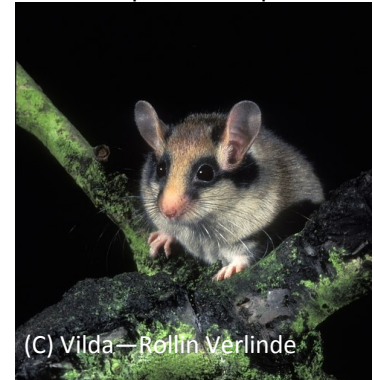


# Garden Dormouse (*Eliomys quercinus*)



(C) Vilda—Rollin Verlinde

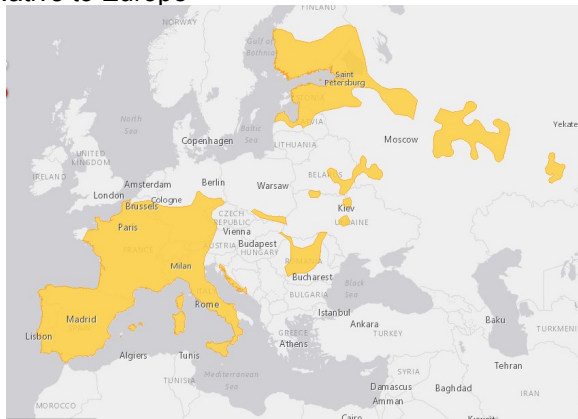
- Medium-sized rodent with distinctive black eye markings, native to Europe.
- Prefers woodland, rocky areas, gardens and orchards.
- Garden dormouse has been reported several times in the wild in GB but has not established breeding populations.
- May cause harm to native birds as a predator of nestlings and eggs.

## History in GB

There have been a number of reports (presumed from accidental releases) in England in recent years including one group of six in Dover. Some animals may have survived for a month or more in the wild but there is no evidence that they have been able to breed.

## Native distribution

Native to Europe



Source: IUCN Redlist 2015

## Distribution in GB

Note: population not established



Source: NBN 2015

## Impacts

### Environmental (moderate)

- Little environmental harm has been reported although *E. quercinus* is known to be a predator of young birds and eggs, including those of rare species.
- Also known to prey on adult birds and small mammals.

### Economic (minor)

- Some loss in profits is possible as *E. quercinus* is a pest of orchards, but unlikely to be significant.

### Social (minimal)

- Occasionally enters buildings, droppings and urine have a potential to harm human health but no significant disease has been recorded.

## Introduction pathways

Ship or plane assisted (moderately likely) - able to survive journey from mainland Europe.

Escape/release (moderately likely) - kept in captivity in zoos, wildlife parks, and by private individuals.

## Spread pathways

Natural (slow) — sedentary species.

Human (very slow) - if *E. quercinus* becomes established, could be spread by trapping and release into new areas.

## Summary

	Risk	Confidence
Entry	LIKELY	LOW
Establishment	MODERATELY LIKELY	LOW
Spread	SLOW	MEDIUM
Impacts	MINOR	MEDIUM
Conclusion	LOW	MEDIUM

## 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](http://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](mailto:nnss@apha.gsi.gov.uk)

**GB NON-NATIVE ORGANISM RISK ASSESSMENT SCHEME**

For more information visit: [www.nonnativespecies.org](http://www.nonnativespecies.org)

	<b>Name of Organism</b>	<b><i>Eliomys quercinus</i> - Garden Dormouse</b>	
	<b>Objectives:</b>	Assess the risks associated with this species in GB	
	<b>Version:</b>	Final (April 2016) - Original draft January 2012; amended by author February 2012; signed off by NNRAP February 2012; approved by GB Programme Board March 2015; published September 2015.	
	<b>Author:</b>	M. Burgess	
<b>N</b>	<b>QUESTION</b>	<b>RESPONSE</b>	<b>COMMENT</b>
1	What is the reason for performing the Risk Assessment?		Request by GB Programme Board for non-native species.
2	What is the Risk Assessment area?	England, Scotland and Wales	
3	Does a relevant earlier Risk Assessment exist?	NO OR UNKNOWN (Go to 5)	A brief risk assessment was undertaken as part of work horizon scanning for possible future invasive species to England (Natural England 2009).
4	If there is an earlier Risk Assessment is it still entirely valid, or only partly valid?		Previous Risk Assessment is valid but reference to Garden dormouse is only brief.
	<b>Stage 2: Organism Risk Assessment SECTION A: Organism Screening</b>		
5	Identify the Organism. Is the organism clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank?	YES (Give the full name & Go to 7)	<i>Eliomys quercinus</i> (Linnaeus 1766) Garden dormouse Rodentia - Mammalia. Easily distinguished from other small mammals, although confusion with juvenile grey squirrels is possible. Black eye markings distinctive. Identification via any European mammal field guide or 'The Handbook of British Mammals' .
6	If not a single taxonomic entity, can it be redefined?		
7	Is the organism in its present range known to be invasive, i.e. to threaten species, habitats or ecosystems?	NO or Uncertain (Go to 8)	
8	Does the organism have intrinsic attributes that indicate that it could be invasive, i.e. threaten species, habitats or ecosystems?	YES or UNCERTAIN (Go to 9)	
9	Does the organism occur outside effective containment in the Risk Assessment area?	NO (Go to 11)	
10	Is the organism widely distributed in the Risk Assessment area?		
11	Does at least one species (for herbivores, predators and parasites) or suitable habitat vital for the survival, development and multiplication of the organism occur in the Risk Assessment area, in the open, in protected conditions or both?	YES (Go to 12)	Garden dormouse habitat is predominantly woodland (deciduous, coniferous and mixed), rocky areas, gardens and orchards which all exist in the Risk Assessment Area.
12	Does the organism require another species for critical stages in its life cycle such as growth (e.g. root symbionts), reproduction (e.g. pollinators; egg incubators), spread (e.g. seed dispersers) and transmission, (e.g. vectors)?	NO (Go to 14)	
13	Is the other critical species identified in question 12 (or a similar species that may provide a similar function) present in the Risk Assessment area or likely to be introduced? If in doubt, then a separate assessment of the probability of introduction of this species may be needed.		
14	Does the known geographical distribution of the organism include ecoclimatic zones comparable with those of the Risk Assessment area or sufficiently similar for the organism to survive and thrive?	YES (Go to 16)	The Garden dormouse is endemic to Europe, now found mainly in western Europe including many Mediterranean islands but has undergone a significant range contraction in the eastern, central and southern parts of its former range resulting in a more fragmented distribution (Bertolino <i>et al.</i> , 2008). The Garden dormouse occurs in France, Germany and The Netherlands which have an ecoclimatic zone similar to the Risk Assessment Area.
15	Could the organism establish under protected conditions (e.g. glasshouses, aquaculture facilities, terraria, zoological gardens) in the Risk Assessment area?		

16	Has the organism entered and established viable (reproducing) populations in new areas outside its original range, either as a direct or indirect result of man's activities?	YES (Go to 17)	The Garden dormouse was possibly deliberately introduced by man onto the offshore Eolian islands of Salina and Lipari (Mitchell-Jones, 1994) and Mallorca (Bover & Alcover, 2008). It has also been suggested that some isolated populations in The Netherlands were introduced by man (Carpaneto & Cristaldi, 1995). Natural geographical spread has also occurred. An adult Garden dormouse from a coastal Dalmatian subspecies was trapped in continental Slovenia indicating dispersal (assisted or otherwise) over some distance is possible (Krystufek, 2003). Remains of Garden dormice have been found in Roman remains within the Risk Assessment Area (O'Connor, 1986) but it is believed these were not introduced to the wild but kept and eaten. There have been a number of reported cases of presumed accidental releases into the Risk Assessment Area (Harris & Yalden, 2008); an individual in north London captured and taken to a rescue centre, an escape from an animal rescue centre in Leicester in 2002, an individual that came as a car stowaway from France which then escaped (Morris pers. com.), and a group of six that lived wild in a Dover cemetery before being taken by cats in 1991 (Mitchell-Jones 1996).
17	Can the organism spread rapidly by natural means or by human assistance?	YES (Go to 18)	Can spread by natural colonisation and, where water is a boundary to spread, by ship-assistance.
18	Could the organism as such, or acting as a vector, cause economic, environmental or social harm in the Risk Assessment area?	YES OR UNCERTAIN (Go to 19)	The Garden dormouse is considered a pest in some areas due to damage caused to fruit and fruit orchards (Gil-Delgado <i>et al.</i> , 2010) and is also recorded entering buildings.
19	This organism could present a risk to the Risk Assessment area and a detailed risk assessment is appropriate.	Detailed Risk Assessment Appropriate GO TO SECTION B	
20	This organism is not likely to be a harmful non-native organism in the Risk Assessment area and the assessment can stop.	Detailed Risk Assessment Not Appropriate - STOP	

<b>B SECTION B: Detailed assessment of an organism's probability of entry, establishment and spread and the magnitude of the economic, environmental and social consequences</b>			
<b>Probability of Entry</b>	<b>RESPONSE</b>	<b>UNCERTAINTY</b>	<b>COMMENT</b>
1.1 List the pathways that the organism could be carried on. How many relevant pathways can the organism be carried on?	very few - 0	LOW - 0	1) Ship or plane-assisted transfer from ports and airports in countries where the species occurs, as a stowaway in containers or vehicles; 2) Escape or release from captive populations such as zoos, wildlife parks and private collections.
1.2 Choose one pathway from the list of pathways selected in 1.1 to begin the pathway assessments.	Ship or plane assisted		
1.3 How likely is the organism to be associated with the pathway at origin?	moderately likely - 2	LOW - 0	The species distribution includes coastal areas of western Europe. There is a risk that Garden dormice could be found in containers or shipments of fruit, seeds or similar foodstuffs. They have also been recorded in cars, including one that entered the Risk Assessment Area in a car transported by boat from France (Morris pers. com.; Harris and Yalden, 2008).
1.4 Is the concentration of the organism on the pathway at origin likely to be high?	very unlikely - 0	LOW - 0	Garden dormice occur at low densities (Bertolino <i>et al.</i> , 2001).
1.5 How likely is the organism to survive existing cultivation or commercial practices?	likely - 3	LOW - 0	Able to survive ship or air journey from mainland Europe.
1.6 How likely is the organism to survive or remain undetected by existing measures?	unlikely - 1	MEDIUM -1	No existing formal monitoring but colonising individuals would probably be quickly detected, as they have been in the past.
1.7 How likely is the organism to survive during transport /storage?	very likely - 4	LOW - 0	No reason to presume that species cannot survive even quite long periods on ships/planes or in containers. Garden dormouse ecology includes periods of hibernation which means they have the ability to store large quantities of fat to survive long periods without food.
1.8 How likely is the organism to multiply/increase in prevalence during transport /storage?	very unlikely - 0	HIGH -2	Pregnant females may give birth during transport or while held in captivity, but otherwise they would be unable to multiply during this time.
1.9 What is the volume of movement along the pathway?	minimal - 0	LOW - 0	Numbers concerned would almost certainly be single individuals.
1.10 How frequent is movement along the pathway?	very rarely - 0	LOW - 0	Numbers concerned would almost certainly be single individuals.
1.11 How widely could the organism be distributed throughout the Risk Assessment area?	very widely - 4	MEDIUM -1	Species could theoretically be initially be distributed widely within the Risk Assessment Area, but survival constrained by availability of suitable wooded habitat.
1.12 How likely is the organism to arrive during the months of the year most appropriate for establishment ?	moderately likely - 2	LOW - 0	Although the species could arrive in any month of the year, establishment would only be possible during the warmer months. In the cooler parts of their natural range they are active between May-September (Bertolino <i>et al.</i> , 2001).
1.13 How likely is the intended use of the commodity (e.g. processing, consumption, planting, disposal of waste, by-products) or other material with which the organism is associated to aid transfer to a suitable habitat?	unlikely - 1	LOW - 0	Commodity (food - fruit and seeds) would most likely be destined for the warehouse or packing house.
1.14 How likely is the organism to be able to transfer from the pathway to a suitable habitat?	very likely - 4	LOW - 0	Given the species' occasional occurrence in buildings, and the proximity of woodlands to most possible ports of entry, transfer to a suitable habitat is very likely.
1.2 Choose one pathway from the list of pathways selected in 1.1 to begin the pathway assessments.	escape or release from captivity		
1.3 How likely is the organism to be associated with the pathway at origin?	moderately likely - 2	HIGH -2	Garden dormice are kept in captivity in the Risk assessment Area, in zoos, wildlife parks and by private individuals, although the number is unknown and there is no register of captive animals.
1.4 Is the concentration of the organism on the pathway at origin likely to be high?	unlikely - 1	MEDIUM -1	Garden dormice are very unlikely to be kept in captivity in large numbers so therefore escape or release would only be of one or a small number of individuals.
1.5 How likely is the organism to survive existing cultivation or commercial practices?	likely - 3	MEDIUM -1	Garden dormice naturally hibernate during the winter and would be able to survive without food or water, although they would be very unlikely to be released or escape at this time. Survival would depend on time of year and location of point of release, being higher in summer months and if released/escaped in wooded habitats.
1.6 How likely is the organism to survive or remain undetected by existing measures?	unlikely - 1	MEDIUM -1	No existing formal monitoring exists but colonising individuals would probably be quickly detected, as they have been in the past.
1.7 How likely is the organism to survive during transport /storage?	very likely - 4	MEDIUM -1	Garden dormouse ecology includes periods of hibernation which means they have the ability to store large quantities of fat to survive long periods without food.
1.8 How likely is the organism to multiply/increase in prevalence during transport /storage?	N/A		
1.9 What is the volume of movement along the pathway?	minor - 1	LOW - 0	There is a greater chance of more than one individual being involved in this second pathway compared to pathway 1.
1.10 How frequent is movement along the pathway?	occasionally - 2	MEDIUM -1	Captive population size is unknown and escapes are not recorded or documented.
1.11 How widely could the organism be distributed throughout the Risk Assessment area?	very widely - 4	MEDIUM -1	Species could theoretically be initially distributed widely within the Risk Assessment Area, but survival constrained by availability of suitable wooded habitat. Entry to the Risk Assessment Area could occur in any locality, however it would be more likely in areas with higher human populations where captive held animals are more likely to be kept.
1.12 How likely is the organism to arrive during the months of the year most appropriate for establishment ?	likely - 3	MEDIUM -1	Although release/escape could occur in any month of the year it is far more likely to occur during the warmer months of the year when establishment is more likely. In the cooler parts of their natural range they are active between May and September (Bertolino <i>et al.</i> , 2001).
1.13 How likely is the intended use of the commodity (e.g. processing, consumption, planting, disposal of waste, by-products) or other material with which the organism is associated to aid transfer to a suitable habitat?	N/A		

1.14	How likely is the organism to be able to transfer from the pathway to a suitable habitat?	very likely - 4	MEDIUM -1	Given the species regular occurrence in buildings, and the proximity of woodlands in most regions of the Risk Assessment Area, transfer to a suitable habitat is very likely.
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	Probability of Establishment	RESPONSE	UNCERTAINTY	COMMENT
1.15	How similar are the climatic conditions that would affect establishment in the Risk Assessment area and in the area of current distribution?	similar - 3	LOW - 0	The natural distribution of the Garden dormouse includes France, Germany and The Netherlands, which all have similar climatic conditions. The climate of the Risk Assessment Area does not restrict or prevent Garden dormice from breeding and surviving.
1.16	How similar are other abiotic factors that would affect establishment in the Risk Assessment area and in the area of present distribution?	very similar - 4	MEDIUM - 1	The UK's other abiotic factors are very similar to France, Germany and The Netherlands. Abiotic factors are unlikely to significantly affect establishment, but any abiotic factors that may influence population persistence of Garden dormice are unlikely to be significantly different in the Risk Assessment Area to their natural distribution. Conditions, including climatic, are very similar to those found in the species' natural range. However in GB, conditions are less suitable at higher latitudes and higher elevations which would probably negatively affect survival and fecundity.
1.17	How many species (for herbivores, predators and parasites) or suitable habitats vital for the survival, development and multiplication of the organism species are present in the Risk Assessment area? Specify the species or habitats and indicate the number.	very many - 4	LOW - 0	No other species is vital for the survival or multiplication of this species. All relevant habitats for foraging and breeding are common throughout much of the Risk Assessment Area, particularly woodland (coniferous, deciduous and mixed). Other habitats that exist in the Risk Assessment Area and could be utilized by Garden dormice are rocky areas (including cliffs and mountain tops), orchards and rural gardens.
1.18	How widespread are the species (for herbivores, predators and parasites) or suitable habitats vital for the survival, development and multiplication of the organism in the Risk Assessment area?	widespread - 4	LOW - 0	Of the preferred habitats of Garden dormice, woodland in particular occurs throughout the Risk Assessment Area. Rocky areas such as cliffs and mountainous areas are also common habitats that occur throughout the area. Orchards are widespread but are especially concentrated in south east England, particularly in Kent, which is a region containing particularly busy ports of entry and so may be of greatest concern.
1.19	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 the risk assessment area?	N/A		
1.20	How likely is it that establishment will not be prevented by competition from existing species in the Risk Assessment area?	very likely - 4	MEDIUM - 1	Garden dormice would have few competitors within the Risk Assessment Area so therefore establishment is unlikely to be confounded by this. Some competition is likely, particularly from other small mammals such as the Grey squirrel, and competition for food and nest sites from birds and other animals. It has been suggested that it is threatened in some areas of its natural range (especially Corsica) because of direct competition with the Brown rat ( <i>Rattus norvegicus</i> ) (Macdonald & Barret 1993). However, the Garden dormouse would only be out competed by rat species if rats occurred at a particularly high density.
1.21	How likely is it that establishment will not be prevented by natural enemies already present in the Risk Assessment area?	very likely - 4	LOW - 0	Although similar-sized mammals in the UK do have some predators (e.g. predatory birds) the Risk Assessment Area has fewer potential predators than on mainland Europe. The introduced UK population of the ecologically similar Edible dormouse ( <i>Glis glis</i> ), appears to be regulated by food (the availability of beech fruits (Burgess, 2002)) rather than by any significant predation. An introduction of Garden dormouse into the Risk Assessment Area in 1990/91 resulted in all six animals being predated by a domestic cat (Mitchell-Jones, 1996).
1.22	If there are differences in man's management of the environment/habitat in the Risk Assessment area from that in the area of present distribution, are they likely to aid establishment? (specify)	N/A		Management of the environment is very similar in the Risk Assessment Area to the species' natural range.
1.23	How likely is it that existing control or husbandry measures will fail to prevent establishment of the organism?	very likely - 4	LOW - 0	Some resident rodent species can be shot/trapped under general licence. However, this is not considered to have a detrimental impact on their populations. It is unlikely that any ongoing local pest control would inadvertently encompass and remove any colonising Garden dormice.
1.24	How often has the organism been recorded in protected conditions, e.g. glasshouses, elsewhere?	very rare - 0	LOW - 0	Garden dormice do occasionally enter buildings (Bertolino <i>et al.</i> , 2008).
1.25	How likely is the reproductive strategy of the organism and duration of its life cycle to aid establishment?	moderately likely - 2	LOW - 0	Life expectancy is short, only 2-3 years (Schaub & Vaterlaus-Schlegel, 2001), which is much shorter than that of the Edible dormouse. Due to their short period of activity, only one yearly reproduction is normal (Bertolino <i>et al.</i> , 2001), which would restrict the potential for establishment compared to other rodents. Its lifespan, although short, coupled with being a hibernating species, makes it possible that an individual can survive for a few years thereby slightly increasing the probability of finding a mate from a subsequent introduction.
1.26	How likely is it that the organism's capacity to spread will aid establishment?	unlikely - 1	MEDIUM - 1	Garden dormice are considered to be relatively sedentary (Bertolino <i>et al.</i> , 2001), so even if there is a successful coloniser its spread would be slow.
1.27	How adaptable is the organism?	not adaptable - 0	LOW - 0	Given the species' decline in recent decades throughout much of its range, it is not considered to be particularly adaptable. However it does occur in a range of habitats and altitudes (Bertolino <i>et al.</i> , 2001).
1.28	How likely is it that low genetic diversity in the founder population of the organism will not prevent establishment?	likely - 3	MEDIUM - 1	The UK population of the Edible dormouse is thought to have had a founder population of less than 12 individuals. Garden dormice have been introduced to small islands where they have persisted - these would have had small founder populations and little, if any, genetic replenishment.
1.29	How often has the organism entered and established in new areas outside its original range as a result of man's activities?	few - 1	LOW - 0	The Garden dormouse was possibly deliberately introduced by man (Romans) onto the offshore Eolian islands of Salina and Lipari (Mitchell-Jones, 1994) and Mallorca (Bover & Alcover, 2008). A small population (6) existed in Dover, UK, in 1990-1991 before being predated by a cat (Mitchell-Jones, 1994).

1.30	How likely is it that the organism could survive eradication campaigns in the Risk Assessment area?	unlikely - 1	MEDIUM -1	This would depend on the population size when eradication campaign begins. If eradication begins early or when the population size is small and very localised, it would probably be successful. However the low level control of Edible dormice in the UK has no effect on populations and the population size has been too large for a successful eradication campaign for many years (Temple & Morris, 1997).
1.31	Even if permanent establishment of the organism is unlikely, how likely is it that transient populations will be maintained in the Risk Assessment area through natural migration or entry through man's activities (including intentional release into the outdoor environment)?	moderately likely - 2	MEDIUM -1	Although it is not possible for transient populations to be maintained by natural migration, intentional or accidental release by humans is a possibility. Garden dormice are kept in captivity and their release, intentional or by escape, has occurred on several occasions in the past (Morris, pers. comm.). The intentional release of Edible dormice into parts of the UK has been, in part, due to a grey area of law. Individuals have trapped them as household pests, where a population persists in the Chilterns, and released them into a new area believing it illegal to kill them (Morris, 1997); this would also be the case for Garden dormice as they are similarly protected.



	<b>Spread</b>	<b>RESPONSE</b>	<b>UNCERTAINTY</b>	<b>COMMENT</b>
2.1	How rapidly is the organism liable to spread in the Risk Assessment area by natural means?	slow - 1	LOW - 0	Spread of the ecologically similar Edible dormouse has been very slow, approximately 35km in 100 years (Morris, 1997), although this is related to the occurrence of a particular habitat (beech woodland). Garden dormice are regarded as sedentary (Bertolino <i>et al.</i> , 2001), have a lower life expectancy and occur at lower densities compared to Edible dormice.
2.2	How rapidly is the organism liable to spread in the Risk Assessment area by human assistance?	very slow - 0	LOW - 0	Garden dormice could be deliberately or accidentally introduced by humans, and this could occur more frequently if populations become established and they become pests, resulting in people trapping and releasing them into new areas. This has occurred with the similar Edible dormouse; however Garden dormice are less likely to be considered such a household pest so the risk is much lower with this species.
2.3	How difficult would it be to contain the organism within the Risk Assessment area?	easily - 1	MEDIUM - 1	If control is initiated when the population is small and restricted in range. Because Garden dormice commonly forage on the ground they are relatively easy to trap during their active period of the year (Bertolino <i>et al.</i> , 2001; Bertolino, 2007).
2.4	Based on the answers to questions on the potential for establishment and spread define the area endangered by the organism.			Any part of the Risk Assessment Area that contains any sort of woodland and any surrounding areas of rural gardens and orchards, coastal areas that contain rocky areas, and upland rocky habitats such as that found, for example, in most National Parks.

	Impacts	RESPONSE	UNCERTAINTY	COMMENT
2.5	How important is economic loss caused by the organism within its existing geographic range?	minor - 1	MEDIUM - 1	The Garden dormouse is considered a pest in some regions of its natural range, particularly in orchards where it eats fruit. Garden dormice have been considered a pest, or a potential pest, in alpine regions of Italy and in Spain.
2.6	Considering the ecological conditions in the Risk Assessment area, how serious is the direct negative economic effect of the organism, e.g. on crop yield and/or quality, livestock health and production, likely to be? (describe) in the Risk Assessment area, how serious is the direct negative economic effect of the organism, e.g. on crop yield and/or quality, likely to be?	minor - 1	LOW - 0	Little known, but use of orchards is recorded. Garden dormice are found in fruit orchards in their native range, and densities may be higher in proximity to orchards and houses (Bertolino <i>et al.</i> , 2001). One study conducted within an orange orchard found the winter and spring diet to be predominantly orange fruit, suggesting a potential to cause a negative economic effect (Gil-Delgado <i>et al.</i> , 2010). Mention is also made elsewhere of the species being an orchard pest (Krystufek, 2003; Burton & Burton, 1969). Significant damage to forestry is not documented but may possibly occur at a low level.
2.7	How great a loss in producer profits is the organism likely to cause due to changes in production costs, yields, etc., in the Risk Assessment area?	minor - 1	LOW - 0	Unlikely to be significant although some loss in profits is possible where fruit crops are affected.
2.8	How great a reduction in consumer demand is the organism likely to cause in the Risk Assessment area?	minimal - 0	LOW - 0	
2.9	How likely is the presence of the organism in the Risk Assessment area to cause losses in export markets?	very unlikely - 0	LOW - 0	
2.10	How important would other economic costs resulting from introduction be? (specify)	moderate - 2	LOW - 0	Moderate costs for research, monitoring and control.
2.11	How important is environmental harm caused by the organism within its existing geographic range?	minor - 1	MEDIUM - 1	Little environmental harm by the organism has been reported although Garden dormice are known to predate birds eggs and nestlings (Juskaitis, 2006; Gil-Delgado <i>et al.</i> , 2010), including those of rare species (Bechet <i>et al.</i> , 1998; Thibault & Villard, 2005). They are also known to predate adult birds and small mammals (Juskaitis, 2006; Gil-Delgado <i>et al.</i> , 2009). Damage to orchards is documented (Krystufek, 2003).
2.12	How important is environmental harm likely to be in the Risk Assessment area?	moderate - 2	MEDIUM - 1	The Risk Assessment Area contains fewer natural predators so any established population may be able to persist at higher densities. Garden dormice are known to predate eggs and young birds (Gil-Delgado 2006, Juskaitis, 2006), which may adversely affect some bird species with already small populations, although the population effects of this are unknown.
2.13	How important is social and other harm caused by the organism within its existing geographic range?	minimal - 0	LOW - 0	Occasionally enters buildings, with the potential to effect human health via faeces and urine which come into contact with human food and water supplies. However no serious disease or illness is known to result from this so human health effects would be very minor.
2.14	How important is the social harm likely to be in the Risk Assessment area?	minimal - 0	MEDIUM - 1	
2.15	How likely is it that genetic traits can be carried to native species, modifying their genetic nature and making their economic, environmental or social effects	very unlikely - 0	LOW - 0	No risk - no interbreeding with other dormice species has been documented, and would certainly not occur with the only native species, the Hazel Dormouse ( <i>Muscardinus avellanarius</i> ).
2.16	How probable is it that natural enemies, already present in the Risk Assessment area, will have no affect on populations of the organism if introduced?	likely - 3	LOW - 0	Similar species (e.g. Grey squirrel and Edible dormouse) have few predators 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 possible but none of these causes of mortality are likely to have any effect on the population.
2.17	How easily can the organism be controlled?	with some difficulty - 2	LOW - 0	Although relatively easy to trap, there is no evidence to suggest this can be used as an effective control method. Control within a small geographical area may be possible, but knowledge of the organism's 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. Any form of lethal control would need to be licensed as the Garden dormouse is a protected species (and has a rapidly declining population and distribution resulting in it being listed as Near Threatened by the IUCN), and so it is illegal to kill or disturb them within Europe, and the Risk Assessment Area.
2.18	How likely are control measures to disrupt existing biological or integrated systems for control of other organisms?	unlikely - 1	LOW - 0	Live trapping and shooting, commonly used to control Grey squirrel, is species specific so does not disrupt other biological systems. The use of poison however would be indiscriminate, potentially disrupting other biological systems, but this would be an unlikely method of official control.
2.19	How likely is the organism to act as food, a host, a symbiont or a vector for other damaging organisms?	unlikely - 1	LOW - 0	The Garden dormouse is known to be a common vector of Lyme disease (Matuschka <i>et al.</i> , 1999), though would not be any more likely to transmit the disease than other mammals. Compared to most other mammal vectors of Lyme disease, Garden dormice have a more sedentary ecology, reducing the species' potential as a significant vector.
2.20	Highlight those parts of the endangered area where economic, environmental and social impacts are most likely to occur			Those parts of the Risk Assessment Area which are primarily endangered are: (i) woodland and rocky areas around the coast of the UK, in areas surrounding ports which receive shipping from countries within the existing range of the Garden dormouse (potential for ship-assisted transfer); and (ii) commercial orchards in south east England due to proximity to ports receiving shipping from its existing range. Economic, environmental and social impacts are most likely to occur in commercial orchards, gardens, parklands and the immediate countryside surrounding these areas.

<b>Summarise Entry</b>	likely - 3	LOW - 0	The accidental entry of the species into the Risk Assessment Area has already occurred on a number of occasions, proving the species capability of entry. Previous entries have been as stowaways on lorries or cars carried by ship, or escapes from captivity. Given the fact that they occur naturally on the European coastline of the English Channel, and that they are kept in captivity, entry in the future is likely.
<b>Summarise Establishment</b>	moderately likely - 2	LOW - 0	Despite the suitability and availability of required habitats, establishment is unlikely due to the small founder population from potential pathways, the importance of timing of introduction (due to long period of hibernation) and a slow reproductive ecology. A life span of 2-3 years slightly increases the probability of finding a con-specific from a subsequent introduction, although the probability is very low. However if the a population can be established it is likely to be capable of persisting.
<b>Summarise Spread</b>	slow - 1	MEDIUM -1	Once established, the Garden dormouse has the potential to spread throughout woodland habitats, and possibly rocky and rural garden habitats. In its native range however, it is regarded as sedentary. A UK population of a similar species, the Edible dormouse, has been very slow to spread - although this is because of reliance on a habitat with restricted availability and with barriers to dispersal.
<b>Summarise Impacts</b>	minor - 1	MEDIUM -1	In general, any impacts are likely to be minimal but the species is considered an agricultural pest in some parts of its natural range. The species has the potential to cause damage to fruit crops in particular. Garden dormice have the potential to adversely affect birds through predation of eggs, nestlings and adults although the extent and population effects of this predation is unknown. There is a possible risk to human health from individuals that enter buildings. These impacts are more likely in areas of the Risk Assessment Area close to ports, with south east England, an area used for fruit production and close to ports, being the most vulnerable.
For pathway/policy risk assessment Assess the potential for establishment and economic/environmental/social impacts of another organism or stop			
<b>Conclusion of the risk assessment</b>	LOW - 0	MEDIUM -1	Likelihood of entry from their native range is highest from ship transported stowaways, or from captive populations. This is likely in the future. On entry the species is unlikely to establish successfully, and is especially unlikely between October-March when they naturally hibernate. The principal danger area comprises urban/semi-urban habitat around ports/coasts. The most important potential impacts are environmental, with predation of local urban/semi-urban birds and mammals. If established, then there is a potential economic impact to fruit growers, particularly in south east England. The Garden dormouse poses a similar risk to the Edible dormouse. However if it entered the Risk Assessment Area the risk posed in terms of spread and establishment is slightly greater because of its slightly broader habit requirements, and its ability to breed annually (Edible dormice breeding is closely related to beech masting with reproduction skipping occurring in years with no available beech fruits).
<b>Conclusions on Uncertainty</b>		MEDIUM -1	There is recognition of the pest status of the species in its native range. Similar damage could occur in the Risk Assessment Area following entry and establishment. See table below for list of uncertainties and priorities for future work.

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