



Strasbourg, 14 May 2019
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T-PVS/Inf(2019)2

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

39th meeting
Strasbourg, 3-6 December 2019

**GUIDANCE DOCUMENT
ON E-COMMERCE AND IAS**

FIRST DRAFT

May 2019

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SUMMARY

The present document aims at providing guidance on voluntary measures to be adopted in order to limit the role of e-commerce as pathway for introduction of invasive alien species at national and regional scale. Scientific literature and surveys of commercial websites all over the world reveal a wide range of invasive species for sale, including many species regulated by national laws or international treaties. Identifying and managing the risks associated with e-commerce is particularly challenging because it is not a physical pathway for introduction of IAS, but rather simply serves as a mechanism for processing commercial and non-commercial transactions between groups and individuals. The Guidance is thus addressed to those 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. 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 on accompanying Bern Convention Contracting Parties in designing and implementing control measures for non-endemic species, 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 (IAS) endorsed by the Bern Convention in 2003, as well as numerous voluntary guidance or codes of conduct addressed to various sectors of activity which are potential pathways for the spread of non-endemic species in Europe.

Voluntary codes of conduct and best practices are in fact considered as fundamental flexible “implementation” tools which could be scaled up with support from 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). On the other hand, the principle of self-regulation is more successful and effective than any other legally binding scheme.

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 (horticulture, hunting, pets’ industry, botanical and zoological gardens, aquaria and protected areas).

The development of these instruments can play an important role in building awareness among 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): “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 this regard and considering the activities of the Convention of Biological Diversity in the field and the adoption of the EU Regulation 1143/2014, the Council of Europe has the intention to develop a guidance document on e-commerce and Invasive Alien Species. Indeed, the considerable increase of e-commerce over the past years, its major role as IAS introduction pathway and the difficulties encountered in regulating this trade, call for development of such guidance. The preparation of such guidance is also expected to provide useful cues and suggestions to support the processes of prioritization and horizon scanning in the framework of the EU Regulation 1143/14.

2. THE 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 \$ 4 trillion and 14.6% of total retail in yearly sales by 2020 (Fig. 1). A portion of this activity includes the sale and trade of living organisms, invasive species included.

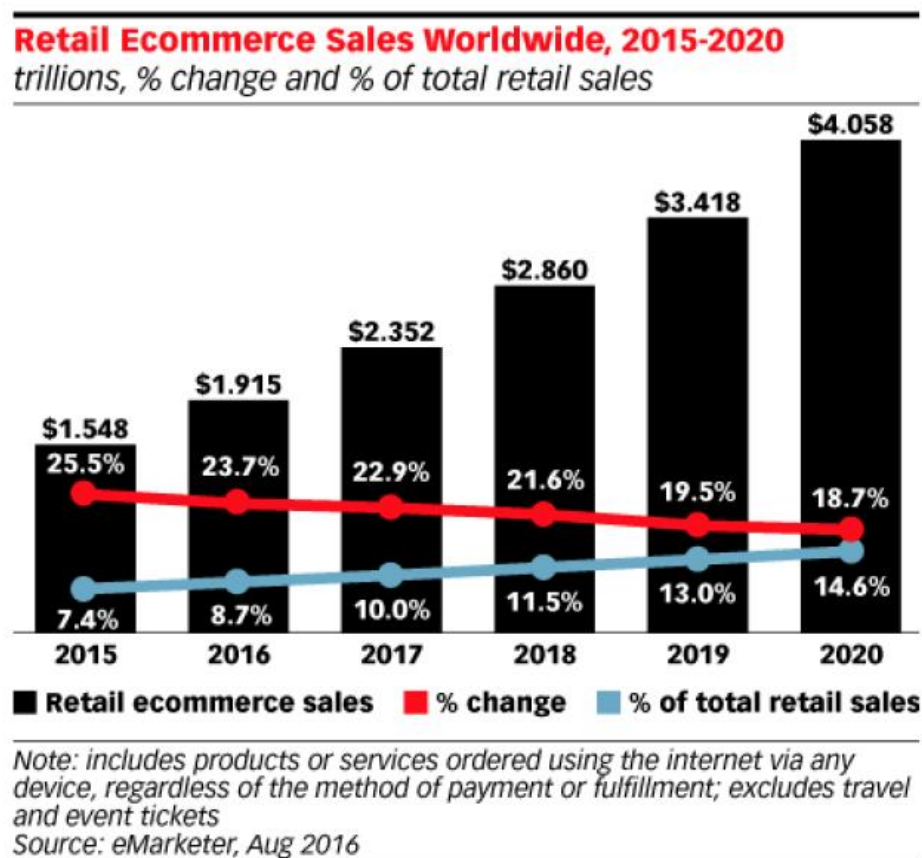


Figure 1. Retail Ecommerce Sales Worldwide. Source: eMarketer August 2016.

In the last decades, Internet has become an invaluable tool for facilitating commerce and communication worldwide, therefore the opportunities to trade in live animals and plants have hugely increased.

The range of sectors and species interested by the e-commerce of living organisms is wide: e.g. 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 internet-based commerce in living organisms is expected to contribute to the spread of invasive alien species and can be considered as a main driver of IAS introduction and a major biosecurity concern (Ricciardi et al., 2017). The online trade of living organisms is poorly regulated and, being accessible to all, has increased considerably making the purchase of invasive species “just a mouse click away” from any home (Mazza *et al.*, 2015; Figg. 2 and 3). Being so easy to sell or buy a plant or an animal coming from all over the world, an internet seller can directly approach a global clientele at low costs and provide instant satisfaction. Thereby, e-commerce not only further accelerates the global interchange of live plants or animals but, being these commodities often marketed by means of small and uneasily recognizable consignments, also entails the risk of bypassing traditional border controls and biosecurity regulations, aimed at reducing the risk of spreading diseases and pests.

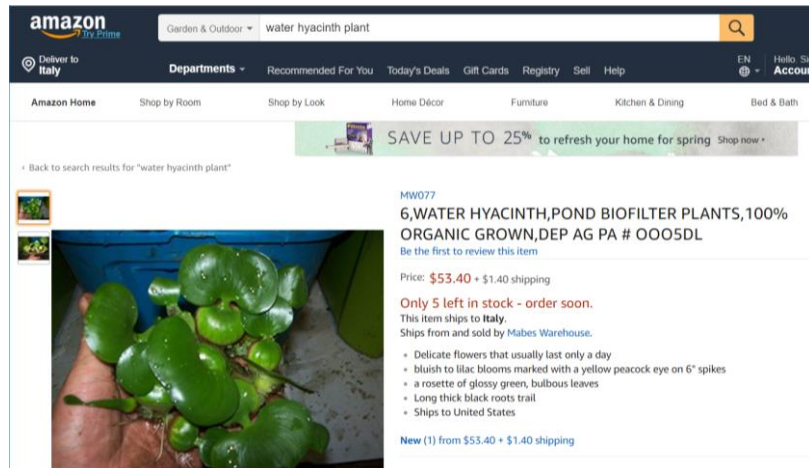


Figure 2. *Water hyacinth*, one of the 23 listed plants of Union concern that can be easily bought on internet.

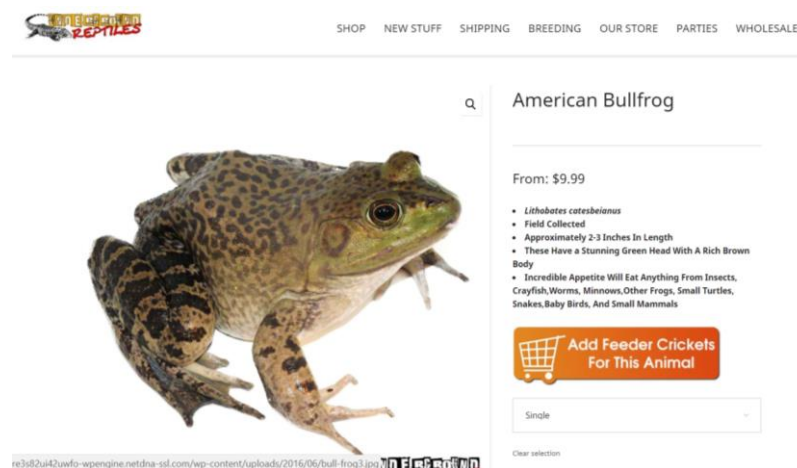


Figure 3. *American bullfrog*, one of the 26 listed animals of Union concern that can be easily bought on internet.

A growing economic importance and an expanding globalization of e-commerce means also a greater diversity and complexity of the trade market, becoming more and more difficult to approach with prevention and control strategies. For instance, invasive species for sale can be offered online through in a number of different ways: auction sites, large marketplaces, large and small producers or growers, e-catalogue of brick-and-mortar shops, hobbyist sites.

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

Besides there may be an increase in non-experts in the plant and animal trade who may be ignorant or misinformed on potential dangers and biosecurity regulations or incorrectly identify their products (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) identify several possible problems concerning the proper naming:

- 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 (ex. higher taxonomic level than species) identified, intentionally or unintentionally
- a trade or common name used that does not refer unambiguously and consistently to any one species

Despite a number of government entities have jurisdiction over specific aspects of e-commerce (often with an overlapping mandate too, Fig. 4), this sector is evolving and expanding in volume at a rate that may exceed these various capacities to address the associated risks of introduction and spread of invasive species. Especially when the import channel or the supplier is located outside of the jurisdiction of a regulatory body (ex. NPPO) national biosecurity regulations may be eluded (Humair et al, 2014).

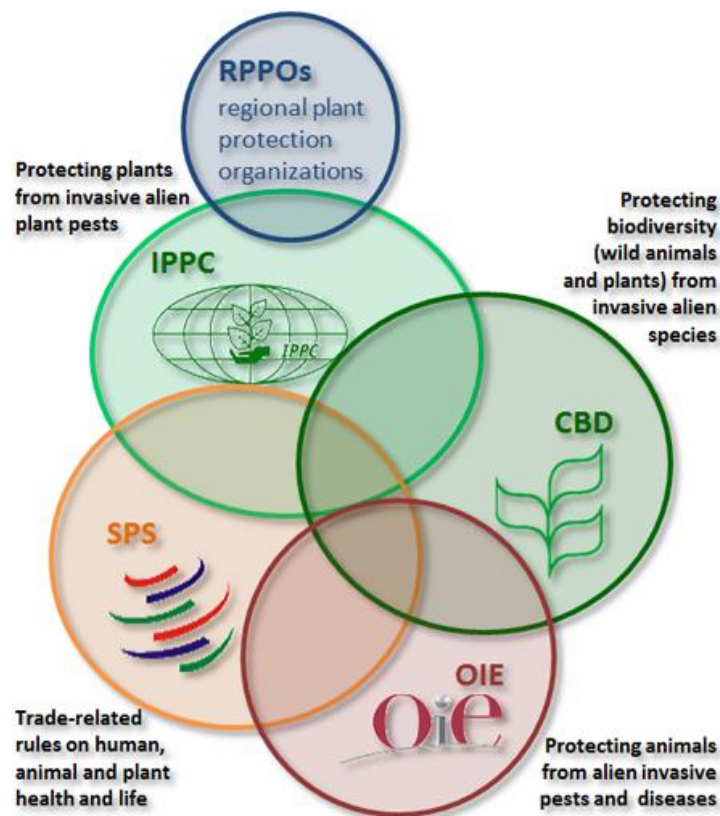


Figure 4. International Trade and Invasive Species: overlapping mandates.

Source: Lopian and Stephen

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

Another critical point is that living organisms are often sent using directly the mail service (Morrissey et al., 2011) that, unlike express delivery services (e.g. DHL, UPS), doesn't generally require any electronic declaration about the content of the packages. This preclude substantially the possibility to effectively inspect consignments because inspections may or not occur depending on volume of mail, availability of personnel or other variables (ISAC, 2012).

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

A recent review of existing relevant legislation in Europe on the sale of exotic pets at national level (27 EU Member States and Norway, Switzerland, Croatia and Turkey) found big gaps in current national legislation for what concern specific restrictions on internet sales (Eurogroup for animals, 2013¹).

To respond to this growing problem, several countries and organisations are developing measures specifically designed to control the e-commerce of invasive species. For example, Canadian authorities developed a tool (the Great Lakes Detector of Invasive Aquatics in Trade – or GLDIATR) employing advanced technology to scan internet pages to identify sellers of invasive species². Launched in 2015. GLDIATR is an innovative software program developed by the Great Lakes Commission (Michigan, USA) that uses advanced technology to search the internet for sites where aquatic invasive species can be purchased and shipped to the Great Lake region. By automatically identifying sales pages, GLDIATR simplifies the process for removing these invasive species from trade. This software enables managers to quickly identify sellers with regulated species offered for sale and notify those sellers to remove those regulated species from their inventory. 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 restricted species. In response, the GLC contacted website owners with information about invasive species regulations and best practices and observed changes to stock and/or shipping restrictions in 27 cases.

Expert meeting organised by the Convention on Biological Diversity³ in preparation for the 22th meeting of the SBSSTA (Montreal, 2018) recognised the serious threat posed via e-commerce to biodiversity, highlighted that the primary way of addressing the risk associated with e-commerce is development of national regulations, to assist national customs agencies to enforce halting entries of invasive alien species. The Expert Workshop also stressed the importance of data sharing and information flow on invasive alien species to facilitate the national process above. It also stressed the need to engage with national Customs authorities (the Customs Administration designated to the World Customs Organization) to raise the issue of invasive alien species, in collaboration, among the users and operators of e- commerce.

A number of scientific analysis and reports has addressed various aspects and sectors of e-commerce and other forms of trade in 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 for what concern the e-commerce in U.S.

Great attention is paid to horticultural trade, 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 UK; Humair et al. (2014) automatically surveyed the global e-commerce of invasive plants to determine its importance as pathway; Lenda et al. (2014) focused on the role of internet sale in the long distance dispersal and spread of invasive plants.

For what concern the aquarium trade and ornamental aquaculture, Mazza et al. (2015) provide an overview of the aquarium e-trade in Italy; Peres et al. (2018) focused on the threat of aquarium plants e-commerce in Brazil; Chucholl (2012) analysed the e-commerce of ornamental freshwater crayfish in Germany, Papavlasopoulou et al. (2014) in Greece and Patoka et al. (2014) in Czech Republic. Kay and Hoyle (2001) cover aquatic weeds sold through the Internet and mail, and Stam et al. (2006) and Walters et al. (2006) focus on the sale of species of *Caulerpa* in Florida. Barroso de Magalhães and Jacobi (2010) analysed the role of e-commerce in the spread of introduced freshwater aquarium fish in Brazil and Martin and Cotzee (2011) the role of internet in introduction and spread of macrophytes in South Africa.

¹ <https://www.eurogroupforanimals.org/wp-content/uploads/Eurogroup-for-Animals-Exotic-Pet-Report-FINAL.pdf>

² <https://www.glc.org/work/gldiatr>

³ <https://www.cbd.int/meetings/IASSEM-2017-01>

Finally, an examination of the Internet pet trade has been done for the UK by Parrott and Roy (2009) and for New Zealand by Kikillus et al. (2012) that used *Trachemys scripta elegans* as representative species.

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

- ✓ 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.

A lot of invasive and worst invasive plant resulted from sale on the web and the authors suggest that their results perhaps 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 suggest also that paying particular attention to social media could help identify changing tastes in consumer plant purchasing, and that 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 resulted the most sold aquarium taxa on internet, probably because their easy maintenance and their cheaper price if compared to marine species. Analysing the biological features of the traded species, the authors found that most of them have characteristics that can favour their survival and spread in the wild, once released or escaped. Half of the traded plants resulted already introduced outside of their native range and some of them are well-known as highly invasive and harmful (ex. *Caulerpa* genus, *Pistia stratiotes*, *Eichhornia crassipes*, *Myriophyllum aquaticum*). The study also highlighted a general low level of information on biology of species traded and a high level of incorrect or poor identification (ex. species are often identified only at genus level).

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

Many authors highlighted also the risk that IAS sold in 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., 2014), as in the case of the chytrid fungus *Batrachochytrium dendrobatidis*, a pathogenic agent responsible for the global decline of amphibians, which seems to have spread also through the international trade of experimental and ornamental amphibians (Fisher and Garner 2007).

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

To collect information useful to develop the present guidance document and to support the proposed key recommendations with some updated quantitative information, a desktop systematic research of species listed on the EU list of Union concern for sale on the web has been performed. The research was not aimed to achieve a comprehensive analysis on sellers offering EU listed IAS for sale but rather to test species availability through e-trade, two years after the EU Regulation 1143/14 entered into force.

The survey was designed and performed in contact with the IUCN Team that is currently charged by the European Commission of the contract "*Technical and Scientific support in relation to the*

Implementation of Regulation 1143/2014 on Invasive Alien Species". One task, among the different issues the IUCN team is working on, is "Assessing the trade in potential IAS in the European Union (TSSR-2018-4)". It is aimed at undertaking a review of the trade into and within the EU in live specimens and reproductive material of potential IAS. The task has three sub-tasks one of them involves an e-commerce survey on a selection of large e-commerce retailers, online shops and peer-to-peer trading platforms.

As far as possible, the present survey was designed, and data analysis was performed, adopting a similar approach used by the IUCN Team in order to allow a comparison of results and to explore aspects not included in their work.

1.1. Methods

The sellers were identified by performing a Google search for each of 49 EU listed species using the following standardised search terms: "*name of species for sale*". All searches were done using the English language. The search for each species was repeated twice, the first time using the Latin name (ex. *Nasua nasua*) and the second one the vulgar English name (ex. South American coati). Only the first 50 results of each google search were considered to check the availability of a species for sale. In total, about 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 retailer** (ex. Amazon, Mercado Libre, Jumia or AliBaba) were considered as "**seller**". 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 the seller has been identified, its stock lists were surveyed to search the species and check: (1) the availability in stock, (2) the deliverability to Europe (in case of non-european seller), (3) the presence of a warning advertisement on the risks to purchase an alien invasive species. Sellers where species were found in the store but was not for sale or were listed for sale but were not currently in stock were excluded by the survey results as a precaution, hypothesizing, at least for European-based sellers, a recent exclusion due to the entry into force of the EU Regulation 1143/14. According to the art. 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 last (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 all EU listed species could be considered forbidden. Moreover, 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
C	Taxa group	amphibians, aquatic plants, birds, crabs, crayfish, dicots, fish, insects, mammals, monocots, reptiles
D	Kingdom	<i>animalia, plantae</i>
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: I+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, Holland (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 performed also on data aggregated for «kingdom», «taxa group» and «environmental system».

1.2. Results

Two hundred and seventeen sellers offering EU listed IAS for sale were recorded. Ninety-two of them (42%) were selected, being based in Europe (n=36) or out of Europe but delivering in Europe (n=54); for two sellers delivering in Europe it was not possible to identify the country. Sellers offering EU listed IAS for sale resulted based in 9 different countries (Figure 1); the highest number of sellers was found in USA (34%, n=31), followed by China (18%, n=17), Germany (16%, n=15) and UK (12%, n=11).

A total of 29 species of Union concern were recorded for sale on internet (59% of the 49 EU listed species) but only 19 are sell in or to Europe (Table 1; 39% of the 49 EU listed species). Plants were most commonly recorded for sale (Table 1; n=13, 68%) than animals (n=6, 32%), and accounted to the 57% of the 23 EU listed plants species, against the 23% of the 26 EU listed animals. Plants also showed a three-fold higher mean number of sellers than animals (Table 2). Plants species resulted available in at least one web site for each of the 9 countries recorded (Figure 2); on the contrary EU listed animals were found on sale only in USA (n=10, 71%), Holland (n=3, 21%) and UK (n=1, 7%).

For what concern the availability on internet of different «taxa group» (Table 3), the high number of dicots (67% of species found) and the low number of mammals (9% of species found) should be highlighted. Considering the mean number per species of sellers based or delivering in Europe (Table 4), the highest availability is recorded for aquatic plants (8,3 sellers), followed by dicots, monocots and reptiles. Availability for each taxa group by country is showed in Figure 3.

Considering data aggregated for «environmental system», similar rates of availability were found for species belonging to different systems (Table 5), except for the lowest mean number of sellers recorded for species belonging to the mixed terrestrial/freshwater environment (Table 6).

Twelve out of the 19 EU listed species recorded resulted available at sellers based in Europe (Table 7) and 16 at sellers based out of Europe but delivering in Europe. Nine species (8 plants and one crayfish) were found on sale 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*).

Asclepias syriaca was the most commonly found (Figure 4; 21% of all sellers, 32% based out of Europe) followed by *Cabomba caroliniana* (12% of all sellers, 73% based out of Europe) and *Eichornia 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 animals resulted on sale at more than one seller: *Trachemys scripta* (5 sellers, all based out of Europe) and *Eriocheir sinensis* (2 sellers based in Europe).

Only seventeen sellers out of 92 (Table 8, 18%) warns on their website on the risks to purchase an alien invasive species. Plants accounted for the 21% (n=14) of websites and only one advertisement was recorded when simulating to purchase an EU listed animal (7%). Presence of warning advertisements resulted very different considering different taxa (Table 9). For what concern animals, except for a single

seller offering the Chinese mitten crab *Eriocheir sinensis*, no warning advertisement was recorded on the websites selling EU listed crayfish, amphibians, reptiles or mammals. Just a bit better the results for what concern plant taxa, where the highest frequency of advertisements was recorded for aquatic plants (36%, n=9); only 7 out of 43 (16%) sellers of EU listed dicots warns about the risks to purchase an IAS and no warning messages were found at the 10 web sites offering monocots. Looking at the differences among species (Figure 5) 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, pointed out *Trachemys scripta* as the most commonly (4 on a 4-point scale) EU listed species offered on specialized platforms. A quite high level of trade was recorded also for *Eichhornia crassipes* (3 on 4) and *Asclepias syriaca* (2 on 4). A highly traded species on peer-to-peer platforms as *Nasua nasua* was not considered because delivery outside the US resulted never available.

1.3. Results in a nutshell

- Two hundred and seventeen sellers offering EU listed IAS for sale were recorded. Ninety-two of them (42%) were selected, being based in Europe (n=36) or out of Europe but delivering in Europe (n=54); for two sellers it was not possible to identify the country.
- Sellers offering EU listed IAS for sale resulted based in 9 different countries; the highest number of sellers was found in US (34%, n=31), China (18%, n=17), Germany (16%, n=15) and UK (12%, n=11).
- Twenty-nine species of Union concern were recorded for sale on internet (59% of the 49 EU listed species) but only 19 are sold in or to Europe (39% of the 49 EU listed species).
- Plants were most commonly recorded for sale (n=13, 68%) than animals (n=6, 32%), and accounted to the 57% of the 23 EU listed plants species, against the 23% of the 26 EU listed animals.
- *Asclepias syriaca* was the most commonly species 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», the high number of dicots (67% of species found) and the low number of mammals (9% of species found) should be highlighted. 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 92 (18%) warns on their website on the risks to purchase an alien invasive species. The highest frequency of advertisements was recorded for plants (21%, n=14), in particular for aquatic plants (36%, n=9). Only one advertisement was recorded when simulating to purchase an EU listed animal (7%).
- On a rough assessment, *Trachemys scripta* resulted the most commonly EU listed species offered on specialized platforms of peer-to-peer trade, followed by *Eichhornia crassipes* and *Asclepias syriaca*.

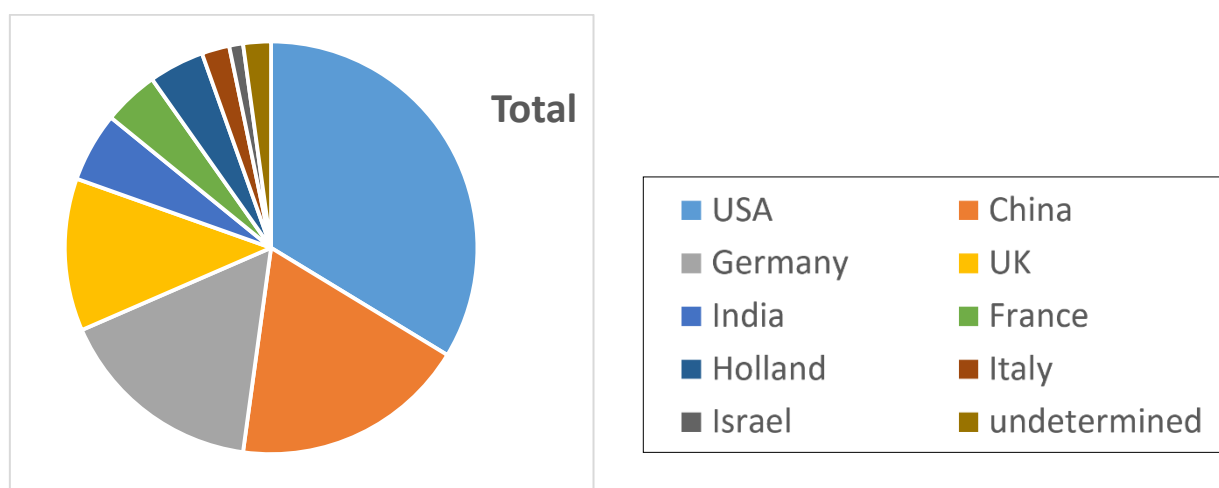


Figure 1. Sellers of species of Union concern by country (%) recorded in the on-line survey. Data not aggregated. (Survey performed from 10.09.2018 to 05.10.2018)

Table 1. Species 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	species EU listed ‘on sale’	species EU listed	% species EU listed on sale
Animalia	6	26	23%
Plantae	13	23	57%
Total	19	49	39%

Table 2. Sellers of species 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	species EU listed ‘on sale’	sellers	mean number of sellers per species
Animalia	6	14	2,3
Plantae	13	78	6,0
Total	19	92	4,8

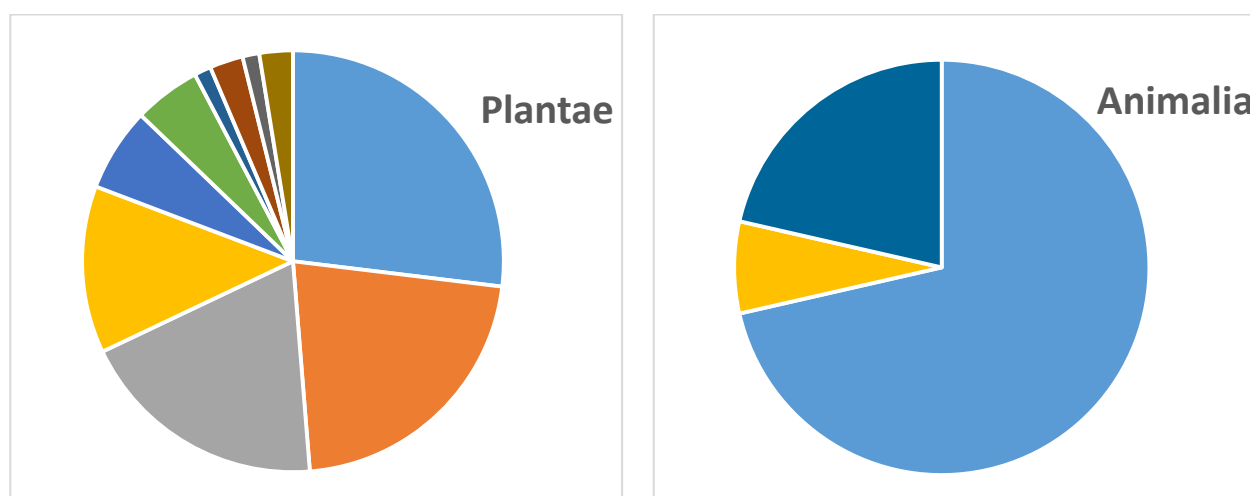


Figure 2. Sellers of species of Union concern by country (%) recorded in the on-line survey. Data aggregated for “Kingdom”. (Survey performed from 10.09.2018 to 05.10.2018)

Table 3. Sellers of species 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	species EU listed ‘on sale’	species EU listed	% species EU listed on sale
Amphibians	1	1	100%
Aquatic plants	3	8	38%
Birds	0	4	0%
Crabs	1	1	100%
Crayfish	2	5	40%
Dicots	8	12	67%
Fish	0	2	0%
Insects	0	1	0%
Mammals	1	11	9%
Monocots	2	3	67%
Reptiles	1	1	100%

Table 4. Sellers of species 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	species EU listed 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
Dicots	8	43	5,4
Mammals	1	1	1,0
Monocots	2	10	5,0
Reptiles	1	5	5,0

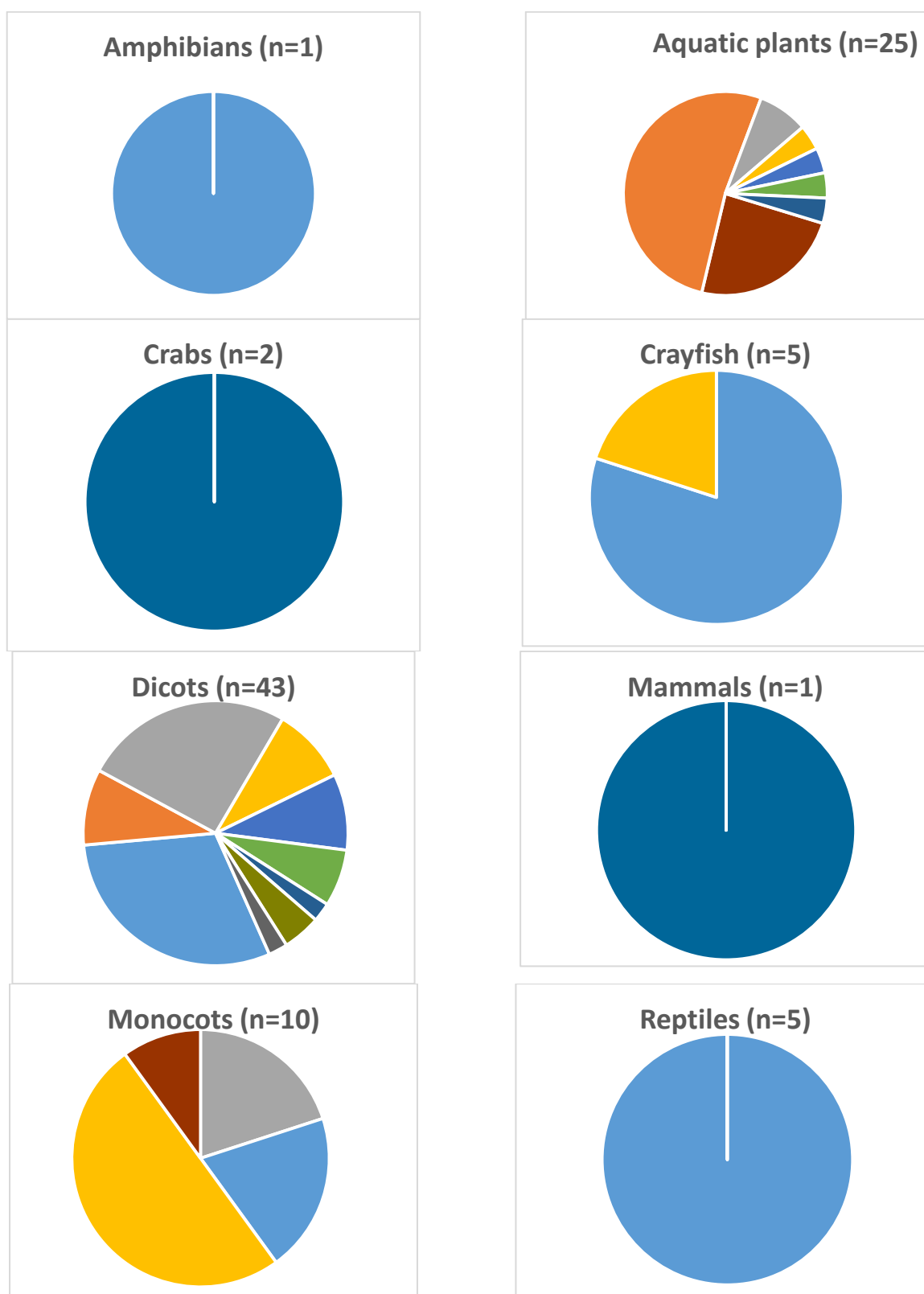


Figure 3. Sellers of species of Union concern by country (%) recorded in the on-line survey. Data aggregated for "Taxa group". (Survey performed from 10.09.2018 to 05.10.2018)

Table 5. Sellers of species 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	species EU listed on sale	species EU listed	% species EU listed on sale
Freshwater	6	17	35%
Terrestrial	11	27	41%
Terrestrial/Freshwater	2	5	40%

Table 6. Sellers of species 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	species EU listed 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 7. Species of Union concern recorded on sale in Europe in the on-line survey (1=on sale; 0=not for sale). (Survey performed from 10.09.2018 to 05.10.2018)

Species name	on sale in Europe	on sale out of Europe
<i>Alternanthera philoxeroides</i>	0	1
<i>Asclepias syriaca</i>	1	1
<i>Baccharis halimifolia</i>	0	1
<i>Cabomba caroliniana</i>	1	1
<i>Eichhornia crassipes</i>	0	1
<i>Eriochloa sinensis</i>	1	0
<i>Gunnera tinctoria</i>	1	1
<i>Heracleum persicum</i>	0	1
<i>Heracleum sosnowskyi</i>	1	0
<i>Impatiens glandulifera</i>	1	1
<i>Lithobates catesbeianus</i>	0	1
<i>Lysichiton americanus</i>	1	1
<i>Myriophyllum aquaticum</i>	1	1
<i>Nasua nasua</i>	1	0
<i>Pacifastacus leniusculus</i>	1	1
<i>Pennisetum setaceum</i>	1	1
<i>Procambarus clarkii</i>	0	1
<i>Pueraria lobata</i>	1	1
<i>Trachemys scripta</i>	0	1

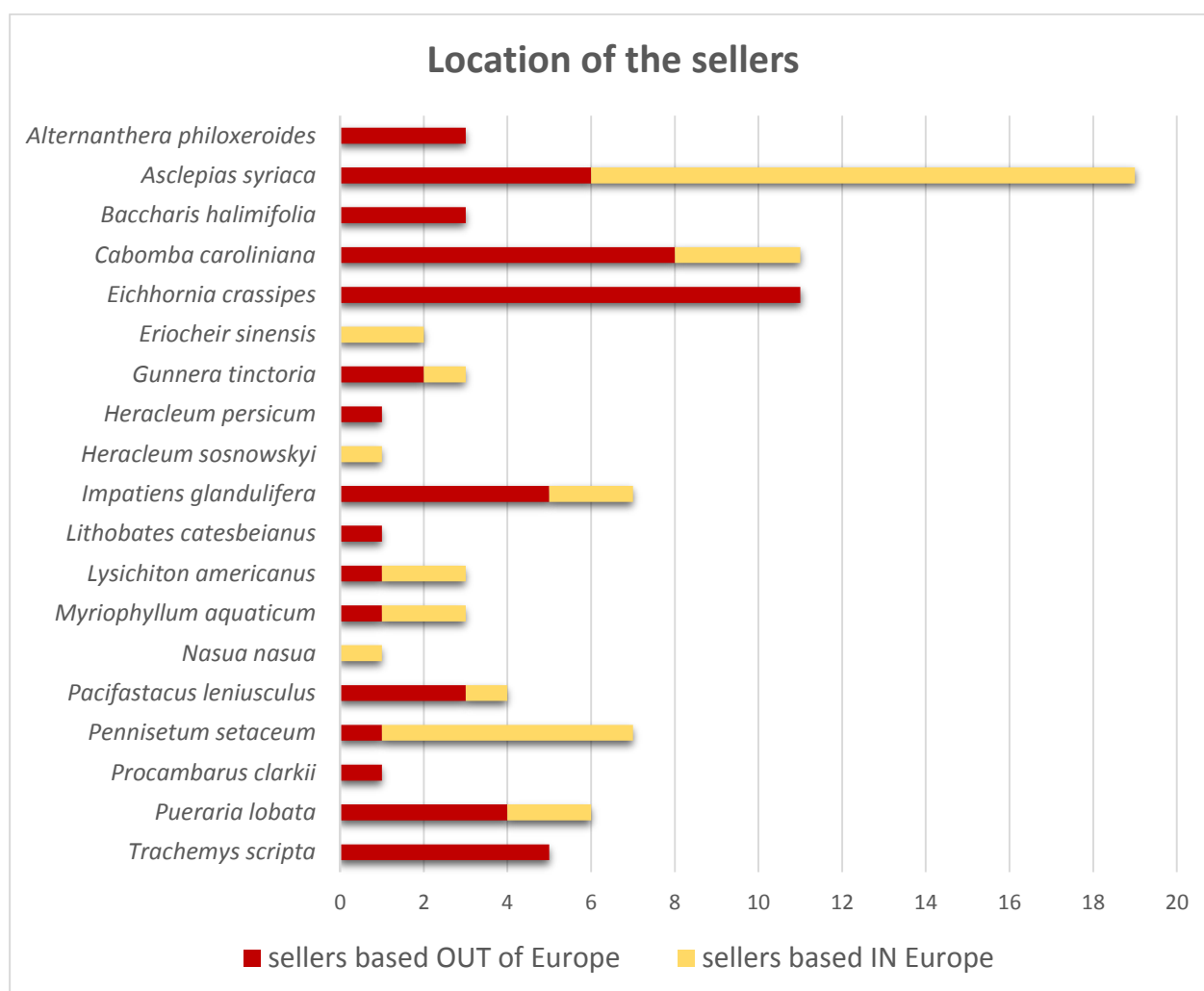


Figure 4. Species of Union concern recorded on sale in Europe in the on-line survey. Location of the sellers. (Survey performed from 10.09.2018 to 05.10.2018)

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)

Kingdom	species EU REG 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 9. Sellers of species of Union concern recorded in the on-line survey. Presence of warning advertisement within the web site. Data aggregated for “Taxa group”. (Survey performed from 10.09.2018 to 05.10.2018)

Taxa group	species EU REG 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%
Dicots	8	43	7	16%
Mammals	1	1	0	0%
Monocots	2	10	0	0%
Reptiles	1	5	0	0%

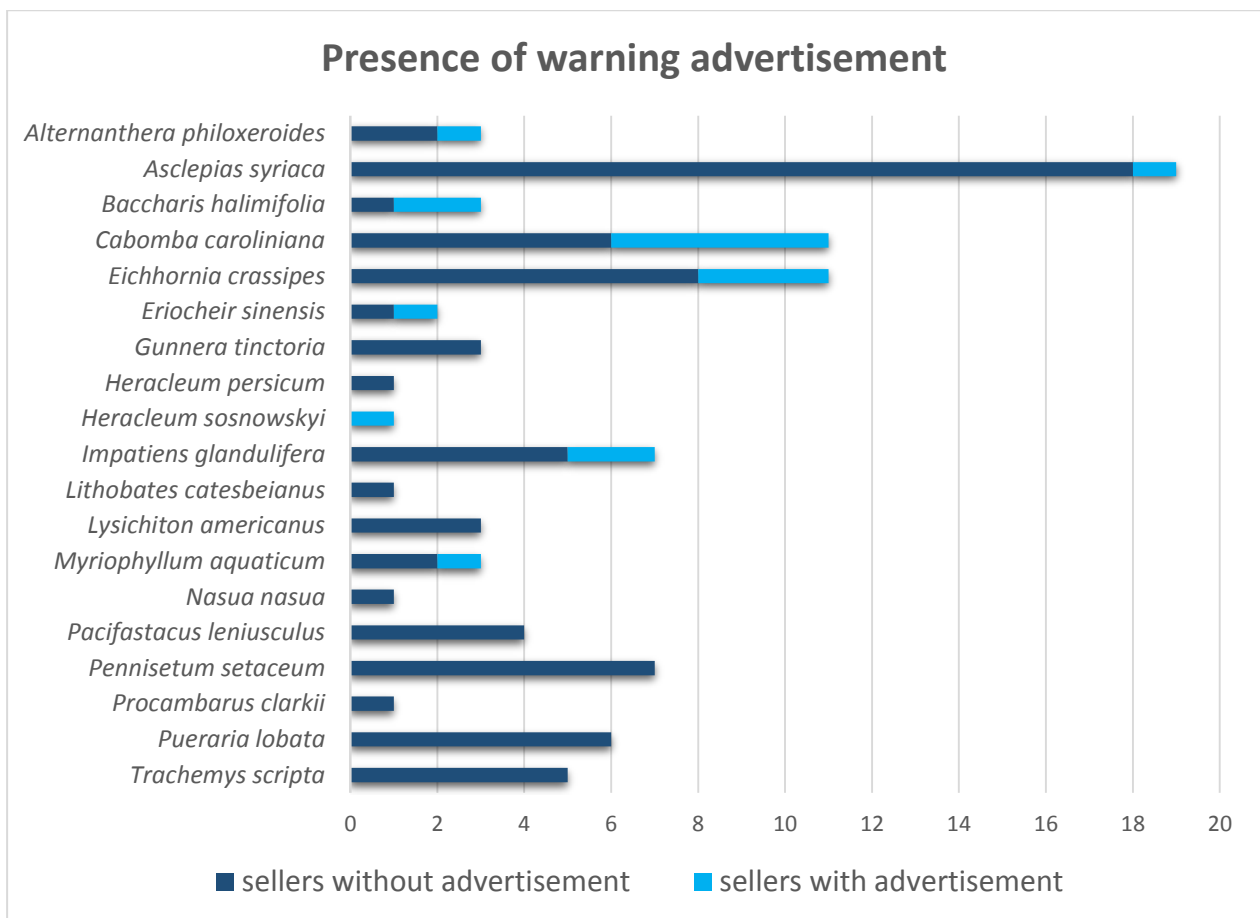


Figure 5. Species of Union concern recorded on sale in Europe in the on-line survey. Presence of warning advertisement within the web site. (Survey performed from 10.09.2018 to 05.10.2018)

4. THE LEGAL AND POLICY CONTEXT

Because of the substantial increase of the e-commerce, in recent years some International treaties, policies and position statements started to deal with the risk of biological invasion associated with trade in wildlife via e-commerce.

1.4. The International context

Convention on Biological Diversity (CBD)

The CBD acknowledges the impacts caused by IAS at 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 COP in Pyeongchang (2014) the CBD adopted a couple of decisions dealing with the 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 his 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”, that at the 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 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».

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 welcoming adopted by the SBSTTA with the Recommendation XX/7 «Invasive Alien Species», at the 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:*

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 [...].”

- 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;***

The 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*».

The point 9 request 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 [...]*».

The CBD SBSTTA, at its 22th Meeting (2018), adopted **Recommendation XXII/8** «*Invasive Alien Species*» which recommends that the Conference of the Parties, *recognizing the growth in e-commerce in invasive alien species and the need for collaboration to minimize the associated risks*, at its fourteenth meeting decides, subject to the availability of resources, to establish an Ad Hoc Technical Expert Group aimed to provide advice or 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*». In the same formal document, the SBSTTA recommends also that the Conference of the Parties welcomes Annex 1 «*Supplementary «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* », already annexed to the COP decision XII/16.

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** that recommends that the 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 that 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 referred to the e-commerce of IAS listed in Appendices I-III 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 was focused on two main topics: (i) the technical infrastructure of the Internet which is evolving rapidly and offer 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 (<http://www.cites.org/eng/prog/e-commerce.php>) in accordance with Decisions 15.57, 16.62 and Resolution Conf. 11.3 (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 on 1995. It concerns the

application of food safety and animal and plant health regulations and it allows countries to set their own standards. Regulations must be based on scientific findings and should be applied only to the extent that they are necessary to protect human, animal or plant life or 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 invasive alien species. Several key actions were identified to control such species more effectively, including:

- 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 been the traditional 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 geared to manage bulk shipment of consignments of commodities moving through these traditional transportation pathways. Sales of plants and plant products ordered through the e-commerce has increased significantly in 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 (e-commerce) in plants and other regulated articles»**. The Recommendation, not specifically directed to IAS, 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 e-commerce, 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;*

- 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 e-commerce 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.*

1.5. 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. 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, Bern Convention developed numerous voluntary Codes of conduct addressed to various sector 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 Alien Species”, 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 e-commerce:

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 is aimed to protect native biodiversity and ecosystem services, as well as to minimise and mitigate the human health or economic impacts that IAS can have.

Even if the EU Regulation does not explicitly refer to the e-commerce, it creates a pivotal legal framework to deal with the risk of biological invasion associated with the internet 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.

The EU regulation on IAS includes some innovative pathways-related provisions, such as the provisions of article 13, which explicitly foresee the contribution of voluntary instruments and approaches to prevent the introduction of IAS:

Article 13. Action plans on the pathways of invasive alien species

1. *Member States shall, within 18 months of the adoption of the Union list carry out a comprehensive analysis of the pathways of unintentional introduction and spread of invasive alien species of Union concern at least in their territory, as well as in their marine waters as defined in point (1) of Article 3 of Directive 2008/56/EC, and identify the pathways which require priority action ('priority pathways') because of the volume of species or of the potential damage caused by the species entering the Union through those pathways.*
2. *Within three years of the adoption of the Union list, each Member State shall establish and implement one single action plan or a set of action plans to address the priority pathways it has identified pursuant to paragraph 1. Action plans shall include timetables for action and shall describe the measures to be adopted and, as appropriate, voluntary actions and codes of good practice, to address the priority pathways and to prevent the unintentional introduction and spread of invasive alien species into or within the Union.*
3. *Member States shall ensure coordination with the aim of establishing one single action plan or a set of action plans coordinated at the appropriate regional level in accordance with Article 22(1). Where such regional action plans are not established, Member States shall establish and implement action plans for their territory and as far as possible coordinated at the appropriate regional level.*
4. *The action plans referred to in paragraph 2 of this Article shall include, in particular, measures based on an analysis of costs and benefits, in order to: (a) raise awareness; (b) minimise contamination of goods, commodities, vehicles and equipment by specimens of invasive alien species, including measures to tackle transportation of invasive alien species from third countries; (c) ensure appropriate checks at the Union borders, other than the official controls pursuant to Article 15*

Article 22 aims to strengthen the co-operation and coordination of pathway management between EU countries among Member States:

Article 22 Cooperation and coordination

1. *Member States shall, when complying with their obligations under this Regulation, make every effort to ensure close coordination with all Member States concerned and, where practical and appropriate, use existing structures arising from regional or international agreements. [...] At the request of the Member States involved, the Commission shall act to facilitate the coordination.*
2. *Member States shall, when complying with their obligations under this Regulation, endeavour to cooperate with third countries, as appropriate, including by using existing structures arising*

from regional or international agreements, for the purpose of meeting the objectives of this Regulation.

3. *Member States may also apply provisions, such as those referred to in paragraph 1 of this Article, to ensure coordination and cooperation with other relevant Member States as regards invasive alien species of Member State concern identified in national lists adopted in accordance with Article 12(1). Member States may also establish mechanisms for cooperation at the appropriate level for those invasive alien species. Such mechanisms may include exchange of information and data, action plans on pathways and exchange of best practice on management, control and eradication of invasive alien species, early warning systems and programmes related to public awareness or education.*

To conclude, another key point of the EU Regulation for what concern the management of e-commerce pathway is the article 32 which provides transitional measures for commercial stocks of EU listed alien species:

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 draw a set of key recommendations to be adopted in order to limit the role of e-commerce as pathway of introduction of invasive alien species at national and regional scale. The Guidance document is addressed to national authorities and institutions, and to different subjects (importers, domestic breeders, resale entities, retailers, e-tailers, shipping agents, collectors, specialist 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.

The Guidance document is focused both on “conventional” and “unconventional” commodities (e.g. seed-infused greeting cards, bookmarks, clothes), which often skip traditional screening by border controls and for which no effective mechanism for detecting products exist.

Like other similar codes of conduct, also 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 spread of IAS.

The framework of actions to implement this guidance is voluntary and depends on there being a high level of self-regulation by different subjects. In this context, the support of the relevant authorities is pivotal to ensure that appropriate measures are established to facilitate the implementation of the guidance and the change of people attitudes toward the IAS problem.

The Guidance document is also expected to provide useful suggestions in support of the processes of prioritization and horizon scanning at a national and regional scale, as in the framework of the EU Regulation 1143/14.

The Guidance document takes account of existing initiatives and relevant obligations and principles of 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 and 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, moreover, especially for what concerns small-scale retailers, the economic interest does not make the compliance with the voluntary standards and codes of conduct a priority. On the other hand, in many cases both sellers and buyers are ignorant or misinformed, rather than intentionally attempting to breach legislation. This makes the definition and implementation of standardized approaches to increase awareness at all levels complex.

Information campaign should be aimed to inform both sellers and buyers, focusing on their, also legal, responsibility. Both social media and specialized media, such as pet magazines/journals/books, should be used to spread correct information, aiming to shift consumer values (e.g. toward native and non-invasive species) and to change behaviors (e.g. to prevent impulse purchase of IAS). Also, e-commerce sites can provide opportunities for potential buyers to learn about the invasive species issue and responsible behaviors (ex. alternatives to release the unwanted organisms into the wild). Some campaigns on consumers' smart behavior can have a much greater chance of success if organized through the vendors' network or industries in collaboration with invasive species management authorities. A good example of collaboration is *Habitatattitude*^{TM4}, 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, 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*⁵, 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 become invasive-free.

Making information (biological and legal) more accessible to layperson could be crucial to increase awareness. This can be achieved for instance by establishing a constantly updated clearing-house with any kind of useful resources: eg. lists, laws, best practices, factsheets, information on the risks and care of species, information for discarding undesired pet or plant, app (ex. NYIS.INFO, the New York State's gateway to science-based invasive species information⁶ or the GB non-native species secretariat website⁷). New communication tools can also be developed to provide connection 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 on the risks related to the trade of invasive alien species. 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 legislations 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 invasive alien species. EU countries regulate the species included in the list of invasive species of union concern and have the

⁴ <http://www.habitattitude.net/>

⁵ <http://beplantwise.ca/>

⁶ <http://nyis.info/>

⁷ <http://www.nonnativespecies.org/>

possibility to also develop national or regional lists. Some European countries not in the EU system have adopted a white list approach (Iceland, Norway); also, some EU countries (Belgium, Netherlands) have adopted a white list approach for pet species, regulating all species but those include in a so-called positive list of alien species posing limited risks of environmental impact that are the only ones that can be freely traded.

A “white list” approach probably offers better risk mitigation potential than a “black list” because little is known about the ecology and invasiveness of most of the imported species and species traded change very fast (Chucholl, 2012, Hulme 2015). On the other hand, black list is considered a cost-effective means to limit the importation of invasive alien species (Essl et al., 2011). In any case, both black and white list, particularly in the face of increasing the e-commerce of IAS, without mechanisms to check compliance can be easily bypassed (Hulme et al., 2017).

As recommended also by the CBD, at the SBSTTA in 2018, in order to minimize the risks associated with e-commerce of IAS, is pivotal to share information on national regulations as well as regional regulations and lists on invasive alien species. 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.). National or regional authorities should also ensure the maintenance and updating of 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 Experts⁸ as method of alerting suppliers and potential buyers to the risk posed by invasive alien species 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 the national level may facilitate reporting on 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 (e.g.: ebay), in order to prevent sales and auctions of species into countries where these are regulated, and to improve correct labelling of traded species. Stimulate large platforms to actively searching listings for potential culprits and proactively comply with countries' invasive species laws can be a very cost-effective prevention measure.

An example, concerning the wildlife trade of endangered and threatened species, is the recent agreement⁹ 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 render online platforms and apps inoperable for wildlife traffickers to trade in endangered and threatened species. In collaboration with WWF, TRAFFIC, and IFAW, each company will develop and implement policies to reduce wildlife trafficking across platforms by 80% by 2020.

6.4 Guiding principle 4: Ensure that sellers and buyers are provided with the 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

⁸ <https://www.cbd.int/meetings/IASEM-2015-01>

⁹ <https://www.traffic.org/news/leading-tech-companies-unite-to-stop-wildlife-traffickers/>

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 a correct and consistent identification and labelling of all traded species (also stated in the Guiding Principle 3).

An international labelling system, to be 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. 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 and the proper identification of species (e.g. scientific name, taxonomic serial number or its equivalent) it would be useful also for custom authorities to have information on invasive alien species that threaten biodiversity on the label.

6.5 Guiding principle 5: 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 exist on their invasiveness in non-native places. To develop effective responses, it is essential to monitor current introductions and examine them for emerging risk species. For example, timely identification of new traded invasive alien species can help focus prevention efforts as well as early detection and rapid response to new incursions.

Monitoring the internet trade of IAS could help to identify changing preferences for particular plants or animal and to forecast new possible invaders, to target preventive management measures. Monitoring online sales (both on pet shops and 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 market, and using both major international languages and the local ones because 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 organisms should invest on the monitoring of e-commerce, including through the development of automated tools.

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