Allegato 7.3.2
Pest Risk-Assessment per lo scoiattolo grigio (*Grey squirrel Pest Risk Assessment*)

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The Grey squirrel Pest Risk Assessment has been produced following three different European procedures, these are:

- ISEIA (Invasive Species Environmental Impact Assessment) - Guidelines of the harmonia information system (source: Belgian Forum on Invasive Species (http://ias.biodiversity.be); final list score: A2 (black list);

- QUICKSCAN RISK ASSESSMENT - Method according to a report for the Commission for Invasive exotic species (COIE) of the Netherlands Ministery of Agriculture, Nature and Food quality; final evaluation: this organism could present a risk to the Risk Assessment area (Italy);

- UK NON-NATIVE ORGANISM RISK ASSESSMENT SCHEME Version 3.3 - Prepared by CABI Bioscience (CABI), Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Centre for Ecology and Hydrology (CEH), Central Science Laboratory (CSL), Imperial College London (IC) and the University of Greenwich (UoG). Final evaluation: risk of entry: 4 (very likely), risk of establishment: 4 (very likely), risk of spread: 2 (intermediate), impacts 3 (major).

QUICKSCAN RISK ASSESSMENT GREY SQUIRREL

QUICKSCAN VALUTAZIONE DEL RISCHIO SCOIATTOLO GRIGIO

Method according to a report for the Commission for Invasive exotic species (COIE) of the Netherlands Ministery of Agriculture, Nature and Food quality
Il metodo adottato ha seguito le indicazioni di un rapporto per la Commissione per le Specie Esotiche Invasive (COIE) del Ministero olandese dell'Agricoltura, Natura e Qualità dell'Alimentazione.
Dijkstra V. & Dekker J. (2008) Risico-assessment uitheemse eekhoorns. VZZ rapport 2008.10. Zoogdiervereniging VZZ, Arnhem.

1. Identify the organism (Identificare l'organismo)
Sciurus carolinensis Gmelin, 1788 (scoiattolo grigio). Scoiattolo arboricolo di taglia media con assenza di dimorfismo. La lunghezza testa-corpo è di 380-525 mm, mentre la lunghezza della coda è di 150-250 mm. Il peso negli adulti varia tra i 300 e i 710 g. La colorazione del dorso è grigio cenere con parti rosso mattone su fianchi, zampe e capo; a livello dorsale il grigio può sfumare nel rosso mattone. Le orecchie sono prive dei ciuffi di peli. La coda presenta una parte centrale con tonalità grigie chiare e rossicce e un caratteristico alone esterno bianco. Il melanismo è comune in America, ma non è mai stato osservato in Italia.

2. Is the organism clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank? (L'organismo è un'entità tassonomica ben definita e adeguatamente distinguibile da altri taxa dello stesso livello?)
Si, la specie è identificabile morfologicamente in base alle biometrie del corpo-coda, la tipica colorazione del pelo dorso-laterale e della coda. In caso di dubbi la specie è chiaramente identificabile a livello genetico.
Se si, vai a punto 4

4. Is the organism in its present range (including areas where it has spread or been successfully introduced beyond its natural range) known to be invasive, i.e. to threaten species, habitats or ecosystems?
(La specie è invasiva? È una minaccia per specie autoctone, habitat o ecosistemi nell'area dove è stata introdotta o che ha successivamente colonizzato?)
Si, la specie causa l'estinzione della specie autoctona *Sciurus vulgaris* (scoiattolo comune) nelle aree dove le due specie entrano in contatto.
Se si, vai a punto 6

6. Is the organism widely distributed in the Risk Assessment area? (La distribuzione della specie nell'area del "Risk assessment" è ampia?)
In Piemonte l'areale della meta-popolazione è estesa. Nel resto dell'areale italiano i nuclei o le popolazioni della specie sono generalmente ancora limitati a piccole aree, come parchi o singoli boschi (es. Genova Nervi, Parco di Legnano), mentre in altri siti la distribuzione delle popolazioni non è ben nota ma è potenzialmente estesa o comunque in fase di aumento (es. Parco di Montevecchia, Parco del Ticino).

Se no, vai a punto 7

7. 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? (Esiste almeno un habitat o una

risorsa alimentare essenziale per la sopravvivenza e la riproduzione della specie nell'area di distribuzione?)
Si, la specie è presente in boschi misti e in parchi alberati, entrambi habitat con ottima disponibilità alimentare.

Se si, vai a punto 8

8. 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)? (La specie ha bisogno di altri organismi durante una fase critica del ciclo vitale?)
No

Se no, vai a punto 10.

10. 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?
(Le zone eco-climatiche di distribuzione della specie nell'area di "Risk assessment" sono abbastanza simili a quelle nell'areale di distribuzione naturale?)

Si, in entrambi i casi la specie si trova in zone eco-climatiche temperate; inoltre nell'areale naturale da nord a sud esistono variazione climatiche molto ampie a indicare una certa adattabilità della specie.

Se si, vai a punto 12.

12. 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? (Esistono già popolazioni autosufficienti che si riproducono ed espandono nell'areale di introduzione e colonizzazione?)

Si, la specie è in continua crescità in Piemonte, mentre popolazioni dove gli animali si riproducono esistono in Liguria e in alcuni siti della Lombardia.

Se si, vai a punto 13.

13. Can the organism spread rapidly by natural means or by human assistance? (La specie si può diffondere velocemente in modo naturale o con l'aiuto dell'uomo?)
Si, la velocità di colonizzazione naturale di nuove aree dipende del grado di frammentazione degli habitat e dalla loro qualità nelle aree già occupati. La velocità di dispersione naturale è molto variabile e può essere sia bassa e sia relativamente alta a seconda delle condizioni ambientali. Purtroppo, arrivano di continuo nuove segnalazioni della specie in siti separati e lontani da quelli di presenza accertata, indicando che nuovi rilasci (volontari o no) sono frequenti.
E' dunque essenziale proibire immediatamente il commercio della specie e obbligare alla sterilizzazione degli individui attualmente presenti in cattività.

Se si, vai a punto 14.

14. Could the organism as such, or acting as a vector, cause economic, environmental or social harm in the Risk Assessment area? (La specie può causare danni economici, ambientali o sociali nell'area del "Risk assessment"?)

Si, la specie causa l'estinzione della specie autoctona *Sciurus vulgaris*, ed è dunque un rischio per la biodiversità. Altri potenziali effetti sono legati alla predazione sull'avifauna, in particolare su specie che nidificano in cavità arboree. La specie causa danni da scorteggiamento nei pioppeti e consuma sementi e bulbi appena seminati o piantati.

Se si o incerta, vai a punto 15.

15. 15. This organism could present a risk to the Risk Assessment area and a detailed risk assessment is appropriate.
15. Questa specie può presentare rischi per l'Italia; è quindi necessario passare a un "risk assessment" dettagliato.

ENVIRONMENTAL IMPACT ASSESSMENT SCIURUS CAROLINENSIS IN ITALY ACCORDING TO THE ISEIA (Invasive Species Environmental Impact Assessment) GUIDELINES OF THE HARMONIA INFORMATION SYSTEM (source: Belgian Forum on Invasive Species – http://ias.biodiversity.be)

Based on guidelines proposed by the CBD decision VI/7 and the European strategy on Invasive Alien Species, which categorises non-native alien species based on a two-dimensional ordination (environmental impact x invasion stage)

Scoring system based on a 3-point scale for assessment providing information exists and is well documented in the literature (low level of uncertainty):
L = Low score = 1
M = Medium score = 2
H = High score = 3

Poorly documented parameter (based on expert judgement, field observations):
Unlikely score = 1
Likely score = 2

Nothing can be said about parameter: DD = deficient data, no score

Parameter	Risk Score for *Sciurus carolinensis* in Italy
5.1. Dispersion potential	high (3)
5.2. Colonisation of high conservation value habitats	high (3)
5.3. Adverse impacts on native species - predation	low
Adverse impacts on native species – competition	high (3)
Adverse impacts on native species – disease transmission	high
Adverse impacts on native species – genetic effects	low
5.4. Alteration of ecosystem functioning – nutrient cycling	low
Alteration of ecosystem functioning – physical alterations	DD
Alteration of ecosystem functioning – succession modifications	low
Alteration of ecosystem functioning – food web disruption	likely (2)
Global ISEIA environmental risk score	11 – List category = **Black list (A)**
6. Invasion stage in Italy	3 – Naturalised species with a restricted range in strong expansion in the wild

Final List Score = A2 (Black list)

A black list species for which IMMEDIATE ACTIVE CONTROL MEASURES must be taken to:
(i) eradicate all isolated populations
(ii) contain in those regions with large population(s) over extended area(s).

Date: 04/05/2011

References

Andersen MC, Adams H, Hope B, Powell M (2004) Risk assessment for invasive species. Risk analysis 4: 787-793.

Baker R, Hulme P, Copp GH, Thomas M, Black R, Haysom K (2005) Standard methodology to assess the risks from non-native species considered possible problems to environment. DEFRA.

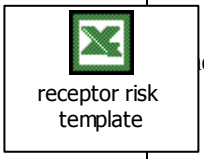
Genovesi P, Shine MC (2003) European strategy on invasive alien species. Europe Council, Convention on the conservation of European wildlife and natural habitats.

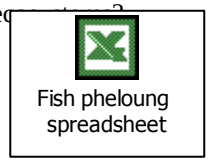
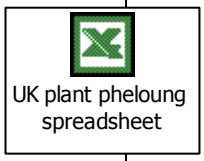
UK NON-NATIVE ORGANISM RISK ASSESSMENT SCHEME Version 3.3

Prepared by CABI Bioscience (CABI), Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Centre for Ecology and Hydrology (CEH), Central Science Laboratory (CSL), Imperial College London (IC) and the University of Greenwich (UoG) under Defra Contract CR0293, February 2005.

NOTE: This template contains minimal help and background. Please refer to the User Manual and examples of best practice when using this scheme.

	Name of Organism, Pathway, Receptor or Policy	*Sciurus carolinensis* Gmelin, 1788 (grey squirrel or eastern grey squirrel)
	Objectives:	Assessment of the potential spread and impact on the native *Sciurus vulgaris* (red squirrel)
	Authors, Date, Draft:	Wauters Lucas, Bertolino Sandro, Gurnell John, 15/06/2010, draft 2

N	QUESTION	RESPONSE	COMMENT
1	What is the reason for performing the Risk Assessment?  	e organism has been identified as a risk by scientific research	Widescale spread from release sites in Italy and to neighbouring countries has been predicted (Lurz et al. 2001; Tattoni et al. 2006; Bertolino et al. 2008). There is also a receptor risk since resource competition with native red squirrels causes extinction of the latter (Wauters et al. 2001, 2002a, b; Gurnell et al. 2004)
2	What is the Risk Assessment area?	Italy	
3	Does a relevant earlier Risk Assessment exist?	NO OR UNKNOWN (Go to 5)	
4	If there is an earlier Risk Assessment is it still entirely valid, or only partly valid?		
	Stage 2: Organism Risk Assessment SECTION A: Organism Screening		
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)	Sciurus carolinensis
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?	YES (Go to 9)	threatens the native red squirrel (sciurus vulgaris) with extinction; reports by woodland owners of negative effects on some hole-breeding birds and possibly on edible dormouse (Myoxis glis)

8	Does the organism have intrinsic attributes that indicate that it could be invasive, i.e. threaten species, habitats or ec[illegible]  Fish pheloung spreadsheet  UK plant pheloung spreadsheet		
9	Does the organism occur outside effective containment in the Risk Assessment area?	YES (Go to 10)	Known distribution (2010) described in Martinoli et al. 2010
10	Is the organism widely distributed in the Risk Assessment area?	NO (Go to 11)	Current distribution (2010) consists of one large (meta)population in Piedmont, one in the Ticino Park, Lombardy, several smaller, often isolated nuclei in Lombardy, and a population in parks and gardens at Genova Nervi, Liguria. In the latter case, squirrels seemed to have start collonising areas outside the park in recent years
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)	Si, la specie è presente in boschi misti e in parchi, entrambi habitat con ottima disponibilità alimentare
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)	Temperate areas in both natural and introduced range (Bertolino 2008, 2009); moreover the natural Nearctic range of the species includes a wide variation of habitat types and climate, indicating high adaptability to different eco-climatic conditions (Koprowski 1994) .

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)		Continuous spread and colonisation of new areas in Piemont (Wauters et al. 1997; Bertolino & Genovesi 2003), establishment of various (Martinoli et al. 2010) populations in different locations in Lombardy
17	Can the organism spread rapidly by natural means or by human assistance?	YES (Go to 18)		High natural dispersal capacity (Koprowski 1994; Wauters et al. 1997; Lurz et al. 2001)
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)		Economic damage to poplar plantations has been described (Currado 1993; Currado et al. 1997); damage-payment requests from landowners in Piedmont for tree damage (F. Gauthier, pers. comm.); high consumption rate of immature hazelnuts in hazel orchards
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.			
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**			
	Probability of Entry	**RESPONSE**	**UNCERTAINTY**	**COMMENT**
1,1	List the pathways that the organism could be carried on. How many relevant pathways can the organism be carried on?	many - 3	LOW - 0	Escapes from pet shops, pet owners, deliberate release from pet owners, deliberate (new) introductions, future spread from the existing populations (Lurz et al. 2001, Tattoni et al. 2006, Bertolino et al. 2008, Bertolino 2009).
1,2	Choose one pathway from the list of pathways selected in 1.1 to begin the pathway assessments.	further spread from existing populations		
1,3	How likely is the organism to be associated with the pathway at origin?	very likely - 4	LOW - 0	The principal pathway for entry is escape or release from captivity. The origin of the pathway is considered to be the keeping of the animals in captivity but also deliberate introductions in parks and woods. Likelihood of association is considered to remain high as long as the species continues to be kept in captivity and sold by pet shops.

1,4	Is the concentration of the organism on the pathway at origin likely to be high?	likely - 3	MEDIUM -1	Natural populations can establish from few founders (< 10 animals) but grow quickly (Bertolino & Genovesi 2005, Bertolino 2009)
1,5	How likely is the organism to survive existing cultivation or commercial practices?	very likely - 4	LOW - 0	Occurs in habitats similar as in the native area (North America)
1,6	How likely is the organism to survive or remain undetected by existing measures?	unlikely - 1	LOW - 0	Day-active and often foraging on the ground, easy to recognise. A large number of cases of new nuclei consisting (probably) of only few animals have been reported by the public and by wildlife rangers
1,7	How likely is the organism to survive during transport /storage?	N/A		
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?	moderate - 2	MEDIUM -1	At least 10 separate releases/escapes have occurred in the past decade in Lombardy; number of animals unknown (Martinoli et al. 2010)
1,10	How frequent is movement along the pathway?	often - 3	LOW - 0	New releases still occur occassionally, but natural dispersal in existing populations is common as revealed by hair-tube monitoring in Piedmont and Ticino Park (Genovesi & Bertolino 2001, Bertolino & Genovesi 2003).
1,11	How widely could the organism be distributed throughout the Risk Assessment area?	limited - 1	MEDIUM -1	Actual distribution still limited in Italy but species is spreading
1,12	How likely is the organism to arrive during the months of the year most appropriate for establishment ?	likely - 3	LOW - 0	Generalist species that can adapt diet to resources availability; late winter can be critical period in years of low food abundance (tree seed production) Gurnell 1996; Gurnell et al. 2001, 2004; Wauters et al. 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?	moderately likely - 2	MEDIUM -1	Use of the species as a pet or in small zoos/exhibits is likely, in many cases, to place it in proximity to suburban gardens, parkland, cemeteries etc, which could provide suitable habitat.
1,14	How likely is the organism to be able to transfer from the pathway to a suitable habitat?	very likely - 4	LOW - 0	Woodland species but habitat generalist and high dispersal capacity
	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?	very similar - 4	LOW - 0	Climatic conditionin the Po Plain and in low elevation mountain in the north-western Italy (current distribution) are similar to large part of Italy

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	LOW - 0	Temperate forests and woodlands in Europe have many tree species that are similar (same genus) than in the native area of grey squirrels and thus produce food resources similar in quantity and quality; (sub)urban park populations occur both in Europe and N. America
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.	many - 3	LOW - 0	The species lives in deciduous, mixed and coniferous woodland habitats feeding on nuts, seeds, tree flowers, buds, mushrooms, berries, catterpillars, rarely in insects and bird eggs/young and sometimes on cereals (mais). The species is also regularly found in parks and towns. Therefore no single species is "vital" for its survival, development and multiplication. However, suitable habitat is present and widely distributed in the Risk Assessment Area.
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	These habitats are available over the whole of Italy
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	LOW - 0	Outcome of competition with red squirrels is in favour of alien species (Gurnell & Pepper 1993; Kenward & Holm 1993; Wauters et al. 2001, 2002a, b; Gurnell et al. 2004)
1,21	How likely is it that establishment will not be prevented by natural enemies already present in the Risk Assessment area?	likely - 3	LOW - 0	A range of potential predators exist in Italy, these include raptors, red fox (*Vulpes vulpes*), stone and pine marten (*Martes* sp.), feral and domestic cats, and potentially owls. This suite of predators has not prevented the establishment (except for a small number of animals released in Rome), nor the spread of the animals in Piedmont and Lombardy. Feral/domestic cats may have a significant impact in some areas.
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		
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	No control carried out yet (May 2011)

1,24	How often has the organism been recorded in protected conditions, e.g. glasshouses, elsewhere?	occasional - 2	MEDIUM -1	grey squirrels are still sold as pets, but there is no info on the extend of this practise: legislation is in preparation to stop importation and traid
1,25	How likely is the reproductive strategy of the organism and duration of its life cycle to aid establishment?	very likely - 4	LOW - 0	Can have 2 litters/year with 2-5 weaned young; varying % of adult females reproduce in a given season
1,26	How likely is it that the organism's capacity to spread will aid establishment?	very likely - 4	LOW - 0	Dispersal capacity high, juveniles can move easily between 1 and 3 (5) km from the natal site (Koprowski 1994; Wauters et al. 1997; Lurz et al. 2001)
1,27	How adaptable is the organism?	adaptable - 3	LOW - 0	Occurs in a wide variety of woodland habitat types
1,28	How likely is it that low genetic diversity in the founder population of the organism will not prevent establishment?	very likely - 4	LOW - 0	Piedmont population from only 4 founders, many other tree squirrel introductions had success using less than 10 founders (Bertolino & Genovesi 2005; Bertolino 2009)
1,29	How often has the organism entered and established in new areas outside its original range as a result of man's activities?	moderate number - 2	LOW - 0	59 out of 74 (79.7%) introductions outside the native range in US, Canada, Europe, Australia, South Africa, were succesful (Bertolino 2009)
1,30	How likely is it that the organism could survive eradication campaigns in the Risk Assessment area?	moderately likely - 2	MEDIUM -1	So far no eradication campaigns have been started, but control actions in the UK and Ireland show that high removal rates are necessary to obtain success and that numbers return quickly to pre-control levels once killing is stopped (Lawton & Rochford 2007)
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)?	very likely - 4	LOW - 0	several intentional releases have certainly occurred in Lombardy over the past decade (1999-2008)
	Spread	**RESPONSE**	**UNCERTAINTY**	**COMMENT**
2,1	How rapidly is the organism liable to spread in the Risk Assessment area by natural means?	intermediate - 2	LOW - 0	Active saturation dispersal, mainly of immature individuals, which will colonize new areas of suitable habitat
2,2	How rapidly is the organism liable to spread in the Risk Assessment area by human assistance?	intermediate - 2	MEDIUM -1	This will depend on how fast an efficient control of animals already present in pet-shops will be obtained and on when the complete ban of introduction and traid will become law
2,3	How difficult would it be to contain the organism within the Risk Assessment area?	with some difficulty - 2	MEDIUM -1	Likelihood is that it could be 'contained', partly because of seasonally high trappability, and partly because of easy recognition of the species in new areas. However, practical difficulties likely to arise because of diverse

				landownership patterns likely to be encountered in typical release/escape areas and because of potential public opposition to control (Barr et al. 2002; Rushton et al. 2002).
2,4	Based on the answers to questions on the potential for establishment and spread define the area endangered by the organism.	Suitable habitat throughout RA area	LOW - 0	
	Impacts	**RESPONSE**	**UNCERTAINTY**	**COMMENT**
2,5	How important is economic loss caused by the organism within its existing geographic range?	major - 3	LOW - 0	For economic damage in existing range see Koprowski 1994. Introduced in the British isles, the species has caused major damage to forestry (Kenward & Parish 1986; Gurnell & Pepper 1993; Rushton et al. 2002)
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 quality, likely to be? 	moderate - 2	HIGH -2	Difficult to assess at this time. Damage expected to increase in poplar plantations for pulpwood, future damage expected in hazelnut orchards in Piedmont; possible impact on vineyards (Currado et al. 1987, Currado 1993, Signorile & Evans 2007)
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?	moderate - 2	HIGH -2	See 2.6.
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?	unlikely - 1	MEDIUM -1	
2,10	How important would other economic costs resulting from introduction be? (specify)			
2,11	How important is environmental harm caused by the organism within its existing geographic range?	minimal - 0	LOW - 0	Game species over much of its native range (Koprowski 1994)
2,12	How important is environmental harm likely to be in the Risk Assessment area?	major - 3	LOW - 0	Causes extinction of a native species, the red squirrel
2,13	How important is social and other harm caused by the organism within its existing geographic range?	minimal - 0	LOW - 0	
2,14	How important is the social harm likely to be in the Risk Assessment area?	moderate - 2	MEDIUM -1	Social conflict expected on eradication programmes that will be inacceptable for extreme animal-rights groups; this must be

				mitigated by large-scale information and education campaigns
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 more serious?	very unlikely - 0	LOW - 0	No inbreeding with native squirrels documented
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?	moderately likely - 2	MEDIUM -1	Predation is only rarely a major cause of mortality in grey squirrel populations (Koprowski 1994; Gurnell 1996)
2,17	How easily can the organism be controlled?	with some difficulty - 2	MEDIUM -1	No control carried out yet (May 2011), but control programmes in Britain show need for intensive, long-term effort.
2,18	How likely are control measures to disrupt existing biological or integrated systems for control of other organisms?	very unlikely - 0	LOW - 0	target-species specific methods of control (live trapping)
2,19	How likely is the organism to act as food, a host, a symbiont or a vector for other damaging organisms?	likely - 3	LOW - 0	Possible vector for Poxvirus which causes a lethal disease in native red squirrels (Tompkins et al. 2002)
2,20	Highlight those parts of the endangered area where economic, environmental and social impacts are most likely to occur		LOW - 0	The parts of the risk assessment area that are most likely to be affected are those in close proximity to human habitation, where escapes/releases from captivity are most likely to occur. Establishment is most likely to occur where such areas provide access to suitable habitat, such as woodlands and parks. Environmental and economic impacts are most likely to occur in plantations and semi-natuatl habitats where red squirrels occur. In gardens and parks social impacts are most likely. Cereal production in fragmented landscapes with established populations in small woods may also be threatened.
	Summarise Entry	very likely - 4	LOW - 0	Introduced several times between 1948 (Piedmont) and 2008; escapes occur from pet-shops and owners
	Summarise Establishment	very likely - 4	LOW - 0	Already established in parts of Piedmont, Lombardy, Liguria, Umbria (Venturini et al. 2005; Martinoli et al. submitted)
	Summarise Spread	intermediate - 2	LOW - 0	Typical saturation dispersal of small-sized mammals; SEPD models show typical logistic growth with slow population growth and spread in the early phase after introduction, followed by rapid increase of population size and distribution range (Lurz et al. 2001; Tattoni et al. 2006; Bertolino et al. 2008)

Summarise Impacts	major - 3	LOW - 0	Extinction native red squirrel (Wauters et al. 1997; Bertolino & Genovesi 2003)
For pathway/policy risk assessment Assess the potential for establishment and economic/environmental/social impacts of another organism or stop			
Conclusion of the risk assessment	HIGH -2	LOW - 0	
Conclusions on Uncertainty		LOW - 0	A large number of scientific publications demostrate the invasiveness of the grey squirrel, its economic impact (in Britain) and mechanisms by which it replaces the native red squirrel, causing wide-scale extinction of the latter
Should risk management options be considered?	YES (Go to Risk Management)		

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