Strasbourg, 26 August 2021 **T-PVS/Inf(2021)39**
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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS

Standing Committee

41st meeting
Strasbourg, 29 November - 3 December 2021

GUIDANCE DOCUMENT ON E-COMMERCE AND IAS

August 2021

Report prepared by
Mr Andrea Monaco Lazio Region/ISPRA (Italy) and IUCN SSC Invasive Species Specialist Group
(The opinions expressed in this work are the responsibility of the author and do not necessarily reflect the official policy of the Council of Europe)

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SUMMARY

This document aims to provide guidance on voluntary measures to limit the role of e-commerce as a pathway for the introduction of invasive alien species (IAS) at both a national and regional scale. Scientific literature and surveys of global commercial websites reveal a wide range of IAS for sale, including many species that are regulated by national laws or international treaties. Identifying and managing the risks associated with e-commerce is particularly challenging as e-commerce is not a physical pathway for the introduction of IAS, but rather simply serves as a mechanism for processing both commercial and non-commercial transactions between groups and individuals. The Guidance is thus addressed to those who can contribute to the enforcement of an effective management and regulation of this pathway. The Guidance also aims to raise awareness of the dangers related to this threat and to improve the existing information on this issue. The support of national authorities in implementing the code is pivotal to ensure the effectiveness of the measures envisaged.

1. INTRODUCTION

Over the past 25 years, the Council of Europe has been working to support the Bern Convention Contracting Parties in designing and implementing control measures for invasive alien species (IAS), with the aim to reduce their negative impacts on native biodiversity in Europe. The Council has produced a number of reports and policy documents in the field and, above all, has developed the European Strategy on Invasive Alien Species endorsed by the Bern Convention in 2003. It has also produced numerous voluntary guidance documents and codes of conduct to address the various sectors of activity which are potential pathways for the spread of non-endemic species in Europe.

The European Strategy on IAS paved the way for the adoption of the EU Regulation 1143/2014, leading to concerted action on a list of IAS of Union concern. The voluntary codes of conduct and best practice documents are valuable complementary tools. They are considered to be fundamental and flexible "implementation" tools, which can be strengthened through the support of public bodies, industry federations, user groups and/or NGOs as appropriate, with the aim of ensuring responsible, proactive policies, and applying these in a coherent manner across Europe (Shine et al. 2010).

For this reason, the Bern Convention, with the technical support of the IUCN SSC Invasive Species Specialist Group, has started to develop a series of voluntary instruments (codes of conduct and guidelines) covering several industries, activities or contexts potentially responsible for the introduction of alien species (*e.g.* horticulture, hunting, pet industry, botanical and zoological gardens, aquaria and protected areas).

The development of these instruments could play an important role in building awareness amongst key societal sectors and is fully in line with Aichi Target 9 of the Strategic Plan for biodiversity 2011–2020 (CBD-COP, Nagoya, 2010, Decision X/38[1]): "by 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment", and with Target 5 of the EU Biodiversity strategy to 2020.

In light of the above and considering the activities of the Convention of Biological Diversity in relation to IAS and the implementation of the EU Regulation 1143/2014, the Council of Europe proposes to develop a guidance document on e-commerce and IAS. The considerable increase of e-commerce over the past years, its major role as an IAS introduction pathway and the difficulties encountered in regulating this trade, all calls for

[1] https://www.cbd.int/decision/cop/?id=12304

the development of such guidance. The present guidance is also expected to provide useful cues and suggestions to support the processes of prioritization and implementation of the EU Regulation 1143/2014.

2. E-COMMERCE OF INVASIVE ALIEN SPECIES

E-commerce (*"the activity of buying or selling of products on online services or over the Internet"* from Wikipedia) is a growing and vital part of the global economy. Globally, e-commerce is expected to amount to more than $ 6 trillion and 21.8% of total retail in yearly sales by 2024 (Fig. 1). A portion of this activity includes the sale and trade of living organisms, including IAS.

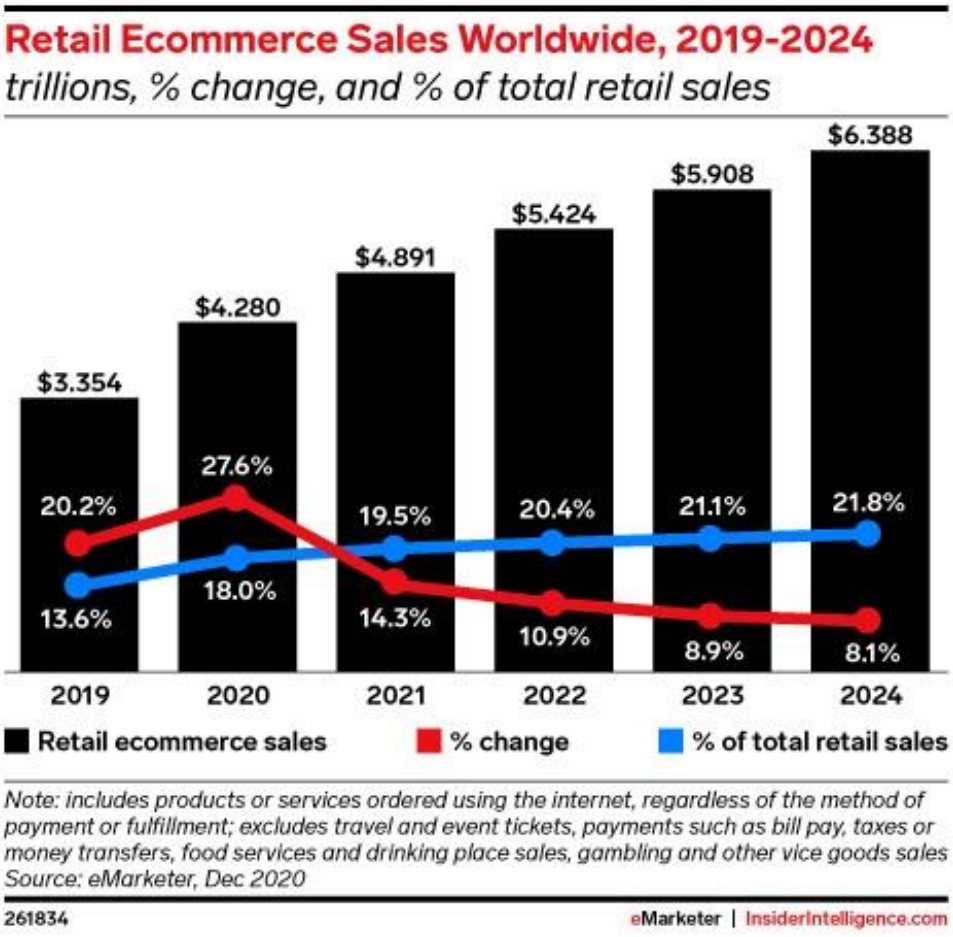


Figure 1. *Prediction of Retail Ecommerce Sales Worldwide (eMarketer, 2021).*

Over the past few decades, the internet has become an invaluable tool for facilitating commerce and communication worldwide, resulting in vastly increased opportunities to trade in live animals and plants.

The range of sectors and species that are relevant for the e-commerce of living organisms is wide: for example, pet and aquarium species, horticultural and agricultural species (plants, cuttings, seeds, soils), live food and bait, scientific and educational supplies, firewood and other biofuel stocks, and herbal or medicinal products.

The rise of e-commerce of living organisms is expected to contribute to the spread of IAS, causing it to be considered to be one of the main drivers of IAS introduction and a major biosecurity concern (Ricciardi et al.

2017). Online trade of living organisms is poorly regulated and, being accessible to all, has increased considerably in recent years, with the purchase of invasive species "just a mouse click away" from any home (Mazza et al. 2015; Figs. 2 and 3). As it is so easy to sell or buy a plant or an animal, from anywhere in the world, an internet seller can directly approach a global clientele at low costs and provide instant satisfaction. This further accelerates the global trade of live plants and animals, and presents a risk of bypassing the traditional border controls and biosecurity regulations that reduce the risk of spreading diseases and pests. Since these commodities are often marketed by means of small and not easily recognisable consignments, the possibility that they are overlooked by border controls is a concrete risk that must be taken in consideration.

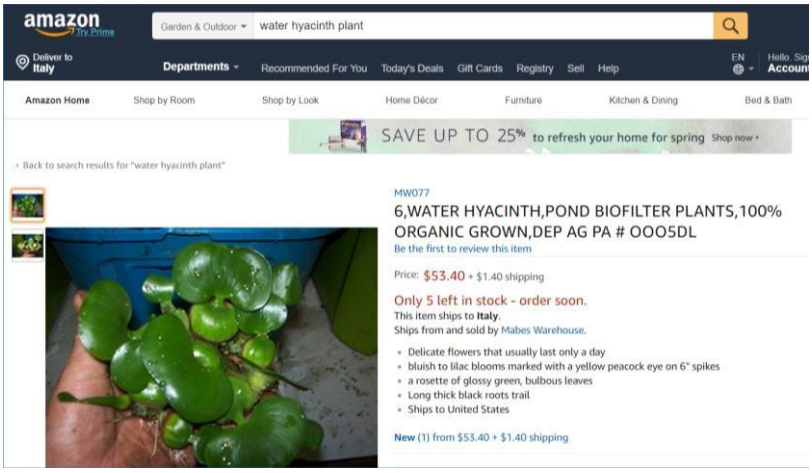


Figure 2. *Water hyacinth, one of the 23 listed plants of Union concern that can be easily bought on internet. Access date 10 September 2018.*

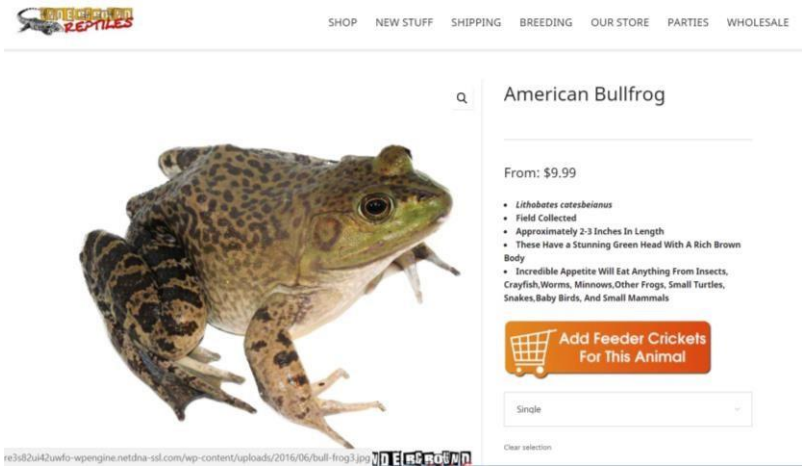


Figure 3. *American bullfrog, one of the 26 listed animals of Union concern that can be easily bought on internet. Access date 10 September 2018.*[2]

The COVID-19 pandemic has had a marked impact on consumer behaviour, as online shopping has been encouraged over traditional sales. The e-commerce global market peaked during the COVID-19 pandemic, jumping from 16% in its share of all retail sales in 2019 to 19% in 2020 (China from 20.7 to 24.9%, US from

[2] US website, the possibility of shipment to EU was unclear at the access date.

11 to 14%, Australia from 6.3 to 9.4%, UK from 15.8 to 23.3%; United Nation Conference on Trade and Development 2021).

This increase in online sales during the pandemic affected many product categories, including pets and ornamental plants (in addition to their related products; Fig. 4). With physical stores closed, people confined to home and severe restrictions on movement, many retailers in the sector have had to drastically increase their online offer and adapt their logistics to survive.

Figure 4. *The top 10 Product Categories in online sales during COVID-19 (Wix 2020).*

In the future it is likely that this shift towards online shopping will continue, increasing the risk of introduction and spread of pests and IAS worldwide (IPPC, 2021). A recent study investigated whether the pandemic has permanently altered how consumers will shop for plants after the pandemic, by using an online survey to compare against pre-pandemic shopping behaviour in the U.S. (Campbell et al., 2021). The study showed that the Coronavirus has changed the way consumers approach shopping; ~43% of the respondents stated that they are planning to change their plant- purchasing habits in the future and respondents who have converted to buying plants online are more likely to continue shopping online, rather than going back to the pre-pandemic shopping behaviour.

The growing economic importance and expanding globalization of e-commerce creates a more diverse and complex trade market, making it increasingly difficult to adopt effective prevention and control strategies. For example, invasive species can be sold online in a number of different ways, such as auction sites, large marketplaces, large and small producers or growers, e-catalogue of brick-and-mortar shops and hobbyist sites.

Individuals and small companies that sell through the internet may not be legally registered, often do not disclose their specific location of operations and can use a high level of anonymity to circumvent accountability and taxes (ISAC, 2012).

In parallel, sellers may not have any expertise of the plant or animal they sell and may therefore be ignorant or misinformed of the potential dangers and biosecurity regulations related to it, or alternatively, they may incorrectly identify their product (Walters et al., 2006; Giltrap et al., 2009). In these cases, raising awareness to adopt preventive measures is much more difficult than in the case of professional sellers.

Misidentification of species is a major issue in both traditional and electronic commerce of living organisms. ISAC (2012) identifies several possible problems concerning the proper naming of items sold online:

- the exact species may not be known to science;

- taxonomic classifications and scientific names can change over time;
- new or little-known species are often particularly sought after;
- species may be incorrectly or insufficiently (i.e. higher taxonomic level than species) identified, intentionally or unintentionally;
- a trade or common name used that does not refer unambiguously and consistently to any species.

Despite a number of government entities having jurisdiction over specific aspects of e-commerce (often with an overlapping mandate too, Fig. 5), the sector is evolving and expanding at a such a rate that these entities' capacity to address the associated risks of introduction and spread of invasive species may be exceeded. Especially when the import channel or the supplier is located outside of the jurisdiction of a regulatory body (e.g. NPPO - National Plant Protection Organization) as national biosecurity regulations may be eluded (Humair et al., 2014).

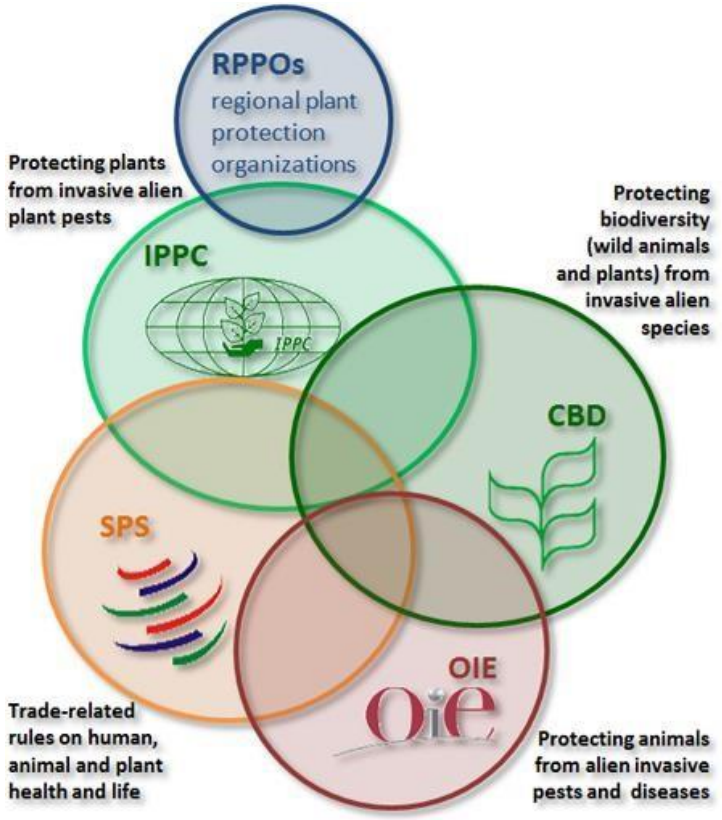


Figure 5. *International Trade and Invasive Species: overlapping mandates (Lopian, 2005).*

A challenging issue for detecting IAS at the border is that the custom declaration on a mail package often fails to accurately disclose its content (either intentionally or unintentionally), increasing the difficulty in halting the entry of consignments containing IAS (Derraik and Phillips, 2010; ISAC, 2012). In addition, shipping agents or companies may not necessarily know that they are transporting living and harmful organisms.

Another critical point is that living organisms are often sent directly via the mail service (Morrisey et al., 2011) which, unlike express delivery services (e.g. DHL, UPS), does not typically require an electronic declaration about the content of the packages. This substantially precludes the possibility of effectively inspecting consignments because inspections may or may not occur depending on the volume of the mail, the availability of personnel or other variables (ISAC, 2012).

Some authors, considering all these critical issues, highlight the pivotal role of raising awareness among customers and stress the need to encourage them to take voluntary actions to mitigate the risk of IAS introduction and spread (Giltrap et al., 2009; Martin and Coetzee, 2011).

A review of existing relevant legislation in Europe on the sale of exotic pets at a national level (27 EU Member States and Norway, Switzerland, Croatia[3] and Turkey) found great gaps for specific restrictions concerning internet sales (de Volder et al., 2013).

In response to this growing problem, several countries and organisations are developing measures specifically designed to control the e-commerce of IAS. For example, Canadian authorities developed a tool (the Great Lakes Detector of Invasive Aquatics in Trade – or GLDIATR) that employs advanced technology to scan internet pages to identify sellers of invasive species (Great Lakes Commission, 2020). Launched in 2015, GLDIATR is an innovative software program developed by the Great Lakes Commission (Michigan, USA) to identify sites where aquatic invasive species can be purchased and shipped to the Great Lake region. By automatically identifying sales pages, GLDIATR simplifies the process of removing these invasive species from trade. This software enables managers to quickly identify sellers offering regulated species for sale and notify those sellers to remove regulated species from their offer. In the first 30 days of full- scale testing alone, GLDIATR scanned over 300,000 web pages and identified 200 websites with invasive species for sale, including 56 regulated species. As a result, the Great Lakes Commission contacted website owners with information about invasive species regulations and best practices and observed changes to stock and/or shipping restrictions in 27 cases. A critical feature of this approach is that its effectiveness strictly depends on the ability (or willingness) of the website owners to correctly identify the species that they offer.

An Expert Workshop organised by the Convention on Biological Diversity (CBD, 2017) in preparation for the 22nd meeting of the SBSSTA[4] (Montreal, 2018) recognised the serious threat that e-commerce poses to biodiversity, highlighting that the primary way to address this risk is in the development of national regulations that assist national customs agencies to enforce halting entries of IAS. The Expert Workshop also highlighted the importance of data sharing and information flow on IAS to facilitate the national process above, as well as the need to engage with national Customs authorities (the Customs Administration designated to the World Customs Organization) to raise the issue of IAS among the users and operators of e-commerce.

Several scientific analyses and reports have addressed various aspects and sectors of e-commerce and other forms of trade in relation to invasive or potentially invasive species. For instance, Derraik and Phillips (2010) provide several examples and a broad overview of the issue in New Zealand and ISAC (2012) provides a general analysis and several recommendations as regards e-commerce in the U.S.

Horticultural trade is a prominent focus of the literature, being recognised as a major pathway of IAS introduction: Peters et al. (2006) examine the horticultural trade in Minnesota and Dehnen-Schmutz et al. (2010) in Britain; Giltrap et al. (2009) describe a couple of significant examples on internet sales of plants in the UK; Humair et al. (2014) investigate the importance of invasive plants as a pathway by surveying global e-commerce; Lenda et al. (2014) focus on the role of internet sale in the long distance dispersal and spread of invasive plants in Poland.

For aquarium trade and ornamental aquaculture, Mazza et al. (2015) provide an overview of the aquarium e-trade in Italy; Peres et al. (2018) focus on the threat of aquarium plants e-commerce in Brazil; Chucholl (2012)

[3] The analysis was released on July 2013 and the Croatia become the European Union's 28th MS on 1 July 2013.
[4] Subsidiary Body on Scientific, Technical and Technological Advice, an open-ended intergovernmental scientific advisory body established under Article 25 of the Convention on Biological Diversity

analyse the e-commerce of ornamental freshwater crayfish in Germany, Papavlasopoulou et al. (2014) in Greece and Patoka et al. (2014) in the Czech Republic. Kay and Hoyle (2001) examined aquatic weeds sold through the internet and by mail, and Stam et al. (2006) and Walters et al. (2006) focus on the sale of *Caulerpa* spp. in Florida. Barroso de Magalhães and Jacobi (2010) analyse the role of e-commerce in the spread of introduced freshwater aquarium fish in Brazil and Martin and Cotzee (2011) the role of the internet in the introduction and spread of macrophytes in South Africa.

Finally, an investigation of the internet pet trade has been produced by Parrott and Roy (2009) in the UK and Kikillus et al. (2012) in New Zealand, using *Trachemys scripta elegans* as a representative species.

A comprehensive analysis on e-commerce of plants (Humair et al. 2014), performing 50 days of automated searches on 10 major online auction sites (including eBay), produced significant results:

- ✓ 41 out of the 100 most-offered species were classified as invasive,
- ✓ 13 out of the 35 plant species on the IUCN's "100 of the World's Worst Invasive Alien Species" list, were on sale.

Many invasive plant species, including some of the worst invasive plant species, were found for sale on the internet. The authors suggest that their results may even underestimate the true scale of the problem, highlighting that biosecurity is not effectively regulating online plant trade. As pivotal action to prevent the spread of invasive plant species, the authors suggest implementing an automated system to monitor e-commerce. They also suggest that paying attention to social media could help to identify potential changes in consumer preferences, which could help researchers and governments with the early detection of new invaders.

In a study on the online commerce of aquarium species conducted in Italy (Mazza et al. 2015) freshwater fish and plants were the most frequently sold aquarium taxa on the internet, most likely because of their easy maintenance and their cheaper price compared to marine species. Analysing the biological features of the traded species, the authors found that most of them have characteristics that may favour their survival and spread in the wild, once released or escaped. Half of the traded plants are already introduced outside of their native range and some of them are well-known as highly invasive and harmful (for example, *Caulerpa* genus, *Pistia stratiotes* (water lettuce), *Eichhornia crassipes* (water hyacinth) and *Myriophillum aquaticum* (parrot's feather)). The study also highlighted a generally low level of available information on the biology of species traded and a high level of incorrect or poor identification (e.g. species are often identified only at genus level).

Internet sales can also affect the dispersal models of IAS. This has been identified in a study on plant sales in Polish gardening shops that sell via both the internet and traditional customer sales (Lenda et al. 2014). By comparing data on thirteen of the most harmful invasive plants in Europe, the authors found that IAS sold via the internet were transported over a distance several times further than those sold as traditional sales. While traditional sales, involving almost only visiting customers, resembled more natural dispersal modes with only a few individuals travelling very long distances, the e-commerce changed the dispersal patterns of invasive alien plants by increasing the number of long-distance dispersal events and the rate of geographical range spread. The study also pointed out a huge increase of the invasive alien plants sold via internet by the Polish gardening shops (over one-hundred-fold from 2006 to 2011), resulting in a massive increase of potential propagule pressure and colonization of new areas.

Many authors also highlighted a risk that IAS sold on the internet may become vectors of alien parasites or pathogens harmful for native organisms and for human health (Derraik and Philips 2010; Lenda et al. 2014, Mrugala et al. 2015), as in the case of the chytrid fungus *Batrachochytridium dendrobatidis*, a pathogenic agent

responsible for the global decline of amphibians, which seems to have spread through the international trade of experimental and ornamental amphibians (Fisher and Garner 2007).

3. E-COMMERCE OF INVASIVE ALIEN SPECIES OF UNION CONCERN: AN UPDATED GLOBAL PICTURE FROM A WEB SURVEY

In order to develop the present guidance document and to support the proposed key recommendations with some updated quantitative information, systematic desktop research of the species listed as Species of Union Concern that are for sale on the internet was conducted. Similar analysis could be made for other samples, such as species on national lists (for example, the Spanish Catalogue on IAS). The research is not aimed at achieving a comprehensive analysis on internet sellers offering EU listed IAS for sale, but rather to estimate the availability of banned species through e-trade.

3.1 Methods

Sellers were identified by performing a Google search for each of the fourty-eight IAS of Union concern[5], using the following standardised search term: "*name of species* **for sale**". All searches were written in English. The search for each species was completed twice; the first time using the Latin name (e.g. *Nasua nasua*) and the second time using the common English name (e.g. South American coati). Only the first fifty results of each Google search were included in the scope of the research. In total, around 5,000 Google results were examined and more than 1,100 were verified to check the availability of a species for sale.

Both **online shops** (pet, aquarium, horticulture, etc.) and **large e-commerce on line retailers** (ex. Amazon, Mercado Libre, Jumia or AliBaba) were considered as "**sellers**". Peer-to-peer platforms were excluded and only a rough assessment (reported on a 4-point scale) of the frequency of this kind of trade was carried out. Once a seller had been identified, its stock lists were surveyed to search the species and check: (1) the availability in stock, (2) the deliverability to Europe (in the case of a non-European seller), and (3) the presence of a warning advertisement on the risks to purchase an IAS. Sellers that have invasive species in store but either not for sale or not currently in stock were excluded by the survey results as a precaution. This decision was made on the assumption that the recent exclusion may be due to the entry into force of the EU Regulation 1143/14 (at least for European-based sellers). According to Article 32 of the EU Re. 1143/14 «*The sale or transfer of live specimens to non-commercial users shall be allowed for one year after inclusion of the species on the Union list* […] ». Considering that the first update of the List of IAS of Union concern entered into force on 2 August 2017, at the time of the survey the sale of forty-eight listed IAS of Union concern could be considered forbidden. In addition, several sellers were excluded when the correct species identification was not certain.

The survey was performed from 10.09.2018 to 05.10.2018. The following information has been collected, synthesized and stored in an excel spreadsheet:

A	**Species name**	genus, species
B	**Common name**	common English name

[5] *Nyctereutes procyonoides* was not part of the list yet.

C	**Taxa group**	amphibians, aquatic plants, birds, crabs, crayfish, terrestrial dicotyledons, fish, insects, mammals, terrestrial monocotyledons, reptiles
D	**Kingdom**	*animalia, plantae*
E	**Environmental system**	freshwater, terrestrial, terrestrial/freshwater
F	**N total of sellers**	sum of the columns: H+I
G	**N total of sellers with warning advertisement**	total number of sellers with warning advertisement on the risks to purchase an alien invasive species
H	**N of sellers based in Europe**	number of sellers based in Europe
I	**N of sellers based out of Europe**	number of sellers based out of Europe
L	**N of sellers based out of Europe delivering in Europe**	number of sellers based out of Europe but delivering in Europe
M	**N total of sellers delivering in Europe**	sum of the columns: H+L
N	**N sellers delivering Europe for each country**	countries with at least 1 seller delivering in EU: China, USA, France, Germany, Italy, UK, India, Israel, the Netherlands (and undetermined)
O	**P2P rough assessment**	4-point scale (1=lowest to 4=highest) evaluation of the frequency of the peer-to-peer trade

To highlight possible relevant differences, the analysis was also performed on data aggregated for « kingdom», «taxa group» and «environmental system».

3.2 Results

Two hundred and seventeen sellers offering IAS of Union concern were recorded. Ninety two (42%) of these sellers delivered to Europe, based both in Europe (n=36) and outside of Europe (n=54); it was not possible to identify the country of origin for two of the sellers that deliver in Europe. The results of sellers offering IAS of Union concern for sale were based in nine different countries (Figure 6); the highest number of sellers was found in the USA (34%, n=31), followed by China (18%, n=17), Germany (16%, n=15) and the UK (12%, n=11).

A total of twenty-nine IAS of Union concern were recorded for sale on the internet (60% of the 48 IAS of Union concern), but only nineteen of these were for sale in or to Europe (Table 1; 40% of the 48 IAS of Union concern). Plants were more commonly recorded for sale (Table 1; n=13, 68%) than animals (n=6, 32%), and accounted for 57% of the twenty-three plants species of Union concern, compared to 24% of the twenty-five EU listed animals. Plants also showed a three-times higher mean number of sellers than animals (Table 2). Plants species were available on at least one website for each of the nine countries recorded (Figure 7); on the contrary, listed animals were found on sale only in the USA (n=10, 71%), the Netherlands (n=3, 21%) and the UK (n=1, 7%).

Concerning the availability of different «taxa group» (Table 3), the high number of dicots (67% of species found) and the low number of mammals (10% of species found) should be highlighted. Based on the mean number of sellers based or delivering in Europe per species (Table 4), the highest recorded availability was for aquatic plants (8.3 sellers), followed by dicotyledons, monocotyledons and reptiles. Availability of each taxa group by country is shown in Figure 8.

When the data is aggregated for "environmental systems", similar rates of availability are found for species belonging to different systems (Table 5), except for species belonging to the mixed terrestrial/freshwater environment which has the lowest mean number of sellers recorded (Table 6).

Twelve out of the nineteen IAS of Union concern recorded were available from sellers based in Europe (Table 7) and sixteen from sellers based out of Europe but delivering in Europe. Nine out of the nineteen available species (eight plants and one crayfish) were sold by sellers based both in and out of Europe (*Asclepias syriaca, Cabomba caroliniana, Gunnera tinctoria, Impatiens glandulifera, Lysichiton americanus, Myriophyllum aquaticum, Pennisetum setaceum, Pueraria lobata* and *Pacifastacus leniusculus*). Among the nineteen listed species sold in or to Europe, *Asclepias syriaca* was the species most commonly found (Figure 9; 21% of all sellers, 32% based out of Europe) followed by *Cabomba caroliniana* (12% of all sellers, 73% based out of Europe) and *Eichhornia crassipes* (12% of all sellers, 100% based out of Europe), *Impatiens glandulifera* (8%, 71% based out of Europe), and *Pennisetum setaceum* (8%, 14% based out of Europe). Only two animal species were identified as being sold by more than one seller: *Trachemys scripta* (five sellers, all based out of Europe) and *Eriocheir sinensis* (two sellers based in Europe).

Only seventeen sellers out of ninety-two (18%) provided a warning on their website of the risks of purchasing an invasive alien species of Union concern (Table 8). Warning advertisements were present on 21% (16 sellers out 78) of websites offering plants of Union concern and on only one website selling animals of Union concern (7% of sellers). The presence of warning advertisements greatly varied for different taxa (Table 9). The animal seller that displayed a warning advertisement was for Chinese mitten crab (*Eriocheir sinensis)*, whereas no warning advertisements were identified on the websites which sold crayfish, amphibians, reptiles or mammals of Union concern. The results for plant taxa were marginally better, with the highest frequency of advertisements recorded for aquatic plants (36%, n=9); only seven out of forty-three (16%) sellers of listed dicots warned about the risks of purchasing an IAS and no warning messages were found on the ten websites offering monocotyledons. Looking at the differences among species (Figure 10), the highest frequency of warning advertisements regarding two plants, *Baccharis halimifolia* (66%, n=2) and *Cabomba caroliniana* (45%, n=5), should be highlighted.

Finally, the rough assessment of the frequency of peer-to-peer trade identified *Trachemys scripta* as the most common (4 out of a 4-point scale) IAS of Union concern offered on specialized platforms. Quite a high frequency of trade was also recorded for *Eichhornia crassipes* (3 out of 4) and *Asclepias syriaca* (2 out of 4). *Nasua nasua,* a frequently traded species on peer-to-peer platforms, was not considered in this analysis because delivery outside of the US was not available.

3.3 Summary of results

As stated in the introductory section the survey was not aimed at achieving a comprehensive analysis on the e-trade of EU listed IAS, but rather to estimate the availability of banned species through e-trade. Therefore, results obtained are partial and underestimate the full scale of the problem, firstly because the search was only performed in English and using the English common name of IAS of Union concern.

- Two hundred and seventeen sellers offering IAS of Union concern for sale were identified. Ninety two (42%) of these sellers delivered in Europe, based both in Europe (n=36) and out of Europe (n=54); it was not possible to identify the country of origin of two of the sellers.
- Sellers offering IAS of Union concern for sale were based in nine different countries; the highest number of sellers were identified in the US (34%, n=31), China (18%, n=17), Germany (16%, n=15) and the UK (12%, n=11).
- Twenty-nine species of Union concern were recorded for sale on the internet (60% of the 48 EU listed species) but only nineteen were sold in or to Europe (40% of the 48 listed species).
- Plants were more commonly for sale (n=13, 68%) than animals (n=6, 32%), with 57% of the twenty three listed plants species, compared to 24% of the twenty five listed animals.
- Among the nineteen listed species sold in or to Europe *Asclepias syriaca* was the species most commonly found on sale (21% of all sellers, 32% based out of Europe), followed by *Cabomba caroliniana* (12% of all sellers, 73% based out of Europe) and *Eichhornia crassipes* (12% of all sellers, 100% based out of Europe).
- Among different «taxa group», there was a high number of dicotyledons (67% of species found) and a low number of mammals (10% of species found). Aquatic plants showed the highest mean number of sellers per species (8.3 sellers).
- Similar rates of availability were found for species belonging to different «environmental systems».
- Only seventeen sellers out of ninety-two (18%) warned on their website on the risks of purchasing an invasive alien species of Union concern. The highest frequency of advertisements was recorded for plants (21% of websites offering plants of Union concern), in particular for aquatic plants. Only one advertisement was recorded when simulating to purchase a listed animal (7%).
- On a rough assessment, *Trachemys scripta* was identified as the most common IAS of Union concern sold on specialized platforms of peer-to-peer trade, followed by *Eichhornia crassipes* and *Asclepias syriaca.*

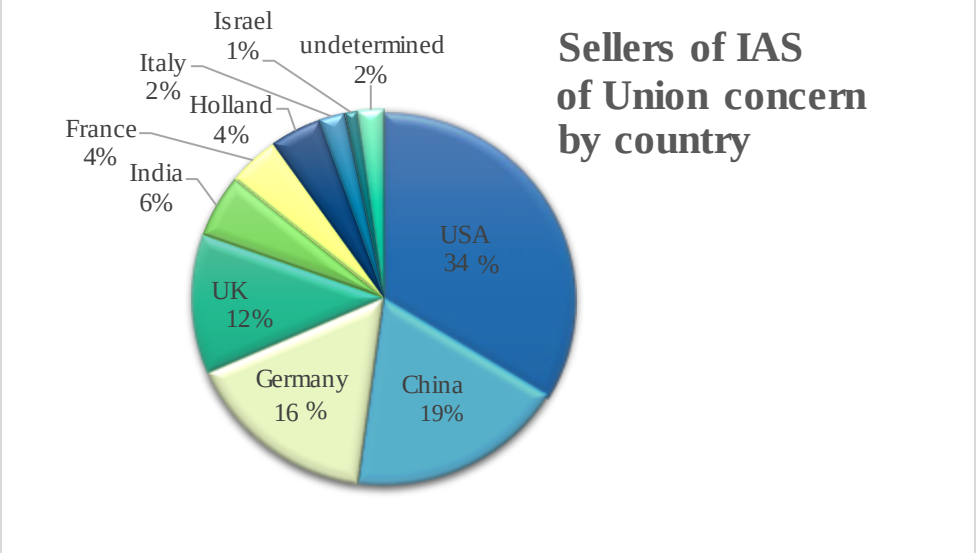


***Figure 6**. Sellers of IAS of Union concern by country (%) recorded in the on-line survey. Data not aggregated (survey performed from 10.09.2018 to 05.10.2018).*

Kingdom	IAS of Union concern on sale	IAS of Union concern	% IAS of Union concern on sale
Animalia	6	25	24%
Plantae	13	23	57%
Total	***19***	***48***	***40%***

Table 1. *IAS of Union concern recorded on sale in Europe in the on-line survey. Data aggregated for "Kingdom" (survey performed from 10.09.2018 to 05.10.2018).*

Kingdom	IAS of Union concern on sale	Sellers	Mean number of sellers per species
Animalia	6	14	2,3
Plantae	13	78	6,0
Total	***19***	***92***	***4,8***

Table 2*. Sellers of IAS of Union concern recorded on sale in Europe in the on-line survey. Data aggregated for "Kingdom" (survey performed from 10.09.2018 to 05.10.2018).*

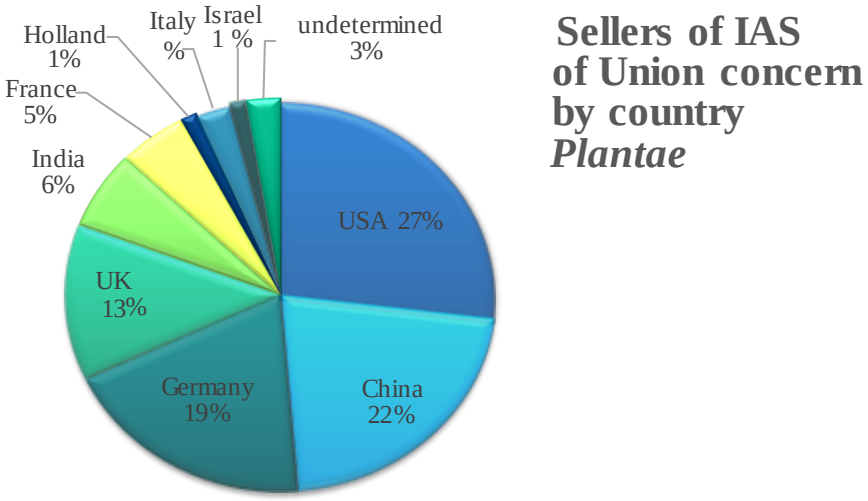


Figure 7*. Sellers of IAS of Union concern by country (%) recorded in the on-line survey. Data aggregated for "Kingdom" (survey performed from 10.09.2018 to 05.10.2018).*

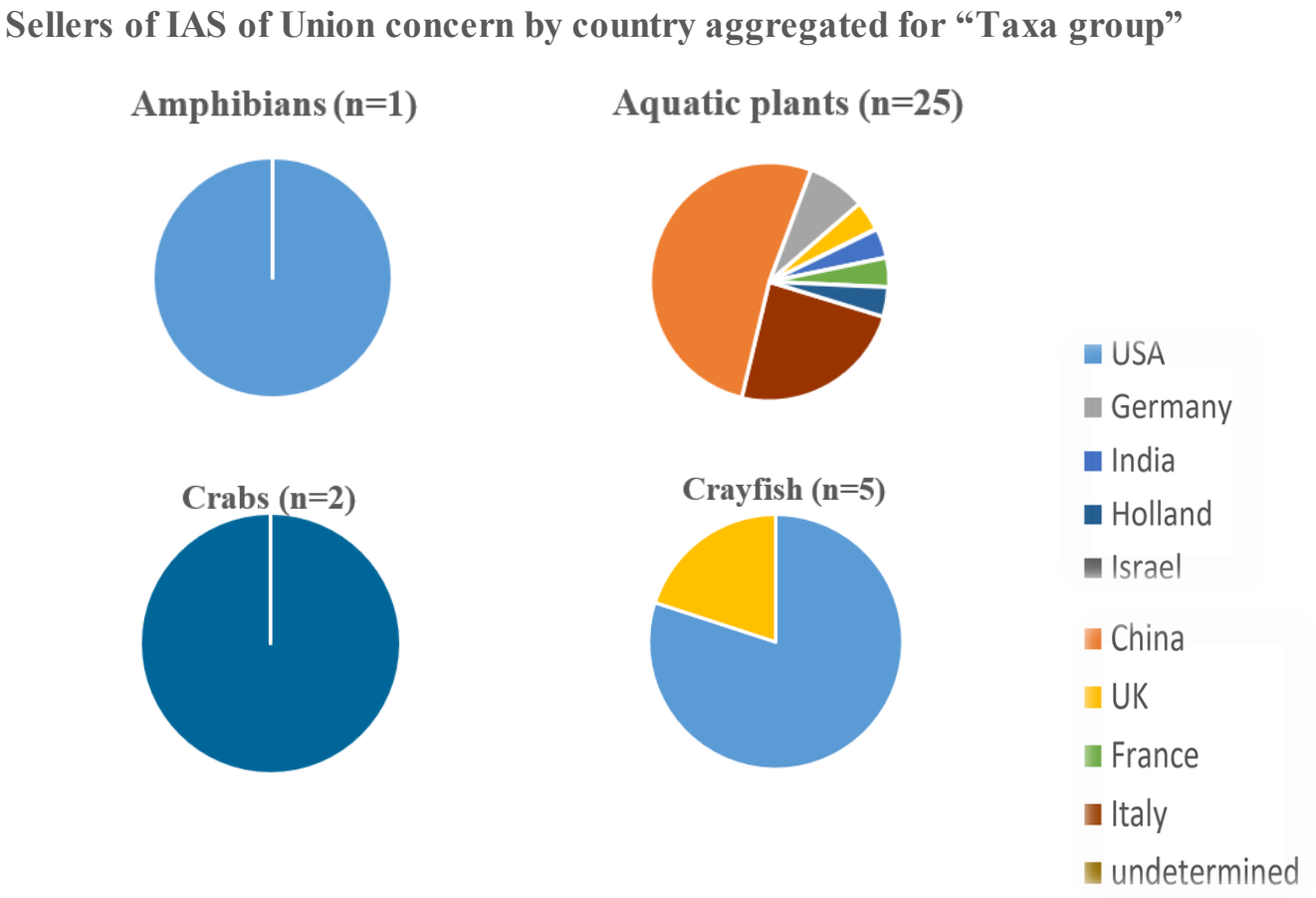
Taxa group	IAS of Union concern on sale	IAS of Union concern	% IAS of Union concern on sale
Amphibians	1	1	100%
Aquatic plants	3	8	38%
Birds	0	4	0%
Crabs	1	1	100%
Crayfish	2	5	40%
Dicotyledons	8	12	67%
Fish	0	2	0%
Insects	0	1	0%
Mammals	1	10	10%
Monocotyledons	2	3	67%

Reptiles	1	1	100%

***Table** 3. Sellers of IAS of Union concern recorded on sale in Europe in the on-line survey. Data aggregated for "Taxa group" (survey performed from 10.09.2018 to 05.10.2018).*

Taxa group	IAS of Union concern on sale	Sellers	Mean number of sellers per species
Amphibians	1	1	1,0
Aquatic plants	3	25	8,3
Crabs	1	2	2,0
Crayfish	2	5	2,5
Dicotyledons	8	43	5,4
Mammals	1	1	1,0
Mono cotyledons	2	10	5,0
Reptiles	1	5	5,0

***Table 4.** Sellers of IAS of Union concern recorded on sale in Europe in the on-line survey. Data aggregated for "Taxa group" (survey performed from 10.09.2018 to 05.10.2018).*



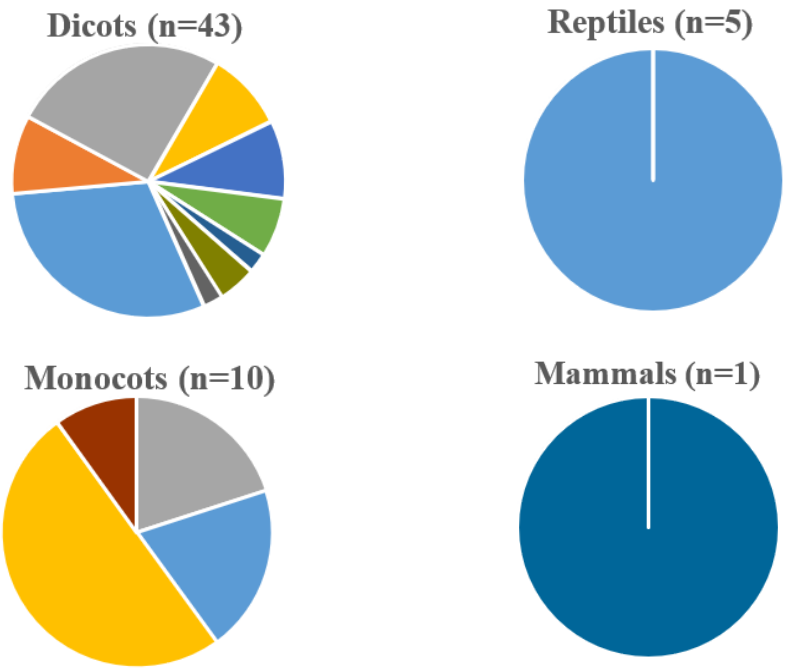


***Figure 8**. Sellers of IAS of Union concern by country (%) recorded in the on-line survey. Data aggregated for "Taxa group" (survey performed from 10.09.2018 to 05.10.2018).*

Environment system	IAS of Union concern on sale	IAS of Union concern	% IAS of Union concern on sale
Freshwater	6	17	35%
Terrestrial	11	27	41%
Terrestrial/Freshwater	2	5	40%

***Table 5**. Sellers of IAS of Union concern recorded on sale in Europe in the on-line survey. Data aggregated for "Environment system" (survey performed from 10.09.2018 to 05.10.2018).*

Environment system	IAS of Union concern on sale	Sellers	Mean number of sellers per species
Freshwater	6	32	5,3
Terrestrial	11	54	4,9
Terrestrial/Freshwater	2	6	3,0

***Table 6.** Sellers of IAS of Union concern recorded on sale in Europe in the on-line survey. Data aggregated for "Environment system" (survey performed from 10.09.2018 to 05.10.2018).*

Species name	On sale in Europe	On sale to Europe
Alternanthera philoxeroides	0	1
Asclepias syriaca	1	1

Baccharis halimifolia	0	1
Cabomba caroliniana	1	1
Eichhornia crassipes	0	1
Eriocheir sinensis	1	0
Gunnera tinctoria	1	1
Heracleum persicum	0	1
Heracleum sosnowskyi	1	0
Impatiens glandulifera	1	1
Lithobates catesbeianus	0	1
Lysichiton americanus	1	1
Myriophyllum aquaticum	1	1
Nasua nasua	1	0
Pacifastacus leniusculus	1	1
Pennisetum setaceum	1	1
Procambarus clarkii	0	1
Pueraria lobata	1	1
Trachemys scripta	0	1

Table 7. *IAS of Union concern recorded on sale in or to Europe in the on-line survey (1=on sale; 0=not for sale). (Survey performed from 10.09.2018 to 05.10.2018).*

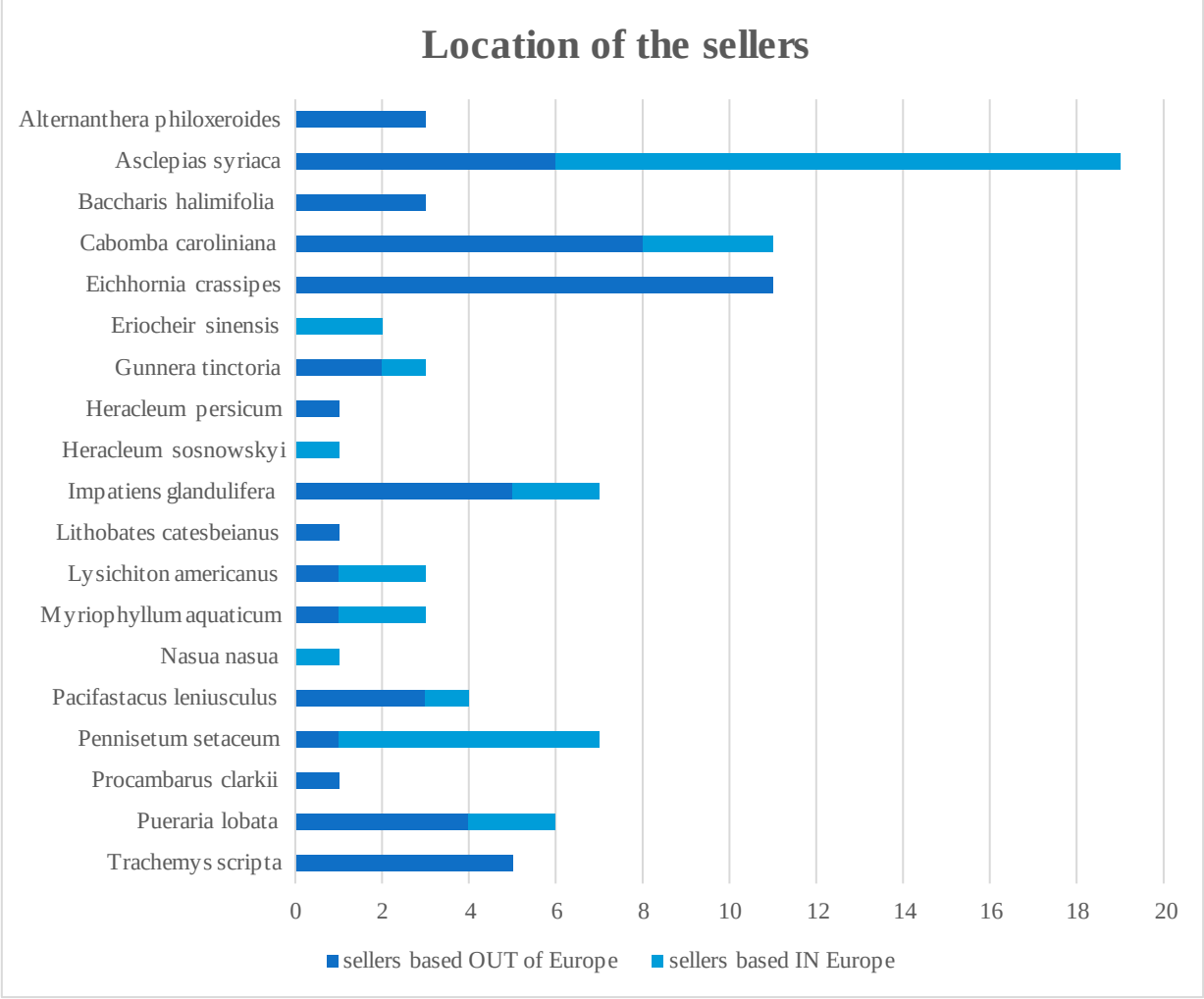


***Figure 9**. IAS of Union concern recorded on sale in or to Europe in the on-line survey. Location of the sellers (survey performed from 10.09.2018 to 05.10.2018).*

Kingdom	IAS of Union concern on sale	Sellers	Sellers with warning advertisement	% sellers with warning advertisement
Animalia	6	14	1	7%
Plantae	13	78	16	21%
Total	**19**	**92**	**17**	**18%**

***Table 8**. Sellers of species of Union concern recorded in the on-line survey. Presence of warning advertisement within the web site. Data aggregated for "Kingdom" (survey performed from 10.09.2018 to 05.10.2018).*

Taxa group	IAS of Union concern on sale	Sellers	Sellers with warning advertisement	% sellers with warning advertisement
Amphibians	1	1	0	0%
Aquatic plants	3	25	9	36%
Crabs	1	2	1	50%
Crayfish	2	5	0	0%
Dicotyledons	8	43	7	16%
Mammals	1	1	0	0%
Monocotyledons	2	10	0	0%
Reptiles	1	5	0	0%

***Table 9**. Sellers of IAS of Union concern recorded in the on-line survey. Presence of a warning advertisement within the web site. Data aggregated for "Taxa group" (survey performed from 10.09.2018 to 05.10.2018).*

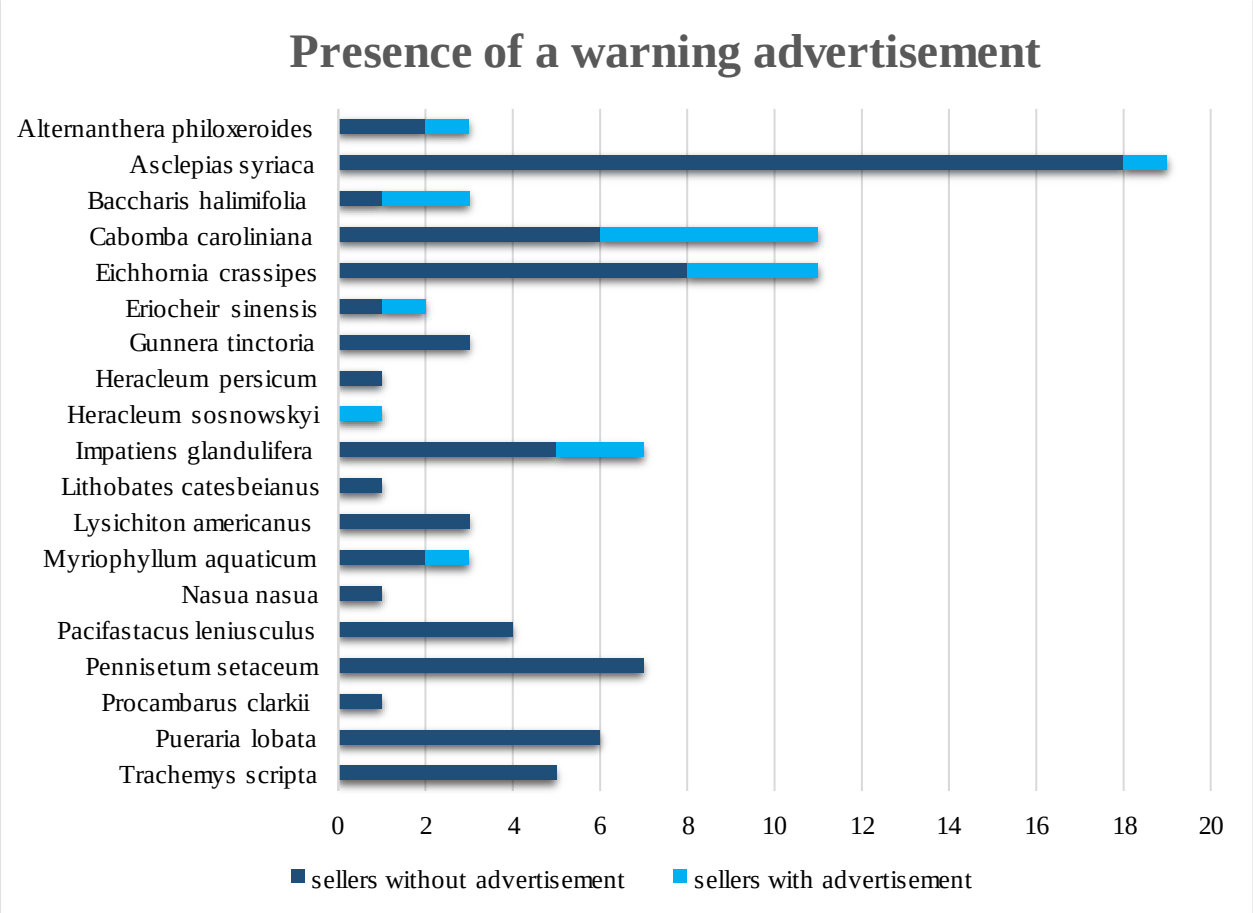


***Figure 10**. IAS of Union concern recorded on sale in Europe in the on-line survey. Presence of a warning advertisement within the web site (survey performed from 10.09.2018 to 05.10.2018).*

4. THE LEGAL AND POLICY CONTEXT

Due to the substantial rise of e-commerce, in recent years some international treaties, policies and position statements on the risk of biological invasion associated with trade in wildlife via e-commerce have been adopted.

4.1 The international context

Convention on Biological Diversity (CBD)

The CBD acknowledges the impacts caused by IAS in Article 8.h, calling parties to "prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats and species".

At the 12th Conference of the Parties (COP) in Pyeongchang (2014) the CBD adopted the following two decisions to deal with e-commerce of IAS:

1. the **Decision XII/16** *Invasive alien species: management of risks associated with introduction of alien species as pets, aquarium and terrarium species, and as live bait and live food, and related issues* and the annex *Guidance on devising and implementing measures to address the risks associated with the introduction of alien species as pets, aquarium and terrarium species, and as live bait and live food*, that includes voluntary measures that apply to e-commerce as much as any other form of trade;
2. the **Decision XII/17** *Invasive alien species: review of work and considerations for future work* at point 9 (d) request the Executive Secretary "[…] to explore with relevant partners, including the standard-setting bodies recognized by the World Trade Organization (the International Plant Protection Convention, the World Organisation for Animal Health (OIE), and the Codex Alimentarius Commission) and other members of the inter-agency liaison group on invasive alien species, **methods of alerting suppliers and potential buyers to the risk posed by invasive alien species sold via e-commerce** […]".

Pursuant of the Decision XII/17, a **technical note** *Methods of alerting suppliers and potential buyers to the risk posed by invasive alien species sold via e-commerce* was prepared by the CBD Secretary to the "Expert meeting on alien species in wildlife trade, experiences in the use of biological control agents and development of decision support tools for management of invasive alien species" held in Montreal (2015). The conclusions of the technical note were adopted by the CBD Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) at its 20th Meeting (2016) with the **Recommendation XX/7** *Invasive Alien Species.*

Welcoming the Recommendation XX/7 *Invasive Alien Species* adopted by the SBSTTA, at the 13th COP in Cancun (2016), the CBD adopted the **Decision XIII/13** *"Invasive alien species: addressing risks associated with trade, experiences in the use of biological control agents, and decision support tools* that at point 7 "Encourages Parties, and invites other Governments, relevant international organizations, consumers, regular mail and express delivery service providers and e commerce traders and managers, as appropriate**, to reduce the risk of biological invasion associated with trade in wildlife via e-commerce** by:

a. **Promoting greater awareness among consumers, e-commerce traders and managers and other stakeholders** about the risk of biological invasions, and the relevant international standards and national regulations through, inter alia, e-commerce market places and related social media, including by using information made available through the Global Invasive

Alien Species Information Partnership;

b. **Reviewing the risk of biological invasions, and associated sanitary and phytosanitary risks**, posed by some forms of distance selling and, as appropriate, endeavour **to develop suitable measures and guidance to minimize the risks** of introduction of invasive alien species, consistent with international obligations;

c. **Using or promoting the use of the Single Window approach** of the United Nations Centre for Trade Facilitation and Electronic Business in order to facilitate reporting on the trade in regulated live species via e-commerce;

d. **Collaborating with e-commerce traders and managers in developing measures to reduce the risk** of potentially invasive alien species from e-commerce";

Point 8 of the Decision XIII/13 "Invites Parties and other Governments **to take into account or review, as appropriate, legislation relevant to trade in wildlife to reduce the risk of biological invasion associated with trade in wildlife via e-commerce**, also noting relevant decisions adopted under the Convention on International Trade in Endangered Species of Wild Fauna and Flora".

Point 9 requests the Executive Secretary "To explore with the World Customs Organization, as well as member organizations of the inter-agency liaison group on invasive alien species, **the need for tools or guidance for Parties that may assist national customs authorities in facilitating the necessary control of live alien species via e-commerce**, building on the national experience or legislation related to the Convention on International Trade in Endangered Species of Wild Fauna and Flora and its enforcement, and to develop such tools or guidance where appropriate […]".

At the 14th COP in Sharm El-Sheikh (2018), the CBD, "recognizing the growth in e-commerce in invasive alien species and the need for collaboration to minimize the associated risks", adopted the **Decision XI/14** *Invasive alien species* that, at point 5, states to establish an Ad Hoc Technical Expert Group aimed, among other things, to provide advice and develop elements of technical guidance on "methods, tools and measures for identification and minimization of additional risks associated with cross-border e-commerce in live organisms and the impacts thereof".

As requested, the Ad Hoc Technical Expert Group developed a guidance document (CBD, 2020) that is under discussion for adoption at the next 24th Meeting CBD SBSTTA (2021). The guidance document consists of four sections:

1. "Suggested actions for national authorities/border agencies"
2. "Suggested actions for web marketplaces (sale platforms) and e payment service providers, postal and express courier services"
3. "Suggested actions for international bodies/agreements and cross jurisdictional collaboration"
4. "Suggested actions for relevant international expert organizations".

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

Although the regulatory framework under the CITES does not contain measures to reduce the risk of biological invasion as a consequence of trade in wildlife, at the 13th COP held in Bangkok (2004) CITES adopted the **Resolution 13.10**[6] that recommends that parties:

a. "consider the problems of invasive species when developing national legislation and regulations that deal with the trade in live animals or plants";

b. "consult with the Management Authority of a proposed country of import, when possible and when applicable, when considering exports of potentially invasive species, to determine whether there are domestic measures regulating such imports";

c. "consider the opportunities for synergy between CITES and CBD and explore appropriate cooperation and collaboration between the two Conventions on the issue of introductions of alien species that are potentially invasive".

In this context, some countries and regions have included invasive alien species of concern in wildlife trade regulations as part of the implementation of the CITES framework at the national or regional level. No specific regulations referring to the e-commerce of IAS listed in Appendices IIII of CITES were found.

At its 58th meeting (Geneva, 2009), the Standing Committee of the CITES established a working group on e-commerce of specimens of CITES-listed species. The Working Group on E-commerce of Specimens of CITES-Listed Species focused on two main topics: (i) the technical infrastructure of the internet which is rapidly evolving and offers a variety of different mechanisms to conduct trade; and (ii) the legal framework required to ensure sustainable, legal and traceable trade through the internet.

The CITES Secretariat is developing an internet portal as part of the CITES website to compile, publish and disseminate information submitted by parties and stakeholders related to e-commerce of CITES-listed species in accordance with Decisions 15.57[7], 16.62[8] and Resolution Conf. 11.3[9] (Rev. CoP15) on e-commerce.

WTO - Agreement on the Application of Sanitary and Phytosanitary Measures (SPS)

The Agreement on the Application of Sanitary and Phytosanitary Measures (the "SPS Agreement") entered into force with the establishment of the World Trade Organization in 1995. It concerns the application of food safety and animal and plant health regulations, allowing countries to set their own standards. Regulations must be based on scientific findings and should be applied only to the extent that these are necessary to protect human, animal or plant life and health. All countries maintain measures to ensure that food is safe for consumers and to prevent the spread of pests or diseases among animals and plants.

A workshop on "*International Trade and Invasive Alien Species"*, organized in 2012 by the Standard and Trade Development Facility (STDF), the IPPC and the World Organization for Animal Health (OIE), underlined that strengthening SPS capacity is the first line of defence in managing the risks linked to IAS. Several key actions were identified to control such species more effectively, including:

[6] https://cites.org/eng/res/13/13-10R14.php
[7] https://cites.org/sites/default/files/eng/dec/valid15/E15-Dec.pdf
[8] https://cites.org/sites/default/files/eng/dec/valid16/E16-Dec.pdf
[9] https://cites.org/sites/default/files/eng/res/all/11/E11-03R15.pdf

a. "boosting continuing efforts to improve the way the relevant international organizations work together, support each other and strengthen each other's ability to implement the SPS Agreement and global biodiversity conventions";

b. "ensuring existing international standards are implemented better, to prevent trade from spreading harmful alien species — and developing new standards where needed";

c. "boosting countries' ability to undertake scientific risk analysis and other studies, particularly in developing countries";

d. "improving coordination between ministries and other agencies within countries, between countries and within regions — the agencies' concerned have diverse responsibilities, from law enforcement, customs and trade to agriculture, fisheries, forestry and environmental protection";

e. "enhancing cooperation between governments and industry";

f. "raising public and political awareness";

g. "**studying potential risks associated with the growth in internet trade, and how to address them**".

Food and Agriculture Organization (FAO)/International Plant Protection Convention (IPPC).

The formal trade of plants and plant products has traditionally been the target for phytosanitary measures by national plant protection organizations (NPPO) that have frameworks for regulation by customs authorities for revenue collection and NPPOs for phytosanitary risks. The frameworks are primarily set up to manage bulk shipment of consignments of commodities moving through traditional transportation pathways. Sales of plants and plant products ordered through e-commerce has increased significantly over the years and the internet has become a pathway by which many small and often uneasily recognizable consignments of plants and plant products move across international borders into countries and across continents.

To respond to this developing situation the Commission on Phytosanitary Measures (CPM) of IPPC adopted in 2014 (published in 2017) the ***Recommendation R05-2017 on Internet trade (ecommerce) in plants and other regulated articles*** (IPPC, 2017)[10]. The Recommendation is not specifically directed to IAS. It applies to a variety of products ordered and delivered through e-commerce: plants for planting or consumption, soils, growing media, and living organisms that are known or have the potential to be plant pests and are sold to and exchanged by hobbyists, collectors, researchers, etc. Many of these articles may be sold in a variety of product configurations that may incorporate or be infused with plants for planting, though the product itself may not be recognized immediately to contain them (e.g. articles of clothing, footwear, packaging, greeting cards, paper products, home accessories or novelty products). Contracting parties, NPPOs and RPPOs are encouraged to:

a. "**develop mechanisms for identifying e-commerce traders based within their countries and regions**";

b. "**establish mechanisms to identify products of concern that may be purchased via ecommerce, with a focus on potential high-risk pathways** such as plants for planting, soils and growing media, living organisms etc. and **to explore options ensuring they comply with appropriate phytosanitary regulations** based on risk assessment";

[10] https://www.ippc.int/static/media/files/publication/en/2017/04/R_05_En_2017-04-26_Combined_dBxiOPB.pdf

c. "**promote compliance by customers and traders operating through e-commerce** with the phytosanitary import requirements of importing countries and provide adequate information on the risks posed by bypassing such requirements";

d. "**strengthen coordination with postal and express courier services** to ensure that relevant information of the phytosanitary risks and phytosanitary measures are conveyed to ecommerce traders";

e. "investigate the phytosanitary risks posed by all forms of distance selling and if necessary to include these purchasing methods in their risk management activities".

The management of e-commerce and the postal and courier pathways have also been identified as one of eight development agenda items in the IPPC Strategic Framework 2020–2030. An IPPC e-commerce programme has been launched which includes the following key elements:

1. "establishing an informal network of e-commerce experts to enhance collaboration among the participants, facilitate the exchange of information about e-commerce initiatives that are already underway and identify opportunities for addressing the phytosanitary risks associated with cross-border e-commerce;"
2. "strengthening collaboration and partnerships between the IPPC Secretariat and the WCO and other key international organizations[11];"
3. "gathering existing information and technical resources relevant to the IPPC community on the subject of e-commerce and making these contributed resources available on the IPPC website;"
4. "developing a new IPPC Guide on e-Commerce (2017-039)."

4.2 The European context

The Bern Convention

Article 11.2.b of the Convention of Conservation of European Wildlife and Natural Habitats ("Bern convention", 1979) requires parties to promote the reintroduction of native species and strictly control the introduction of non-native species.

In 2003 the Bern Convention adopted a European Strategy on Invasive Alien Species (Genovesi and Shine, 2004). The strategy identifies priorities and key actions to prevent or minimise adverse impact of IAS, and proposes measures required to recover species and natural habitats affected by IAS. The Strategy also seeks to engage stakeholders involved in the movement, use and control of potentially invasive alien species (industry and trade, transporters, retailers, resource managers, the public etc.). Since the adoption of the European Strategy on Invasive Alien Species, the Bern Convention developed numerous voluntary Codes of conduct addressed at various sectors of activity which are potential pathways for the spread of IAS in Europe.

In 2011 the Bern Convention adopted the "European Code of conduct on Pets and Invasive

[11] In March 2019, the Secretariats of the IPPC and the World Customs Organization (WCO) signed a joint work plan that addresses several major areas for bilateral cooperation, including cross-border e-commerce.

Alien Species" (Davenport and Collins, 2011), addressed primarily at the pet industry (including importers, breeders, retailers, keepers and owners). One of the key themes highlighted by the Code is specifically focused on ecommerce:

10. Promote awareness of IAS and the internet

"Trade via the internet is as yet largely unregulated. The following are suggestions for guidance on best practice for all stakeholders. Key points would be an insistence that websites":

- "Identify the country in which they are based and should state (and be able to be able to provide documentary evidence to establish) the country of origin of any animals offered for sale".
- "Accurately identify the animals offered for sale".
- "Should remind customers that they must check all import rules (e.g. CITES, health and other controls) in the country to which the animal is taken (if different from the source). Where possible this should be facilitated by drop down menus of official sources of information".
- "Ensure that information, as outlined above for retailers, should be made available to customers".

The EU Regulation No. 1143/2014 on Invasive Alien Species

The EU Regulation on IAS entered into force on 1st January 2015. This Regulation is based on the CBD Guiding Principles of prevention, prioritisation and coordination and it is aimed at protecting native biodiversity and ecosystem services, as well as at minimising and mitigating the potential impact of IAS on human health and the economy.

The EU Regulation does not explicitly refer to e-commerce, however it creates a pivotal legal framework to deal with the risk of biological invasion associated with online trade. The core of the system is an open list of IAS of Union concern for which a general ban from the EU is established with the provisions of article 7:

"Article 7. Restrictions

1. Invasive alien species of Union concern shall not be intentionally:

(a) brought into the territory of the Union, including transit under customs supervision;

(b) kept, including in contained holding;

(c) bred, including in contained holding;

(d) transported to, from or within the Union, except for the transportation of species to facilities in the context of eradication;

(e) placed on the market;

(f) used or exchanged;

(g) permitted to reproduce, grown or cultivated, including in contained holding (h) released into the environment."

Article 15 of the EU regulation on IAS includes provisions on official controls that shall take place when goods are brought into the Union and underlines the need to strengthen cooperation and coordination among Member States, to improve the effectiveness of the controls:

"Article 15. Official controls

7. Member States shall put in place procedures to ensure the exchange of relevant information and the efficient and effective coordination and cooperation between all authorities involved for the verification referred to in paragraph 2.

8. Based on best practices, the Commission, together with all Member States, shall develop guidelines and training programmes to facilitate the identification and detection of invasive alien species of Union concern and the performance of efficient and effective controls."

To conclude, the key points of the EU Regulation on the management of e-commerce pathway can be found in articles 31 and 32 of the Regulation. These provide transitional measures for non-commercial owners and for commercial stocks of EU listed alien species:

"Article 31. Transitional provisions for non-commercial owners

1. By way of derogation from points (b) and (d) of Article 7(1), owners of companion animals not kept for commercial purposes that belong to the invasive alien species included on the Union list shall be allowed to keep them until the end of the animals' natural life, provided the following conditions are met:

   (a) the animals were kept before their inclusion on the Union list;

   (b) the animals are kept in contained holding and all appropriate measures are put in place to ensure that reproduction or escape are not possible.

2. Competent authorities shall take all reasonable steps to inform non-commercial owners of the risks posed by keeping the animals referred to in paragraph 1 and of the measures to be taken to minimise the risk of reproducing and escaping through awareness-raising and education programmes organised by Member States.

3. Non-commercial owners who cannot ensure that the conditions set out in paragraph 1 are met, shall not be permitted to keep the animals concerned. Member States may offer them the possibility of having their animals taken from them. Where this occurs, due regard to animal welfare shall be given.

4. The animals referred to in paragraph 3 of this Article may be kept by the establishments referred to in Article 8 or in facilities established by Member States for that purpose."

"Article 32. Transitional provisions for commercial stocks

1. Keepers of a commercial stock of specimens of invasive alien species acquired before their inclusion on the Union list shall be allowed up to two years after inclusion of the species on that list to keep and transport live specimens or reproducible parts of those species in order to sell or transfer them to the research or ex-situ conservation establishments and for the purposes of medicinal activities referred to in Article 8, provided that the specimens are kept and transported in contained holding and all appropriate measures are put in place to ensure that reproduction or escape are not possible; or in order to slaughter or humanely cull those specimens to exhaust their stock.

2. The sale or transfer of live specimens to non-commercial users shall be allowed for one year after inclusion of the species on the Union list provided that the specimens are kept and transported in

contained holding and all appropriate measures are put in place to ensure that reproduction or escape are not possible."

5. AIM OF THE "GUIDANCE DOCUMENT ON E-COMMERCE AND IAS"

The Guidance document aims to provide a set of key recommendations to be adopted to limit the role of e-commerce as a pathway for the introduction of IAS at both a national and regional scale. The Guidance document is addressed by national authorities and institutions, and by different subjects or stakeholders (importers, domestic breeders, resale entities, retailers, e-tailers, shipping agents, collectors, specialist, NGOs and the public) that can contribute to the enforcement of an effective management and regulation of this pathway. It also aims at raising awareness on this threat, and at improving the information on this issue.

In order to achieve the goal of a significant reduction of the risk of introducing IAS through e-commerce, the adoption of these key recommendations must be accompanied by a strengthening of international cooperation and coordination among Member States, especially to improve the effectiveness of controls as well as the importance to raise awareness of relevant legislation among key stakeholders involved in e-commerce. The Guidance document is focused on both "conventional" and "unconventional" commodities (e.g. seed-infused greeting cards, bookmarks, clothes), which often bypass traditional border control screening and for which no effective detection mechanism yet exists.

As with other similar codes of conduct, the present guidance is addressed to all the fifty countries which, by signing up to the Bern Convention, committed to implement appropriate measures to guarantee the conservation of biodiversity - and particularly the protection of wild fauna and flora in Europe – including by mitigating the problems related to the introduction and spread of IAS.

The framework of actions to implement this guidance is voluntary and, therefore, strictly dependent on the level of self-regulation by different subjects involved. In this context, the support of relevant authorities is pivotal to ensure that appropriate measures are established to facilitate the implementation of the guidance and to change people's attitudes toward the IAS problem.

The Guidance document is also expected to provide useful suggestions in support of the processes of prioritization and implementation of legal provisions at a national, regional and EU scale.

The Guidance document takes into account existing initiatives and relevant obligations and principles of the EU Regulation 1143/14 on IAS, the Directive 92/43/EEC (the Habitat directive), the Directive 79/409/EEC (the Birds Directive), the Bern Convention, the Ramsar Convention and the Convention on Biological Diversity (CBD).

6. GUIDANCE DOCUMENT

6.1 Guiding principle 1: Raise awareness on biological invasion risks associated with e-commerce, among all relevant subjects and institutions

The methods of transaction and the subjects that operate in the field of e-commerce are very diversified and not always explicit. It is important to consider that there are often other subjects, in addition to the seller and the buyer, who play a role in the commercial transaction.

In general, especially for small-scale retailers, economic interest impairs compliance with the voluntary standards and codes of conduct, as these are not perceived as a priority. However, if on the one hand there are communities of very well-informed enthusiasts, then on the other hand, in many cases, both sellers and buyers are ignorant or misinformed, rather than intentionally attempting to breach legislation. This makes it complicated to define and implement standardized approaches to increase awareness at all levels.

An information campaign should be aimed at informing both sellers and buyers, focusing on their responsibility, including legal responsibility. Both social media and specialized media, such as pet magazines/journals/books, should be used to disseminate the correct information, with the aim to shift consumer values (e.g. toward native and alien non-invasive species) and to change behaviours (e.g. to prevent impulsive purchase of IAS). In addition, e-commerce sites can provide opportunities for potential buyers to learn about the problems of IAS and responsible behaviours (e.g. alternatives to releasing unwanted organisms into the wild). Campaigns on consumers' smart behaviour may have a much greater chance of success if organized through the network or industries of the vendor in collaboration with IAS management authorities. A good example of collaboration is *Habitatattitude*™ (2021), a national initiative developed by a task force between Pet Industry Joint Advisory Council, National Sea Grant College and the U.S. Fish and Wildlife Service, which is aimed at increasing awareness among aquarium hobbyists, backyard pond owners, water gardeners and others who are concerned about aquatic resource conservation. Another good example is *Plantwise* (Invasive Species Council of British Columbia 2021), a joint program of the Invasive Species Council of British Columbia and plant growers and retailers, that supports the (ornamental) horticulture industry's transition to becoming invasive free.

Making information (biological and legal) more accessible to the layperson could be crucial to increase awareness. This can be achieved, for instance, by establishing a clearing-house constantly updated with any kind of useful resources: e.g. lists, laws, best practices, factsheets, information on the risks and care of species, information for discarding undesired pets or plants, app, as for example the New York State's gateway to science-based invasive species information (New York invasive species information 2021) or the GB non-native species Secretariat (GB non-native species Secretariat 2021). New communication tools can also be developed to provide connections with hobbyists and the wider public (e.g., WhatsApp Messenger or other smartphone apps).

Relevant authorities involved in different roles in the regulation and control of e-commerce may not be aware of the risks related to IAS trade. Therefore, information on this issue should be provided also to all relevant national and regional authorities: ministers, custom authorities, and border control authorities.

6.2 Guiding principle 2: Adopt and enforce national legislation regulating invasive alien species, and make the lists of regulated species easily accessible to all subjects (sellers, buyers, platforms, custom organisations, environmental protection agencies, etc.).

A legislative basis is essential for an effective regulation of the e-commerce of IAS. Two opposite regulatory approaches have been developed by countries to ban the commerce of some alien species: "negative" or "positive" lists.

A "negative" list contains species that cannot be imported or traded. A negative list is usually defined after assessing the potential risk (e.g. ecological economic or health) posed by certain species. The United States regulates deliberate alien species introduction by "negative" lists (Simberloff 2016) and EU countries regulate the species included in the list of IAS of Union concern and have the possibility to also develop national or regional lists.

Conversely, some countries have adopted a "positive" list approach to restrict the importation of IAS, especially ornamental plants species or pet species[12] (Oceania: Australia, New Zealand; Africa: Cameroun; North America: Delaware, New Brunswick, New Jersey, Rhode Island, Utah; Europe: Belgium, Croatia, Luxembourg, Malta, Norway, the Netherlands; Warwick and Steedman, 2021): all species are regulated but those included in a list of alien species posing limited risks of environmental impact, evaluated by a risk assessment procedure, that are the only ones that can be freely traded.

This has also been suggested in the guidance document under discussion for possible adoption at the next 24th Meeting CBD SBSTTA. A "white list" approach is likely to offer better risk mitigation potential than a "black list" because ecological knowledge is limited and because the invasiveness of most of the imported species and the species that are traded changes very fast (Chucholl 2012, Hulme 2015). In addition, a concise list of animals that may be kept and traded provides clarity to owners and enforcing agencies, and creates less regulatory bureaucracy for governments. On the other hand, a "black list" is considered a cost-effective means to limit the importation of IAS (Essl et al. 2011). In any case, both black and white lists, particularly in the face of increasing e-commerce of IAS, can be easily bypassed without adequate compliance checking mechanisms in place (Hulme et al. 2017).

In agreement with the previously cited CBD guidance document, in order to minimize the risks associated with e-commerce of IAS it is pivotal to share information on national regulations as well as regional regulations and lists on IAS. Therefore, once a legislative basis is adopted at a national or regional level, lists of regulated species should become easily accessible to all relevant subjects (sellers, buyers, platforms, custom organisations, environmental protection agencies, etc.). Harmonisation of legislation among neighbouring countries would also facilitate enforcement. National or regional authorities should also ensure to maintain and update shared data infrastructures, expert curation and building capacity in use of data-sharing tools and information on best practices.

A possible approach to enhance the efficient exchange of information between trade and government, the *Single Window*, has been developed by The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) and evaluated by the CBD Experts (CBD 2015) as a method of alerting suppliers and potential buyers of the risks posed by IAS sold via e-commerce. The *Single Window* approach allows the lodging of standardized information and documents with a single-entry point to fulfil all import, export and transit-related regulatory requirements. Its implementation at a national level may facilitate reporting on

[12] The purpose of the adoption of the white lists goes beyond the issue of invasive alien species and aims at improving also animal welfare, animal and human health, species and biodiversity conservation.

regulated articles (including live alien organisms with phytosanitary and sanitary risks, and risks to biological diversity).

6.3 Guiding principle 3: Collaborate with the main platforms and actors of e-trade of plants and animals to prevent the e-commerce of invasive alien species.

It is essential to seek the collaboration of the main players in the trade of plants and animals, including large platforms (e.g. Amazon, Alibaba) and online auctions sites (e.g. eBay), in order to prevent sales and auctions of species into countries where these are regulated, to improve correct labelling of traded species and to ensure the traceability of sellers.

Monitoring compliance with national and international legislation should also be a clear responsibility of online platforms. Stimulating large platforms to actively search listings for potential culprits and proactively comply with the EU regulation and individual countries' invasive species laws can be a very cost-effective prevention measure. In addition, dissuasive measures should be adopted in case of infraction of the existing legislation.

An example concerning the wildlife trade of endangered and threatened species is an agreement (2018) between the world's leading e-commerce and social media companies (Alibaba, eBay, Facebook, Google, Instagram, Microsoft, Pinterest, etc.) and some environmental organizations (TRAFFIC, WWF, IFAW) to make online platforms and apps inoperable for wildlife traffickers wishing to trade endangered and threatened species. In collaboration with WWF, TRAFFIC, and IFAW, each company developed and implemented policies to reduce wildlife trafficking across platforms. By March 2020, Coalition companies working with WWF, TRAFFIC and IFAW reported removing or blocking more than 3 million endangered species listings from their platforms (WWF 2020).

6.4 Guiding principle 4: Ensure that sellers and buyers are provided with key information and warnings on the species they sell or buy, including on their potential invasiveness.

An informed trade is an essential condition for preventing the unwanted movement of goods, including species. It is therefore important that sellers and buyers are provided with the key and correct information on the species they sell or buy, including taxonomy, biology and ecology, as well as on the potential invasiveness of these species and appropriate measures that should be used to prevent a species escape or release.

All this information needs to be made accessible to the competent authorities, and it is therefore important to cooperate with online retailers and catalogue sellers to ensure there is a correct and consistent identification and labelling of all traded species (also stated in the Guiding Principle 3). An example could be the Walloon Region (Belgium) that has recently adopted a legislation that allows only specialised websites to sell animals.

An international labelling system, that is used for all species sold via the internet (but also physical stores), should indicate which animals and plants are safe for biodiversity and provide guidance on the handling and care of organisms, while taking into consideration, in case of animals, their species-specific welfare requirements. As also mentioned by the CBD expert, the use of labelling on consignments of live alien species to identify it as a potential hazard for biodiversity (e.g. based on the IUCN standard EICAT, IUCN 2021) and the proper identification of species (e.g. scientific name, taxonomic serial number or its equivalent) would both be useful tools for customs authorities. The label could easily inform customs authorities of IAS that threaten biodiversity.

6.5 <u>Guiding principle 5:</u> Monitor e-commerce of invasive alien species at all scales.

In the current globalized market, new species are integrated into global trade on a daily basis and, for such species, often no information or experience exists on their invasiveness outside of their native range. To develop effective responses, it is essential to monitor current introductions and examine data for emerging risk species. For example, timely identification of newly traded IAS can help focus prevention efforts, as well as early detection and rapid response to new incursions.

Monitoring the internet trade of IAS could help with identifying changes in buyers' preferences for particular plants or animals and to forecast new possible invaders, in order to target preventive management measures. Monitoring online sales (both in pet shops and on auction sites) can also provide a rough minimum estimate of the propagule pressure related to a specific invasive species.

Monitoring should be done constantly, toward external and internal markets, and use both major international languages as well as local ones, as sellers can use vernacular name or local synonyms.

Effective monitoring of e-commerce can be very difficult and resource-consuming to put into practice, especially if done on a regular basis, due to its heterogeneity and its dynamism. Therefore, international, regional and national institutions and organisations should invest in the monitoring of e-commerce, including through the development of automated tools.

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