Wild Pets in the European Union



An information document provided to the European Commission, the European Parliament, the European Council and the Council of Europe highlighting the impacts of the trade in and keeping of wild animals as pets on the environment, people and animals. The international trade in wild animals as pets (hereafter referred to as 'wild pets') is a multi-billion dollar industry¹. The EU is one of the largest markets for wild pets and demand continues to grow as EU membership expands². Wild pets are traded through diverse outlets including pet shops, garden centres, markets, via newspaper advertisements and, increasingly, the Internet.



Wild pet trading and keeping represents an established threat to biodiversity and ecology, consumer health and safety, and animal health and welfare, and results in substantial economic cost to governments. This document summarises these issues and includes recommendations regarding the harmonisation and improvement of related regulations and their enforcement.





Introduction

Wild pets (also known as 'exotic pets') may be considered any animal of a species that is non-native to and not normally domesticated in the EU, and that is produced, sold or kept as a pet – that is, for display, amusement and/or companionship. The diversity of animals used is considerable and (conservatively) involves over 1,000 species³, including invertebrates, fishes, amphibians, reptiles, birds and mammals (including non-human primates).

This is a collative and interpretive document aimed at providing information to the European Commission, the European Parliament, the European Council and the Council of Europe highlighting the impacts of the trade in and keeping of wild animals as pets on the environment, people and biodiversity and the individual animals themselves.

'Wild Pets in the European Union' has been peer-reviewed by independent scientific experts prior to publication.

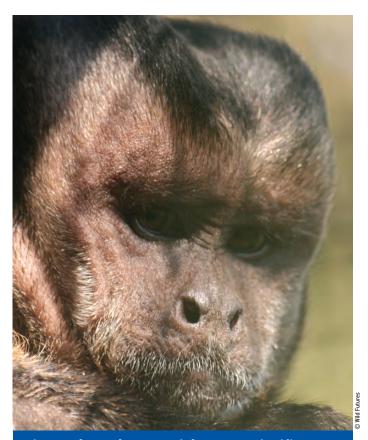
Impacts of the wild pet trade

Threats to biodiversity and ecology

Harvesting of wild animals can deplete populations and threaten their long-term viability^{4,5}. Methods used to collect wild animals from their natural environment for trade can result in serious disturbance to habitats and the displacement, injury or death of animals that live within those habitats (including animals not targeted for capture)⁶. The capture of wild animals for the pet trade is regularly cited as a major cause of species decline and is a significant factor in ecological alteration and biodiversity loss^{7,8,9}. Furthermore, the accidental or deliberate release of wild pets can lead to the establishment of invasive alien species, which can disrupt ecosystems and displace local fauna^{7,10,11}. Invasive alien species are considered to be one of the direct drivers of global biodiversity loss^{7,12}.

Threats to consumer health and safety

Wild pets (whether wild-caught or captive-bred) are wild animals (as defined) that can be unpredictable and may possess significant and robust physical attributes and defences. Some animals, such as large carnivores, primates and venomous species, have the potential to cause significant human injury or death 13,14,15,16,17. In addition, wild pets may carry pathogens that are potentially infectious or negatively impact humans (such diseases are called zoonoses), livestock, domestic pets and indigenous wildlife^{7,18,19}. More than 60% of all human infectious diseases and up to 75% of emerging diseases may be derived from wild animals^{20,21}. The trade in and ownership of wild pets is recognised as a significant factor in the emergence and spread of zoonotic disease^{22,23}. Well-known examples include avian influenza and psittacosis from birds, salmonellosis from amphibians, reptiles and birds, and hepatitis A, tuberculosis, monkey pox and herpesvirus simiae-B from primates^{23,24,25}. The potential for



Primates have the potential to cause significant human injury or death

as yet poorly-understood infectious or otherwise invasive agents to have an impact on people is also considered to be significant^{23,26}. Quarantine requirements at ports of entry only apply to certain species, and monitoring takes place for only a handful of infectious agents²⁷, and it is not possible to screen for all potential pathogens²⁴.







Information on the diversity and prevalence of potential pathogens associated with wildlife trade hubs (for example at airports) is limited²⁴, although ample data exists to demonstrate that significant and major pathogenic agents are routinely associated with wild pets at all stages of production, trade and keeping^{3,20,23,28,29}.

Threats to animal health and welfare

For each wild pet that does end up in someone's home, numerous others may have died along the way^{30,31,32}. For every wild animal captured and sold as a wild pet, an estimated 50 may be killed or die in transit³³. Many owners of wild pets lack the necessary expertise to provide them with appropriate care, and animals commonly suffer as a result of an unsuitable environment, malnutrition, inadequate or inappropriate social contact, and the stress of confinement^{14,34}. Many are neglected or abandoned^{31,35}. According to animal shelters, 60% of all wild animals kept as pets die within the first month of ownership³⁶. An expert veterinary and biological investigation at a US commercial dealer and supplier of wild pets to Europe identified that, on inspection of the facility, 80% of amphibians, reptiles and mammals were sick, injured or dead, and the mortality rate was approximately 70% over six weeks, a situation that is reportedly an 'industry standard' mortality rate3. A scientific study in the UK has shown that at least 75% of reptiles die within one year in the home³.

Economic cost to governments

Data regarding economic costs to EU governments relating to environmental impacts, outbreaks of animal and human disease or injuries resulting from the international trade in wild animals have not been collated but are estimated to cost the global economy billions of dollars7. The establishment of invasive alien species (IAS), many of which originate from the wild pet trade, can result in devastating economic costs to agriculture and natural resource industries^{37, 38, 39}. Once invasive alien species become established, control or eradication programmes are difficult, expensive, and often incite public opposition^{7, 39}. The invasion of the protected habitat of the Ebro Delta in Cataluña, Spain, by the apple snail (Pomacea insularum), is one such example. Introduced through the drains from a wholesaler of wild pets, the snail has caused millions of Euros worth of damage to rice crops. The cost to the Regional Government for the removal of the animals is estimated at approximately 6 million Euros⁴⁰. The damage from IAS in the European Union has been estimated at an annual cost of approximately 12.5 billion⁵⁸ although this figure may actually represent only 10% of real cost⁴¹. The estimated costs to the healthcare profession of treating an injury or infection caused by wild pets has not been quantified, although examples may range from €250 per consultation to €2,500 per day hospitalisation⁴². In the UK alone it is estimated that there may be around 5,600 cases of reptile-related salmonellosis (RRS) annually3. RRS is one of approximately 70 diseases that may be or can be attributable to wild pets²³.

GLOSSARY AND DEFINTIONS:

Wild pet: Wild pets (also known as 'exotic pets') may be considered any animal of a species that is non-native to and not normally domesticated in the EU, and that is produced, sold or kept as pets — that is, for display, amusement and/or companionship.

DAISIE (Delivering Alien Invasive Species Inventories for Europe)⁴³: inventory of invasive species that threaten European terrestrial, fresh-water and marine environments.

Five Freedoms⁴⁴: a framework for aiding animal welfare including fundamental requirements and safeguards (FAWC).

Welfare quality®: a project funded by the European Commission, focussing on integration of animal welfare in the food quality chain: from public concern to improved welfare and transparent quality. The project aims to accommodate societal concerns and market demands, to develop reliable on-farm monitoring systems, product information systems, and practical species-specific strategies to improve animal welfare standards in Europe. (Adapted from Welfare Quality website, www.welfarequality.net)

CITES⁴⁵: The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) was established in 1975 in order to protect wild animals and plants from over-exploitation by international trade. Today, 175 countries ('Parties') have signed the CITES treaty and more than 30,000 thousand plant and animal species are protected by CITES. CITES is a legally-binding treaty. Individuals found to be in contravention of CITES are operating illegally and are at risk of prosecution.

Precautionary Approach: Rio Principle 15, states: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

ENDCAP is a pan-European coalition of animal welfare NGOs and wildlife professionals from over twenty countries in Europe, whose members specialise in the welfare and protection of wild animals in captivity. While ultimately aiming to end the keeping of wild animals in captivity, the coalition works with the European Community, national governments and other stakeholders to raise awareness of and address the needs of these animals.

In 2009, ENDCAP launched an initiative at the European Parliament called 'Europe's Forgotten Animals' with the aim of improving the protection of wild animals in captivity within Member States. In 2012, following ENDCAP campaigning, 'wild animals in captivity' were officially recognised by the European Council and the EU Strategy for the Protection and Welfare of Animals, allowing for further actions and provisions to improve their protection.







Aims of this document

This document, compiled on behalf of ENDCAP, aims to increase awareness of the serious problems caused by the wild pet trade and the ownership of wild pets within the European Union, and the associated threats to biodiversity and ecology, consumer health and safety, and animal health and welfare, as well as economic costs to governments. EU and national legislation does not yet afford the same degree of protection to wild animals in captivity as it does for some other categories of captive animals^{46, 47}. Knowledge amongst stakeholders and within Member States is often limited, and the quality of legislation and enforcement varies widely48. This document provides information to justify the development of Communitywide legislative and non-legislative policy that will address the negative impacts of trade, including proposals for: an urgent ban on wild-caught animals for the pet trade¹²; measures to ensure that those animals in trade receive the best possible care; measures to ensure that all animal and human health and safety risks are identified and minimised; and ultimately introducing a ban on all trade in wild pets.



The ban on wild-caught birds has coincided with a significant increase in the trade in reptiles

Insights into the wild pet trade

The lack of consistent legislation or licensing requirements for wild pets makes the collation of accurate information impossible. Monitoring and regulation of trade are, at best, inconsistent and at worst inadequate or even non-existent. The EU databases designed to track animal trade into and between EU Member States (the Trade Control and Expert System TRACES⁴⁹, and the EC Eurostat database⁵⁰), do not record sources of animals, and the Convention on International Trade in Endangered Species (CITES)⁴⁵ only concerns itself with the relatively small proportion of animal species listed on its Appendices. The following facts give an overview of the size and diversity of the trade:

- Trade in live animals both legal and illegal is driven by trade promotion and supply-led consumer demand and has increased to its present scale in parallel with the development of international transport infrastructure and access to the Internet and 'new media' advertising and pet popularisation. Animal traffic generally flows from Africa, Asia and South America to Europe, Japan and the USA; and from Africa, India and South East Asia to Far Eastern markets.
- Fishes, amphibians, reptiles, birds and mammals are all traded into the EU and between Member States.
- The European Union is the second largest importer of live reptiles in the world (with a market value of €7 million)². The trade in primates also generates high sales volumes (market value: €15 million), although this sector is reportedly directed more towards medical research than pet sales¹9.
- According to the United Nations Food and Agriculture Organisation, as many as 1.5 billion live ornamental fish are exported each year from over 100 countries, with the EU

- representing a major market⁷. For example, between 2006 and 2011, 245 million ornamental fish were imported into the UK⁵¹, giving an average of over 40 million fish per year for that country.
- During 2003 and 2004, EU-based enforcement authorities made more than 7,000 seizures - these included more than 3.5 million wildlife specimens (including live animals) that were prohibited from being traded⁵². In 2005 alone, customs officers at Frankfurt airport made 20,000 seizures of protected animals and plants and animal products⁵³.
- From 2002-06, almost 1,000 critically endangered Egyptian tortoises were illegally-trafficked, and seized, in the EU - which represent around 13% of the species' entire wild population⁵³.
- According to surveys by the Pet Food Manufacturers
 Association (2011) there are over 42 million non-domesticated
 pet animals kept in the UK, which includes approximately
 40 million fish. Dogs and cats combined approximately
 account for a further 20 million pets⁵⁴.
- The European Invasive Alien Species Gateway⁴³ lists 80 alien terrestrial vertebrate species known to have become established in Europe as a direct consequence of the trade in wild pets⁵⁵. The origins of many more have not yet been established.
- Exotic amphibians and reptiles have been widely introduced unintentionally into natural habitats, and many have successfully established themselves⁵⁶. In some instances this has resulted in the widespread devastation of indigenous species, for example through the spread of the fungal disease chytridiomycosis, which has been identified as a cause of serious declines in amphibian populations worldwide^{37, 57}. Invasive alien species are regarded as second only to habitat destruction in terms of biodiversity risk^{7,12,39}.







- The EU spends over €12 billion annually on controlling invasive alien species and repairing the damage that they cause⁵⁸. Policy on dealing with invasive alien species has also been controversial; in 2011, the UK's Department for Environment, Food and Rural Affairs (DEFRA) announced plans to cull introduced monk parakeets originating from escaped or released pets, without imposing any restrictions on their sale³⁸. This led to criticism that the birds could easily become re-established following a successful eradication programme because the problem would not have been addressed at source that is, by preventing further trade.
- There is evidence to indicate that veterinary controls are not always strictly applied to imported species, increasing the health risk to humans, livestock and other animals⁵⁹. The risk of zoonoses (diseases that may pass from animals to humans) and reverse zoonoses (diseases that may pass from humans to animals) being introduced through the import of wild pets is widely recognised, although often difficult to quantify. Many of the pathogenic agents causing pet-related zoonoses can also be transmitted to other animals¹⁹. For example in 2000, the United States banned all imports of African tortoises in order to protect cattle from heartwater disease and it is widely known that avian flu has been common in live bird markets and can be disseminated through wildlife trade⁶⁰. Both heartwater disease and avian flu have the potential to decimate livestock industries^{61,62}.
- At the British Veterinary Association congress in May 2010, the lack of understanding of the care needs for wild pets, the abandonment of temporarily fashionable or desirable pet animals (where demand is possibly stimulated by external factors such as a cinema film, e.g. Finding Nemo and the sudden popularity of Clown Fish), and the disease risks of importing exotics into the UK, were identified as being among the most important animal welfare issues facing the British government⁶³. Forty percent of wild pet owners in the UK cite lack of information provided by suppliers as a common problem64. In an RSPCA survey of pet shops in England and Wales in 2010 only just over half made welfare information of some kind freely available in the form of leaflets or signs, and less than 25% had information on all 'Five Freedoms' that underpin the duty of care requirements in the Animal Welfare Act 200635.
- The keeping of wild animals requires specialist knowledge of the species' biological and environmental needs as well as essential human health and safety knowledge. Unfamiliarity with the species may result in severe harm to both animal and human health and welfare^{14,15,17,23,31,34}.
 - There appears to be a particularly severe lack of knowledge among wild pet keepers (and even experienced hobbyists) regarding the psychological and behavioural needs of these animals and serious problems may arise as a result. For example, the keeping of birds in cages that restrict natural behaviour commonly results in poor welfare and the development of stereotypic behaviours³¹ (induced by physical changes in the brain⁶⁵). There are also approximately 30 recognised behavioural signs of captivity-stress in reptiles, and all these signs are most commonly associated with wild pet keeping³⁴.
- Bird breeders commonly employ selective breeding and inbreeding to produce birds with particular feather

- colouration or other characteristics, which can result in serious health problems⁶⁶.
- In a survey conducted to examine worldwide attitudes towards animals, most of the respondents in Switzerland, Germany, France and the UK disagreed with the statement "Keeping wild animals as pets at home is acceptable"⁶⁷.
- Although the percentage of wild pet animals imported into the EU from captive-bred sources is claimed to have increased markedly (from 7% in 1990 to over 77% in 2000-2006), in many cases it is difficult to verify whether an animal is captive-bred or wild-caught². Intentional mislabelling, using incorrect source codes for imported animals, and the 'laundering' of wild-caught species into the pet trade, marked as captive-bred, are common problems.
- Prior to the ban on the commercial import of wild-caught birds for the pet trade, which came into force in 2005 in response to the threat of avian influenza, the EU was the world's largest importer of wild-caught live birds. Although the ban, which was made permanent in 2007⁶⁸, was introduced primarily to protect human health rather than animal welfare or biodiversity, it has prevented the importation of up to 2 million birds per year. The ban has coincided with a significant increase in the trade in wild-caught and captive-bred reptiles⁶⁹.
- Increasing trade over the Internet may give traders the opportunity to avoid established controls and regulation^{7,70}.
- Poorly-informed tourists who are unaware of the wildlife trade legislation sometimes unwittingly import protected species. Chameleons, turtles and even primates are sold at North African markets, as these animals can be seen as attractive souvenirs⁷¹. It is difficult to estimate the number of exotic animals imported by tourists because this data is unrecorded.
- It is estimated that approximately 25% of the trade in wildlife is illegal, and that the illegal trade in wildlife species is worth billions of Euros each year, third only in value to weapons and drug trafficking^{1,70}.



Captive parrots may display feather plucking as a result of captivity-stress

Wild Pets in the European Union



Case study 1: The reptile trade



Wild-capture of reptiles, such as Hermanns tortoise, for the pet trade threatened many species with extinction

The EU constitutes a very large market for pet reptiles. Between 2000 and 2005 imports into the EU of protected live reptiles represented 20% of this group in world trade at that time². According to trade statistics, between 2005 and 2007 the EU imported 6.7 million live reptiles⁷². The RSPCA estimates that between 5.9 and 9.8 million live reptiles were imported into the EU in 2009 alone, a substantial rise from the 1.6 million imported in 2005. The majority of these animals were imported without any monitoring or control³⁵.

- There has been a large increase in the number of live, wild-caught CITES-listed reptiles imported into the EU in recent years. Of just under 400,000 imported consignments reported under CITES regulations in 2008, approximately 60% were listed as wild-caught, almost double the proportion in 2000. EU imports of CITES-listed reptiles have almost doubled since the ban on wild bird imports in 2005, and imports of wild-caught CITES-listed reptiles have tripled since 2000⁶⁹.
- The collection of individuals from the wild to supply the wild pet trade has been cited as a major factor in the population decline of a number of reptile species. For example, over-collection of Greek or spur-thighed tortoises (Testudo graeca) has contributed to serious depletions of populations

- in North Africa⁵. Over-collection for international trade was also cited in the proposal to list the North American spotted turtle (Clemmys guttata) on CITES Appendices in 2000⁷³.
- In 2009, of approximately 300,000 reptiles imported into the UK, 99% arrived from outside the EU, principally from South America and Africa, from where many CITES-listed species originate⁵². Combined, legal and illegal UK imports together with home-grown specimens provides a conservative supply of 700,000 reptiles into the British market annually in recent years³.
- The scale of the illegal reptile trade is unknown, although in 2008-9 alone, 1044 live CITES-listed reptiles were seized by UK customs authorities³⁵.
- As presented elsewhere in this document, the premature mortality rate for reptiles in the pet trade is very high. An estimated 90% of wild reptiles captured for the pet trade die before the end of their first year in captivity^{10, 32}, even though the potential natural lifespan of commonly traded species may be 8-120 years. There is a considerable volume of published material showing that reptiles are particularly sensitive to the stress of captivity^{34,74, 75}. More recently, an investigation at a US commercial supplier of wild pets to Europe identified that 80% of amphibians, reptiles and







mammals were sick, injured or dead, and the mortality rate was approximately 70% over six weeks, which is apparently 'standard' for the pet industry³. A scientific study in the UK has shown that at least 75% of reptiles die within one year in the home³.

- The incidence of venomous snake bites is rising in Europe, due mainly to the increased keeping of exotic venomous species such as rattlesnakes^{15,17,76}.
- Red-eared slider turtles (Trachemys scripta): native to North America, are commonly traded as pets or for their meat. Abandonment or escape of pet animals has resulted in populations becoming established around the world, including in Spain, France, Italy, Slovenia, England and Cyprus⁴³. In some areas these populations threaten native turtles, fish, amphibians and birds, and they are known to carry potentially zoonotic pathogens. The importation of red-eared sliders into the EU was banned in 1997⁵⁶.
- Burmese pythons (Python molurus bivittatus): native to S and SE Asia, have become established in Florida and threaten native wildlife including snakes, alligators and the Key Largo woodrat, through predation, competition and possibly also disease transmission. Programmes are in place to remove the pythons, and the US is establishing regulations on the purchase and trade of potentially invasive reptiles⁷⁷.
- Salmonellosis is the most commonly known zoonosis transmitted by reptiles²³. In the United States in the 1960s and 1970s, 280,000 cases of salmonellosis were attributed annually to the trade and keeping of baby turtles^{18,23}. It is estimated that 90% of captive reptiles harbour salmonella⁷⁸. As a consequence of the major public health hazard posed by baby turtles as pets, the domestic trade in turtles 10cm or less was banned in 1975 with a resultant 77% decrease in turtle-associated salmonellosis by the following year⁷⁹. A resurgence in other reptile-keeping (mostly lizards and snakes) since the ban is believed to be responsible for the current prevalence of RRS accounting for 4-5% of all salmonellosis cases which is equal to approximately 70,000 actual cases annually⁷⁹.
- According to the Catalan Amphibian and Reptile Rescue Centre, "The increasing market for pet reptiles and amphibians is of great concern. These animals need very specialised care and their welfare can rarely be fulfilled in a home environment. The demonstrated risk of disease transmission and of invasion in the local ecosystems should be enough for governments to take serious action and limit their trade".
- Over the last 20 years, Germany has imported approximately 280,000 green iguanas, 213,000 pythons, almost 15,000 boas and almost 30,000 monitor lizards. Concerning "dangerous" pets, insiders estimate approximately 250,000 boids and pythons and 100,000 venomous snakes are kept in private households in Germany¹¹⁰.



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Case study 2: The Trade in non-human Primates



Owners of primates often lack the necessary expertise to provide them appropriate care

The legal situation within the EU on the keeping of primates as pets varies considerably between individual Member States. The Netherlands, Bulgaria, Italy, Portugal, Latvia, Lithuania, Estonia and Hungary have implemented bans on the keeping of primates. Denmark bans the import and keeping of the majority of primate species. Belgium has a 'positive list' for mammals which prohibits the keeping of some primate species, whilst Austria and Poland ban the private keeping of Great Apes (pages 15 & 16). The UK requires keepers of those primate species listed under in the Dangerous Wild Animals Act (1976) to be licensed, and has a non-binding Code of Practice for the keeping of non-human primates⁸³.

- The number of non-human primates (hereafter referred to as primates) kept as pets in the EU is not known, although between 2,500-7,500 may be kept by private individuals in the UK alone⁸⁰. The UK requires primate species listed under the Dangerous Wild Animals Act (1976) to be licensed, although recent changes to the lists have reduced the number of species for which a licence is required, and non-compliance levels are believed to be high⁸¹. Accordingly, the licensing system cannot be used to produce anything more than a broad estimate of the total number of primates kept as pets in the UK¹⁴.
- International trade in all primate species is controlled by CITES regulations, because all are listed on CITES Appendices and associated EU Wildlife Trade Regulation Annexes⁸².

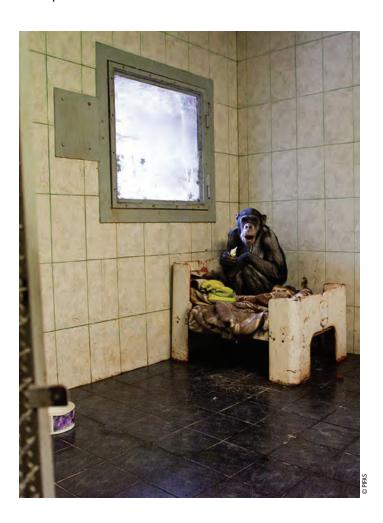
- Spanish newspaper reports suggest that between 1990 and 2008, the police seized at least 89 primates, mainly chimpanzees and marmosets, because of abuse, mistreatment or illegal possession⁸⁴.
- Over half of all incidents involving primates reported to the Royal Society for the Prevention of Cruelty to Animals (RSPCA) in the UK between 2001-2008, involved species for which a license is not required, and over 60% involved animals housed on their own⁸⁰. There is considerable evidence to suggest that many keepers of pet primates lack the appropriate knowledge and/or facilities to adequately provide for their welfare^{14,80,85}. One UK sanctuary reports that all of the primates transferred to them from private keepers are suffering from either physical or behavioural problems (or both) including stereotypic behaviours. Many exhibit a tendency to exhibit self-harming behaviour⁸⁰.
- Primatologists, conservationists, zoo professionals, primate rescue organisations and other respected professionals support restricting the keeping of primates to those with highly specialised knowledge, skills and facilities appropriate to the species⁸⁰. Veterinarians commonly oppose the keeping of pet primates and attempt to dissuade potential owners from acquiring them¹⁴. A recent scientific assessment of the suitability of primates as pets in the UK, based on the criteria established by Schuppli and Fraser (2000)⁸⁶, concluded that the practice should end¹⁴.







- In the wild, many primate species are threatened by habitat loss, hunting for meat, and capture for the pet trade. As few as 5,000-6,000 Barbary macaques are thought to remain in the wild, a reduction of some 80% over the past three decades, driven largely by demand for the European pet trade^{71,87}. The existing markets for legal trade in wild species in regions such as the EU and the USA are thought to drive a parallel illegal trade⁸⁸, and the current level of exploitation for the wild pet trade continues to propel species such as the Barbary macaque towards extinction^{71,89}.
- Aggression towards humans is common among primates kept as pets, and can lead to serious injury or death, with children being identified as being particularly at risk¹⁴.
- The potential for people to contract known or unknown zoonotic infections from primates is recognised as a major public health concern, and legally imported primates have been identified as the source of several human epizootics in Europe and in the US¹⁴. This has led to a proposal by the US Centers for Disease Control (CDC) that all non-human primates imported into the US should be directed through ports of entry where a CDC quarantine station is located⁹⁰.
- Although poorly documented, there are reports of fatalities among primates kept as pets, resulting from reverse zoonoses, that is the transmission of diseases from humans to primates⁹¹.





For every wild pet in someone's home, many will have suffered and died...

Wild Pets in the European Union



Case study 3: Illegal trade



to the rainforests of South America

The collation of available, up-to-date information on the trade in wild pets in the EU is currently insufficient to enable a thorough evaluation of the exact source of all animals and thus the impacts of their removal from the wild. This is a serious problem, because it renders well-understood potentially detrimental impacts unquantifiable. There is also evidence to show that permitting systems are being abused to facilitate illegal trade, and to 'launder' illegallytraded animals into the system. For example:

Primates

In March 2011, a British citizen was arrested in Spain while trying to transport four pygmy marmosets (Callithrix pygmaea) without the required permits. According to newspaper reports, the animals were found locked in plastic cages in unsuitable and unsanitary conditions inside the vehicle of the accused. The accused claimed to be the owner of a species recovery centre in Granada and stated that the monkeys were to be sent to the UK for captive breeding. On searching the facility of the accused in Granada, Spanish authorities discovered a further 50 exotic animals, including 20 primates, all lacking any type of documentation. The Spanish Public Prosecutor is seeking a custodial sentence92.

African grey parrots

African grey parrots (Psittacus erithacus) are classified as 'near threatened' by the IUCN93 and are listed on CITES Appendix II45 and Annex B of the EU Wildlife Trade regulations82. Only two countries hold 2011 export quotas for live wild-caught parrots: the Democratic Republic of Congo (DRC) (5,000 birds), and Congo (4,000 birds)⁶⁹. In 2009 the DRC exported at least 12,000 birds⁶⁹. Guinea also exports live birds, although it holds no quota, and Cameroon continued issuing export permits although it was directed to establish a two year moratorium pending a status survey. In July 2012, CITES granted Cameroon an annual export quota of 3,000 grey parrots. Live birds can fetch up to US\$2,000 on the black market in Europe.

In January 2005, the DRC issued a CITES export permit for 100 live African grey parrots destined for Lebanon (Lebanon is not a signatory to CITES, although membership is being progressed). Using this out-of-date permit, Lebanon subsequently issued a re-export permit for 20 African grey parrots from Exotic World in Beirut in November 2009, with a six-month expiration date. The Beirut facility has been given large numbers of import permits for birds from Central and West African countries, and has granted export permits to Gulf and Eastern European states. The seller claimed that 125 birds were exported under this re-export permit, and that they were covered by the original 2005 permit. The birds were transported via Cyprus to Bulgaria.





In many cases it is difficult to verify whether an animal is captive-bred or wild-caught. Wildlife laundering is common practice

On arrival, 108 birds in 4 plastic containers were confiscated and transferred to Sofia Zoo. Zoo sources confirmed that at least half of these subsequently died. It transpired that the re-export permit for 20 birds, on the basis of which the shipment had taken place, listed Serbia as a final destination, and therefore did not relate to this shipment at all.

In this case, the Bulgarian-based importer and buyer, a Lebanese national, provided the Ministry with a signed contract from a Cyprus-based seller. The buyer indicated to the Bulgarian Ministry that the birds originated from Cyprus.

(The owner of Exotic World continues to import large numbers of various parrot species from Iraq, all classified as captive-bred.)

Regardless of the existence or otherwise of appropriate CITES permits, the shipment was illegal under EU Regulation 318/2007 which only allows captive-bred birds to be imported into the EU from approved sources (Lebanon is not an approved source).



Illegally imported from Africa, this vervet monkey was seized on entry into the EU

Wild Pets in the European Union

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Case study 4: EU pet markets



75% of reptiles kept as pets die in their first year

Wild pets are offered for sale at markets in various parts of the world including in the EU. In 2011, a scientific investigation and assessment of European amphibian and reptile markets identified approximately 100 formally-listed wild pet markets as existing in the EU (including Austria, Belgium, the Czech Republic, France, Germany, Hungary, Italy, The Netherlands, Slovakia, Spain, Switzerland, and the UK)⁹⁴ although other investigations suggest that the actual number of events may be considerably greater, with around 700 being associated with Germany alone⁹⁵.

The 2011 study examined three key wild pet markets - one in Germany, one in Spain and one in the UK, and assessed animal welfare, public health and safety, and invasive alien species potential. The study also comprised a literature study and review.

The study monitored nine signs of captivity-stress and found that of 1,533 animals observed during one minute periods, stress-related behaviours were noted in approximately 50%. Therefore, stress was common in animals at all three events and this was likely to be largely due to severe spatial restrictions, that is enclosures comprising small plastic tubs, a severe lack or absence of naturalistic environments suitable for the species involved, disturbance relating to transportation and handling, and pre-existing stress states. A major stressor for some species, particularly nocturnal species, was the constant and invasive light at the events. Importantly, most of the animals

had no dedicated heat source and none of the enclosures observed at the events were of sufficient size to enable the animals to behaviourally thermoregulate. Conditions and treatment for the majority of animals at the event were described as, 'tantamount to animal abuse'94. Further, the welfare problems, as presented, were considered endemic to the market environment and grossly unresolvable.

Public health was analysed by assessing visitor behaviour at the stalls that sold animals by observing incidents of direct contact (meaning contact with an animal) and indirect contact (meaning contact with a potentially contaminated source, for example animal box or animal seller) and subsequent contacts thereafter. In total, 813 public visitors were observed at vendors' stalls, and 29 (3.6%) made direct contact with an animal, while 222 (27.3%) made indirect contact. The proportion of visitors that made subsequent contact was 18.7% hand to mouth, 52.2% hand to body, and 19.9% person to person. Importantly, it was concluded that within a relatively brief period, all public attendees were potentially subjected to some level of contamination. This is because amphibians and reptiles act as a reservoir of known pathogens and therefore all animals, their containers, seller facilities and the sellers themselves can be regarded as potential sources of zoonotic pathogen contamination.

The study's assessment of the potential for animals sold at EU markets to become invasive alien species in Europe found that of the 179 species identified, 28% had a recorded history as an IAS.







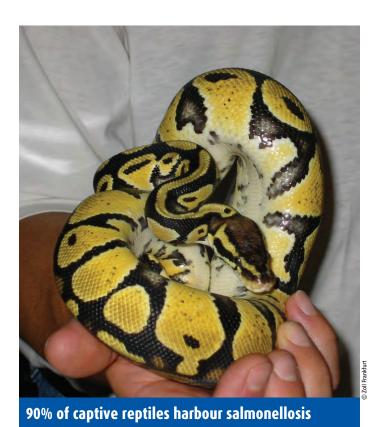
Government regulation, not self-regulation

It is known that the pet industry has historically requested self-regulation. However, the authors could find no evidence to suggest that 'the trade' has acted as, or has the capacity to act as, a self-regulatory system. There is a manifest dearth of exemplary information to show that the wild pet industry has acted to control traders, whether by prosecution for illegal conduct or by penalisation for unethical practice.

The fact that, for example, 25% of trade remains unlawful⁷⁰; that 70% of animals die within six weeks at commercial supply houses³; that 75% of reptiles die in the home in their first year³; that invasive alien species are routinely infiltrating the EU and causing ecological alteration³⁹; that emergent diseases are now firmly attributed to the wild pet industry²³; and that combined, these impacts represent a serious international problem and very substantial economic costs to governments, demonstrate how grossly unsustainable it is for the wild pet industry to self-regulate. Independent assessments of the wild pet industry have determined that it has failed to self-regulate or self-moderate its actions^{3,94}.

Further, it is widely known that trade and vested interests have historically (and tenaciously) resisted government control (even minimalistic measures) because these controls are commonly viewed as inconvenient and burdensome by traders and keepers⁹⁴.

Accordingly, it appears that within the wild pet industry there exists a culture of resistance to self-regulation and self-moderation⁹⁴ and it is therefore essential that all regulation of wild pet trading and keeping is formally controlled by government.



Wild Pets in the European Union





Captivity-stress was identified at all markets, largely due to severe spatial restrictions

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Current legislation

The European Union lacks a consistent approach to legislation or licensing requirements relating to the trade in and keeping of wild pets. Many species are not covered by conservation or trade legislation and are only likely to be better protected when their wild numbers become severely depleted. The following represents a brief summary of relevant international agreements, together with European Union and Member State legislation.

International agreements

Convention on Biological Diversity (CBD)

Article 8 (h) of the CBD states that Parties should take measures to "prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species". Decision VIII/27 paragraph 53 of the 8th Conference of the Parties "Urges Parties and other governments to take measures, as appropriate and consistent with their national and international obligations, to control import or export of pets, aquarium species, live bait, live food or plant seeds, that pose risks as invasive alien species" [Currently, this international regulatory framework does not adequately consider the threat posed by the pet trade.]

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES⁴⁵)

Implemented through EU Wildlife Trade Regulations82 and Member State national legislation CITES is an international trade agreement signed by 175 countries, and is designed to protect species that are or may be affected by international trade. Several CITES Resolutions deal specifically with live animal trade, including Resolution Conf. 8.13 (Rev.) on the "Use of coded-microchip implants for marking live animals in trade"; Resolution Conf. 10.20 on "Frequent cross-border movements of personally owned live animals"; and Resolution Conf. 10.21 (Rev. CoP14) on "Transport of live specimens". CITES obligations are implemented in EC law by Regulation 338/97, Article 9 of which requires that live animals covered by the Regulations should be "prepared, moved and cared for" so as to minimise the risk of injury, damage to health or cruel treatment. It further requires that "...the place of destination is adequately equipped to conserve and care for it [the animal] properly."82

World Trade Organisation (WTO)

The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) sets out how governments can apply import restrictions to animal and plant species, but prohibitions "must apply only to the extent necessary to protect human, animal or plant life or health" Article 30 of the EC Treaty of Lisbon sets out similar guidelines.

World Organisation for Animal Health (OIE)

The OIE Terrestrial Animal and Aquatic Codes and Manuals aim to address international trade in animals and animal products by controlling animal diseases and zoonoses⁹⁸. However, the OIE focuses primarily on livestock trade and the trade in wild pets is somewhat neglected⁷.

European regulations

The enlargement of the EU in May 2004 and again in January 2007 shifted the EU's borders further east, placing the 12 new Member States on the frontline when it comes to controlling imports of regulated wildlife into the EU. The EU's eastern land borders are now controlled by nine countries instead of three. There is concern about the lack of co-operation and coordination among enforcement agencies involved in ontrolling wildlife trade in the EU, and this concern has increased following enlargement.

The proportion of wild pets being traded illegally in the EU is thought to be substantial^{19,53,88}. There is evidence that the legal trade in wildlife, including the pet trade, feeds the demand for and facilitates the international illegal trade in wildlife⁸⁸. For some time, the EU has been criticised for its apparent failure to coordinate its efforts to implement international conventions effectively and to curb illegal wildlife trade.

Resolutions and treaties

The Council of Europe adopted the Resolution on the Keeping of Wild Animals as Pet Animals (page 18) into the Multilateral Consultation of Parties to the European Convention for the Protection of Pet Animals (ETS 125) in 1995. However, some 30% of European nations have, to date, failed to sign up to the Consultation, and of those countries that have, few have transposed its provisions into their national legal systems^{99,100}. The Resolution on the Keeping of Wild Animals as Pet Animals, which discourages the keeping of such animals, is rarely referenced.

Animal welfare became an integral part of the EC Treaty through the adoption of the Protocol on Animal Welfare annexed to the Treaty of Amsterdam in 1999. Article 13 of the Treaty of Lisbon states that "...Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals...".

Council Directive 92/65/EEC lays down animal health requirements governing trade in animals and their import into the Community.







A ban on the introduction of live wild-caught birds into the EU was introduced in 2005 as a means of reducing the risk from avian influenza. This was made permanent in 2007⁶⁸.

Other European Initiatives

EU Biodiversity Strategy

The EU has made protecting biodiversity one of four environmental priorities for Europe¹⁰¹. The collection of wild animals for the pet trade is a significant cause of ecological alteration and loss of biodiversity. In the European Parliament Report reviewing the Strategy, the Commission and the Member States have been requested to 'monitor and report regularly on imports of exotic and non-native species', whilst the Commission specifically has been requested to 'assess and make proposals for a ban on wild-caught animals for the pet trade'¹².

EU strategy on invasive alien species

The EU is developing a strategy for dealing with invasive alien species, as part of its goal to halt the decline in biodiversity by 2020. The release or escape of wild pets represents a major source of invasive alien species^{55,58}.

EU Animal Health Strategy

The EU's Animal Health Strategy (2007-2013) has been developed in recognition of the devastating impact that serious livestock disease outbreaks can have on farmers, society and the economy¹⁰². Wild pets have the potential to spread serious disease to livestock^{19,60,99}.

EU Strategy for the Protection and Welfare of Animals

The new Strategy 2012 to 2015 has been published. As well as setting out proposals for a European Network of Reference Centres for animal welfare and a Framework European Animal Welfare Law for all animals^{46,99}, the Council and the European Parliament has requested that the scope of EU animal welfare legislation should cover other species, including 'wild animals kept in captivity'^{99,103}.



Commonly traded as pets and then abandoned,

Trachemys scripta, is a recognised invasive alien species





National Requirements

Member State	Prohibitions on private keeping	Registration of permitted species		

member state	Trombitions on private keeping	Registration of permitted species
Austria	Primates (great apes), large terrestrial and marine mammals and venomous snakes	Yes - those listed
Belgium	Mammal species identified as potentially hazardous, including large terrestrial mammals and carnivores	Not known
Bulgaria	Primates, large felines and protected species (Art 37 + 47 Biodiversity Act)	Yes
Cyprus	No restriction	Not required
Czech Republic	No restriction	Yes
Denmark	Primates (except Callithricidae), penguins, flamingos, marine mammals and venemous snakes	Yes
Estonia	Primates	Yes - for Annex A-listed species
Finland	Wild native species	Not required
France	Primates (genus <i>Cebus</i>) - unless used by handicapped people and birds of prey - unless used for hunting	Yes
Germany	Dependent on Federal State law. Seven of the sixteen states have legislation, although these focus on public safety	Devolved to Federal State, although privately kept protected species must be registered
Greece	No restriction	Not required
Hungary	Primates and listed invasive species	Yes
Ireland	No restriction	Not required
Italy	Primates, large mammals inc large felines and venemous snakes	Yes
Latvia	Primates, <i>Carnivora</i> , marine mammals, <i>Crocodylia</i> and snakes (and wild-caught native species)	Yes
Lithuania	Primates, large mammals, Crocodylia (with exemptions)	Not required
Luxembourg	Non-domestic species not meeting national criteria	Yes
Malta	No restriction	Not required
Netherlands	Primates, large felines and listed invasive species (unless permission is granted)	Yes
Poland	Primates (great apes), large terrestrial mammals and venomous snakes	Yes - those listed on Appendix 2
Portugal	Primates, large terrestrial mammals, <i>Crocodylia</i> , and pythons and venomous snakes	Yes
Romania	Nationally protected species (wild-caught or captive-bred)	Not required
Slovakia	Trachemys scripta elegans	Yes
Slovenia	Nationally protected species	Not required
Spain	Dependent on regional law. Andalucia prohibits animals weighing over 10kg and Andalucia and Valencia restricts invasive species	Devolved to regional law
Sweden	Dependent on State Law	Not required
United Kingdom	No restriction	Yes - species on Schedule of the Dangerous Wild Animals Act 1976
Norway	Non-native mammals, reptiles and amphibians	Not required

The data were sourced from Member State Competent Authorities, expert opinion and published literature between June and September 2012. ENDCAP and authors of this document have made every effort to ensure that the information provided is correct and complete at the time of writing.





National criteria

European Convention for the Protection of Pet Animals (ETS 125)

	Signed	Entered into force
Negative List - Hazardous	02/10/1997	01/03/2000
Positive List of Mammals only (Positive List of Reptiles proposed)	13/11/1987	01/07/1992
Negative List - Hazardous / Protected	21/05/2003	01/02/2005
(Negative List - Hazardous, in development)	09/12/1993	01/07/1994
Positive List - Hazardous	24/06/1998	24/03/1999
Negative List - Hazardous	24/06/1998	24/03/1999
Negative list	Not Signed	
None	02/12/1991	01/07/1992
Negative List - Hazardous + Invasive (Annex 1 - requiring minimum specialist care + Annex 2 - requiring specialist care)	18/12/1996	01/05/2004
Dependent on Federal State e.g. State of Hessen has a Negative List - Hazardous	21/06/1988	01/05/1992
(Ministerial Decree with positive list in development)	13/11/1987	01/11/1992
Negative List - Hazardous + protected species	Not Signed	
None	Not Signed	
Negative List - Hazardous	13/11/1987	04/12/2010
Negative List	01/03/2010	01/05/2011
Negative list - Hazardous	11/09/2003	01/12/2004
Non-domestic fauna, unless for didactic, scientifc or conservation purposes	13/11/1987	01/05/1992
(Negative List - Hazardous, is in development)	Not Signed	
Negative List + invasive species (Positive List of Mammals in development)	13/11/1987	
Negative List - Hazardous (Appendix 1-prohibited species Appendix II-requiring authorisation)	Not Signed	
Negative List - Hazardous + Animal Welfare	13/11/1987	01/01/1994
None	23/06/2003	01/03/2005
Negative List	Not Signed	
Negative list — protected species	Not Signed	
Negative List - Hazardous / Invasive Species	Not Signed	
Dependent on State Law	14/03/1989	01/05/1992
Negative List - Hazardous	Not Signed	
Positive List	13/11/1987	01/05/1992





Recommendations

The European Community (both the Commission and the Member States) should urgently review the impacts of the ongoing trade in wild pets, in relation to its commitments to preserving biodiversity, reducing the impact of invasive animal species, protecting the public, improving animal welfare and safeguarding the EU economy. Appropriate and immediate action should be taken to address these issues, to harmonise animal protection regulations across the EU, including appropriate care for wild animals in captivity, and to seek the means to: a near-future ban wild-caught animals from the pet trade; introduce measures to ensure that those animals in trade receive the best possible care; introduce measures to ensure that all risks to animal and human health and safety are minimised; and ultimately introducing a ban on all trade in wild pets.

Bans on trade are proven and effective measures for controlling the raft of problems associated with collection, transportation, storage, sale and keeping of wild animals as pets³. Examples are: the 1984 ban on Mediterranean tortoises, which led to reductions from several hundred thousand animals per year into the UK to approximately 14,500 controlled sales at present; the 1997 ban on the red-eared terrapin trade into the EU, which has almost eradicated the former trade in 5-7 million animals annually; and the 2005 wild bird ban to address avian influenza, which has resulted in substantial elimination of avian trade³. Such bans address all the multifactorial problems associated with trade and keeping.

The following recommendations are intended to emphasise or enhance those made in the existing ENDCAP position document 'EUPAW: Promoting Animal Welfare Excellence in Europe'¹⁰⁴.

The European Commission should consider the following actions:

EC Regulation 338/97, Wildlife Trade:

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- To actively and continuously improve animal welfare regulations in the framework of the EU Wildlife Trade Regulation (EC) No 338/971 (as amended)⁹⁹; particularly to ensure that animal welfare remains the priority from the time the animals are sourced and prepared for transportation, through the shipping and import process, to their point of sale and conditions under which they are kept at the final destination.
- To provide clear guidelines concerning any exemptions to the prohibition on the import of Annex A species.
- With regard to the establishment of a European Network of Reference Centres for Animal Welfare^{46,99} to ensure its scope covers 'wild animals kept in captivity'^{99,103} (including wild pets) and that Member States and other stakeholders are

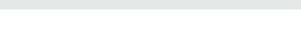
- provided sufficient support and information to harmonise EU regulations establishing a duty of care, imposing restrictions on the keeping of 'hazardous' species and ensuring the welfare of wild pets.
- Active enforcement of Council Regulation 338/97/EC is vital. The Commission and Members States should ensure all ports of entry have appropriately trained enforcement personnel able to identify and record all 'imports of exotic and non-native species' and, if necessary, confiscate and provide suitable care and shelter for seized animals. Such an initiative could be supported by training programmes co-ordinated by the European Network of Reference Centres.
- Encourage the development of a decision-making procedure in all EU Member States for the management of confiscated wild animals, including the provision of adequate quarantine facilities, and, where possible, the repatriation or rehoming of animals to appropriate destinations, following international guidelines such as the IUCN Guidelines for the Placement of Confiscated Animals¹⁰⁵, the CITES Guidelines for the Disposal of Confiscated Live Specimens of Species Included in the Appendices¹⁰⁶ and the Species Survival Network's list of Wildlife Rescue Facilities¹⁰⁷. Member State authorities should be encouraged to consider euthanasia only as a last resort.

Curbing Biodiversity loss:

- Unacceptable mortality rates are suffered by many species in trade. All EU Member States should systematically record and monitor mortality in trade, not only among CITES-listed species, but all wild animal species in trade.
- The European Union should exercise the option under Article 4.6.c of Regulation 338/97/EC to immediately ban the trade in species that are likely to suffer high mortality rates during capture, transportation and in captivity by applying the Precautionary Approach (see Glossary).
- The option of ultimately introducing a ban on all wild-caught animals for the pet trade should be fully assessed¹².

Reducing the threat of invasive species:

- The EU should adopt strict control measures on the import and keeping of wild animals listed on the DAISIE list of invasive alien species⁴³, and a precautionary approach for those species where insufficient data is available.
- All EU Member States should take robust measures to regulate the keeping of wild pets and seek to prohibit the keeping of invasive alien species. Of the 27 EU Member States, 18 have so far made a concerted effort to restrict the import/export of invasive alien species, based on identification or prioritisation of such species^{58,108}.







Animal Health Law:

Ensure that the New Single Regulatory Framework for Animal Health (EU Animal Health Law¹⁰²) and the World Organisation for Animal Health (OIE) Guidance⁹⁸ recognise the potential threats that the trade in and keeping of wild pets may pose to the health of other animals, and that this framework should be amended to include preventative measures, as appropriate.

EU Strategy for the Protection and Welfare of Animals:

- Encourage the Council of Europe to urgently revive the European Convention for the Protection of Pet Animals¹⁰⁰, update provisions relating to a mandatory 'duty of care' for pets supported by scientific evidence and to actively encourage all EU Member States to adopt and implement the Convention.
- Encourage the Council of Europe to revise the Resolutions incorporated in the Convention for the Protection of Pet Animals, in particular the Resolution on the Keeping of Wild Animals as Pet Animals (1995), and to actively encourage restrictions on wild animal pet keeping in all EU Member States.
- Ensure that the European Council's deliberations on the welfare of cats and dogs¹⁰⁹ be extended to include all pet animals, and that Member States ensure all captive animals are maintained to recognised animal Welfare Quality[®] standards which could be established through the European Animal Welfare Law and developed through the proposed European Network of Reference Centres⁴⁶.
- Ensure that the scope of EU animal welfare legislation covers all species, including 'wild animals kept in captivity', (which would include wild pets), as required by the "Paulsen Report" (2010 and 2012) and Council of Ministers' Report (2012) and ensure that it is properly and effectively enforced.
- Ensure information and support is available and accessible
 to all animal keepers at national, regional and local level,
 through regional workshops, practical tools (such as
 checklists) and the use of modern technology, to ensure
 high levels of husbandry and care of wild pet species⁹⁹.
- Consider the suitability of wild animals as pets on the basis of established criteria, such as the 'Five Freedoms'⁴⁴ or equivalent, the recommendations of Schuppli & Fraser (2000)⁸⁶, and appropriate public health and conservation criteria.

Consumer protection and hazardous animals:

 Recognise that wild pets can cause people harm including: physical injury; infection by zoonotic disease; or even death.

- In addition, establish and publish a list of hazardous species, with the aim of safeguarding the health and safety of the public and the environment. Limitations on the use and ownership of certain animal species would reduce the risks. An example of standards is: http://www.defra.gov.uk/wildlife-pets/zoos/documents/zoo-standards/app12.pdf
- Of the 27 EU Member States, 12 regulate and establish limitations on the use and ownership of certain animal species based on their 'hazardous animal' status. All Member States should, as a minimum, restrict the keeping of wild animals as pets to those species deemed non-hazardous (whether by injury or disease) to humans.

European Member States should consider the following actions:

Effectively enforcing current legislation by:

Ensuring robust measures are taken to regulate and restrict
the keeping of wild pets that recognise EU policy and aim to
limit risks to biodiversity, the natural environment, public
health and safety and animal health and welfare.

Resolution on the Keeping of Wild Animals as Pet Animals¹⁰⁰

The Resolution is an agreement to set up a system controlling the keeping of wild animal species as pets, taking into account the following basic criteria:

- 1. An animal must be housed and cared according to its physiological and behavioural needs;
- 2. In particular, the following conditions must be met:
 - i. space allocation sufficient for the specific needs of the animal in particular for movements and exercise;
 - ii. appropriate enclosure enrichment with climbing material, digging possibilities, rest and hiding places, as well as bathing, swimming or diving facilities;
 - iii. possibilities to fulfil the needs for social behaviour;
 - iv. appropriate climatic conditions.
- 3. The keeper must have appropriate knowledge to be able to satisfy the physiological and behavioural needs of the animal during its entire keeping;
- 4. The necessary conditions must be met to prevent the animal from escaping;
- 5. The aspects related to aggressiveness of the animal and to possible risk for human safety and health should be taken into account.









- Signing up to, transposing and implementing the Council of Europe's European Convention for the Protection of Pet Animals, imposing a 'duty of care' on pet owners. In addition, recognising and implementing the Resolution on the Keeping of Wild Animals as Pet Animals (1995) by actively restricting wild pet keeping.
- Ensuring that all exotic and non-native species are imported only through authorised ports of entry where adequate predetermined facilities and trained personnel will be required to gather relevant data including species, origin, age and sex where practicable and when the legality of the importation can be verified, disease risk analysed, and appropriate quarantine facilities provided.
- Ensuring that all imports and exports of wild animals between EU Member States are recorded (species, origin, age and sex, where practicable) and that Member State Competent Authorities are informed about, and authorise, shipments before they are exported.
- Any trader, owner or person in possession of wild animals for commercial purposes wishing to move animals across internal EU borders must first receive written authorisation (an import permit) from the Competent Authorities of the State of import, before applying for written authorisation (an export permit) from the Competent Authorities of the State of export. Furthermore, the State of export may not issue this authorisation without being satisfied that the specimen was not obtained in contravention of any laws; that any living specimen will be so prepared and shipped as to minimise the risk of injury, damage to health or cruel treatment; and that an import permit has been granted for the specimen. This requirement is compatible with Article III of the CITES Treaty.
- Maintaining centralised records of trade in and ownership of wild pets and making them available to international, European and National institutions for the purposes of enforcement, and as a guide to future regulation aimed at protecting biodiversity and ecology, public health and safety, and animal health and welfare.

Establishing and developing further regulation to:

- Ensure the Framework European Animal Welfare Law includes and provides sufficient protection for the welfare of 'wild animals in captivity', which would include wild animals kept as pets.
- Establish limitations on the use and ownership of certain animal species based upon their 'hazardous animal' status, their potential to cause injury or transmit zoonoses, their conservation status, their species-specific welfare needs and/or EU invasive alien species listing (DAISIE⁴³).

- The majority of EU Member States have established negative species lists, some have banned certain species, such as all primates, whilst nine EU Member States have yet to sufficiently regulate the keeping of wild pets.
- Adopt and effectively enforce the revised Council of Europe's Resolution on the Keeping of Wild Animals as Pet Animals¹⁰⁰ and seek to ensure all wild animal species kept as pets are appropriately housed and provided with adequate care.
- Implement the proposal¹² to introduce a ban on the import of wild-caught, non-native animals destined for the pet trade.

Capacity-building, Non-legislative:

- Take all necessary measures to educate stakeholders as to the requirements for keeping and handling wild animal species to discourage impulse purchases and improve the welfare of wild animals currently in captivity. Encourage (and, if necessary legislate for) a 'duty of care' for animal keepers, whereby pet animal breeders and vendors selling wild animals must provide prospective owners with detailed guidance on the species-specific physiological, behavioural and environmental needs of the animals concerned and all relevant legal requirements prior to any sale taking place. This information should be prepared by entirely independent (that is having absolutely no vested interests) experts and should be scientific evidence-based and avoid over-simplistic messaging aimed at generating sales.
- Ensure all enforcement personnel are educated and trained to effectively implement and enforce animal protection legislation.
- Support the establishment and development of the European Network of Reference Centres for Animal Welfare, which will co-ordinate with existing centres of excellence in each EU Member State, to facilitate training, share information and knowledge and establish a common understanding and application of welfare principles.







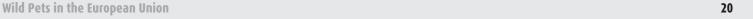


Wildlife belongs in the wild

ENDCAP believes the prompt implementation of the Recommendations (page 17) will result in the following benefits:

- A reduction in the number of wild animals harvested for the pet trade, leading to improvements in species conservation and bio diversity protection;
- A reduction in ecological disturbance and habitat degradation associated with the invasive capture of wild animals for the pet trade, leading to improved habitat conservation globally;
- The avoidance of the introduction of invasive alien species and pathogens into novel ecosystems, leading to local ecosystem protection and avoidance of eradication costs and other economic losses;
- The avoidance of public injury and zoonotic disease and a reduction in the potential for the spread of emerging infectious diseases, leading to improved human health and safety and reduced healthcare costs and other economic losses;
- The reduction of trade in both wild-caught and captive-bred wild animals, and the improvement in conditions in which captive wild animals are held, leading to a reduction in animal welfare problems;
- An improvement in the protection and welfare of wild pets currently in captivity;
- The reduction in resources required to monitor the trade in wild pets.









References

- Check E. (2004) Exotic pet trade. Nature 427; 277.
- Engler M. & Parry-Jones R. (2007) Opportunity or threat: The role of the European Union in Global Wildlife Trade. TRAFFIC Europe, Brussels, Belgium.
- Toland, E., Warwick, C. & Arena P. (2012) The exotic pet trade: pet hate. The Biologist Vol. 59, No 3 pp.14-18.
- Collen B., Ram M., Dewhurst N., Clausnitzer V., Kalkman V., Cumberlidge N. and Baillie J.E.M. (2008) Broadening the coverage of biodiversity assessments. In: J.-C. Vié, C. Hilton-Taylor and S.N. Stuart (eds). The 2008 Review of The IUCN Red List of Threatened Species. IUCN Gland, Switzerland.
- van Dijk P.P., Corti C., Mellado V.P. & Cheylan M. (2004) Testudo graeca (reptile). In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. www.iucnredlist.org>. Downloaded on January 2011.
- Goode M. J., Swann D.E. & Schwalbe C.R. (2004) Effects of destructive collecting practices on reptiles: A field experiment. Journal of Wildlife Management 68:429–434. Secretariat of the Convention on Biological Diversity (2010) Pets, Aquarium, and
- Terrarium Species: Best Practices for Addressing Risks to Biodiversity. Montreal, SCBD, Technical Series No. 48, 45 pages.
- Sodhi et al (2004) Southeast Asian biodiversity: an impending disaster. Trends in Ecology and Evolution 19(12)654-660.
- Gibbon et al (2000) The global decline of reptiles, deja vue amphibians. BioScience 50(8):653-666
- Franke J. & Telecky T.M. (2001) Reptiles as pets; an examination of the trade in live reptiles in the United States. The Humane Society of the United States.
- Daszak P., Berger L., Cunningham A.A., Hyatt A.D., Green D.E. & Speare R. (1999) Emerging Infectious Diseases and Amphibian Population Declines. Emerging Infectious Diseases 5, 735-748.
- 12 Committee on the Environment, Public Health and Food Safety. Report on our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011/2307 (INI)); No.100. European Parliament 2009 to 2014. Rapporteur: Gerben-Jan Gerbrandy
- "Pet marmosets turn into homewreckers." Western Daily Press, 3rd March 1999.
- Soulsbury C.D., Iossa G., Kennell S. & Harris S. (2009) The welfare and suitability of primates kept as pets. Journal of Applied Animal Welfare Science 12 (1); 1-20
- 15 Schaper A., de Haro L., Desel H., Ebbecke M. & Langer C. (2004) Rattlesnake bites in Europe - experiences from southeastern France and northern Germany. J. Toxicol Clin Toxicol. 42(5); 635-41.
- 16 Snake sanctuary owner Luke Yeomans dies from cobra bite. (2011) http://www.bbc.co.uk/news/uk-13968581
- 17 Warwick C. & Steedman C. (2012) Injuries, envenomations and stings from exotic
- pets, J Roy Soc Med 105:296—299; doi:10.1258/jrsm.2012.110295.

 18 Mooney C. (2002) Reptiles and disease keeping the risks to a minimum. Journal of Small Animal Practice, 43, 471-472.
- Praud A. & Moutou F. (2010) Health Risks from New Companion Animals. Commissioned by Eurogroup for Animals.
- Karesh W., Cook R.A., Bennett E.L. & Newcombe J. (2005) Wildlife Trade and Global Disease Emergence. Emerging Infectious Disease, 11; 1000-1002, Centers for Disease Control, Atlanta.
- 21 Brown C. (2004) Emerging zoonoses and pathogens of public health significance -an overview. Rev. Sci. Tech. Off. Int. Epiz. 23; 435-442.
- 22 Chomel B.B., Belotto A. & Meslin F-X. (2007) Wildlife, Exotic Pets, and Emerging Zoonoses. Emerging Infectious Diseases 13 (1); 6-11.
- 23 Warwick, C., Arena, P.C., Steedman, C. and Jessop, M. (2012) A review of captive exotic animal-linked zoonoses. Journal of Environmental Health Research, 12:9-24. http://www.cieh.org/jehr/default.aspx?id=41594
- Warwick C. (2006) Zoonoses: Drawing the battle lines. Veterinary Times 36; 26-28
- Renquist D.M. & Whitney R.A. (1987) Zoonoses acquired from pet primates. Veterinary Clinics of North America: Small Animal Practice 17 (1); 219-240.
- American Journal of Primatology Special Edition: Disease Risk Analysis (2006). 68 (9); 951-948.
- 27 Nuzzo J.B. & Gronval G.K. (2011) Global Health Security: Closing the Gaps in Responding to Infectious Disease Emergencies. Global Health Governance IV (2) http://www.upmc-biosecurity.org/website/resources/publications/2011/2011-06-15-closing_gaps_inf_disease.html
- 28 GAO (2009) United States Government Accountability Office: Report to the Committee on Homeland Security and Governmental Affairs, U.S. Senate. Live animal imports: agencies need better collaboration to reduce the risk of animal-related diseases, November 2010 GAO-11-9.
- 29 Smith KM, Anthony SJ, Switzer WM, Epstein JH, Seimon T, et al. (2012) Zoonotic Viruses Associated with Illegally Imported Wildlife Products. PLoS ONE 7(1): e29505. doi:10.1371/journal.pone.0029505
- Carter N. & Currey D. (1987) Research into the conditions of capture, transportation and export of wild-caught birds from Senegal. In: Thorton A (ed) The Trade in Live Wildlife. Mortality and Transport Conditions, pp.10-18. The Environmental Investigation Agency: London, UK.
- 31 Engebretson M. (2006) The welfare and suitability of parrots as companion animals: a review. Animal welfare 15; 263-276.

- 32 Altherr S. & Freyer D. (2001) Mortality and morbidity in private husbandry of reptiles, RSPCA.
- Miller G.T. & Spoolman S. (2007) Sustaining the Earth: an integrated approach. Cengage Advantage
- Warwick C., Frye F.L. & Murphy J.B. (Eds.) (1995) Health and Welfare of Captive Reptiles. Chapman & Hall/Kluwer, London and New York.
- 35 RSPCA (2010) The Welfare State: Measuring animal welfare in the UK 2009
- The Captive Wild Animal Protection Campaign, a programme of the Global Federation of Animal Sanctuaries. http://www.cwapc.org/education/PETA_ BornFree_SoldOut.html
- 37 Pimentel D., Zuniga R. & Morrison D. (2005) Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics 52: 273-288.
- F. Williams et al., (2010) The Economic Cost of Invasive Non-Native Species on Great Britain. CAB/001/09. www.cabi.org
- 39 Shine C., Kettunen M., ten Brink P., Genovesi P. & Gollasch S. (2009) Technical support to EU strategy on invasive species (IAS) - Recommendations on policy options to control the negative impacts of IAS on biodiversity in Europe and the EU. Final report for the European Commission. Institute for European Environmental Policy (IEEP), Brussels, Belgium. 35 pp. Available at http://ec.europa.eu/environment/nature/invasivealien/docs/Shine2009_IAS_Final%20report.pdf
- 40 El Periodico, 21 June 2011. La lucha contra el caracol manzana desecará un tercio del delta del Ebro. http://www.elperiodico.com/es/noticias/sociedad/20100926/ lucha-contra-caracol-manzana-desecara-tercio-del-delta-del-ebro/499283.shtml
- Vilà M., Basnou C., Pyšek P., Josefsson M., Genovesi P., Gollasch S., Nentwig W., Olenin S., Roques A., Roy D., Hulme P.E., & DAISIE partners (2010) How well do we understand the impacts of alien species on ecosystem services? A pan-European, cross-taxa assessment. Frontiers in Ecology and the Environment, $8(3)\,135-144$ doi: 10.1890/080083.
- Economic implications associated with the exotic pet trade. EDF unpublished.
- Delivering Alien Invasive Species Inventories for Europe (DAISIE). http://www.europe-aliens.org/index.do
- Farm Animal Welfare Council. Five Freedoms. http://www.fawc.org.uk/freedoms.htm (accessed June 2011)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora. http://www.cites.org/ (accessed June 2011)
- European Commission DG Health and Consumers. Animal Welfare EU Action Plan, Evaluation and the Second Strategy on Animal Welfare. http://ec.europa.eu/food/ animal/welfare/actionplan/actionplan_en.htm (accessed June 2011)
- The 'Report on evaluation and assessment of the Animal Welfare Action Plan 2006-2010 (2009/2202(INI))' (2010) ("Paulsen Report") http://www.europarl.europa.eu/sides/getDoc.do?language=EN&reference= A7-0053/2010
- Born Free Foundation (2012) EU Zoo Inquiry 2011, Report Findings and Recommendations. P29-30.
- European Commission, DG Health and Consumers. Trade Control and Expert System. http://ec.europa.eu/food/animal/diseases/traces/index_en.htm (accessed June 2011)
- 50 European Commission. Eurostat Home Page. http://epp.eurostat.ec.europa.eu/ portal/page/ portal/eurostat/home/ (accessed June 2011)
- European Commission, DG Health and Consumers. Trade Control and Expert System 2012. Appendix 1: The number of live imports into the UK from EU member states and third countries, supplied by AHVLA UK.
- 52 Illegal Wildlife Trade. WWF http://www.wwf.org.uk/what_we_do/safeguarding_the_ natural_world/wildlife/illegal_wildlife_trade/
- Crossland D. (2007) Alarm over exotic pet boom: Invasion of Pet Piranhas. Spiegel International. http://www.spiegel.de/international/alarm-over-exotic-pet-boominvasion-of-the-pet-piranhas-a-467865.html
- Pet Food Manufacturers Association (2011)
- Westphal M.I., Browne M., MacKinnon K. and Noble I. (2008) The link between international trade and the global distribution of invasive alien species. Biological Invasions, 10 (4): 391-398.
- 56 Global Invasive Species Database (2010). Trachemys scripta elegans (reptile). http://www.issg.org/database/species/ecology.asp?si=71&fr=1&sts= &lang=EN (accessed June 2011)
- Skerratt L., Berger L., Speare R., Cashins S., McDonald K., Phillott A., Hines H. & Kenyon N. (2007) Spread of Chytridiomycosis Has Caused the Rapid Global Decline and Extinction of Frogs. Ecohealth 4 (2); 125-134
- European Commission Environment. Development of an EU strategy on invasive alien species. http://ec.europa.eu/environment/nature/invasivealien/index_en.htm (accessed June 2011)
- 59 Dutch Society for the Protection of Animals (2000) The veterinary control in the
- European Union of imported pet birds and mammals of CITES and non-CITES species. International Illegal Trade in Wildlife: Threats and U.S. Policy (March 2008) CRS Report for Congress, Order Code RL34395.





- 61 Heartwater: Another Potential Foreign Animal Disease John Kirk and Heidi Hamlen http://www.vetmed.ucdavis.edu/vetext/INF-DA/INF-DA HEARTWATER.HTML
- Webster RG.Influenza virus: transmission between species and relevance to emergence of the next human pandemic. Arch Virol Suppl. 1997;13:105-13.
- 63 British Veterinary Association (2010) Exotic pets and welfare labelling are top priorities for new Government. http://www.bva.co.uk/newsroom/1830.aspx (accessed June 2011)
- Wells D. (2002) The ownership and welfare of exotic pets. RSPCA.

 Tarr B. A., Rabinowitz J. S., Imtiaz M. A. and DeVoogd T. J. (2009). Captivity reduces hippocampal volume but not survival of new cells in a food-storing bird. Developmental Neurobiology 69; 972-981.
- Girling S.J. (2010) The welfare of birds in the future. In The welfare of domestic fowl and other captive birds. Duncan I.J.H. (Ed.). Springer. PD Dr. sc. D.C. Turner. Institute of Evolutionary Biology & Environmental Studies,
- University of Zurich. Pers. Comm
- European Commission Decisions 2005/759/EC, 2005/760/EC, 2006/522/EC, and 2007/318/EC. http://eur-lex.europa.eu/en/index.htm (accessed June 2011)
- United Nations Environment Programme. http://www.unep-wcmc.org/ (accessed June 2011)
- International Fund for Animal Welfare. Fight Illegal Wildlife Trade. http://www.ifaw.org/ifaw_canada_english/join_campaigns/fight_illegal_wildlife_trade/index.php (accessed June 2011)
- 71 AAP (2010) Stop buying monkeys in Morocco. http://www.aap.nl/english/news/ news/stop-buying-monkeys-in-morocco.html
- European Commission Export Helpdesk, trade statistics. http://exporthelp.europa.eu/thdapp/comext/ComextServlet?languageId = EN(accessed June 2011)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora. Prop. 11.37 (2000). http://www.cites.org/eng/cop/11/prop/37.pdf (accessed June 2011)
- 74 Warwick C. (1990) Reptilian ethology in captivity: observations of some problems and an evaluation of their aetiology. Appl. Anim. Behav. Sci. 26; 1-13
- 75 Kreger M.D. (1993) Zoo-academic collaborations: physiological and psychological needs of reptiles and amphibians. Herpetologica 49; 505-512.
 76 Diarrio de Navarra (2009) Los animales exóticos no dan cariño en casa y su
- abandono daña el entorno. http://www.diariodenavarra.es/20090530/ culturaysociedad/los-animales-exoticos-dan-carino-casa-abandono-dana entorno.html?not=2009053011323974&idnot= 2009053011323974&dia= 20090530&seccion=culturaysociedad&seccion2= culturaysociedad&chnl=40 (accessed June 2011)
- 77 Beck, S. et al. Undated, Florida Invaders, (Ed) Clarke, A. "A Joint publication of the National Park Service (NPS) & Florida Fish and Wildlife Conservation Commission. http://www.nps.gov/ever/naturescience/upload/2008%20Florida%20Invaders%20 For%20Web.pdf (accessed June 2011)
- Schilliger L. (2004) Guide pratique des maladies des reptiles en captivité. Paris : Med'com, p. 224.
- Mermin J., Hutwagner L., Vugia D., Shallow S., Daily P., Bender J., Koehler J., Marcus R. & Angulo F. J. (2004) Reptiles, amphibians, and human salmonella infection: A population-based, case-control study. Clin. Infect. Dis. 38, 253-261.
- RSPCA & Wild Futures (2009) Primates as Pets; is there a case for regulation? http://www.wildfutures.org/sites/default/files/reports/Primate %20Pack_ Nov%2009.pdf (accessed June 2011)
- Greenwood A. G., Cusdin P. A. & Radford M. (2001). Effectiveness study of the Dangerous Wild Animals Act 1976. Department for Environment Food and Rural Affairs.
- 82 European Council Regulation 338/97 (and subsequent amendments) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=0J:L:1997:061:0001: 0069: EN:PDF (accessed June 2011)
- 83 DEFRA (2009) Code of Practice for the Welfare of Privately kept Non-Human Primates. http://archive.defra.gov.uk/wildlife-pets/pets/cruelty/documents/primate-cop.pdf (accessed June 2011)
- 84 El Pais (2011) Los Mossos han liberado a 89 primates en malas condiciones desde 1990 http://www.elpais.com/articulo/espana/Mossos/han/liberado/89/ primates/malas/condiciones/1990/elpepuesp/20080606elpepunac_10/Tes (accessed June 2011)
- 85 Hevesi, R. (2005). Welfare and health implications for primates kept as pets. In International Fund for Animal Welfare (Eds.), Born to be wild: Primates are not pets (pp. 18–29). London: IFAW.
- 86 Schuppli C.A. & Fraser D. (2000) A framework for assessing the suitability of different species as companion animals. Animal Welfare 4; 359-372
- Moroccan Primate Conservation Foundation (2010) The history and current status of the Barbary macaque. http://www.mpcfoundation.nl/pages.php?pageid=14323 (accessed June 2011)
- 88 Cook D, Roberts M & Lowther J. (2002) The international wildlife trade and organised crime: A review of the evidence and the role of the UK. Regional Research Institute, University of Wolverhampton.

- 89 Redmond I. (2005) The primate pet trade and its impact on biodiversity conservation. In: Born to be wild: Primates are not pets. London: International Fund for Animal Welfare (IFAW).
- US Federal Register January 5th 2011 pages 677-695. http://edocket.access.gpo.gov/2011/2010-32922.htm (accessed June 2011)
- Huemer H. P., Larcher C., Czedik-Eysenberg T., Nowotny N. & Reifinger M. (2002). Fatal infection of a pet monkey with Human herpesvirus 1. Emerging Infectious Diseases 8: 639-641.
- 92 20 month prison sentence for a British man who was arrested at the frontier in Irun found to be carrying four 'Titio Pigmeo' monkeys, an endangered species. (2011) Costa del Gangster http://costadelgangster.blogspot.co.uk/2011/03/20-monthprison-sentence-for-british.html
- The International Union for the Conservation of Nature Red List of Threatened Species. http://www.iucnredlist.org
- Arena P., and Steedman C., and Warwick C. (2012) Amphibian and reptile pet markets in the EU an investigation and assessment. Animal Protection Agency, Animal Public, International Animal Rescue, Eurogroup for Wildlife and Laboratory Animals, Fundación para la Adopción, el Apadrinamiento y la Defensa de los Animales, 52 pgs.
- Altherr S., Brückner J. & Mackensen H. (2010) Missstände auf Tierbörsen (2010) Mangelhafte Umsetzung der BMELV-Tierbörsen-Leitlinien Eine Bestandsaufnahme, ProWildlife, Germany,
- The Convention on Biological Diversity. http://www.cbd.int
- The World Trade Organisation. Sanitary and phytosanitary measures. http://www.wto.org/english/tratop_e/sps_e/sps_e.htm (accessed June 2011).
- The World Organisation for Animal Health. http://www.oie.int
- Report on the European Union Strategy for the Protection and Welfare of Animals 2012–2015 (2012/2043 (INI)). European Parliament, Committee on Agriculture and Rural Development. Rapporteur: Marit Paulsen.
- 100 Council of Europe (1995) European Convention for the Protection of Pet Animals. Available at: http://www.felinewelfare.co.uk/coemcp.htm
- 101 European Commission Environment. Biodiversity Campaign http://ec.europa.eu/environment/biodiversity/campaign/index.htm (accessed June 2011)
- 102 European Commission DG Health and Consumers. The new Animal Health Strategy (2007-2013): "prevention is better than cure". http://ec.europa.eu/food/animal/ diseases/strategy/index_en.htm (accessed June 2011).
- 103 Council conclusions on the protection and welfare of animals. 3176th Agriculture and Fisheries Council meeting Luxembourg, 18 June 2012. $http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/agricult/$ 131032.pdf
- 104 ENDCAP (2011) EUPAW Promoting Animal Welfare Excellence in Europe. http://ec.europa.eu/food/animal/welfare/actionplan/docs/ENDCAP%20 Position%20Document%20on%20EUPAW%202011.pdf
- 105 IUCN (2002) Guidelines for the Placement of Confiscated Animals. Prepared by the IUCN/SSC Reintroduction Specialist Group. IUCN, Gland, Switzerland and ERWDA, Abu Dhabi, UAE. 24pp.
- 106 CITES Res.Conf.10.7 (Rev.CoP15) Disposal of confiscated live specimens of species included in the Appendices. http://www.cites.org/eng/res/10/10-07R15.shtml (accessed June 2011)
- 107 www.ssn.org/cites_rescue_intro_EN.htm
- 108 Shine C., Kettunen M., Genovesi P., Essl F., Gollasch S., Rabitsch W., Scalera R., Starfinger U. & ten Brink P. (2010). Assessment to support continued development of the EU Strategy to combat invasive alien species. Final Report – Service Contract ENV.B.2/SER/2009/0101R. Available at: http://ec.europa.eu/environment/nature/ invasivealien/docs/IEEP%20report_EU%20IAS%20Strategy%20components
- 109 Council of the European Union: Council conclusions on the welfare of dogs and cats. Brussels, 29th November 2010.http://www.consilium.europa.eu/uedocs/ cms_Data/docs/pressdata/en/agricult/118076.pdf 110 ProWildlife (2012) Wildnis im Wohnzimmer: Ausmaß und Folgen des
- Wildtierhandels in Deutschland Warum die Politik endlich aktiv werden muss



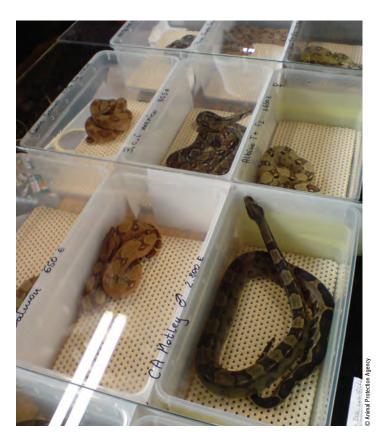














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