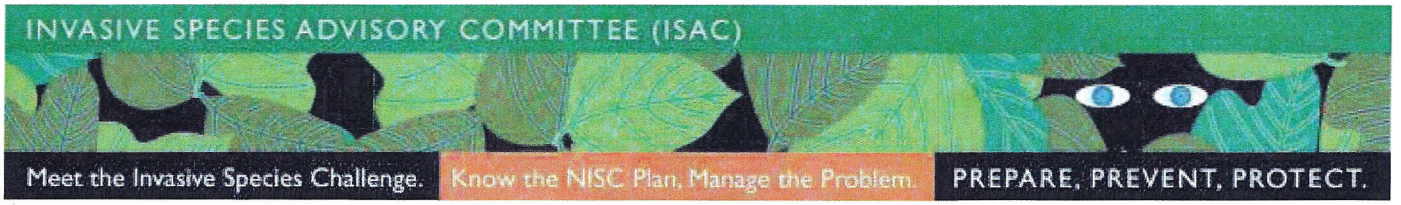

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Invasive Species and E-commerce

Approved by ISAC on May 24, 2012

Issue

Internet commerce (hereafter e-commerce[1]) is a growing and vital part of the U.S. economy. Total e-commerce sales in the U.S. for 2011 totaled $194 billion, an increase of 16% over 2010. From 2002 to 2011, the proportion of reported e-commerce sales in the U.S. grew from about 1.4% to 5.5% of total retail sales (U.S. Census Bureau News 2012). Globally, e-commerce is expected to increase at a rate of 13.5% annually, amounting to $1.4 trillion in yearly sales by 2015 (Enright 2011). A portion of this activity includes the sale and trade of living organisms. Unfortunately, such organisms and other organisms that they may carry can be invasive species, defined by U.S. Executive Order 131121 as "alien [non-native] species whose introduction does or is likely to cause economic or environmental harm or harm to human health." Order 131121 mandates that Federal agencies work to ensure that they do not promote e-commerce in invasive species, because the order states that these agencies should..."not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species...."

A number of government entities have jurisdiction over aspects of e-commerce including particular types of organisms (U.S. Department of Agriculture, Animal and Plant Health Inspection Service [USDA, APHIS] – plants, livestock and their products; Department of Interior [DOI], U.S. Fish and Wildlife Service [USFWS] – wildlife); shipping services (Department of Homeland Security [DHS], U.S. Postal Service [USPS]); imports and interstate trade (Federal government) and intrastate trade (state governments). However, e-commerce as a 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.

Action

This briefing paper, adopted by the U.S. Invasive Species Advisory Committee (ISAC), provides:

- Background information on the linkages between invasive species and e-commerce, and
- Recommendations to strengthen action by the Federal government to address the invasive species risks posed by e-commerce.

[1] E-commerce refers to "the buying and selling of products or services over electronic systems such as the Internet and other computer networks... [and] also includes the entire online process of developing, marketing, selling, delivering, servicing and paying for products and services." While typically associated with the worldwide web, e-commerce can also incorporate technologies such as e-mail, mobile devices, and telephones. http://en.wikipedia.org/wiki/Electronic_commerce (downloaded December 30, 2011).

Background

Scientific analyses and informal reviews of commercial websites and specific niche markets in the U.S. reveal a wide range of invasive species for sale, including many species regulated by state and federal laws. Identifying and managing the risks associated with e-commerce is particularly challenging because the Internet simply serves as a mechanism for processing commercial and non-commercial transactions between groups and individuals. Unlike other vectors of introduction of invasive species, e-commerce is not a physical means of moving organisms.

An analysis of the full role of the Internet in the spread of invasive species needs to consider the ranges and amounts of:

- Sectors and species traded: 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;[2]
- Internet tools for the sale or trade of organisms or products that may be pathways for other organisms: commercial websites; auction sites such as eBay; classified ad websites such as Craigslist; online forums such as those hosted by Google Groups, Yahoo Groups, Facebook, Google+, and specialist groups; and other online social networking and communication tools;
- Actors in supply chains: importers, domestic breeders, resale entities, box stores and large-scale retailers, small businesses, brick and mortar stores, e-tailers, interest groups such as 4H Clubs, collectors and specialist groups interested in particular species, and the general public; and
- Shipping agents and routes: shippers can include public entities such as the U.S. Postal Service and private companies such as FedEx and DHL; routes of regulatory significance include imports into the U.S. and interstate and intrastate trade.

The scale and diversity of e-commerce present regulatory difficulties. Individuals and companies that sell through e-commerce may not be legally registered businesses and frequently do not disclose their specific location of operation. They frequently fail to acquire the appropriate licenses and permits, or to use appropriate labeling for packages. Sellers that are out of state or out of the country may undermine local efforts with cooperative retailers to limit the sale of invasive species. Sellers can use the relatively high level of anonymity associated with the Internet to skirt accountability and avoid identification, regulation, and prosecution. Shipping agents may not necessarily know they are transporting potentially harmful organisms, or that they are transporting live organisms at all.

A range of scholarly work has addressed various aspects and sectors of e-commerce and other forms of trade in invasive or potentially invasive species. For instance, the Global Invasive Species Program (GISP, no date) provides a broad overview of the issues, Peters *et al.* (2006) examine the horticultural trade in Minnesota, 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. A number of reports have tried to quantify the volume of species being imported into the U.S., including Romagosa (2011) and Defenders of Wildlife (2007) for wildlife, and Smith *et al.* (2008) for fish. Recent studies from other countries include a broad overview of the issues in New Zealand (Derraik and Phillips 2010), an examination of the Internet pet trade in the U.K. (Parrott and Roy 2009), an analysis of the role of e-commerce in the spread of introduced freshwater aquarium fish in Brazil (Barroso de Magalhães and Jacobi 2010), and reports by the International Fund for Animal Welfare (IFAW 2005, 2008) on trade in endangered species and their parts through the Internet.

[2] This list will likely keep growing with the use of new species, end-uses, and pathways.

Live animal imports into the U.S.

From 1999-2009, over 2.8 billion live animals were legally imported into the U.S., the vast majority of which (about 88%) were ornamental fish (Romagosa 2011). Despite the fact that scientific and common names are required and submitted on Form 3-177 or attachments to the form (see Appendix 1), one study found that the USFWS Law Enforcement Management Information System (LEMIS) recorded the full taxonomic data for only 3.8% of all shipments (i.e., those species listed under the Convention on International Trade in Endangered Species) (Smith *et al.* 2008). Most species also entered without extensive scrutiny of their potential to harm the environment, agriculture, or human health in the U.S. Surveys of aquatic species sold in the Great Lakes region through the Internet and other sources found a significant percentage of known invasive species available for sale, misidentification of species, and high levels of live invertebrates hitchhiking on plants (Keller and Lodge 2007).

A significant portion of this volume in traded organisms can be associated with e-commerce. Experts estimate that there are at least 4,000 businesses and 15,000 individuals advertising reptiles over the Internet. Numbers of e-commercial traders of horticultural species are difficult to estimate, but conservative guesses place them in the tens of thousands (ISAC 2011).

We focus on those invasive and potentially invasive species that are formally regulated by Federal or state governments and thus restricted from trade and transport, such as those listed as noxious weeds or injurious wildlife. Regulation of these species can include prohibiting or otherwise restricting import into the U.S., forbidding movement between states, and prohibiting intrastate trade and other actions controlled by states. In some cases, a species can be regulated, not because it is itself invasive, but because it can carry pests, pathogens, or parasites directly, in packaging, or during conveyance. We divide our analysis into four areas:

1. Issues specific to e-commerce such as composition of the e-retail industry, Internet-related regulations, and on-line vendor and consumer awareness;
2. Relevant issues more broadly associated with commerce such as international and interstate regulations on trade, postal and courier services, species identification, and hitchhikers;
3. Control mechanisms such as web surveillance, outreach and education; and
4. Recommendations to NISC member agencies.

Issues specific to e-commerce

The Internet has unquestionably revolutionized how individuals and businesses communicate and make transactions, removing former geographical barriers and obstacles to communication. With regard to the movement and trade of invasive species, three areas are particularly notable: 1) increased diversity of commerce, 2) decreased ability of governmental authorities to implement and enforce regulations, and 3) the increasing role of the Internet in public awareness and education.

Increased diversity: The Internet has vastly expanded the range of people and businesses engaged in the movement and sale of plants and animals. For example, while a combination of large and small "brick and mortar" stores once held sway in the pet and aquarium trade, individual hobbyists, collectors, breeders, wholesalers and others can now easily engage in the sale of species. Some set up Internet-based businesses that cut out middlemen, maintain a low-cost infrastructure, access a broad range of potential buyers, process sales over the Internet, and use postal or express delivery services to send purchased merchandise. Traditional retailers have likewise diversified by adding Internet and mail sales to their businesses. This model has expanded the geographic reach of the market, facilitating transactions across the country and around the world.

The array of mechanisms for making transactions is also highly diverse, including standard retail websites, auction sites, local business and want ads, portals that facilitate communication between buyers and sellers, and specialty chat forums and user groups. Social media such as Facebook, Twitter, and Foursquare are further changing the landscape, particularly through informal retail arrangements. A shift to person-to-person transactions will likely continue, raising significant questions about whether and how e-commerce can be regulated.

Kudzu (*Pueraria montana* var. *lobata*)

Pueraria montana (Lour.) Merr. var. *lobata* (Willd.) Maesen & S. Almeida, introduced to North America from Asia and commonly known as kudzu, is a high-profile, invasive vine. In the southeastern U.S., kudzu is very widespread and forms famously dense blankets over whole trees. Despite this, multiple listings (e.g., "20 Seeds Pueraria lobata Kudzu Seeds") on eBay offer seeds for sale (eBay 2012), and search engines readily find on-line businesses selling seed, such as B & T World Seeds (B & T World Seeds 2012).

Suppliers are motivated in part by Internet sites that host questions such as:

> "Where can I buy Kudzu plants/seeds? Hi Everyone, I would like to buy Kudzu plants/seeds, but everywhere I look, I only see Kudzu destroying products for sale. No plants. I am quite aware of the rapid growth and the capabilities of this invasive species, so please don't tell me why not to buy it. I need it for observation purposes in a closed environment. Thanks, Batman" (Yahoo, no date)

Specialty cultivars of kudzu can also be found on-line:

> "*Pueraria lobata* 'Sherman's Revenge' (Sherman's Revenge Variegated Kudzu) For the gardener who has everything or as the perfect gag gift for a garden party, yes, it's variegated kudzu. Originally discovered in Japan, it was named by plantsman Barry Yinger, who's never met a variegated plant he didn't like. This fast-growing deciduous vine...rumors of several feet per hour when established are probably true...is covered with lovely trifoliate light green leaves edged in white. The vines are adorned with small clusters of Nu-grape soda smelling flowers in late summer. If you're going to have a weed, it might as well be variegated. Not recommended for states where it has been banned, and because there are so many, we won't ship out of state." (Plant Delights Nursery 2012)

Regulations and enforcement: The Internet has facilitated an increase in sales of organisms by individuals, not just by lowering overhead and transaction costs, but also by helping sellers circumvent state and federal regulatory requirements. For example, brick and mortar stores are frequently required by states or countries to apply and pay for licenses that allow them to move and sell species, and for permits to breed or import species into the country. Individuals sellers are often unaware of these requirements or may deliberately circumvent them by being located in another jurisdiction. Such sellers are often hard to trace; it may be difficult to hold them accountable; and efforts by enforcement agencies to pursue them may be time-consuming and expensive. The Internet has also made it easier to exchange information on how to avoid regulations, such as by falsifying documents or using transshipments, transfers between more than one shipper.

Those who want to be responsible may find it hard to find out what the relevant regulations are. There is no one comprehensive listing or guide to federal and state regulations on the transport and sale of plants, animals, and materials that could be a pathway for the transport of invasive species. Many states lack a standard means for communicating with non-registered businesses that work over the Internet. Policy-makers are still debating whether only in-state sellers should be licensed, how to design the process for licensing, and how to enforce regulations, all difficult issues. Many would argue that current policies have not kept up with the age of the Internet, resulting in an increasingly unregulated sector of trade in invasive and potentially invasive species. The current situation thus favors largely unregulated, virtual sellers, puts conventional stores at a significant competitive disadvantage, and increases the risks of the introduction and spread of invasive species.

Illegal Importation of Freshwater Ornamental Fish

Based on a search of websites, including news articles published on Practical Fishkeeping, there appear to be a number of ways to illegally import prohibited, freshwater, ornamental fish.

One avenue of illegal importation seems to center on websites such as Aquabid.com, where buyers bid on fish offered by a wide variety of sellers worldwide. As on eBay, fish are sold and shipped to the highest bidder. Some sellers on this website offered fish that were illegal to import into the U.K. and indicated that they would send them to buyers in the U.K. via ground postal service without the import license, health documentation, or notification of the Fish Health Inspectorate required by U.K. law. In some cases, fish were sent without documentation via EMS Express Mail, a service for documents and merchandise run by postal operators of the Universal Postal Union. Another apparent route for illegal importation of ornamental fish was for the seller to ship fish to a trans-shipper in a nearby country where the fish were not banned; buyers in the country where the fish were illegal then arranged with the trans-shipper to have the fish delivered to them.

A third means of illegal importation was to falsely declare the contents of a shipment on a custom declaration in the hope of getting the shipment past customs and wildlife inspectors. This may also involve shipping ornamental fish that are prohibited in one country first to a nearby country that does not prohibit them. They are then smuggled into the prohibiting country via ground transport to avoid the more rigorous inspection of international air shipments of live animals.

It is likely that these routes are being used to illegally import prohibited species into the U.S.

Education and public awareness: Perhaps the greatest commercial virtue of the Internet is that it allows individuals to readily find information, albeit sometimes unreliable, about products and sales. Individuals can locate sellers, details of the features and care of species, and information about how to circumvent rules or smuggle banned species. The Internet can also be a powerful tool for educating consumers. A number of targeted efforts in stores and at trade shows, such as Habitattitude™ and Be PlantWise, have helped educate those involved in conventional, face-to-face transactions. Such efforts are increasing their presence on the web, and there is a need to develop more effective methods to harness the power of the Internet to inform those involved in on-line transactions.

Issues more broadly related to commerce

While the Internet is facilitating a surge in the sale and trade of organisms, it cannot actually serve as a means for the physical movement of species. E-commerce is thus related to a number of other broader areas, including international and interstate commerce, postal and delivery services, taxonomy and species identification, and hitchhikers.

International and interstate commerce: Official federal and state lists of invasive species apply equally to electronic and non-electronic commerce. At the federal level, provisions of the Lacey Act on injurious wildlife allow USFWS to regulate the importation and interstate transport of animal species including wild mammals, wild birds, amphibians, reptiles, fishes, crustaceans, and mollusks that may prove harmful to humans, agriculture, horticulture, forestry, wildlife, or resources for wildlife in the U.S. Importers of wildlife are required to submit USFWS Form 3-177 (Appendix 1: Live Wildlife Import Declarations – Form 3-177). Similarly, the Plant Protection Act of 2000 (PPA) provides for the listing of noxious weeds, broadly defined as any plant or plant product harmful to crops, livestock, poultry, conditions for agriculture, irrigation, navigation, natural resources, public health, or the environment. Under this act, APHIS also regulates the importation and interstate movement of plant pests such as insects and pathogens and the commodities that may carry them. These regulations are named for the sections of the Code of Federal Regulations (CFR) in which they appear. For example, "Q37" applies to plants for planting and "Q56" applies to fruits and vegetables. Both the PPA and the Lacey Act work in tandem with the commerce clause of the U.S. Constitution to allow the federal government to regulate trade of potentially harmful species into the U.S. and across state borders.

State governments can similarly regulate the transport, sale, and possession of invasive species within states and many have developed legislation and regulations similar to the Lacey Act and Plant Protection Act that list prohibited species.

Such regulations are also becoming more frequent at the levels of the county and municipality, creating an increasingly complex regulatory system. As noted above, there is no single, regularly updated resource that includes all of this regulatory information and requirements to assist sellers trying to abide by regulations.

Governmental roles and responsibilities in e-commerce of invasive species		
Agency	**Authority**	**Coverage**
USDA/APHIS	Plant Protection Act of 2000: 7 CFR 360 Noxious Weed Regulations	Federally listed noxious weeds
USDA/APHIS	Plant Protection Act of 2000: 7 CFR 319.37 (Q37) Plants for Planting 7 CFR 319.56 (Q56) Fruit and Vegetables	Imported plants, fruits and vegetables that may be invasive or serve as hosts for other invasive pests
USDA/APHIS	Animal Health Protection Act of 2002: 9 CFR 122 Organisms and Vectors 9 CFR 121 Select Agents and Toxins	Animals and animal products that may carry livestock diseases , and permits for moving various pathogens and their vectors
DOI/FWS	Lacey Act: 18 USC 42-43 Importation of Injurious Species (50 CFR 16), 16 USC 3371-3378 Prohibited Acts related to Unlawful Taking of Fish or Wildlife (50 CFR 10-15)	Federally listed injurious wildlife and prohibitions against the import, export, transport, sale, purchase, receipt, or acquisition of fish or wildlife in violation of U.S., state, or foreign law
DHS/CBP	Homeland Security Act of 2002: 6 USC 201-239 Directorate of Border and Transportation Security (7 CFR 319 & 330; 9CFR 94-96)	Border quarantine and inspection stations
DHS/CBP	Homeland Security Act of 2002: 6 USC 201-239 Directorate of Border and Transportation Security (7 CFR 319 & 330; 9 CFR 94-96)	Express delivery services
USPS	Postal Reorganization Act of 1970: 39 CFR 20 International Mail and 39 CFR 111, 121, and 122 Domestic Mail	Postal services
Federal government	U.S. Constitution	Imports and interstate trade
State governments	U.S. Constitution	Intrastate trade

Postal and express delivery services: Since the Internet is often used for transactions across significant distances, purchased specimens are generally sent by mail or express delivery services such as those of USPS, DHL, FedEx, and UPS. Such services have their own set of regulations concerning the shipment of species. All packages sent from abroad require a manifest that lists their contents and may be subject to non-intrusive inspection, such as with dogs or X-rays. Manifests for express delivery consignments must be submitted electronically, which allows for advanced targeting through a range of risk screening measures. DHS Customs and Border Protection (CBP) thus has some idea of what to expect prior to delivery of a package sent by express consignment. In contrast, packages send by international mail are currently exempt from the requirement for electronic manifests,

Appendix 1: Live Wildlife Import Declarations – Form 3-177[3]

As a general rule, all live wildlife[4] imported into the United States[5] for any purpose must be imported through a "designated port."[6] Under certain limited circumstances, arrangements may be made to use a port other than a designated port. In any event, such shipments must be declared on import and inspected by FWS or a designated alternative, such as CBP.

With limited exceptions, all live wildlife imports must be declared on a FWS Declaration Form, Form 3-177, as a pre-condition to inspection and clearance before any imported live animals may be released to an importer. Form 3-177 calls for submission of detailed information on the contents of the shipment. The importer must provide, among other information:

- Purpose code (i.e., personal, zoo, commercial, educational, circus, pet)
- Scientific and common names of each species in the shipment
- Quantity of specimens by species in the shipment
- Country of origin
- Transportation code (i.e., mail, air cargo, personal accompanying baggage)
- CITES Permit number, if applicable
- Wildlife source code (i.e., wild, captive bred, ranched)
- Total value in U.S. dollars
- Indication if venomous
- FWS License number if applicable

There are limited exceptions when such declarations are not required. For example, imports of live shellfish and fishery products imported for human or animal consumption, or fish taken for recreational purposes in Canada or México do not require the filing of Form 3-177. However, exceptions are not available if a permit is required under Part 16 (Injurious Wildlife), Part 17 (Endangered species), Part 18 (Marine mammals), Part 21 (Migratory birds), Part 22 (Eagle permits) or Part 23 (CITES). If the shipment is considered a "commercial" shipment[7] of live animals, the importer or exporter may have to obtain an import or export license under 50 CFR Part 14.91.

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[3] The regulations contain a variety of exceptions or conditions that apply to wildlife products (dead, preserved, dried, etc.), museum specimens, personal baggage, and household effects, etc.

[4] "Wildlife" includes "any wild animal, whether alive or dead, including without limitation any wild mammal, bird, reptile, amphibian, fish, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, whether or not bred, hatched, or born in captivity, and including any part, product, egg, or offspring thereof." (50 CFR Section 10.12) Domesticated animals (50 CFR Part 14.4) are exempt unless specimens are from a wild population.

[5] Import means any wildlife introduced or brought into or landed on any place under the jurisdiction of the U.S. For imports see 50 CFR Parts 14.61 – 14.62; for exports see 50 CFR Parts 14.63 – 14.64.

[6] There are 18 designated ports, listed in 50 CFR Part 14.12. If special permits are not required, as under ESA or CITES, imports may also be cleared at certain border ports with Canada and Mexico or special ports in Alaska, Puerto Rico, the Virgin Islands, and Guam, provided completed Form 3-177 Declarations are submitted.

[7] "Commercial" means offering for sale or resale, purchase, take barter or transfer for gain or profit. There is a presumption that eight or more specimens constitute commercial use and a declaration is required.

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