Review of *Callosciurus erythraeus* and *Sciurus niger*

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1. INTRODUCTION

Invasive Alien Species (IAS) are considered one of the most important threats to biodiversity, as well as impacting the economy and human health (Bruemmer *et al.,* 2000; Genovesi and Shine, 2003; Bertolino, 2008; CBD Secretariat, 2009; Kettunen *et al.,* 2009).

Most EU Member States have some national legislation in relation to IAS, although they vary widely in terms of scope and purpose (Miller *et al.,* 2006; Shine *et al.,* 2008). The European Commission recognised IAS as an emerging issue (Genovesi and Shine, 2003) and is currently considering several policy options for the best EU strategy on IAS (Shine *et al.,* 2008; Shine *et al.,* 2009a; 2009b):

- Option A: Business as usual
- Option B: Maximising use of existing approaches and voluntary measures
- Option B+: Amending existing legislation
- Option C: Comprehensive, dedicated EU legal instrument

It was recognised that prevention of unwanted introductions is the most desirable approach, followed by eradication where possible or long-term containment/control (Shine *et al.,* 2008). Shine *et al.* (2009b) advised that "a comprehensive EU legal instrument, is the only policy package that could deliver the necessary visibility, coverage, coordination, resourcing and horizon-scanning for all types of IAS risks and impacts."

The EU Wildlife Trade Regulations contain provisions to list in Annex B, "species in relation to which it has been established that the introduction of live specimens into the natural habitat of the Community would constitute an ecological threat to wild species of fauna and flora indigenous to the Community" (Article 3.2(d) of EC Regulation 338/97). The Commission may also establish restrictions on introduction into the Community "of live specimens of species for which it has been established that their introduction into the natural environment of the Community presents an ecological threat to wild species of fauna and flora indigenous to the Community" (Article 4.6(d) of EC Regulation 338/97). There are also provisions to restrict "the holding or movement of live specimens of species in relation to which restrictions on introduction into the Community have been established in accordance with Article 4(6)." Four IAS have already been listed in Annex B, with their import into the EU currently prohibited: the Red-eared slider *Trachychemys scripta elegans*, American bullfrog *Rana catesbeiana*, Painted turtle *Chrysemys picta* and Ruddy duck *Oxyura jamaicenis*.

Tree squirrels were considered to make particularly successful invasive species due to their high reproductive potential, ability to disperse effectively, diverse food habits, ability to build nests, and adaptability to human-impacted landscapes (Palmer *et al.,* 2007). Bertolino (2009) reported that the most frequent vectors of squirrel introductions were the pet market, private citizens and zoos, with squirrels introduced into new areas by either intentional release into public estates and parks or the escape of imported live animals. The negative impacts of invasive squirrels were reported to include competition with native squirrels, negative impact on breeding birds, damage to vegetation, crop damage, spread of parasites and disease, and damage to electric cables and irrigation systems (Bertolino, 2009).

A review of the North American Grey squirrel *Sciurus carolinensis* was presented at SRG53 along with a proposal from Italy to list the species in Annex B of EC Regulation no. 338/97. Two additional invasive squirrel species were proposed for review: *Callosciurus erytherus* and *Sciurus niger.*

This report investigates whether *Callosciurus erytherus* and *Sciurus niger* are currently offered for sale in the EU, the status and distribution of any existing introduced populations in the EU, the (potential) impact on native EU fauna and flora of any introduced populations, and any existing legislation or management measures in place, to determine whether these species might merit listing in Annex B of Council Regulation 338/97, Article 3.2(d).

General EU legislation for IAS and the relevant legislation of the individual Member States was described in detail in Miller *et al,* (2006) and Shine *et al.* (2008), hence only legislation specific to *C. erytherus* and *S. niger* is presented in this report.

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2. METHODS

In the absence of any trade statistics, an internet survey was conducted 4th-12th October 2010, in order to investigate whether live *Callosciurus erythraeus* and *Sciurus niger* appear to be traded within the EU, and whether there appears to be demand for these species as pets.

Firstly, a list of pet retailers or classifieds websites offering small animals for sale within a variety of EU countries was compiled (Annex), and each website was checked for advertisements relating to *C. erythraeus* and *S. niger*. Secondly, Google searches were conducted in a number of EU languages (Danish, Dutch, English, Finnish, French, German, Italian, Portuguese, Spanish and Swedish), using the Google search engines of those countries and search terms such as 'for sale', 'buy', 'pets', 'price' and 'wanted', and the translated terms, as appropriate, as well as the species' scientific and common names.

In each case, price and source (e.g. wild or captive-bred) were noted when available, in addition to whether the advertisement used the species' scientific or common name. There may be some uncertainty regarding advertisements using a species' common name, as often the same common name may be used for several species. However, initial searches revealed that for small mammal pets (such as hamsters, rabbits, chinchillas and chipmunks), common names are generally used, hence searching by scientific name would have restricted our findings. Nevertheless, if photographs indicated that the species advertised was not *C. erythraeus* or *S. niger*, this information was noted.

Any other indications that these species are kept as pets, or that there is demand for them as pets, were also noted, as well as any other indications of trade in the species or its parts and derivatives (such as skins or meat).

3. SPECIES REVIEWS

MAMMALIA SCIURIDAE

SPECIES:	*Callosciurus erythraeus*
SYNONYMS:	*Callosciurus flavimanus*
COMMON NAMES:	Veverka Pallasova (Czech), Pallas's Squirrel, red-bellied tree squirrel (English), Pune-kabeorav (Estonian), Écureuil à ventre rouge (French), Csinos tarkamókus (Hungarian), Ardilla de Pallas (Spanish)
RANGE STATES:	Argentina (int), Belgium (int), Bhutan, Cambodia, China, France (int), Hong Kong (int), India, Japan (int), Lao People's Democratic Republic, Malaysia, Myanmar, Taiwan, Province of China, Thailand, The Netherlands (int), Viet Nam
IUCN RED LIST:	Least Concern

TRADE PATTERNS

Offers for sale

- Two individuals of "Rødbuget egern (*Callosciurus Erythraeus*)" were advertised for sale (with photographs) on the Danish website www.egern-hobby.dk/unger_tilsalg_2008.htm.
- Three individuals of "Rødbuget egern" were listed for sale for a total of DKK 4500 on the Danish website http://fuglemarkedet.dk/annoncer/.
- An individual of "egern, rødbuget" (with photographs), female, two years old, was listed for sale for DKK 1500 on the Danish website www.guloggratis.dk.
- A mature pair and five juvenile "Pallas ekorrar" (with photographs) were sold on a Swedish classifieds web site http://www.zoonen.com/annonzparken/ for SEK 2000 each.

Other information

- "Rødbuget egern *(Callosciurus Erythraeus)"* was listed under animals held in a farm house on the Danish private website http://www.hytten-no13.dk/.
- On the Danish website www.egern-hobby.dk, the user published photographs of at least three individuals of "Rødbuget egern (*Callosciurus Erythraeus*)" held in outdoor squirrel cages in Denmark.
- On the German website http://www.tiere-kleinanzeigen.com, someone expressed an interest to buy "Pallas Schönhörnchen".
- On the Swedish exotic pet forum http://exotiskadjur.ifokus.se/Forum/, a user (dated 09/02/2005) commented to have seen "pallas" on sale recently.
- Photographs of two individuals of "Pallasekorre *Callosciurus erythraeus*" were published under "our animals" on a private Swedish website www.lovenest.se.
- Someone from Switzerland expressed an interest to buy male "Pallas Schönhörnchen" on the website http://bundesweit.annoncen.org/annonce-459503.html.

CONSERVATION STATUS in range states

The range of native *C. erythraeus* was reported to extend from India and the Malay Peninsula to southeastern China and Taiwan, Province of China (Duff and Lawson, 2004). Native range countries were considered to include Bangladesh, Cambodia, China (including Taiwan, Province of China), India, Lao PDR, Malaysia, Myanmar, Thailand and Viet Nam (Wilson and Reeder, 2005; Duckworth *et al.*, 2008).

Evergreen broad-leaved forests were considered a typical habitat for the species (Hori *et al.*, 2006), although it was considered to be "very flexible in terms of habitat" by Duckworth *et al.* (2008). Generation time was reported to be two to three years (Duckworth *et al.*, 2008). Tamura *et al*. (1988) reported one to three litters per year, with an average litter size of 1.4 at the time of weaning.

In the IUCN Red List, the species was classified as "Least Concern" due to "its wide distribution, presumed large population, it occurs in a number of protected areas, has a tolerance of a degree of habitat modification, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category" (Duckworth *et al.*, 2008). Furthermore, the species was reported to be generally common, and to face no major threats (Duckworth *et al.*, 2008).

GLOBAL INTRODUCTIONS

Bertolino (2009) reported that in 14 out of 21 introductions worldwide, *C. erythraeus* had become established with a 'large increase' (i.e. a self-regulating population with spatial spread), whilst in three cases, the species had been established with only a 'slight increase' (i.e. a self-regulating but localised population); introductions had failed to result in established populations on only four occasions. *C. erythraeus* was considered to be a "good invader" due to its ability to colonize new environments (Novillo and Ojeda, 2008). It was considered to have a good ability to spread efficiently in urban areas, using small fragmented forest sites (Miyamoto *et al.*, 2004), individual trees and cables as stepping-stones (Guichón *et al.*, 2005).

Outside the EU, introductions of *C. erythraeus* were reported in Argentina, Japan and Hong Kong (Guichón *et al.*, 2005; Chung and Corlett, 2006; Hori *et al.*, 2006; Palmer *et al.*, 2007). In Argentina, the predicted spread of the population was described as so rapid, that complete eradication of the species was considered to be impossible (Guichón and Doncaster, 2008). The Argentinean population was reported to have originated from two to five pet animals in 1973 (Guichón and Doncaster, 2008; Cassini and Guichón, 2009). In Argentina and Japan, the species was reported to have been transported to several urban forests, parks and islands after its initial introduction (Miyamoto *et al.*, 2004; Guichón *et al.*, 2005).

C. erythraeus was found to have caused damage to trees by gnawing bark in Japan (Hori *et al.*, 2006), and Taiwan (Kuo, 1982). Damage to buildings (Hori *et al.*, 2006), cables (Hori *et al.*, 2006; Stuyck *et al.*, 2009) and irrigation systems (Guichón and Doncaster, 2008) were also reported. In Japan, the impacts of seed predation were reported to affect tree regeneration negatively (Hori *et al.*, 2006). In Argentina and Japan, the risk of negative impacts on native squirrel species was also considered high (Miyamoto *et al.*, 2004; Cassini and Guichón, 2009).

In Argentina, targeted culling at key areas was suggested to be an effective means of slowing the rate of spread, preventing the invasion of conservation areas and reducing the abundance of *C. erythraeus* (Guichón and Doncaster, 2008). However, there was a lack of systematic management, and "sporadic lethal trapping" was reportedly practiced by local farmers (Guichón and Doncaster, 2008).

In Taiwan, a bounty had been set up for squirrel tails with no significant effects (Kuo, 1982). Poison baits were reported to have been relatively successful in population control in some areas (Kuo, 1982).

INTRODUCTIONS TO THE EU

Belgium: *C. erythraeus* was considered an invasive species in Belgium, although its range was reported to be restricted to isolated populations (Branquart *et al.,* 2009).Two introduced populations of *C. erythraeus* were reported in Belgium: a population in Dadizele (near Kortnijk, western Belgium) recorded in 2005, and thought to originate from individuals that had escaped from a zoo or a pet shop (Stuyck *et al.,* 2009); and a population in the region between Weert and Ell in the Netherlands that was reported to reach to the Belgian side of the border (Dijkstra *et al.,* 2009). In addition, a third possible occurrence was reported from Mariahof, near the border between Belgium and the southern tip of the Netherlands (Dijkstra *et al.,* 2009).

France: Introduced populations of *C. erythraeus* were reported on the peninsula of Cap d'Antibes near Cannes in southern France (Gurnell and Wauters, 1999; Duff and Lawson, 2004). Gurnell and Wauters (1999) indicated that the introduction occurred in the early 1970s, and that the introduced subspecies was *C. erythraeus erythrogaster*, originating in Assam and Myanmar. Chapuis and Menigaux (2010) noted that the species was introduced by an individual in the late 1960s for ornamental purposes. There were reported to be no natural predators for the species in the gardens at Cap d'Antibes (Gurnell and Wauters, 1999), and the species was thought to be well established and to have a high resistance to harsh winters (Le Louarn and Quéré, 2003). Gurnell and Wauters (1999) estimated the population size to be over 100 individuals, with densities thought to be higher than those of *Sciurus vulgaris*, whereas Chapuis and Menigaux (2010) estimated the population size to be several thousand individuals. Breeding was reported to take place throughout the year, with only one offspring usually produced per litter (Gurnell and Wauters, 1999).

Le Louarn and Quéré (2003) reported that expansion of the species outside Cap d'Antibes had so far been limited, as the area is bordered by the sea and the urban belt. However, Tillon *et al*. (2007) noted that they had unconfirmed information suggesting that the species had spread from its territory in Cap d'Antibes. Chapuis and Menigaux (2010) reported that the species had spread beyond the barrier of Juan-les-Pins in the late 1990s, but its current expansion into southern France was hindered by the A8 motorway.

The Netherlands: Two populations of *C. erythraeus* were recorded in the Netherlands, both in the province of Limburg in the southeast of the country (Dijkstra *et al.,* 2009; Dijkstra, 2010). The population in the area between Weert and Ell was reported to have been established by individuals that had escaped from an animal trader in 1998 (Dijkstra *et al.,* 2009). The size of the population was estimated to be between 50 and 110 individuals and to still be increasing (Dijkstra *et al.,* 2009; Dijkstra, 2010). Over a period of ten years, the squirrels were estimated to have spread nearly 6 km from the initial site of escape (Dijkstra *et al.,* 2009). The population was considered to be so large that growing numbers of individuals were expected to disperse (Dijkstra *et al.,* 2009; Dijkstra, 2010). Additional observations were made in the surrounding areas of Tungelerwallen at Tungelroy and in Bergheide at Leveroy (Dijkstra *et al.,* 2009; Dijkstra, 2010).

The other Dutch population was reported to occur in America, a small area northeast of Weert (Dijkstra, 2010). According to Dijkstra (2010), these animals escaped from captivity, from a group of twelve *C. erythraeus* held in a cage. It was thought that at least two of these caged animals had escaped in 2006, although the males were reported to have been castrated (Dijkstra, 2010). It was not known how many animals were still present in the wild, nor whether the animals had been able to breed or if the castrations were successful (Dijkstra, 2010).

IMPACT ON NATIVE EU FLORA AND FAUNA

C. erythraeus was considered to pose a threat to native *Sciurus vulgaris* (Stuyck *et al.,* 2009; Dijkstra *et al.,* 2009; Dijkstra, 2010; Chapuis and Menigaux, 2010) and to cause damage to houses and vegetation in the Netherlands (Dijkstra *et al.,* 2009; Dijkstra, 2010). Dijkstra *et al.* (2009) cautioned that without effective management measures, *C. erythraeus* would displace *S. vulgaris* and cause damage to trees in the local forests, woodland and agricultural areas; Chapuis and Menigaux (2010) cautioned that *C. erythraeus* may cause significant damage to fruit crops in southern France; Stuyck *et al.* (2009) reported that *C. erythraeus* had caused damage to trees in Belgium by gnawing the bark; and

Jouanin (1992, cited in Bertolino 2009) reported that *C. erythraeus* in Cap d'Antibes, France, had caused vegetation damage by bark stripping in plantations and urban parks.

MANAGEMENT IN THE EU

Dijkstra *et al.* (2009) recommended that there should be continued monitoring and a complete removal of the existing populations in the Netherlands and Belgium. They suggested that live trapping would be an appropriate method to ensure that no native squirrels (*S. vulgaris*) were killed, and that this should be done between September and January as *S. vulgaris* rears its young between February and September (Dijkstra *et al.,* 2009). They noted that due to the expected increase in the population size and range of *C. erythraeus,* action should be taken as soon as possible to minimize the costs of management (Dijkstra *et al.,* 2009). Dijkstra *et al.* (2009; 2010) also recommended that there should be a ban on trading and holding of *C. erythraeus* and other harmful exotic squirrels.

Belgium: Intensive trapping operations in 2008 were said to have possibly eradicated a local population in Belgium (Shine *et al.,* 2008; Stuyck *et al.,* 2009).

France: Tillon *et al*. (2007) reported that they were working with the Ministry of Ecology to prohibit the sale and transport of all Sciuridae in France. Chapuis and Menigaux (2010) reported that some city dwellers were shooting, trapping and poisoning the species (whilst others were feeding it), and that an action plan was urgently needed to limit the species before the last geographical barrier was crossed (the A8 motorway). They also noted that non-intervention in the early years, followed by marked expansion in the population, meant that interventions would now be more difficult and costly (Chapuis and Menigaux, 2010).

The Netherlands: In November 2009, the Minister of Agriculture banned the trade and keeping of three squirrel species in the Netherlands including *C. erythraeus* under the Flora and Fauna Act, although it was reported that this ban would take some time to come into force (Landbouw natuur en voedselkwaliteit, 2009; Staatsbosbeheer, 2009).

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MAMMALIA SCIURIDAE

SPECIES: *Sciurus niger*

SYNONYMS: -

COMMON NAMES: Amerikaanse voseekhoorn, Zwarte eekhoorn (Dutch), Mustaorava, Iso-orava (Finnish), Écureuil fauve (French), Eastern Fox Squirrel (English), Schwarzhörnchen (German), Ræve egern (Danish), Scoiattolo volpe (Italian), Ardilla zorro (Spanish), Rävekorre (Swedish)

RANGE STATES: Canada, Mexico, United States of America

IUCN RED LIST: Least Concern

TRADE PATTERNS

Offers for sale

- A pair of "Amerikanische Fuchshörnchen" (with photographs) was offered for sale on the Austrian website www.tieranzeigen.at.
- Two young individuals, male and female, of "Ræve egern (*Sciurus Niger,* Fox squirrel)" (with photographs) were advertised for sale on the Danish website www.egern-hobby.dk/unger_tilsalg_2008.htm.
- A pair of "Amerikanische fuchshörnchen" was listed for sale on the German website http://kleinanzeigen.ebay.de.
- On the German website http://cms.exoticanimal.de, there were several advertisements for the buying, selling and exchanging of the species, including the listing of two breeding pairs and five young "Fuchshörnchen (*Sciurus niger*)" (with photograph) for sale; an offer to sell two young female "Fuchshörnchen" (with photograph); an advertisement listing "Fuchshörnchen (*Sciurus niger*)" along with other squirrel species for sale; an advertisement listing a pair of "Fuchshörnchen" for sale for EUR 300, and an offer to sell young "Fuchshörnchen".
- Two pairs of "Amerikanische Eichhörnchen - kl. Fuchshörnchen" (with photographs) were advertised for sale on the German website http://www.deine-tierwelt.de for EUR 220 per pair, or two females and one male for EUR 300.
- On the German website http://www.dhd24.com, there were several offers to sell the species, including the offer of two "Fuchshörnchen Eichhörnchen" for sale for the price of EUR 300, an offer of young "Fuchshörnchen" for sale, and a general offer of "fuchshörnchen" for sale.
- On the German website http://www.fast-alles.net/index.php, there were two offers to sell two young "Amerikanische Fuchshörnchen", and an offer to sell both mature and young "Amerikanische Fuchshörnchen" from a user who claimed to have experience of more than 30 years of private breeding.
- On the German website http://www.kleintiermarkt.com/, there was an offer to sell a breeding pair of "Amerikanischen Fuchshörnchen" (with photograph).
- Several "Amerikaanse Vooseekhoorn" were listed for sale for EUR 200 each on the Dutch website http://www.ter.nl/animalmarket/.
- Two "Amerikaanse Vooseekhoorns", 2-3 weeks old, were offered for sale or to exchange for a young male of the same species on the Dutch website http://www.eekhoorns.nl/set/vraag_aanbod.

- On the Dutch website www.marktplaats.nl, a young female "Amerikaans Vos Eekhoorn" was listed for sale (with photographs). On the same site, a male "voseekhoorn" had been for sale, but was no longer available.
- A pair of "voseekhoorns" was offered in exchange for individuals of another squirrel species on the Dutch website http://www.zoekwekker.nl/aanbod/eekhoorns. The full advertisement had been removed.

Other information

- On the Danish website www.egern-hobby.dk, photographs of "Ræve egern (*Sciurus Niger,* Fox squirrel)" of at least one individual were published under "squirrel species held" in outdoor squirrel cages.
- On the Dutch website http://www.hgrouve.nl/, several photographs of at least two cage-held individuals of *S. niger* were published.
- Someone on the French classifieds website http://annonces.rongeurs.net was interested in obtaining a female "ecureuil renard (ecureuil du niger)".
- On the German forum Eichhörnchenfreunde.de at http://www.nexusboard.net/, several users expressed their interest in buying "amerikanischen Fuchshörnchen (*Sciurus niger*)".
- "Fuchshörnchen (*Sciurus niger*)" (with photograph) was listed among animals kept by the breeder on the German website http://www.hoernchenzucht-ritzert.de/13801.html.
- Two people were seeking to buy young or old "Fuchshörnchen" on the German website http://cms.exoticanimal.de/; also, two people expressed interest to buy a pair of "Fuchshörnchen" on the same site.
- On the German website http://www.tiere-kleinanzeigen.com, someone expressed an interest to buy "Fuchshörnchen", and another user expressed an interest to buy young "Fuchshörnchen".
- In the Netherlands, someone expressed an interest to buy about ten weeks old "amerikaanse voseekhoorns" on the website http://www.eekhoorns.nl/set/vraag_aanbod.
- On the Dutch forum http://www.zoosite.nl/forum, someone claimed to own three "vooseekhoorns".
- A veterinary clinic's web site in Portugal, www.exoclinic.com.pt, offered information about the care of "Esquilo Fox *Sciurus niger*".
- Fly-fishing websites in Denmark, Finland and UK were selling *S. niger* and generally "squirrel" skins or tails as dubbing or fly-tying material: www.flytying.dk/prisliste.pdf, http://perhorasia.fi/, http://www.britnett-carver.co.uk/, http://www.lakelandflytying.com/, http://www.cliff-harvey-angling.co.uk/.

CONSERVATION STATUS in range states

Sciurus niger was reported to be the largest North American tree squirrel (Allen, 1982). Its original range was reported to cover most areas in eastern and central United States, extending to Canada (Koprowski, 1994) and northeastern Mexico (Duff and Lawson, 2004). Burton (1991) reported a decrease in the overall range during the past 150 years.

The species was reported to inhabit a variety of different habitat types including open woodlands and pine forests (Burt and Grossenheider, 1976), the interface between forest and prairie (King *et al.,* 2010), and woodland and agricultural land (Allen, 1982). It was also reported to inhabit riparian forests and town parks (Hoffmann *et al.,* 1969), favouring human-disturbed woodland above undisturbed areas (Salsbury *et al.,* 2004). Frey and Campbell (1997) found that the species did well in city areas and outskirts, and McCleery *et al.* (2007) found it to inhabit areas with a high coverage of pavement and to use buildings to survive over winter. Females may reproduce at the age of eight months, but the usual reproductive age is over 1.25 years (Koprowski, 1994). Two litters of two to five young per year were reported by Burton (1991). *S. niger* was classified as 'Least Concern' in the IUCN Red List, due to "its wide distribution, presumed large population, occurrence in a number of protected areas, and because it is unlikely to be declining at nearly the rate required to qualify for listing in a threatened

category" (Linzey *et al.,* 2008). The population trend was reported to be stable (Linzey *et al.,* 2008). Population densities were recorded to vary from 0.04 to 25 individuals per hectare (Burt and Grossenheider, 1976; Linzey *et al.,* 2008). Some subspecies were classified as Vulnerable or Endangered in certain U.S. states (Guynn *et al.,* 2006).

Dawson *et al*. (2008) reported that intentional translocations were used to restore declining populations of certain subspecies of *S. niger* in its native range in the south-eastern United States, and that in an attempt to establish a population of the subspecies *S. niger niger* in the South Carolina islands, up to 24-28 individuals were needed for a successful introduction.

GLOBAL INTRODUCTIONS

Bertolino (2009) listed 42 introductions of *S. niger* to various U.S. states and two to Canada and Palmer *et al.* (2007) listed nine introductions to various U.S. States and one to Ontario, Canada. All of the introductions for which the date was known occurred in the first half of the 20th Century (Palmer *et al.*,2007; Bertolino, 2009). Bertolino (2009) reported that out of a total of 44 recorded introductions of *S. niger*, the species had become established with a 'large increase' (i.e. a self-regulating population with spatial spread), in 37 cases.

Burt and Grossenheider (1976) reported successful introductions to several city areas, including Seattle, Washington, Fresno and San Francisco. Some of the populations found in New Mexico were also reported likely to originate from introduced individuals (Frey and Campbell, 1997). King *et al.* (2010) reported that since its initial introduction to Los Angeles in 1904, *S. niger* had spread through much of the south of Los Angeles County, and into Ventura and Orange County, southern California, spreading at rates of 0.44-3.44 km/year. (King *et al.,* 2010). In addition, the species was reported to have expanded its range through natural dispersal, particularly of juveniles and young adults (King *et al.,* 2010).

S. niger was reported to be able to expand its range efficiently, from both natural and introduced populations (King *et al.,* 2010). It was found to spread along riparian corridors (Wright and Weber, 1979; King *et al.,* 2010) and use human-made constructions such as bridges (Wright and Weber, 1979) and utility cables (King *et al.,* 2010). It was also reported to be capable of dispersing across treeless, extensively farmed areas (Wright and Weber, 1979).

S. niger was reported to cause damage to pine trees and orchard trees (Jackson, 1994), grain crops (Burt and Grossenheider, 1976), gardens and power lines (Koprowski, 1994), and buildings and phone lines (Salmon *et al.,* 2005). It was classified as an agricultural pest in some areas (Salmon *et al.,* 2005). *S. niger* was reported to be commonly considered as a potential threat to the native Douglas squirrel *Tamiasciurus douglasi* (Link, 2004). In the Portland-Vancouver region, *S. niger* was considered to "have contributed to the decline of native squirrel species" (Aubudon Society of Portland, 2010), and in Washington, it was said to "outcompete native squirrels in urban areas" (King County Biodiversity, 2010).

To control existing populations, different kinds of traps and shooting were reported to be commonly used (Jackson, 1994; Link, 2004; Salmon *et al.,* 2005). Salmon *et al.* (2005) reported that the use of chemical repellents and sound frightening devices had been attempted, but with little success. *S. niger* was also reported to be often classified as a pest, hence it can be legally killed without a hunting licence or permit in some parts of the U.S. (Link, 2004; Salmon *et al.,* 2005).

INTRODUCTIONS TO THE EU

No information was located on introductions of *S. niger* in Europe.

In Bertolino's (2009) list of 248 worldwide squirrel introductions, all 44 recorded introductions of *S. niger* were to North America.

IMPACT ON NATIVE EU FLORA AND FAUNA

As no introductions are known in the EU, the potential impacts of *S. niger* on the native EU flora and fauna are not known. In the Netherlands, a recent report considered the risk of large-scale displacement of native *S. vulgaris* by *S. niger* to be significant (Landbouw natuur en voedselkwaliteit, 2009).

MANAGEMENT IN THE EU

The Netherlands: In November 2009, the Minister of Agriculture banned the trade and possession of three squirrel species in the Netherlands including *S. niger* under the Flora and Fauna Act, although it was reported that this ban would take some time to come into force (Landbouw natuur en voedselkwaliteit, 2009; Staatsbosbeheer, 2009).

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4. ANNEX

Websites used to investigate the trade in *Callosciurus erytherus* and *Sciurus niger* within the European Union.

Website	Country/Region	Type of site
www.toutypasse.be	Belgium	Pet classifieds
http://www.kugli.com/	Czech Republic	Pet classifieds
www.guloggratis.dk/	Denmark	Pet classifieds
http://fuglemarkedet.dk/	Denmark	Pet classifieds
www.eurofauna.com	Finland	Pet classifieds
www.lemmikkipalstat.net	Finland	Pet classifieds & forum
www.puutorinakvaario.fi	Finland	Pet retailer
www.verkkopirkko.fi	Finland	Pet classifieds
www.4pets.fi	Finland	Pet retailer
www.vente-animaux.com	France	Pet classifieds
www.petite-annonce-gratuite.com	France	Pet classifieds
www.evannonce.com/animaux	France	Pet classifieds
www.marche.fr/animaux	France	Pet classifieds
www.toutypasse.com/autres	France	Pet classifieds
www.local24.de/tiere/nagetiere/	Germany	Pet classifieds
www.markt.de/Tiere/	Germany	Pet classifieds
www.kleintiermarkt.com	Germany	Pet classifieds
http://cms.exoticanimal.de	Germany	Pet classifieds
http://annunci.ebay.it	Italy	Pet classifieds
www.italypet.com	Italy	Pet classifieds
www.animalicuccioli.it/	Italy	Pet classifieds
www.animalinelmondo.com/annunci	Italy	Pet classifieds
www.supernatura.it/	Italy	Pet retailer
http://kopen.marktplaats.nl/	Netherlands	Pet classifieds
www.dierenaanbod.nl/	Netherlands	Pet classifieds
www.adoos.es	Spain	Pet classifieds
www.olx.es	Spain	Pet classifieds
www.almacenanimal.com	Spain	Pet retailer
www.mundoanuncio.com	Spain	Pet classifieds
http://espana.anunciosdiarios.com	Spain	Pet classifieds
www.ebay.es	Spain	Pet classifieds
www.anuncios-gratuitos.com/clasificados/	Spain	Pet classifieds
www.petsathome.com/shop/small-pet	United Kingdom	Pet retailer
www.animalanticsonline.com	United Kingdom	Pet retailer
www.pets4homes.uk	United Kingdom	Pet classifieds
www.petforums.co.uk/small-animal-classifieds	United Kingdom	Pet classifieds
www.pets-classifieds.co.uk/	United Kingdom	Pet classifieds
http://pets.oodle.co.uk/	United Kingdom	Pet classifieds