throughout the wood.
- Create linked coppice blocks.
- Manage mature standard trees and allow some young trees to develop.
- Retain bramble.
- Bring derelict coppice back into rotation.
- Retain climbing plants, veteran trees and dead wood.

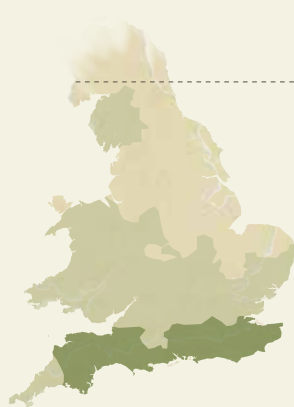
Vulnerability

Dormice are very vulnerable to habitat quality, weather, population size and dispersal corridors. And these are the main factors which mean dormice are on the brink of extinction.

DORMOUSE DISTRIBUTION

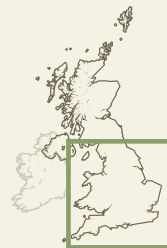
- Widespread populations
- Scattered populations

Map: PTES Dormouse Research

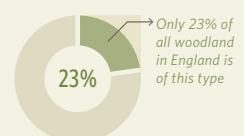


HABITAT

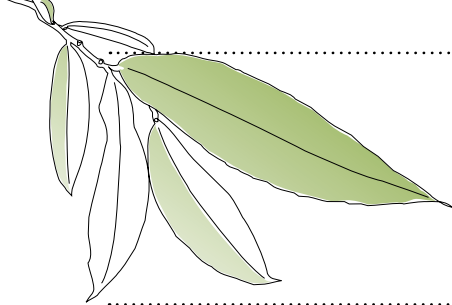
The best habitat for dormice is semi-natural woodland. **This habitat now occupies only 2-3% of the land in England and Wales.**



32,000 ha of ancient semi-natural woodland have been lost from these counties since 1930.



The rest are plantations and various other woodland types that usually offer less optimal habitat for dormice.



Black dormice in Germany

First discovered in the 1970s, rediscovered today, Sigrid & Gerhard Augustin and Björn Schulz (Stiftung Naturschutz Schleswig-Holstein) document the occurrence of black dormice in Germany.

The first ever evidence of black dormice was found in 1972, when Enno Bünning discovered five individuals, living in a small, but dark spruce forest situated in a hedgerow-rich, forest poor northern German lowland landscape. In April 1972 one black adult was discovered in a concrete nest box. Later that year in June, two adults, both black, were found in the same nest box as previously, and two more adults, both black, were found in another nest box just 50m away.

When Sigrid and Gerhard Augustin heard of this event a decade later, they were already involved in captive-breeding dormice and very keen to map all known and unknown dormouse locations.

The first evidence of black dormice was found in 1972

Unfortunately the location of the black dormice was kept secret by Lütke & Krumbeck, so further searches for more black dormice were in vain. But the Augustins didn't give up. If we look at the species database for the federal state of Schleswig-Holstein, the Augustins alone detected 406 nests in different locations, which represent 33 % of all historic and recent dormouse evidence in the state! However none of those nests contained a black dormouse. So the original find was believed to be a chance occurrence, a freak of nature.

But on 17 September 2015 their luck finally changed: Approximately 10km from the site of the 1970s discovery, they found a free hanging nest, situated in a hop shrub, at a height of 1.5m. And inside the nest there

was a mother (golden-coloured) with four juveniles (approximately four weeks old), two of them the colour of normal hazel dormice, but the other two were black with a white throat.

These animals will be kept in captivity for a while, to find out more about them. And of course they will try to find out more about the distribution and the proportion of black animals in this "unique" population.

If you also have come across any colour aberrations in hazel dormice, Sven Büchner would be glad if you could send pictures to him with a short description of the circumstances of your finding: muscardinus@gmx.net. And don't forget to investigate dormouse skins in your local museum!





Gerhard Augustin and Björn Schulz



TOP: A litter of four young were found with a golden-furred mother. Two young were golden like their mother, the other two were black-furred with white throats.

ABOVE RIGHT: The young dormice are being kept in captivity in order to study them further.

ABOVE LEFT: Gerhard Augustin with the litter of dormice he'd been searching so long for.

RIGHT: The litter of dormice were found in a free-hanging nest in a hop shrub (marked by the red circle.)

LEFT: One of the dark-furred hazel dormice.





How do pheasants impact on dormice during hibernation?

Olivia Barnes undertook a study at The University of the West of England, looking at the potential predation rates on hazel dormice, by pheasants.

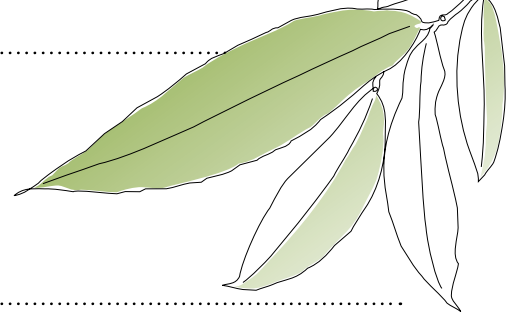
Across the British countryside, game shooting remains a thriving industry. Over 300 game farms exist, over 80% of which rely on hand-reared game. It is estimated that some 35 millions pheasants are released annually into approximately 14% of British woodlands during the autumn and winter and have the potential to impact on native species, such a hazel dormice, which often hibernate in seemingly risky places. Hazel dormice begin hibernating as temperatures start to drop during autumn and when sufficient fat reserves have been accumulated. They are usually solitary during hibernation, which takes place on the ground, as this is where temperature and moisture levels remain the most stable. Slightly damp hibernation sites are preferable as this reduces levels of moisture lost,

preventing desiccation. During hibernation the body temperature of dormice remains close to ground temperature, although when below -3°C , core body temperature remains slightly higher. During the hibernation period small, tightly woven spherical nests are constructed for protection out of concentric layers of grasses and dry leaves. Some nests also have an internal core of interlaced, dry grasses. Most nests are approximately 10cm in diameter, with walls reaching a thickness of approximately 2cm. The most frequent positioning is on or just below the surface of the ground, underneath dead wood, moss or loose-leaf litter. At ground level and particularly in more open areas with less cover, they are exposed and vulnerable to flooding, trampling by domestic animals and predation. It is

not known exactly how effective the presence of a nest is in preventing predation during hibernation. Different predators are likely to have different levels of ability in finding them. Studies have also shown that predation is more likely during snowless winters, an increasingly frequent occurrence in parts of Britain, particularly in the south where dormice are more prevalent.

Olivia Barnes carried out a study at The University of the West of England to determine to what extent pheasants are likely to predate dormice. Imitation dormice were used to identify predator types over a four-month period. Half of the samples were also placed in a nest to see whether nests gave some protection to the species. Hibernating dormice are at risk from a range of predators including badgers, red foxes and wild boar. Pheasants are omnivores





and, although not active predators, will occasionally and opportunistically prey on small vertebrates such as reptiles, amphibians, small mammals and young birds. This causes concern that pheasants may pose a threat to hibernating *M. avellanarius* by increasing the predation rate in areas where pheasant management creates unnatural densities of pheasants. The purpose of this study was to investigate the possible impacts of pheasant management to *M. avellanarius* in ancient semi-natural woodland. The study aimed to identify and assess the main predator type of hibernating *M. avellanarius* during the winter, within an area of ancient semi-natural woodland used for pheasant management, in order to specifically determine whether pheasants can increase the predation rate.

The study took place in an ancient semi-natural woodland almost 350 acres in size, in the Mendips. Although the woodland has an abundant supply of

TOP: Samples showing rodent predation.

BOTTOM: Samples showing pheasant predation.



The majority of predation occurred when there was no nest

hazel, which is on a long coppice rotation, there are no recent records of dormice. Imitation hibernating *M. avellanarius*, each weighing approximately 100g were made from non-toxic and brown coloured plasticine rolled into balls. The use of plasticine is an established technique used for identifying predator type that has previously been used to investigate the predation of birds' nests, allowing the recording of predator type through the identification of teeth or beak imprints. Half of the samples were placed within nests made from locally occurring natural materials and were no thicker than 2cm. 60 samples were set out on transects of 10, with increased distance from pheasant rearing pens.

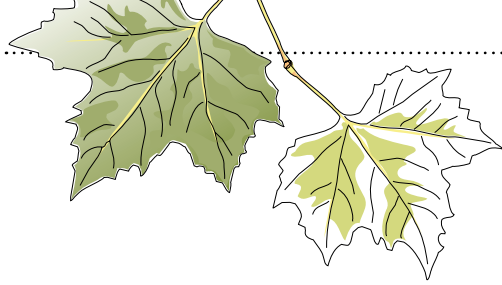
The samples were checked five times, ever two weeks, between November 2014 and January 2015. 70% of the samples showed no signs of predation. Of the rest it was found that pheasants were the most common cause of predation, with 15% of the

samples indicating this and that pheasant predation increased when close to the release pen, being most frequent between 20-75m away. The presence of a nest was found to be frequently effective in preventing pheasant predation, but not in preventing other predator types. A clear majority of pheasant predation occurred when there was not a nest present, with 25% of samples that had signs of predation showing this. Of the remainder, rodents had predated 8% and only 1% by other predators – the rest of the samples were lost, presumed removed by unidentified animals.

It should be taken into consideration that the use of plasticine may have affected predation rates by producing olfactory cues. Recent studies that have used plasticine eggs to identify the predators of birds' nests, reported that the unnatural odour of plasticine may attract predators, therefore inflating the predation rate. It is currently unknown whether the natural odor of *M. avellanarius* may also attract predators; therefore this is in need of further investigation.

Due to a multitude of variables, the inherent complexity of trophic interactions and a lack of previous published literature on this topic, it

meant that this study's findings were difficult to analyse. Therefore explanations for the results obtained must remain as suggestions that require further investigation. Despite the difficulties in analysis, it was highlighted that pheasant management including the mass annual release of pheasants, has the potential to create a wide range of ecological imbalances in woodland ecosystems, such as changes in intricately balanced trophic interactions and predation levels, that are likely to have impacts on a variety of trophic levels. This suggests that there is likely to be direct and indirect implications for *M. avellanarius* populations occurring in the same areas, including an increased risk of direct pheasant predation within close proximities to release pens. This study demonstrated that the impacts of pheasant management to native wildlife is a highly complicated topic that requires further extensive investigation in order to be fully understood, whilst further highlighting that implications to rare and vulnerable species such as *M. avellanarius* should be considered as urgent.



Counting hazel dormice in the Netherlands

Maurice La Haye, Ruud Foppen & Neeltje Huizenga (Dutch Mammal Society), Tom van der Meij (CBS) and René Krekels (NLD) have been monitoring hazel dormice in the Netherlands for over twenty years, with interesting results.

In the Netherlands the hazel dormouse is restricted to the southern most parts of the country where one population lives across the border regions of the Netherlands, Belgium and Germany (North Rhine Westphalia). This population has been monitored since 1992 by the Dutch Mammal Society (DMS) through counts of natural nests along transects. Currently over 50 transects are monitored each year by about 25-30 volunteers. This monitoring scheme is part of the Ecological Monitoring Network, which aims to deliver statistical reliable data about the population trends of protected species in the Netherlands.

In 1992 hazel dormouse experts began looking for the species but found very few animals. The population consists of two geographically separated subpopulations, with one subpopulation living on the 'western' side of the small river 'Geul' and

the other on the 'eastern' side of this river (figure 2).

As can be seen in figure 1, the number of hazel dormouse nests show impressive

The number of nests shows impressive peaks and declines year to year

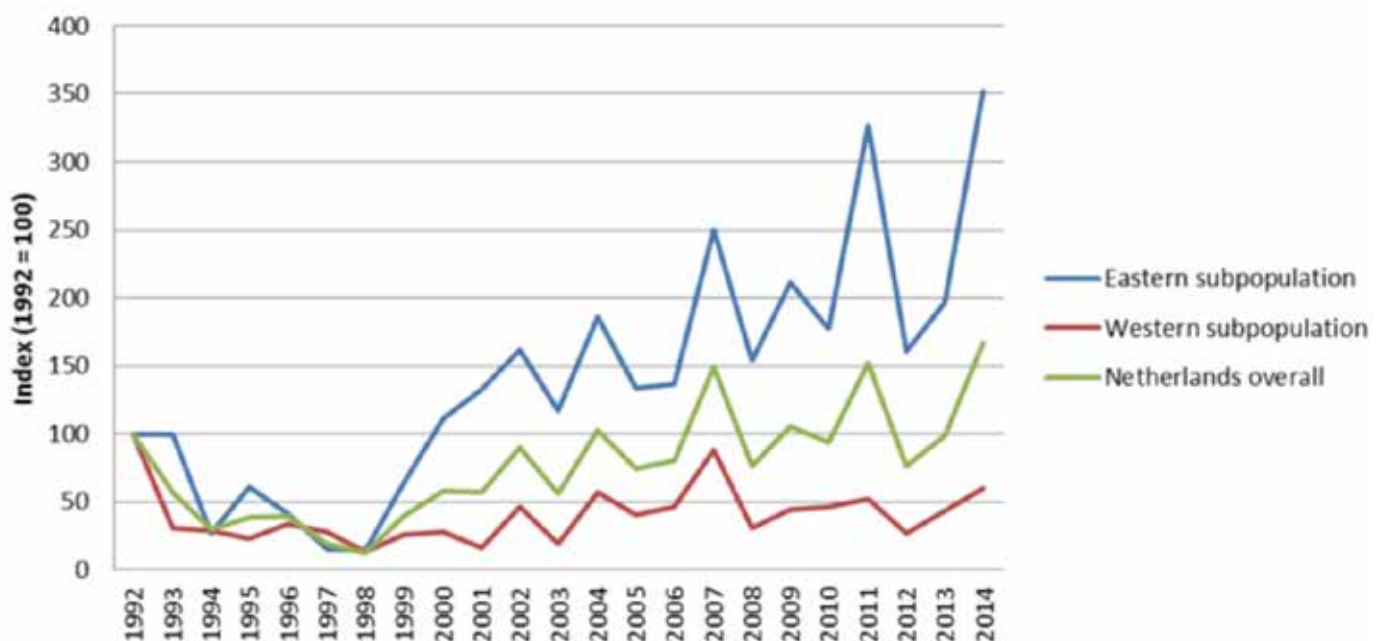
peaks and declines from year to year, especially in the 'eastern' subpopulation. We have not yet carried out a formal analyses to explain the population dynamics so we can only speculate about the driving forces. However, the remarkable synchrony among the subpopulation trends point to regional or national acting

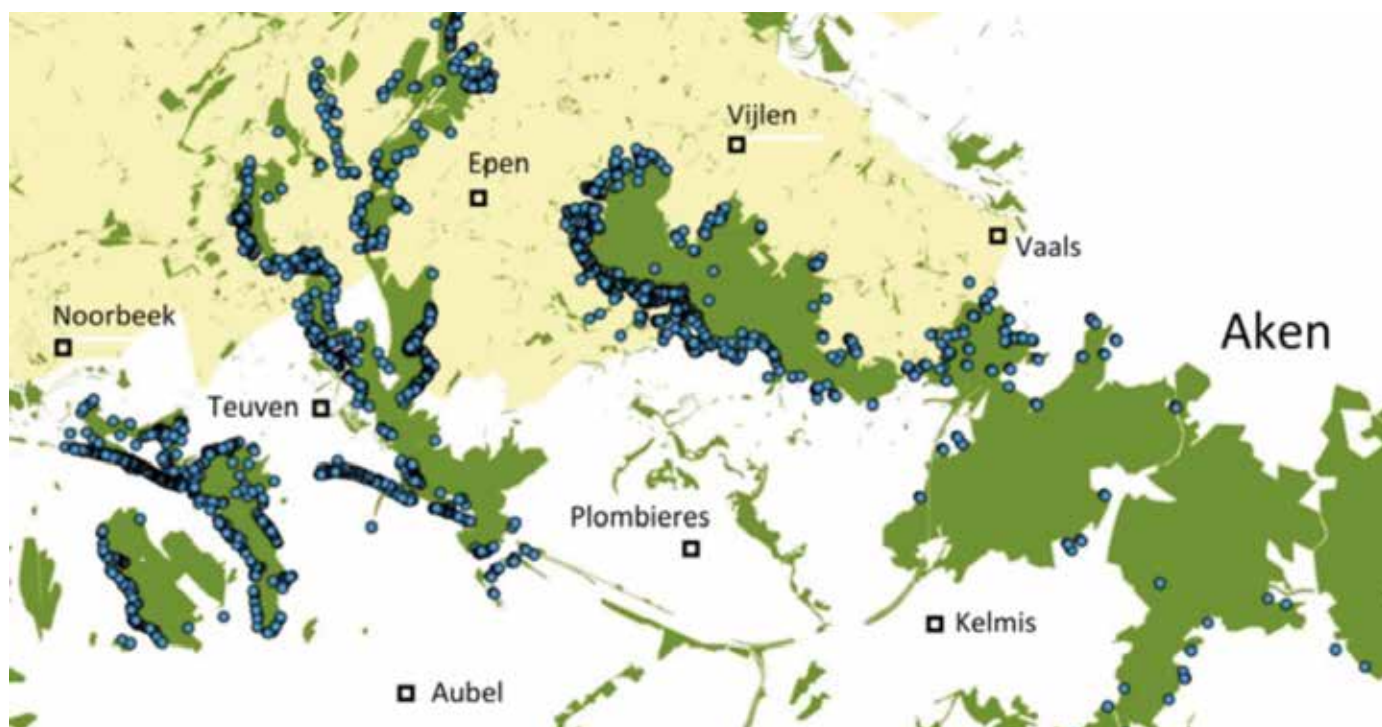
factors like weather and food conditions.

Around the year 2000 nature conservation organisations and volunteers started to implement small-scale management actions to improve habitat conditions for the species, mainly consisting of creating vegetation-rich and diverse woodland-edges. After a few years conservation efforts were rewarded and the population increased. Although the population dynamics between the two

BELOW: Figure 1. Population development of the hazel dormouse in the Netherlands, with indexes presented for 'Netherlands overall', 'western subpopulation' and 'eastern subpopulation'. The population shows a strong increase since the start of the monitoring in 1992 (index was 100 in 1992, which accounts for ca. 100 nests).

Population development Hazel Dormouse





subpopulations are synchronous, the growth rate of the eastern population is larger than the western. There are a number of possible explanations. The most likely ones are that the subpopulation in the west contains much smaller and more isolated patches causing detrimental fragmentation effects. Supporting evidence comes from a genetic study in 2012 that indicates lower genetic diversity in local populations of the western subpopulation and more genetic diversity and no subdivision in the eastern subpopulation. Another possible explanation is that in the eastern subpopulation a larger effort had been made to improve the habitat over a larger area.

The population of hazel dormouse in the Netherlands has significantly increased since 1992, which probably can be explained by the successful conservation measures mainly taken in the eastern subpopulation. In the near future conservation efforts will focus on an improvement of the habitat in the western subpopulation. Also in the valley of the river Geul, hedges and other corridors will be planted and managed in a Hazel dormouse friendly way. This will create corridors between the two subpopulations, which ultimately should result in an exchange of individuals between both subpopulations and an increase of the overall population.

Acknowledgments

In the Netherlands several organizations work together to protect the hazel dormouse: province of Limburg, State Forestry (Staatsbosbeheer), Ark foundation, Natuurpunt Studie (Flanders), IKL foundation, Dutch Mammal Society (DMS) and Natuurbalans (nature consultancy). Finally, many thanks to all volunteers who spent their spare time in counting nests of Hazel dormouse.

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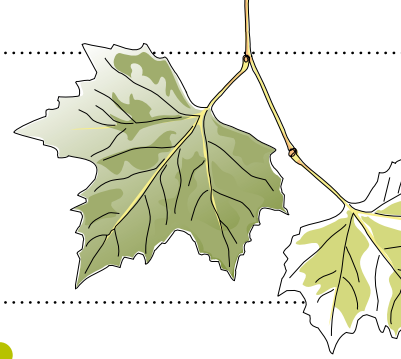
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ABOVE: Figure 2. Overall map of (sub)populations of Hazel dormouse in the Netherlands (= yellow), nearby Belgium (south) and Germany (south-east). Dots on the map represent nest findings. The 'western' subpopulation is fragmented, while the 'eastern' subpopulation lives in one large habitat patch (map copied from Kuijsten & Krekels 2013).

Ruud Foppen





Torpor & hibernation in the NDMP

Ian White, PTES Dormouse Officer, explains what he finds when he takes a closer look at the data supplied to the NDMP in terms of dormouse torpor and hibernation.

Britain is on the edge of the dormouse range, not because of our latitude but because of the maritime climate that we enjoy. Dormice, as hibernators, generally benefit from cold, stable winters which keep them in a state of hibernation and so restrict their energy loss caused by frequent arousals. In spring when they awaken, the weather and food supply varies by region and by year and this will have an effect of their future success throughout the season. From the NDMP we can get some idea of hibernal survival and from data recorded on 'Status' we can get an indication of both the spring weather and potential dormouse activity through the year.

We are currently experiencing a very mild winter with temperatures more like September than December. Will this affect hibernal survival in 2015/16? Unfortunately we won't know until 2016 data comes in next spring but we are able to have a look at previous years. We have been encouraging more accurate recording in the NDMP in the

Fig. 1 The percentage of animals recorded in June relative to the previous October giving an indication of overwinter mortality of hazel dormice by year

'Age Class' and asking monitors

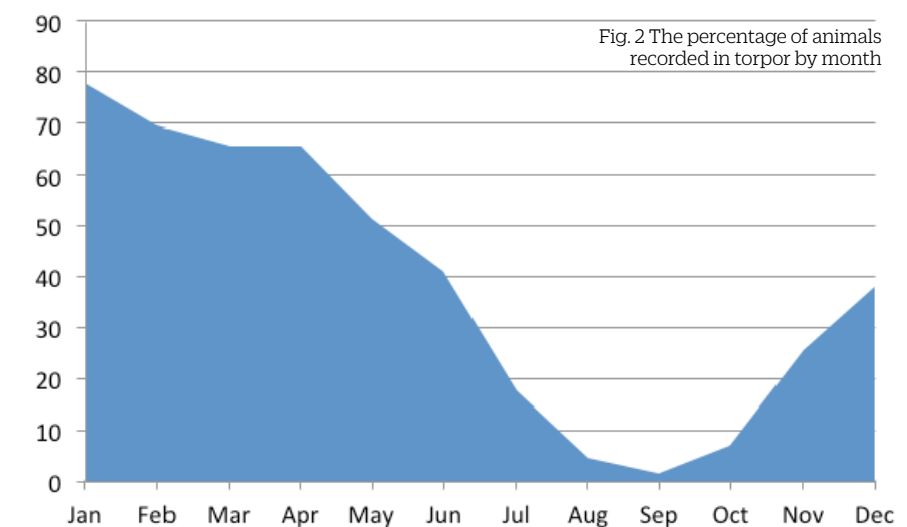
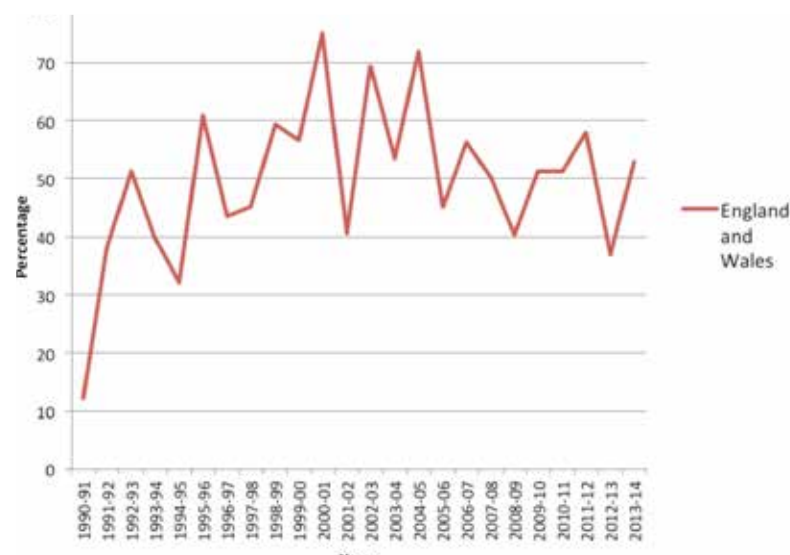


Fig. 2 The percentage of animals recorded in torpor by month

to record mature animals as either adults (having been through a winter hibernation) or juveniles (weaned young of year). We can then look at the number of mature animals recorded in October and compare it with the number of mature animals recorded the following June. While this may not be a very robust method of investigating hibernal survival, the advantage of a long term data

set like the NDMP, means that there is consistency across the years (Fig.1). In 1990 1,122 boxes were checked and 137 mature dormice recorded and the following June 979 boxes checked and 105 mature dormice recorded. This compares to 2013/14 when comparative figures are 19,658 boxes and



The long-term data suggest 40-70% die over winter

1,524 dormice in October and 19,915 boxes and 727 dormice in June. The long-term data would suggest that in the UK between 40% and 70% of the dormouse population die over winter (Fig. 1). This is very comparable to a study in Lithuania by Juskaitis (1999) where it was suggested that between 64% and 72% of the population died over winter probably as a consequence of climate and predator's - chiefly red fox and wild boar. In 2012/13 the mortality rate appeared to be very low and this is

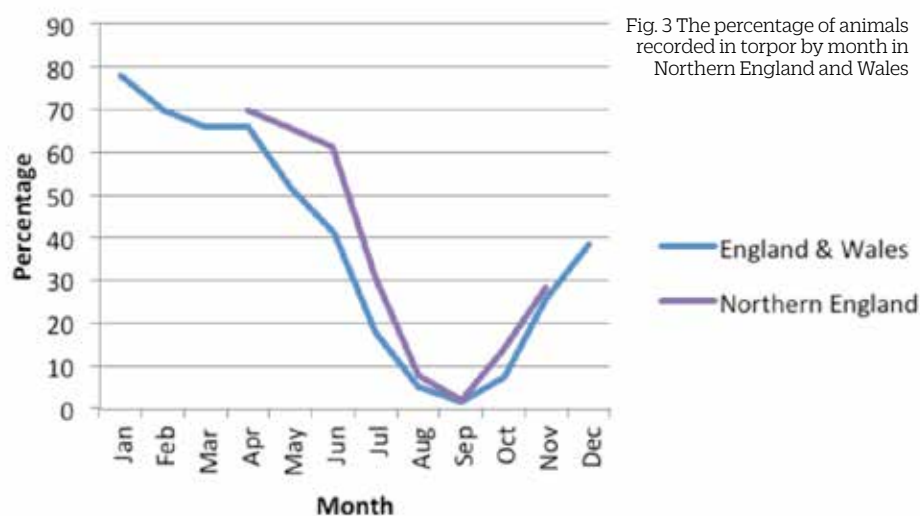


Fig. 3 The percentage of animals recorded in torpor by month in Northern England and Wales

is therefore not a surprise that between May and October the lowest numbers of litters are recorded in the northern counties. Wales shows a lightly different pattern; generally the percentage of dormice recorded in torpor follows the national trend with the exception of May when more are recorded active (Fig 3b). It would be easy to suggest that this is a data anomaly but the anomaly persists over the 25 year dataset. What, if any effect does it have? Recording dormouse litters in May or June is a relatively unusual event with an average of only 1% of all litters found in a year recorded in May and 5.6% of all litters found in a year recorded in June. However more litters are recorded in Wales in June than in any other region so perhaps the increased activity in Wales in May gives rise to earlier breeding in that area.

In 2012 the mature dormouse population seemed to go into hibernation earlier and at better weights. The number of animals recorded in torpor in April 2013 (n=58) was much higher than usual at 86% (compared to the national average 66%) and the number of animals recorded in torpor in July (n=351) was much lower than usual at 7.3% (compared to the nation average of 17.5%) Fig 4. This would suggest that there was a longer breeding season in 2013 and potentially a very successful breeding year. Sure enough, if we compare the proportion of litters born in that year with the number of mature females in June 2013; it does appear to be an excellent breeding year beaten only by 2006.

The NDMP has not been fully analysed and PTES are shortly to undertake a more comprehensive study of the data; it will be interesting to see what it can tell us.

consistent with the poor breeding year in 2012 which enabled mature animals to go into hibernation in good condition and so have a better chance of overwinter survival (for the full article see the Dormouse Monitor Vol. 1 2013).

Animal activity is recorded as part of the NDMP and the number of animals found in torpor in each month can be investigated. From the national data set, in April about 66% of dormice are recorded in torpor and this drops to 1% in September before the numbers found in torpor start to increase (Fig. 2). This is expected; animals just out of hibernation or just about to enter into it are more likely to be torpid than at other time of year and very few animals are recorded in torpor during the peak breeding season in August and September.

The southern counties reflect the national trend of when dormice are

recorded in torpor but in the northern counties the activity season for dormice is reduced with 61% of animals recorded in June in torpor and 31% in July (Figure 3a). It

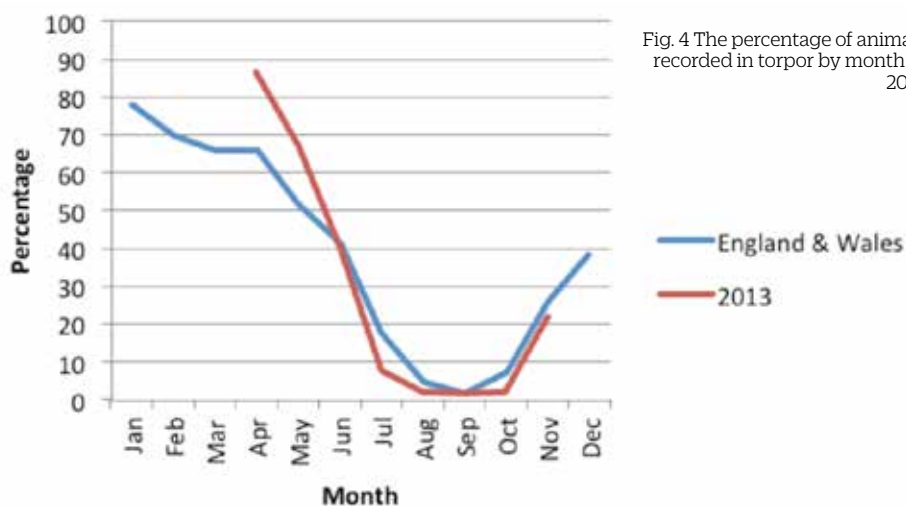
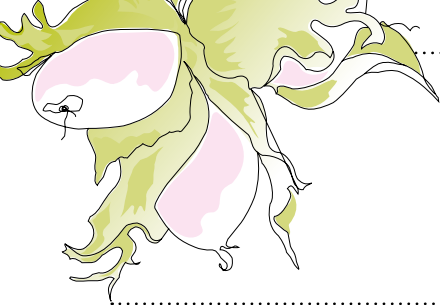


Fig. 4 The percentage of animals recorded in torpor by month in 2013



Launch of the new Warwickshire mammal group

In May this year, the new Warwickshire Mammal Group was launched, to much excitement. Ruth Moffat describes the day.

The launch of the new Warwickshire Mammal Group at Brandon Marsh Nature Centre on 9 May 2015 provided the unique opportunity to offer B&B to a dormouse - and its owner, Roger Trout. Acquired as a 'pinkie', that is a new born, whose nest had been knocked to the ground during rhododendron bashing, it would be the first dormouse most members would see. It didn't seem to mind being in a plastic bag - probably less scary than being handled!

After Roger's first talk 'Mammals Matter' - an exhortation to start looking for mammal signs - half the members visited live traps set out the night before and checked early that morning - catches included this common shrew. The second group enjoyed dissecting barn owl pellets, finding field voles by far the commonest prey.

After swapping activities members heard about forthcoming Mammal Group events, then back to Roger to hear about his consultancy work resolving conflicts between mammals and people - sadly, a balance between conservation and control of numbers often has to be achieved.

Finally we had a walk around the reserve, during which we found signs of 11 species, including badger hair at a sett and a nearby latrine and otter spraint (droppings).



The group spent their first meeting looking for various mammal & signs.



Roger Trout showed many new members their first ever dormouse!

