

Edible Dormouse (*Glis glis*)

- Rat-sized rodent from Europe.
- Primarily a woodland species, but also found in parkland and in buildings in suburban areas.
- Established population in the Chiltern Hills in southern England.
- Damages trees and orchards, and may prey on nesting birds.
- A nuisance in buildings.



History in GB

Intentionally introduced into England by Lord Rothschild in 1902, near Tring, Berkshire. Since then it has slowly spread in the Chiltern Hills within mature beech dominated woodland. There have also been occasional reports in other parts of Southern England but these are not thought to be breeding populations and are likely to be translocations from the Chiltern population which are trapped as household pests.

Native distribution

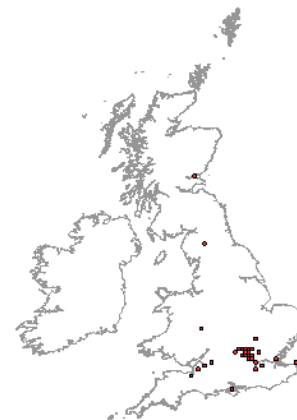
Native to Europe and Russia (native range in yellow)



Source: IUCN, 2014

Distribution in GB

Main area of threat wooded: areas of Southern England and Wales



Source: NBN 2014

Impacts

Environmental (moderate)

- Causes damage to trees and orchards by stripping bark.
- Competes with hole-nesting birds for nest sites, and preys on eggs and nesting birds.

Economic (minor)

- Pest in orchards.
- Damages trees in softwood plantations causing crown death and reducing yield.
- Chews wires and leaves droppings in water tanks.

Social (moderate)

- Nuisance in buildings, >3000 killed between 2002-2007 in GB.
- Vector of Lyme disease.

Introduction pathways

Stowaway in vehicles (very unlikely) - unlikely because French distribution does not extend to within 150-200km of channel ports

Spread pathways

Natural (very slowly) - sedentary behaviour results in slow rate of spread
Human (rapid) - translocation likely to create small, discrete, isolated populations

Summary

	Risk	Confidence
Entry	LIKELY	HIGH
Establishment	LIKELY	HIGH
Spread	SLOW	HIGH
Impacts	MODERATE	MEDIUM
Conclusion	MEDIUM	HIGH

Information about GB Non-native Species Risk Assessments

The Convention on Biological Diversity (CBD) emphasises the need for a precautionary approach towards non-native species where there is often a lack of firm scientific evidence. It also strongly promotes the use of good quality risk assessment to help underpin this approach. The GB risk analysis mechanism has been developed to help facilitate such an approach in Great Britain. It complies with the CBD and reflects standards used by other schemes such as the Intergovernmental Panel on Climate Change, European Plant Protection Organisation and European Food Safety Authority to ensure good practice.

Risk assessments, along with other information, are used to help support decision making in Great Britain. They do not in themselves determine government policy. The Non-native Species Secretariat (NNSS) manages the risk analysis process on behalf of the GB Programme Board for Non-native Species. Risk assessments are carried out by independent experts from a range of organisations. As part of the risk analysis process risk assessments are:

- Completed using a consistent risk assessment template to ensure that the full range of issues recognised in international standards are addressed.
- Drafted by an independent expert on the species and peer reviewed by a different expert.
- Approved by an independent risk analysis panel (known as the Non-native Species Risk Analysis Panel or NNRAP) only when they are satisfied the assessment is fit-for-purpose.
- Approved for publication by the GB Programme Board for Non-native Species.
- Placed on the GB Non-native Species Secretariat (NNSS) website for a three month period of public comment.
- Finalised by the risk assessor to the satisfaction of the NNRAP.

To find out more about the risk analysis mechanism go to: www.nonnativespecies.org

Common misconceptions about risk assessments

To address a number of common misconceptions about non-native species risk assessments, the following points should be noted:

- Risk assessments consider only the risks posed by a species. They do not consider the practicalities, impacts or other issues relating to the management of the species. They therefore cannot on their own be used to determine what, if any, management response should be undertaken.
- Risk assessments are about negative impacts and are not meant to consider positive impacts that may also occur. The positive impacts would be considered as part of an overall policy decision.
- Risk assessments are advisory and therefore part of the suite of information on which policy decisions are based.
- Completed risk assessments are not final and absolute. Substantive new scientific evidence may prompt a re-evaluation of the risks and/or a change of policy.

Period for comment

Draft risk assessments are available for a period of three months from the date of posting on the NNSS website*. During this time stakeholders are invited to comment on the scientific evidence which underpins the assessments or provide information on other relevant evidence or research that may be available. Relevant comments are collated by the NNSS and sent to the risk assessor. The assessor reviews the comments and, if necessary, amends the risk assessment. The final risk assessment is then checked and approved by the NNRAP.

*risk assessments are posted online at: <https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?sectionid=51>
comments should be emailed to nnss@apha.gsi.gov.uk

GB NON-NATIVE ORGANISM RISK ASSESSMENT SCHEME

For more information visit: www.nonnativespecies.org

Name of Organism:	<i>Glis glis</i>, Edible Dormouse
Objectives:	Assess the risks associated with this species in GB.
Version:	Final (April 2016) – Original draft January 2012; signed off by NNRAP February 2012; approved by GB Programme Board March 2015; published on NNSS website September 2015.
Author:	Malcolm Burgess

Stage 1: Initiation

1 - What is the principal reason for performing the Risk Assessment? (Include any other reasons as comments)	Request by the GB Programme Board for non-native species
2 - What is the Risk Assessment Area?	England, Scotland and Wales
3 - What is the name of the organism? This will appear as a heading (Other names used for the organism can be entered in the comments box)	Edible dormouse (<i>Glis glis</i>)
4 - What is the status of any earlier Risk Assessment?	none exists

Stage 2a: Organism Risk Assessment

<p>6 - If you are sure that the organism clearly presents a risk, or that in any case a full Risk Assessment is required, you can omit this section and proceed directly to Section B.</p>	Continue with Organism Screening	
<p>7 - What is the taxonomic group of the organism?</p>	Glis glis	<p><i>Glis glis</i> - Edible dormouse, also called the Fat dormouse or Squirrel-tailed dormouse. The species, although originally named <i>Glis glis</i>, has also been previously temporarily named <i>Myoxus glis</i> and use of this name does persist. It is now renamed <i>Glis glis</i> (International Committee of Zoological Nomenclature 1998).</p>
<p>8 - What is the taxonomic status of the organism?</p>	single taxonomic entity	<p>The following subspecies have been described from Mediterranean islands in the past; <i>Glis glis insularis</i> (Sicily) Barrett-Hamilton, 1898; <i>Glis glis melonii</i> (Corsica and Sardinia) Thomas, 1907; and <i>Glis glis argenteus</i> (Crete) Zimmermann, 1953 (Masseti 2005). However these are no longer recognized as subspecies.</p>
<p>9 - If not a single taxonomic entity, please give details?</p>		
<p>10 - Is the organism in its present range known to be invasive?</p>	yes / possible (the organism is considered to be invasive)	<p>The Edible dormouse is a known opportunistic predator of nestling birds (Adamik & Kral 2008) but does not threaten species, habitats or ecosystems in its native range. It can be an agricultural pest in orchards and commercial forestry, and it causes damage to softwood plantations where introduced in England (Platt & Rowe 1964, Jackson 2004).</p>
<p>12 - What is the current distribution status of the organism with respect to the Risk Assessment Area?</p>	isolated distribution (but not under containment)	<p>The Edible dormouse was intentionally introduced into England by Lord Rothschild in 1902, to an estate in the Chiltern Hills near Tring, Hertfordshire. Since 1902 it has slowly spread along the Chiltern Hills (30 km by 1995) where it is confined to mature beech dominated woodland. There have been occasional reports of Edible dormice in other parts of southern England, but there is no evidence to suggest that these became breeding populations and it is likely that these reports result from intentional translocation from the Chiltern Hills population where they have been trapped as household pests (Morris 1997).</p>
<p>13 - Are there conditions present in the Risk Assessment Area that would enable the organism to survive and reproduce? Comment on any special conditions required by the species?</p>	yes / possible	<p>Edible dormice are primarily woodland species, with a preference for deciduous and mixed woodlands but also readily use pine plantations. They do occur in mature wooded parkland and within suburban areas, where they will inhabit buildings. These habitats exist within the UK Risk Assessment area. There is considerable evidence showing that reproduction by Edible dormice is closely related to the masting of beech <i>Fagus sylvatica</i> trees in many parts of its range. In non-masting years when few, if any, beech seeds are produced entire Edible dormouse populations have been found to skip reproduction altogether, but in masting years breed very successfully (Bieber 1998, Pilastro <i>et al.</i> 2003, Schlund <i>et al.</i> 2002, Ruf <i>et al.</i> 2006, Bieber & Ruf 2009, Kager & Fietz 2009). This phenomenon is also known to occur in the introduced UK population (Morris and Morris 2010, Burgess 2002, Burgess 2003). This is important as the Chiltern Hills is predominantly beech woodland, and within the UK reproduction of Edible dormice may be partly constrained by the presence of mature beech trees.</p>
<p>14 - Does the known geographical distribution of the organism include ecoclimatic zones comparable with those of the Risk Assessment</p>	yes / possible	<p>Edible dormouse distribution includes other European countries that have similar ecoclimatic zones to the GB Risk Assessment area.</p>

Area or sufficiently similar for the organism to survive and thrive?		
15 - Could the organism establish under protected conditions (such as glasshouses, aquaculture facilities, terraria, zoological gardens) in the Risk Assessment Area?	no	
16 - Has the organism established viable (reproducing) populations anywhere outside of its native range?	yes / possible	The Edible dormouse has established a viable breeding population in the UK following introduction into the Chiltern Hills in 1902. The species also occurs on a number of Mediterranean Islands (Sardinia, Corsica, Sicily, Crete and Corfu) but it is unknown whether these are the result of introductions by man (Nowak 1994).
17 - Can the organism spread rapidly by natural means or by human assistance?	yes / possible	Although the Edible dormouse is a territorial and sedentary species, deliberate introductions could lead to establishment into new areas. Evidence from radio tracking studies, both in the established UK population (Morris & Hoodless 1992) and in the species native range (e.g. Properzi <i>et al.</i> 2003), suggests that the species is very sedentary and has a small home range. A study of dispersal in Germany found they could cross treeless areas, but only where the distance between trees was <50 meters (Bieber 1995). This behaviour means that natural spread could only potentially occur where tree cover is essentially continuous. Spread by human assistance is likely to have occurred in the past although this has not led to establishment, except in the Chiltern Hills. Where Edible dormice have been reintroduced to vacant but suitable habitat, home range size and foraging distances were very similar to the individuals' source population (Jurczyszyn 2006), which suggests spread resulting from human introductions would be as slow as it is naturally (maximum foraging distance <0.5 km, home range <4 ha).
18 - Could the organism as such, or acting as a vector, cause economic, environmental or social harm in the Risk Assessment Area?	yes / possible	Edible dormice are a known pest of commercial forestry in the UK (Platt & Rowe 1964, Jackson 1994, Morris <i>et al.</i> 1997) and in their native range (Santini 1978), and also regularly enter houses where they can cause significant damage and pose a potential environmental health risk (Temple & Morris 1997, Morris 1997). The organism is known to damage tree fruit crops such as apples (Nowak 1994) and is a known vector of Lyme disease (Matuschka <i>et al.</i> 1994).
19 - If answers to questions in this section were 'yes' (even if some were only possibilities), then a full assessment is likely to be necessary. If some answers were 'no' then consider whether this negates the need for a full assessment or not. Please give an appraisal of whether it is necessary to proceed with a full assessment and briefly give the key reasons in the comment box.	Necessary to proceed with full assessment	Edible dormice do present a risk in the Risk Assessment area, as is shown by the successful introduction and establishment of a free living, reproducing, population from individuals introduced in 1902. This shows that colonisation in other parts of the Risk Assessment area is possible. There is also evidence that Edible dormice cause economic damage and it may be possible that they negatively impact native species.

Stage 2b: Pathways

<p>20 - How many pathways are relevant to the potential entry of this organism? For organisms which are already present in Great Britain, only complete the entry section for current active pathways of new entry.</p>	<p>very few</p>	<p>Further spread could arise 1) accidentally from cross-Channel crossings, 2) deliberate translocation by those who trap them in households as pests and release them away from the point of capture, 3) escape from captive populations and 4) dispersal of young from existing populations in the Risk Assessment area.</p>
<p>21 - Please list relevant pathways through which the organism could enter (one per line). Give details about specific origins and end points of the pathways (where possible) in the comment box.</p>		<p>1) Cross-channel by vehicle 2) Translocation by man from existing populations in R A area</p>
<p>22 - Please select the pathway:</p>		<p>1) Cross-channel by vehicle</p>
<p>23 - How likely is it that the organism is strongly associated with the pathway at the point(s) of origin?</p>	<p>very unlikely (Confidence Very High)</p>	<p>Cross-Channel introduction of a similar species, the Garden dormouse <i>Eliomys quercinus</i>, is known to have occurred several times accidentally by car from France (Harris & Yalden 2008). However, Garden dormouse distribution extends to coastal France whereas Edible dormouse distribution does not extend to within 150-200 km of channel ports. Entry by this pathway is therefore less likely by Edible dormice compared to Garden dormice, and could only occur if Edible dormice have been able to enter vehicles away from port areas.</p>
<p>24 - How likely is it that large numbers of the organism will travel along this pathway from the point(s) of origin?</p>	<p>very unlikely (Confidence Very High)</p>	<p>If entry along this pathway was to occur it would almost certainly only be by one individual on any one occasion.</p>
<p>25 - How likely is the organism to survive during passage along the pathway?</p>	<p>very likely (Confidence Very High)</p>	<p>Edible dormice would be able to survive in a vehicle for a few days, probably longer, and therefore would be very likely to survive during transportation. Edible dormice hibernate during the winter and would be able to survive without food or water during this period, if they found their way onto a vehicle in a torpid condition they would invariably awake during transit because of warmer temperatures and likely disturbance.</p>
<p>26 - How likely is the organism to enter Great Britain undetected?</p>	<p>Likely (Confidence Very High)</p>	<p>Edible dormice that may have entered vehicles unnoticed are just as likely to leave them unnoticed, and even if found in a vehicle they are likely to be released without any authorities being informed. The established population in the Chiltern Hills was released in 1902 but went largely un-noticed for about 25 years. As Edible dormice are nocturnal detection is further reduced.</p>
<p>27 - How likely is the organism to multiply/increase in prevalence during transport /storage?</p>	<p>very unlikely (Confidence</p>	<p>Pregnant females may give birth during transport or while held in captivity, but otherwise they would be unable to multiply during this time.</p>

	Very High)	
28 - How likely is the organism to survive existing management practices within the pathway (answer N/A for intentional introductions)?	Likely (Confidence Very High)	Checks may be made at points of entry (ports), but in practise there is little chance of stowaway dormice being detected.
29 - How likely is the organism to arrive during the months of the year most appropriate for establishment (if intentional introduction answer N/A)?	Likely (Confidence High)	Because Edible dormice hibernate between October and May they are very unlikely to enter during this period. Entry is much more likely during their active period from the end of May until the beginning of October, and these are the most appropriate months for establishment.
30 - How likely is the organism to be able to transfer from the pathway to a suitable habitat or host?	moderately likely (Confidence High)	Edible dormice would need to find woodland in very close proximity to the point of escape. Such woodland does exist around some ports. The likelihood that they are released into the most suitable woodlands, those containing significant amounts of Beech, are less likely due to the restricted distribution of beech woodlands. Woodlands without beech can still be considered suitable habitat.
31 - Do other pathways need to be considered?	yes	
22 - Please select the pathway:	2) Translocation by man from existing populations in R A area	
23 - How likely is it that the organism is strongly associated with the pathway at the point(s) of origin?	very likely (Confidence Very High)	Edible dormice can be household pests, and householders often trap Edible dormice to remove them. Although some may use licensed pest control companies to do this, some householders will do this themselves and trapped individuals are then subsequently released back into the wild away from the place of capture, and this may be outside the existing range of Edible dormice. This is known to have occurred, with individuals released in the New Forest and Oxford (Harris & Yalden 2008). Natural England figures show 65 licenses were issued to control Edible dormice as household pests in the UK between 2002-2007 (which caught and killed 3148 individuals), which indicates the scale of the problem. The Edible dormouse is listed on Schedule 6 of the Wildlife & Countryside Act which means it cannot be trapped without a license, and on Schedule 9 which forbids its release into the wild.
24 - How likely is it that large numbers of the organism will travel along this pathway from the point(s) of origin?	moderately likely (Confidence Very High)	Edible dormice come into houses in some years more than others, and they are gregarious animals with nest-boxes often found to contain multiple adults in studies in the UK and in their native range (Pilastro <i>et al.</i> 2006). They are more likely to be a pest in years when they more readily enter houses, and are therefore more likely to be trapped then. Concentrations will be potentially high in these years.
25 - How likely is the organism to survive during passage along the pathway?	very likely (Confidence Very High)	Edible dormice would be able to survive largely uncared for in captivity for a few days, certainly a lot longer if food and water was provided. Therefore they would be very likely to survive during transport and while kept prior to being translocated. Edible dormice hibernate during the winter and would be able to survive without food or water during this period. They are unlikely to be trapped as pests in the winter for this reason and would invariably awake if brought into warmer temperatures resulting from capture.
26 - How likely is the organism to enter Great Britain undetected?	very likely	The established UK population in the Chiltern Hills was released in 1902 but went largely un-noticed for about 25 years. Edible dormice are secretive mammals due to their nocturnal behaviour. Translocation

	(Confidence Very High)	of Edible dormice as household pests is less likely to be detected entering the Risk Assessment area partly because of UK law, it is illegal to release an Edible dormouse into the wild, so therefore such cases are not likely to be reported.
27 - How likely is the organism to multiply/increase in prevalence during transport /storage?	very unlikely (Confidence Very High)	Pregnant females may give birth during transport or while held in captivity, but otherwise they would be unable to multiply during this time.
28 - How likely is the organism to survive existing management practices within the pathway (answer N/A for intentional introductions)?	Likely (Confidence Very High)	Although the law makes this action illegal, in practise there is no existing management, or enforcement, likely to prevent Edible dormice surviving intentional translocation.
29 - How likely is the organism to arrive during the months of the year most appropriate for establishment (if intentional introduction answer N/A)?	moderately likely (Confidence High)	Because Edible dormice hibernate between October and May they are unlikely to be trapped and translocated during this period. Edible dormice enter households and are trapped during their active period from the end of May until the beginning of October, and these are the most appropriate months for establishment.
30 - How likely is the organism to be able to transfer from the pathway to a suitable habitat or host?	Likely (Confidence High)	Householders trapping, translocating and releasing Edible dormice rather than controlling them by lethal means are very likely to release them into woodlands as it is well known that this is the habitat they prefer. The likelihood that they are released into the most suitable woodlands, those containing significant amounts of Beech, are less likely due to the restricted distribution of beech woodlands but it is still reasonably likely. Woodlands without beech can still be considered suitable habitat.
31 - Do other pathways need to be considered?	no	
32 - Please estimate the overall likelihood of entry into the Risk Assessment Area for this organism (please comment on the key issues that lead to this conclusion).	Likely (Confidence High)	Entry to the Risk Assessment area by Edible dormice has already occurred by deliberate introduction, and further entry by one of several means is likely to happen at some point again in the future. This is most likely to occur by the translocation of dormice from already established wild populations where it is considered a pest, although may also occur through escapes from captive collections or from cross-channel vehicle movements (including the Channel rail tunnel).

Establishment

<p>33 - How likely is it that the organism will be able to establish in Great Britain based on the similarity between climatic conditions in Great Britain and the area of the organism's current distribution?</p>	<p>Likely (Confidence High)</p>	<p>The climate of the Risk Assessment area is very similar to the climate across the species natural distribution. Certainly the climate of the Risk Assessment area does not restrict or prevent Edible dormice from breeding and surviving, as evidenced by an existing established population.</p>
<p>34 - How likely is it that the organism will be able to establish in Great Britain based on the similarity between other abiotic conditions in Great Britain and the area of current distribution to be similar?</p>	<p>very likely (Confidence High)</p>	<p>Abiotic factors are unlikely to significantly affect establishment, but any abiotic factors that may influence population persistence of Edible dormice are unlikely to be significantly different in the Risk Assessment area to their natural distribution. Edible dormice are controlled as household pests but this mortality is very unlikely to influence establishment as they are only likely to be noted as pests at relatively high densities.</p>
<p>35 - How many species or suitable habitats vital for the survival, development and multiplication of the organism species are present in Great Britain? Please specify in the comment box the species or habitats.</p>	<p>moderate number (Confidence High)</p>	<p>Edible dormice require woodland where they predominantly feed on tree flowers, buds and fruit as well as berries, bark, insects, carrion, fungi, bird eggs and nestlings (Harris & Yalden 2008), all of which are found in the Risk Assessment area. The availability of beech mast has been shown to influence the likelihood of breeding and breeding performance in its native range (e.g. Bieber 1998, Pilastro <i>et al.</i> 2003, Ruf <i>et al.</i> 2006) and parts of the Risk Assessment area contain large areas of potentially suitable habitat. Edible dormice also use conifer plantations, where it gnaws bark, a habitat found throughout the Risk Assessment area.</p>
<p>36 - How widespread are the species or suitable habitats necessary for the survival, development and multiplication of the organism in Great Britain?</p>	<p>Widespread (Confidence High)</p>	<p>Existing data shows that woodland covered 8.4 % of the Risk Assessment area in 2000, 7 % of which was woodland greater than 1 ha in size (Smith & Gilbert 2001), and this high quality data could be used to establish the availability of potentially suitable habitat. Evidence shows that Edible dormice do better in woodland containing beech which may currently limit establishment in western and northern parts of the Risk Assessment area, although Edible dormice do commonly occur in oak woodlands in their natural range (Scinski & Borrowski 2008). Beech woodland occurs throughout the Risk Assessment area but cover is higher in southern England. Other food taken by Edible dormice is widespread throughout the Risk Assessment area and therefore provides no barrier to establishment.</p>
<p>37 - If the organism requires another species for critical stages in its life cycle then how likely is the organism to become associated with such species in Great Britain?</p>	<p>N/A (Confidence Very High)</p>	<p>Although no one species is required for any stage of the Edible dormouse life cycle the species does have a strong association with Beech and the species is likely to be associated with woodlands containing beech in the Risk Assessment area (see answers to previous questions about Edible dormice and beech). Beech woodland is widespread in the Risk Assessment area but most common in south-east England (Smith & Gilbert 2001).</p>
<p>38 - How likely is it that establishment will occur despite competition from existing species in Great Britain?</p>	<p>Likely (Confidence High)</p>	<p>Edible dormice have few competitors within the Risk Assessment area so therefore establishment is unlikely to be confounded by this. The main competitor is likely to be the grey squirrel <i>Sciurus carolinensis</i> due to its similar ecological niche, however Edible dormice persist in the Chiltern Hills despite large numbers of grey squirrels present there. Interspecific competition between Edible dormice and hole-nesting birds for nest sites is known to occur, with dormice out competing birds due to occupying nest sites earlier and predating eggs and nestlings (Koppmann <i>et al.</i> 2003).</p>
<p>39 - How likely is it that establishment will</p>	<p>very likely</p>	<p>In the Risk Assessment area there are few predators of dormice, fewer than in their natural range. The main predator of Edible dormice in the Risk Assessment are Tawny owl <i>Strix aluco</i>, while domestic cats,</p>

occur despite predators, parasites or pathogens already present in Great Britain?	(Confidence High)	stoats <i>Mustela erminea</i> and weasels <i>Mustela nivalis</i> are all potential predators. Predation however is not likely to affect populations except perhaps in the earliest stages of establishment.
40 - How likely are management practices in Great Britain to favour establishment?	Unlikely (Confidence Medium)	Some woodland planting may favour Edible dormice. Species composition of plantation woodlands may be beneficial, such as mixed beech and softwood plantations, but studies are lacking.
41 - How likely is the organism to establish despite existing management practices in Great Britain?	very likely (Confidence Very High)	Past efforts at controlling Edible dormice have only been to remove individuals from households. There is no evidence to suggest that this form of control has any effect on populations and would not prevent the establishment of the species. Morris & Temple (1998) have shown that Edible dormice will use a simple nest-tube for breeding in, designed as a simple means of capture for control although not been subsequently taken up and applied. Similar techniques have been applied in the species natural range (Santini 1978) and traditional dormouse hunters in Slovenia and Croatia catch large numbers of dormice using nest boxes (Krystufek & Haberl 2001).
42 - How likely is it that biological properties of the organism would allow it to survive eradication campaigns in Great Britain?	very likely (Confidence High)	Eradication would only be likely to succeed in the earliest stages of establishment and if populations only existed in small woodland patches, but this would rely on early knowledge of entry and distribution, which is unlikely. Although successful methods have been developed for eradicating other rodent species (Howald <i>et al.</i> 2007) there is currently no recognized method for eradicating Edible dormice, although Morris & Temple (1998) suggest methods. The Chiltern Hills population is now so large that eradication would not be possible using any methods previously used to eradicate rodents, and the chances of recolonisation following eradication of small populations may occur, especially close to the Chiltern Hills.
43 - Is establishment likely to be aided by the biological characteristics of the organism?	moderately likely (Confidence High)	Although Edible dormice can breed in their first year they only have one litter per year so, especially compared to other rodents, they are unable to multiply rapidly. A study shows that the established UK population also have a single litter per year (Morris & Morris 2010). Edible dormice have a unusual life history strategy compared to other rodents in that they are long lived, living to at least 9 years old in a UK population (Morris & Morris 2010) and 12 years in Germany (Ruf <i>et al.</i> 2006), with high survival in years with low food availability. Reproduction skipping in these years aids longevity (Ruf <i>et al.</i> 2006).
44 - Is the organism's capacity to spread likely to aid establishment?	moderately likely (Confidence Medium)	Edible dormice are largely sedentary species and spread is limited by habitat availability and connectivity. Many studies have investigated range size (Morris & Hoodless 1992, Jurczyszyn & Zgrabczynska 2002, Properzi <i>et al.</i> 2003, Jurczyszyn 2006) and find home ranges of between 0.1 - 7 ha (higher where habitat is less suitable) and foraging distances of up to 1900 m, with females ranging further than males. A radio-tracking study conducted on the Chiltern Hills population found home ranges up to 0.6 ha (Morris & Hoodless 1992). Natural spread is only possible with an essentially continuous tree canopy, and even where this occurs spread is likely to be slow, as shown by the slow spread of the Chiltern Hills population which was approximately 30 km in 93 years (Morris 1997). Spread by human translocation would facilitate establishment where individuals are released in suitable habitat, and this is likely to occur.
45 - How likely is the adaptability of the organism to aid its establishment?	moderately likely (Confidence Medium)	Current predictions of environmental change suggest that beech woodland in the south and east of the Risk Assessment area is in decline, but that beech is likely to do better in the north and west in the future (Wesche <i>et al.</i> 2006). Edible dormice would need to spread to the north and west to be able to adapt to this process, but their sedentary behaviour and barriers to dispersal prevent this unless spread

		intentionally by humans. A bird nest-box study in Germany where nest-boxes are also occupied by Edible dormice has shown that Edible dormice have advanced their breeding time and occupied boxes much earlier in 1999 compared to 1975 (Koppmann-Rumpf <i>et al.</i> 2003). Across its natural range the Edible dormouse exists in a wide range of climatic conditions.
46 - How likely is it that the organism could establish despite low genetic diversity in the founder population?	Likely (Confidence High)	Genetic diversity of Edible dormice has not been studied although the DNA has been sequenced (Reyes <i>et al.</i> 1998) and microsatellite markers identified (Dabert <i>et al.</i> 2009). The introduced Chiltern Hills population was founded on a unknown but undoubtedly very small number of individuals (thought to be 12 or less), but this has not prevented successful establishment. This suggests that if breeding at another suitable locality occurs then a population is able to establish without significantly compromised life histories or demographic rates.
47 - How likely is the organism to be established in protected conditions (in which the environment is artificially maintained, such as wildlife parks, glasshouses, aquaculture facilities, terraria, zoological gardens) in Great Britain? (Note that home gardens are not considered protected conditions in this sense.)	Likely (Confidence High)	The species is commonly kept in captivity although as registration is not required the numbers involved are unknown.
48 - Based on the history of invasion by this organism elsewhere, how likely is it to establish in Great Britain? (If possible, specify the instances of invasion in the comments box.)	Unlikely (Confidence Low)	Establishment outside the species original distribution have not been recorded in the past five years, although due to the low detectability of new populations such incidences may not yet have been recorded. Edible dormice have been successfully reintroduced to areas of Poland where they had become extirpated (Jurczyszyn 2001).
49 - If the organism does not establish, then how likely is it that transient populations will continue to occur?	Likely (Confidence High)	It is likely that the number of individuals that may enter the Risk Assessment area will continue at a similar level to that currently occurring, and this may lead to the establishment of transient populations.
50 - Please estimate the overall likelihood of establishment (mention any key issues in the comment box)	Likely (Confidence High)	The Edible dormouse has already become established in the Risk Assessment area, and it is likely that further populations may become established in the future. New populations are likely to arise where animals have been translocated intentionally away from the current population as household pests, accidental translocation from the current distribution, escape from captive populations or introduction from cross-channel vehicle movements. Where such introductions occur in wooded habitats, especially if beech is present, there is every chance that establishment is possible.

Spread

<p>51 - How rapidly is the organism liable to spread in Great Britain by natural means?</p>	<p>very slowly (Confidence High)</p>	<p>The sedentary ecology and reproductive strategy is likely to result in slow rate of spread, as evidenced by the slow spread of the established Chiltern Hills population, 30 km in 93 years (Morris 1997).</p>
<p>52 - How rapidly is the organism liable to spread in Great Britain by human assistance?</p>	<p>Rapidly (Confidence High)</p>	<p>Spread associated with human assistance could lead to spread within the Risk Assessment area, however this is likely to create small discrete and isolated populations and only where suitable habitat exists. Although spread could be rapid in terms of distance travelled, subsequent spread and establishment is likely to be slow as it has been for the Chiltern Hills population.</p>
<p>53 - Within Great Britain, how difficult would it be to contain the organism?</p>	<p>Difficult (Confidence Medium)</p>	<p>Containment is likely to be effective only through a programme of controlled culling. Even with such a programme there is the likelihood that there would be a continued risk of more animals entering the Risk Assessment area in the future.</p>
<p>54 - Based on the answers to questions on the potential for establishment and spread in Great Britain, define the area endangered by the organism.</p>	<p>All wooded areas of the Risk Assessment area, but is most likely to occur in south and east England where suitable beech woodland habitats are most common, and where entry via cross-channel vehicle movements are most likely.</p>	
<p>55 - Please estimate overall potential for spread (using the comment box to indicate any key issues).</p>	<p>Slowly (Confidence High)</p>	<p>Natural spread would be very slow, but spread in terms of distribution could be rapid if human assisted. However if spread was increased by humans the establishment and subsequent spread would be slow due to the species sedentary ecology and life history strategy.</p>

Assessment of potential impacts

<p>56 - How great is the economic loss caused by the organism within its existing geographic range, including the cost of any current management?</p>	<p>Moderate (Confidence Medium)</p>	<p>The Edible dormouse is a known, but minor, pest of forestry plantations, orchards, and households however the economic cost of this is unknown. In softwood forestry plantations the species gnaws bark, often of many trees, causing crown death reducing eventual value of the crop (Platt & Rowe 1964, Jackson 1994). Damage to almond orchards has been recorded in Italy (Santini 1978) and damage to households regularly occurs in some areas (Nowak 1994, Temple & Morris 1997). Damage caused in houses may be minimal but with costly consequences, for example from chewing through electrical wires. Although costs per incident may be low, together the cost may be moderately high. Edible dormice are also known to damage stored fruit such as apples. In the Risk Assessment Area damage is more likely in years when the Beech crop fails as Edible dormice frequent houses more often in these years (Morris & Morris 2011).</p>
<p>57 - How great a loss of production is the organism likely to cause in Great Britain? For example, how serious is the direct negative economic effect of the organism likely to be on crop yield and/or quality, livestock or fish health and production? (Describe the nature and extent of expected losses in the comment box.)</p>	<p>Minor (Confidence Medium)</p>	<p>Crop yield is known to be affected by Edible dormice in the Risk Assessment area (Platt & Rowe 1964, Jackson 1994). Trees in softwood plantations have been damaged by gnawing of bark near the crown of trees which stunts the trees development, possibly allowing fungal infection to take place, and reduces the yield of the plantation. Damage to households has a minor economic cost, although this cost maybe significant to the householder.</p>
<p>58 - How great are the additional economic costs associated with managing this organism likely to be?</p>	<p>Minor (Confidence Low)</p>	<p>A study by the Forestry Commission in 1990 of 14000 softwood trees found damage in some places of up to 25 %, or £220 per ha at 1990 prices (Temple & Morris 1997). A study by Jackson (2004) estimated damage of up to £2000 per ha. No other assessment or research has been carried out, and the value of softwood timber is highly variable.</p>
<p>59 - How great a reduction in consumer demand is the organism likely to cause in the Risk Assessment Area?</p>	<p>Minimal (Confidence High)</p>	<p>No reduction in consumer demand is predicted.</p>
<p>60 - How significant might the losses in export markets be due to the presence of the organism in the Risk Assessment Area?</p>	<p>Minimal (Confidence High)</p>	<p>No losses to export markets are predicted.</p>
<p>61 - How important might other economic costs be resulting from introduction of the organism? (specify in the comment box)</p>	<p>no answer</p>	
<p>62 - How important is environmental harm caused by the organism within its existing geographic range under any current management regime?</p>	<p>moderate</p>	<p>Little environmental harm by the organism has been reported. Edible dormice are known to compete with hole-nesting birds for nest sites, and predate eggs and nestling birds (Koppmann-Rumpf <i>et al.</i> 2003, Adamik & Kral 2008). Koppmann-Rumpf's (2003) study shows that Edible dormice phenology has changed significantly since 1975 (by occupying boxes much earlier) and this advance is much greater</p>

		than the hole-nesting birds, increasing competition between them and predation by dormice on birds eggs and nestlings. Damage to trees has been documented, e.g. softwood plantations (Platt & Rowe 1964) and orchards (Santini 1978).
63 - How important is environmental harm likely to be in Great Britain taking into account any management interventions that might be implemented?	Moderate (Confidence Medium)	Although the potential for environmental harm exists, and has been identified in its natural range, there is no evidence to suggest that this contributes to population declines of other species. However this is a little studied component of Edible dormouse ecology and an aspect that may be particularly important if breeding phenology changes with a changing climate as suggested by Koppmann-Rumpf et al. (2003). Damage to trees has been documented, e.g. softwood plantations (Platt & Rowe 1964) and orchards (Santini 1978).
64 - How important is social, health or other harm (not directly included in economic and environmental categories) caused by the organism within its existing geographic range under any current management regime?	Moderate (Confidence Medium)	Nuisance in buildings
65 - How important is the social, health or other harm likely to be in Great Britain taking into account any management interventions that might be implemented?	Moderate (Confidence High)	Nuisance in buildings
66 - How important is it that genetic traits of the organism could be carried to native species, modifying their genetic nature and making their economic, environmental or social effects more serious?	Minimal (Confidence Very High)	No genetically similar native species exist within the Risk Assessment area.
67 - How important are the expected impacts of the organism despite any natural control by other organisms, such as predators, parasites or pathogens, that may already be present in Great Britain?	Massive (Confidence Very High)	Natural predators of Edible dormice are few in the Risk Assessment area. Tawny owls <i>Strix aluco</i> are the most likely predator, with occasional records of dormice taken by stoats, weasels and domestic cats. Road mortality is also recorded but none of these causes of mortality are likely to have any effect on the organism.
68 - How difficult is it likely to be to control the organism in Great Britain?	Difficult (Confidence High)	Although it is known that Edible dormice are relatively easy to trap (Morris & Temple 1998) there is no evidence that suggests that this can be used as an effective control method. Control within a small geographical area may be possible, but knowledge of the organisms presence or exact distribution is likely to be unknown, making control difficult. Control may therefore be possible at the early stages of establishment but is unlikely to be an option once properly established. Control would need to be sustained as further populations establish in the future.
69 - How likely are control measures introduced for this new organism to disrupt existing biological or integrated systems used	very unlikely (Confidence High)	Control measures are unlikely to disrupt systems for the control of other species.

to control other organisms in Great Britain?		
70 - How likely is the organism to act as food, a host, a symbiont or a vector for other damaging organisms?	Likely (Confidence High)	A number of diseases and parasites are associated with the species. 1. Tick-borne <i>Borrelia burgdorferi</i> (<i>afzeli</i>) was detected in 4 out of 45 Edible dormice in Croatia which shows they are a reservoir (Turk <i>et al.</i> 2008). <i>Borrelia burgdorferi</i> has also been detected in Edible dormice in Germany in a study that concluded that Edible dormice could play an amplifying effect in the transmission of Lyme disease to humans. This would also be likely in the Risk Assessment area (Matuschka <i>et al.</i> 1994). 2. Encephalomyocarditis virus (ZRC 276RA/90 and ZRC 292RA/90) was isolated from two Edible dormice in Italy (Amaddeo <i>et al.</i> 1995). 3. Hantaan virus was detected in 13% of examined Edible dormice in Slovenia (Prosenc <i>et al.</i> 1997). 4. <i>Monopsyllus sciurorum</i> fleas found in Edible dormouse nests are known to support <i>Rickettsia typhi</i> which may infect humans (Trilar <i>et al.</i> 1994).
71 - Indicate any parts of Great Britain where economic, environmental and social impacts are particularly likely to occur (provide as much detail as possible).		Currently impacts are most likely to occur in the Chiltern Hills where the organism has already established. If further populations become established then the areas most affected would be wooded areas of south and east England. However any well wooded area of the Risk Assessment area could experience impacts.
72 - Overall impact rating (please comment on the main reasons for this rating).	Moderate (Confidence Medium)	The most significant impacts would be economic, with damage to softwood plantations and households most likely. There may also be environmental damage to native species of hole nesting birds by competition and predation of eggs and nestlings although the potential extent of this is currently unknown. Some species of conservation importance may be affected if Edible dormice establish in western UK, such as Pied flycatcher <i>Ficedula hypoleuca</i> , which has shown to be negatively affected by dormice (Adamik & Kral 2008).
73 – Conclusion of the risk assessment	Medium (confidence High)	The establishment of the species already in the Risk Assessment Area shows that the species poses some risk, but because natural spread has been very slow and suspected human assisted spread has not resulted in creating further self-sustaining populations it is not considered a high risk. Their sedentary ecology and habitat specialism reduces significant future spread and impact. Containment or control is an option in newly established populations if they can be detected at an early stage, otherwise this would not be possible. Small scale economic impacts have been documented but impacts are not expected to change in the future unless distribution expands. This risk assessment is based on scientific literature of the species in their natural range and from some studies of a population established in the Risk Assessment Area. There is no uncertainty that Edible dormice can colonise and establish in the Risk Assessment Area. Many aspects of Edible dormouse ecology in the established population within the Risk Assessment Area require further study.

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