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Zusammenarbeit (GIZ) GmbH



Ministerio
del **Ambiente**

Ecuador's wildlife trade



Ecuador's Wildlife Trade

This document should be cited as follows:

Sinovas, P. & Price, B. 2015. Ecuador's Wildlife Trade.
English translation of the technical report prepared for the
Ministry of the Environment of Ecuador and
the German Development Cooperation (GIZ).
UNEP-WCMC. Quito, Ecuador.

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Design and Layout
Brandipity © Quito - 0994007625

This document was produced and financed by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), through the Biodiversity, Climate Change and Sustainable Development Programme (ProCamBío).

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Executive Summary

This report provides a comprehensive overview of wildlife trade in Ecuador, focusing on the ten-year period 2004-2014. The exact time-frame of trade varies slightly depending on the different data sources used. The aim of this analysis is to provide a baseline of trade levels and trends in Ecuador, and to inform future trade management in the country in order to ensure that wildlife trade is legal, sustainable and traceable.

Ecuador has one of the highest diversities of amphibian species in the world and has a high concentration of threatened species. The production of amphibians for the pet trade is an emerging market in Ecuador, with an average of around 500 live frogs being exported per year in recent years for the pet market, with approximately a third of them being CITES-listed species (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). The main species involved were *Ceratophrys stolzmanni* (Pacific Horned Frog) and *Epipedobates anthonyi* (Anthony's Poison-Arrow Frog), while the main destination countries of this trade were the United States of America, the Netherlands and Canada. In addition, *Lithobates catesbeianus*, (Bullfrog) a non-native species, was exported by Ecuador to the United States in volumes of over 400,000 per year for the food market.

Approximately 9,000 tonnes of by-caught sharks are landed per year in Ecuador. Most of their meat is destined for the domestic market, while relatively small amounts are exported to the United States, Spain, Japan and other countries. Virtually all of the fins, amounting to a total of about 200 tonnes per year in recent years, are exported to mainland China and Hong Kong, Special Administrative Region of China (henceforth referred to as Hong Kong SAR). The main species captured are *Alopias pelagicus* (Pelagic Thresher), *Prionace glauca* (Blue Shark) and *Carcharinus falciformis* (Silky Shark). Captures also include two species listed in the CITES Appendices of the 16th Conference of the Parties (CoP16): *Sphyrna lewini* (Scalloped Hammerhead Shark) and *S. zygaena* (Smooth Hammerhead Shark), even if recent legislation limits the amount of bycatch that can be landed for these species.

The ornamental fish trade often goes unreported and data are lacking on their taxonomic details and origins. Although trade data on ornamental fish is scarce, the United States reported the import of 1.3 million ornamental fish from Ecuador per year, largely recorded as unspecified tropical freshwater species, showing a declining trend over the ten years (2005-2014).

Sea cucumber fishing started in the 1990's in the Galápagos Islands, with harvests and exports concentrating on *Isostichopus fuscus* (Brown Sea Cucumber). After being listed in Appendix III by Ecuador in 2003, the species was the top CITES-listed taxon in terms of number of individuals exported by Ecuador between 2005 and 2014, with over 1.5 million individuals shipped during that period. Virtually all exports were destined for China. However, trade has been banned in recent years as a result of population overexploitation.

Whilst domestic demand accounted for the majority of timber production by Ecuador between 2010 and 2014, the international trade was an important part of the market. Timber exports amounted to about 87,000 m³ per year on average between 2012 and 2014, with India being the main destination of timber exported by Ecuador and cultivated *Tectona grandis* (Teak) the main species.

Ecuador's extremely diverse orchid flora was one of the most highly traded wildlife groups in Ecuador, averaging over 46,000 plants per year between 2004 and 2015. Almost all were artificially propagated and around three quarters reached Germany, the United States, Japan and Canada. Over 250 genera were reported in trade by Ecuador, with genera *Masdevallia*, *Cattleya* and *Pleurothallis* accounting for more than 25% of exports. Trade in Appendix I was dominated by *Phragmipedium* species.

The wildlife trade in Ecuador has a minimum estimated value of US \$35 million a year. Most of this value (US \$29 million) is represented by the export of timber. Excluding these timber/processed wood commodities, shark exports were the next most valuable commodity, with an average of US \$3.4 million per year.

Forty CITES-listed species occurring in Ecuador showed noteworthy trends (high volume and/or sharp increase) in global exports of wild or ranched specimens in 2012. Birds were the group with the highest number of species showing noteworthy trends, with fourteen species meeting the selection criteria. Of these forty species, only three were reported in trade by Ecuador during the period 2003-2012: *Swietenia macrophylla* (Big-leaf Mahogany), *Cedrela odorata* (Spanish Cedar) and *Isostichopus fuscus* (Brown Sea Cucumber).

According to CITES, over 800 species native to Ecuador were reported in trade between 2004 and 2013, both as wild-sourced and captive-bred or artificially propagated. Two species which are thought to be endemic to Ecuador were traded as captive-bred and artificially propagated by countries that are not in their distribution range (non-range). The majority of these species are not utilized by Ecuador for international trade, and may represent an opportunity for the development of additional wildlife sustainable use systems in the country.

Acknowledgements

The authors express their sincere gratitude to all persons and institutions that supported the production of this report, providing data and participating in the June and November 2015 wildlife trade workshops in Quito.

Special thanks to:

Ministry of Environment of Ecuador: David Veintimilla Yánez and Janeth Olmedo for the institutional support provided, the scoping of the study, the provision of information and their technical support.

GIZ-ProCamBío: Miriam Factos, for the institutional support, the scoping of the study, her technical support and project coordination.

Sub-secretariat of Fishery Resources (SRP): Mariuxy García; and WIKIRI S.A.: Lola Guarderas, for the information provided.

United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC): Brian MacSharry, Kelly Malsch, Emily King, Hazel Thornton, Frances Davies, Hollie Booth and Kristina Olsen, for their contributions to the production, review and design of the report.

Flora: Luis Baquero and Gabriel Iturralde; Ecuagenera: Kelvin Fabricio Suárez Aguilar; International Tropical Timber Organization (ITTO): Jean-Christophe Claudon and Steve Johnson; United States Fish and Wildlife Service (USFWS); and Food and Agriculture Organization of the United Nations (FAO): Mónica Barone, for the information provided.

1. Introduction

This report provides a comprehensive overview of the trade of wildlife in Ecuador during the period 2004-2014. The aim of this analysis is to serve as a baseline of trade levels and trends in Ecuador, and to inform future trade management in the country in order to ensure that wildlife trade is legal, sustainable and traceable.

This analysis covers both international and domestic trade and both species listed in the Appendices of the CITES. While most of the data available relates to legal trade, where applicable insights into illegal trade are also included.

1.1. Data Included

Trade data were compiled from a number of sources in order to provide as complete a picture as possible of wildlife trade at the national scale within Ecuador and from and to Ecuador at the international scale. A summary of data sources is provided in Table 1, and further details on the datasets included can be found in Annex A.

The report comprises an overview of trade from, to and within the country, focusing on those case studies that have the highest relevance for Ecuador, namely amphibians, sharks, sea cucumbers, orchids and timber. It also includes an analysis of the economic value of key commodities in trade and an assessment of noteworthy patterns of trade and information on species native to Ecuador traded by other countries, to provide a global picture of the wildlife trade occurring in the country.



Table 1. Overview of trade datasets included in the report.

Trade type	Taxonomic groups covered	Data source/provider	Date range	Notes
International	All CITES-listed species	CITES Trade Database	2005-2014	Where data reported by Ecuador is compared with data reported by other Parties; the period considered is 2004-2013, as the deadline for submission for CITES annual reports for 2014 is October 31, 2015.
	Illegal trade in CITES-listed species	CITES Trade Database	2004-2013	Data reported as source “I” (seizure/confiscation) by importing countries.
		CITES Biennial Reports	2003-2004, 2005-2006, 2007-2008	Only information on “significant seizures” provided.
	Amphibians (CITES and non-CITES listed)	WIKIRI S.A.	September 2010 -August 2015	
		LEMIS, USFWS database	2005-2014	
	Sharks	FishStatJ, FAO (2013) from Dente and Clarke (2015)	2000-2011	
		MAGAP (2015)	2008-2014	
	Ornamental fish	LEMIS dataset	2005-2014	
	Sea cucumbers	Reyes <i>et al</i> (2013); Murillo and Reyes (2008)	1999-2011	
	Timber	ITTO Biennial Report	2004-2013	
		UN COMTRADE database		
		MAE	2012-2014	
	Orchids	Ecuagenera	2015	Prices in Ecuagenera’s catalogue, available online.
Domestic	Amphibians	WIKIRI S.A.	September 2010 -August 2015	
	Orchids	Floare	2007-2015	
	Internet trade	Google search engine	2015	

2. Overview

This chapter provides a general overview of wildlife trade in Ecuador, including a snapshot of illegal trade where trade data were available, as well as information on wildlife commodities from Ecuador advertised for sale online. More detailed insights into the trade of groups of particular interest to Ecuador are presented in the chapters that follow.

live amphibian exports. When considering the broader context of exports of wildlife from Ecuador, timber and shark meat and fins were also key commodities in trade. The United States of America (hereafter referred to as the United States) was an important import market for orchid and timber commodities, as were China for sea cucumbers and shark products, Europe for orchids and amphibians, and India for timber (Figure 1).

2.1. Exports

(Re-)exports of CITES-listed species from Ecuador are dominated by trade in wild-sourced bodies of *Isostichus fuscus* (Brown Sea Cucumber) (1,563,483 bodies exported during 2005-2014) and artificially propagated live orchids (421,139); an emerging increasing trend can be seen in

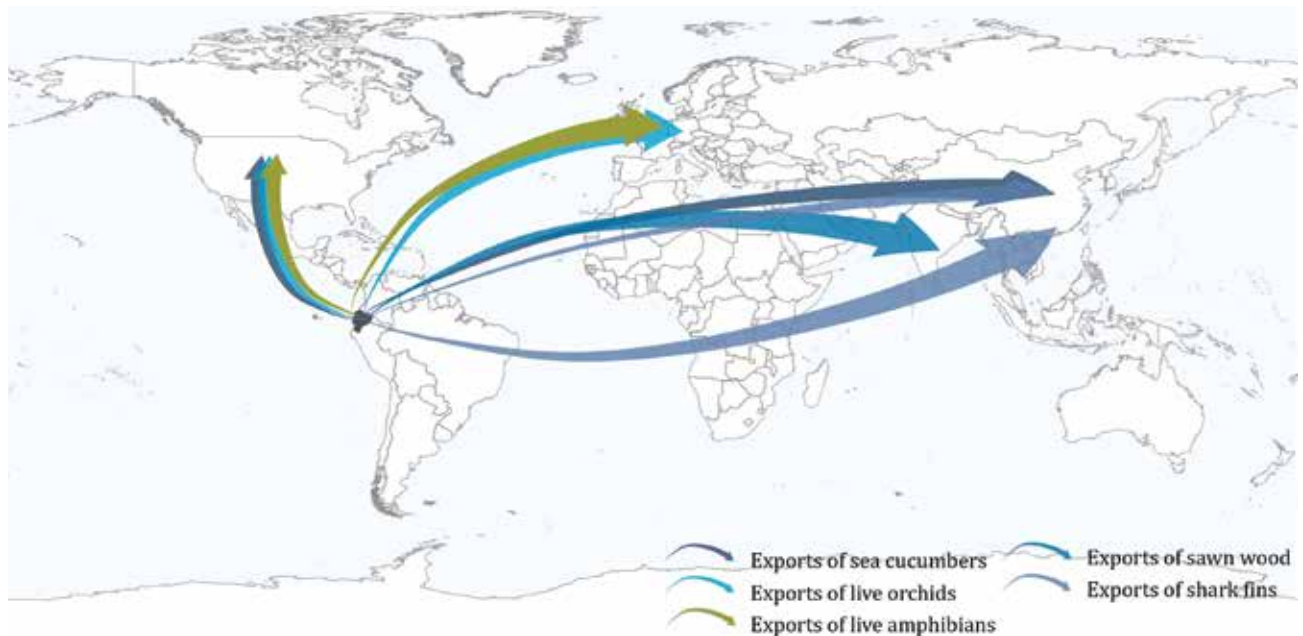


Figure 1. Main destination countries of key commodities exported by Ecuador.

Table 2. Commodities (re-)exported by Ecuador in quantities greater than 1,000 units during 2005-2014, by group.

Group	Commodity (unit)	Quantity	Main source (%)	# taxa involved	Main taxa
Invertebrates (non-coral)	bodies	1,563,483	W (100%)	1	<i>Isostichopus fuscus</i>
Orchids	live	421,139	A (98%)	1,701	<i>Pleurothallis</i> spp.
Reptiles	specimens	8,763	W (99%)	8	<i>Conolophus subcristatus</i>
Birds	feathers	4,107	W (>99%)	43	<i>Ramphastos tucanus</i>
Birds	specimens	3,131	W (100%)	49	<i>Trochilidae</i> spp.
Corals	specimens	2,059	W (100%)	28	<i>Porites lobata</i>
Timber	timber (m ³)	1,371	W (75%)	2	<i>Swietenia macrophylla</i>
Orchids	specimens	1,424	W (79%)	82	<i>Teagueia</i> spp.
Amphibians	specimens	1,121	W (67%)	16	<i>Epipedobates anthonyi</i>

Source: CITES Trade Database. UNEP-WCMC.

Excluding *Isostichus fuscus*, the main wild- sourced CITES-listed commodities exported by Ecuador were scientific specimens, feathers for non commercial purposes (predominantly educational) and timber for commercial purposes (Table 2).

Over half of the 16,542 wild- sourced scientific specimens exported by Ecuador during 2005-2014 were reptiles (52%), with *Conolophus subcristatus* (Galapagos Land Iguana) and *Amblyrhynchus cristatus* (Galapagos Marine Iguana) being the top exported species (15% and 14% of total exports of scientific specimens, respectively). The main countries of import of wild-sourced scientific specimens were the United States (46%) and Italy (28%).

Countries of import reported some items as source “I” (seized/confiscated items) which were not reported by Ecuador. Further details on this illegal trade is provided in Box 1.



Box 1. Illegal trade as reported in CITES annual and biennial reports

Trade from Ecuador that was reported as source “I” in CITES annual reports by importers was analyzed to provide a snapshot of trade relating to seizures and confiscations. It must be noted, however, that the use of source “I” is inconsistent between Parties: it can be interpreted as reporting of illegal trade that was seized on entry to the country or used to represent legal trade in previously seized items. It was not possible to determine how source I had been interpreted for each trade record, and this should be taken into consideration when studying these data.

A total of 62 transactions were reported as source “I” by importers during 2005-2014. Source “I” trade from Ecuador involved 44 taxa, of which 19% were mammals. The vast majority were reported by the United States (81%); other Parties to report seizures were the United Kingdom, Poland, New Zealand, France and Austria.

During the period 2005-2014, four commodities were reported at quantities of greater than 100 units as source “I”:

- *Chelonia mydas* (Green Turtle) specimens
- *Scleractinia* spp. (Stony Corals) traded as raw corals
- *Hippocampus* spp. (Seahorses) traded as bodies, and
- Carvings from *Anodorhynchus* spp. (Blue Macaws)

Other reported seizures of note included 32 m³ of *Swietenia macrophylla* (Mahogany) timber and eight *Leopardus pardalis* (Ocelot) skins.

In the CITES biennial report for 2007-2008, Ecuador reported the seizure of 250 new-born *Podocnemis unifilis* (Yellow-spotted River Turtle), and noted that criminal charges have been brought against those responsible for the illegal trade. No significant seizures were reported in the 2003-2004 and 2005-2006 biennial reports.

2.1.1. Valuation of exports

Considering all groups exported together, the total economic value of wildlife trade in Ecuador is estimated at over US \$35 million per year. When broken down by taxa, timber products account for most of this value (US \$29 million). Shark exports had an estimated value of US \$3.4 million, sea cucumbers a value of US \$1.9 million and orchids had a value of US \$688,000 per year. Exports of live frogs for the pet and meat markets had an estimated combined value of over US \$679,000 per year. Further details on the export of these groups can be found in the case studies in Chapter 3, and further details on the datasets and methodologies used to calculate these values can be found in Annex A. It should be noted that these figures are based on available data and, in many cases, the methods of calculation have not

been standardized across the groups discussed, given the data limitations. Hence, these values should be treated as a preliminary estimate.

2.2. Imports

Live orchids represent the commodity imported in the highest volumes by Ecuador during 2005-2014, with over 5,000 live orchid plants imported over the ten-year period (Table 3).

Orchids accounted for all live plants imported by Ecuador, of which more than 99% were artificially propagated and imported for commercial purposes. In contrast to exports of orchids (for which the top traded taxa was *Pleurothallis* spp. (Table 1), the taxon imported in the highest quantities was *Dendrobium* spp. The vast majority of orchids were imported directly from the

Table 3. All commodities imported by Ecuador during 2005-2014, by group.

Group	Commodity (unit)	Quantity	Main source(%)	# taxa involved	Main taxa (%)
Plants	live	5,554	A (>99%)	267	<i>Dendrobium</i> spp. (19%)
Reptiles	leather products (small)	108	W (81%)	3	<i>Python reticulatus</i> (51%)
Birds	live	19	C (42%); F (42%)	10	<i>Parabuteo unicinctus</i> (21%)
Mammals	live	11	C (73%)	3	<i>Panthera tigris</i> (64%)
Mammals	hair (kg)	10	W (100%)	1	<i>Lama guanicoe</i> (100%)
Mammals	bodies	3	W (67%)	2	<i>Ursus arctos</i> (67%)
Mammals	trophies	1	W (100%)	1	<i>Panthera pardus</i> (100%)
Plants	specimens	1	W (100%)	1	<i>Lepanthes</i> spp. (100%)
Reptiles	live	1	W (100%)	1	<i>Testudo horsfieldii</i> (100%)

Source: CITES Trade Database. UNEP-WCMC.

countries of origin (>99%); the main countries of export were Colombia (35%), Germany (26%) and Panama (25%) (Figure 2).

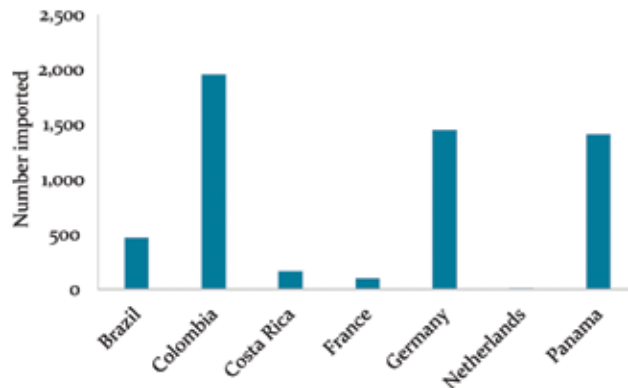


Figure 2. Imports of live orchids by Ecuador, all sources and purposes, 2005-2014, by exporting country. Source: CITES Trade Database, UNEP-WCMC.

2.3. Domestic Trade

Data provided by companies in Ecuador showed that a total of 89 live frogs were traded domestically between September 2010 and August 2015 (WIKIRI S.A.), while over 25,000 live orchids were sold nationally over the period 2007 to August 2013 (Floare). Domestic consumption was reported to account for 69% of sawn wood production and nearly all (98%) of plywood production in Ecuador (ITTO, 2014).

2.4. Internet Trade

A web survey was undertaken to assess the trade and demand for wildlife from Ecuador for sale both inside Ecuador and in the United States (as the main importer of wildlife from Ecuador). Searches were conducted in both English and Spanish, using the Ecuadorian and United States Google search engines. Further details on the methodology and search terms used can be found in Annex A, while full results of the internet survey are available from the following link: <http://wcmc.io/e02a>



There were 15 distinct websites with a total of 197 online adverts found for the sale of wildlife originating from within Ecuador or as species native to Ecuador, totalling 458 products (species/item combinations, e.g. *Psittacus erithacus* [Grey

Parrot] eggs). Three websites accounted for 74% of the adverts found: olx.com.ec (57 adverts), nexolocal.com.ec (45 adverts) and empleo.com.ec (44 adverts). Other websites with over 10 listings were alibaba.com, portaldeavisos.net/Ecuador and quebarato.com.ec. Half of all listings were for birds, accounting for 42% of live animals advertised and 72% of adverts for parts and derivatives (Table 4). The most common live animals advertised were *Cebinae* spp. (22 listings) followed by *Psittacus erithacus* (19 listings) and *Carassius auratus* (17 listings). *P. erithacus* was also the most commonly advertised species for sales of eggs (6 listings). Eleven species listed as globally “Endangered” by the IUCN were advertised for sale as either live animals or eggs: *Panthera tigris* (Tiger), *Pan troglodytes* (Chimpanzee), *Lemur catta* (Ring-tailed Lemur), *Amazona oratrix* (Yellow-headed

Parrot), *Ara ambiguus* (Buffon’s Macaw), *Ara rubrogenys* (Red-fronted Macaw), *Brotogeris pyrrhoptera* (Grey-cheeked Parakeet), *Cacatua alba* (White Cockatoo), *Epipedobates tricolor* (Phantasmal Poison Frog), *Gastrotheca riobambae* (Andean Marsupial Tree Frog) and *Pterapogon kauderni* (Banggai Cardinalfish).

Sixty per cent of items listed did not specify a price; for those which did advertise prices, mammals were the most expensive group, with a range of US \$200 – US \$1,215 per advert, while the most expensive listing of parts and derivatives was *Cilus gilberti* [Sea Bass] swim bladder (US \$344) (Table 4).

In addition, four adverts were found requesting live birds for purchase.

Table 4. Online listings of wildlife for sale in Ecuador and price range, by taxonomic group.

Taxon	Number of Listings		Price (US \$)	
	Live	Parts/Derivatives	Live	Parts/Derivatives
Mammals	37	1	200-1,215	No price
Birds	149	76	0.03 - 80	25
Reptiles	8	3	71	8-78
Amphibians	10	0	No price	-
Sharks	0	10	-	0.25
Fish	140	13	0.01-140	1.5-344
Echinoderms	1	0	No price	-
Insects	0	1	-	25
Crustaceans	3	0	30	-
Molluscs	1	0	1	-
Corals	2	0	30	-
Plants	1	1	5	5.1
Total	352	105	-	-

3. Case Studies

This section presents case studies with detailed trade analyses for the taxonomic groups of greatest relevance in the context of Ecuador's wildlife trade: amphibians, sharks, ornamental fish, sea cucumbers, timber and orchids. On the basis of available information, the case studies present an overview of trade volumes and trends, as well as estimates of the economic value of the trade, and any other noteworthy aspects.

3.1. Amphibians

Ecuador has one of the highest diversities of amphibian species in the world, being home to around 470 amphibian species, and it also hosts one of the highest concentrations of threatened amphibians in the region and in the world (37% of species occurring in the country), including many endemic species (IUCN, 2008).

This case study covers the international trade in amphibians from Ecuador, including that for the pet market globally and for the food market in the United States. It also summarizes data on domestic trade in amphibians within Ecuador.

3.1.1. International Trade

Amphibians were mainly exported from Ecuador as live animals, either for the meat trade or the pet trade.

3.1.1.1. Pet Trade

International trade in live CITES-listed amphibians was primarily for the pet trade. According to records by WIKIRI S.A., a private company “dedicated to the sustainable biotrade of amphibians” for the pet and educational markets, a total of 2,648 live CITES and non-CITES listed frogs were exported by Ecuador between September 2010 and August 2015. The most highly traded species was the non-CITES listed *Ceratophrys stolzmanni* (Pacific Horned Frog; 39%), while *Oophaga sylvatica* (Diablito) was the most highly traded CITES-listed species (all morphs considered) representing 19% of all exports reported by WIKIRI S.A. (Figure 3).



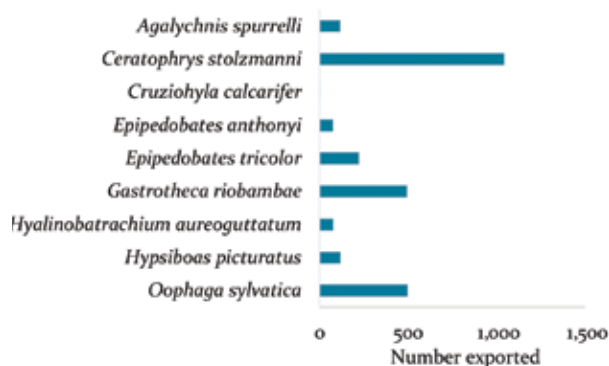


Figure 3. Exports of live amphibians by taxa for the period September 2010 to August 2015. Source: WIKIRI S.A.

During the period 2005-2014, exports of CITES-listed species were first reported by Ecuador in 2011, when 50 captive-bred *Oophaga sylvatica* individuals were exported to Canada for commercial purposes. Subsequently, exports of live ranched frogs were reported by Ecuador in 2013 (146) and 2014 (655), indicating an emerging increasing trend in the export of these species. It should be noted that of the 655 live frogs recorded in the CITES Trade Database for 2014, 347 were reported to be tadpoles. CITES-listed exports comprised five species: *Epipedobates anthonyi* (Anthony's Poison Arrow Frog) (43%), *Oophaga sylvatica* (Diablito) (30%), *Epipedobates tricolor* (Phantasmal Poison-arrow Frog) (20%), *Agalychnis spurrelli* (Gliding Leaf Frog) (5%) and *Oophaga histrionica* (Harlequin Poison Frog) (2%) (Figure 4).

The United States was the main importer of CITES-listed live frogs from Ecuador (49%), the Netherlands and Canada being also major

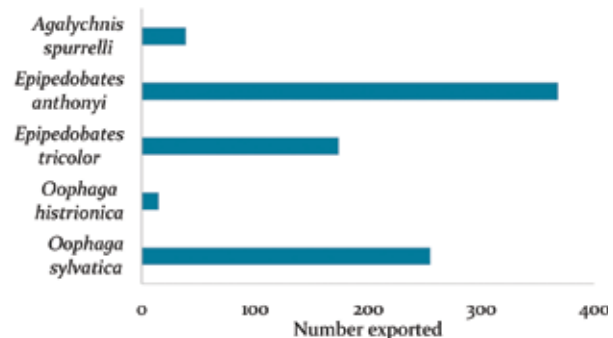


Figure 4. Direct exports of live CITES-listed amphibians by taxon, as reported by Ecuador in annual reports to CITES, 2005-2014 (no trade was reported prior to 2011). Source: CITES Trade Database, UNEP-WCMC.

importers (25% and 18%, respectively) (Figure 5). Canada does not report importing any live frogs from Ecuador over the same time period; however, annual reports have not been received from Canada since 2011. The Netherlands reported the import of 50 live individuals in 2013.

The production of amphibians in Ecuador for the pet trade, undertaken by WIKIRI, consists of a combination of *in situ* production in natural locations adapted to maximise breeding and *ex situ* production in breeding facilities, on the basis of a management plan.

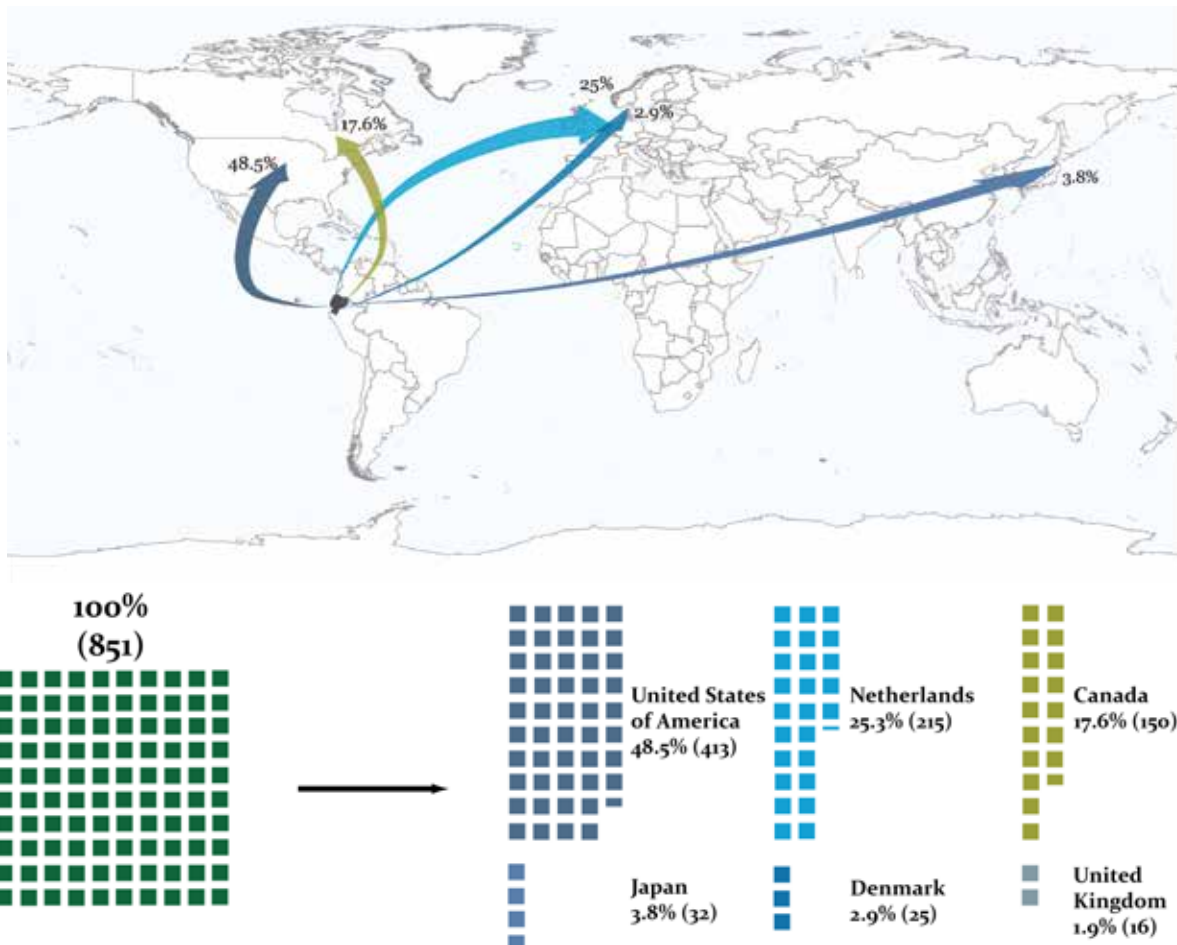


Figure 5. Direct exports of live CITES-listed amphibians by importing country, as reported by Ecuador in annual reports to CITES, 2005-2014. Source: CITES Trade Database, UNEP-WCMC.



Live amphibians were reported as ranched (source “R”) for exports from Ecuador to the Netherlands, and as captive-bred (source “C”) for exports from Ecuador to Canada; however, it is unclear if the different source codes represent differences in production methods for particular specimens.

Exports of CITES-listed amphibians from Ecuador to the United States predominantly comprised *Epipedobates anthonyi* (84% of CITES-listed amphibian exports to the United States), whereas *Oophaga sylvatica* accounted for the majority of live amphibians exported to the Netherlands from Ecuador (70%); the main species imported by Canada was *Epipedobates tricolor* (67%; Figure 6).

3.1.1.2. Value of Pet Trade

Total exports of both CITES and non-CITES listed live frogs, as reported by WIKIRI for the five-year period September 2005 to August 2015, were valued at approximately US \$400,000, with an average annual value of US \$80,000.

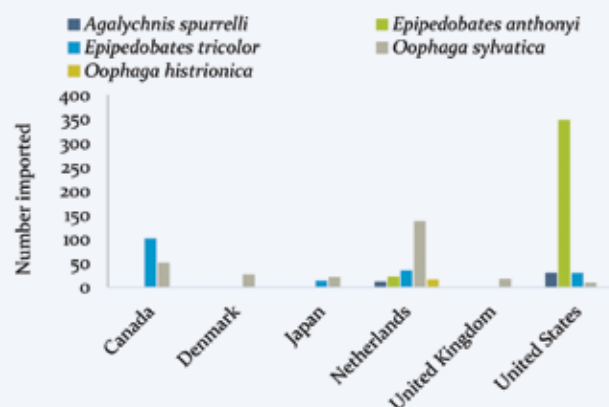
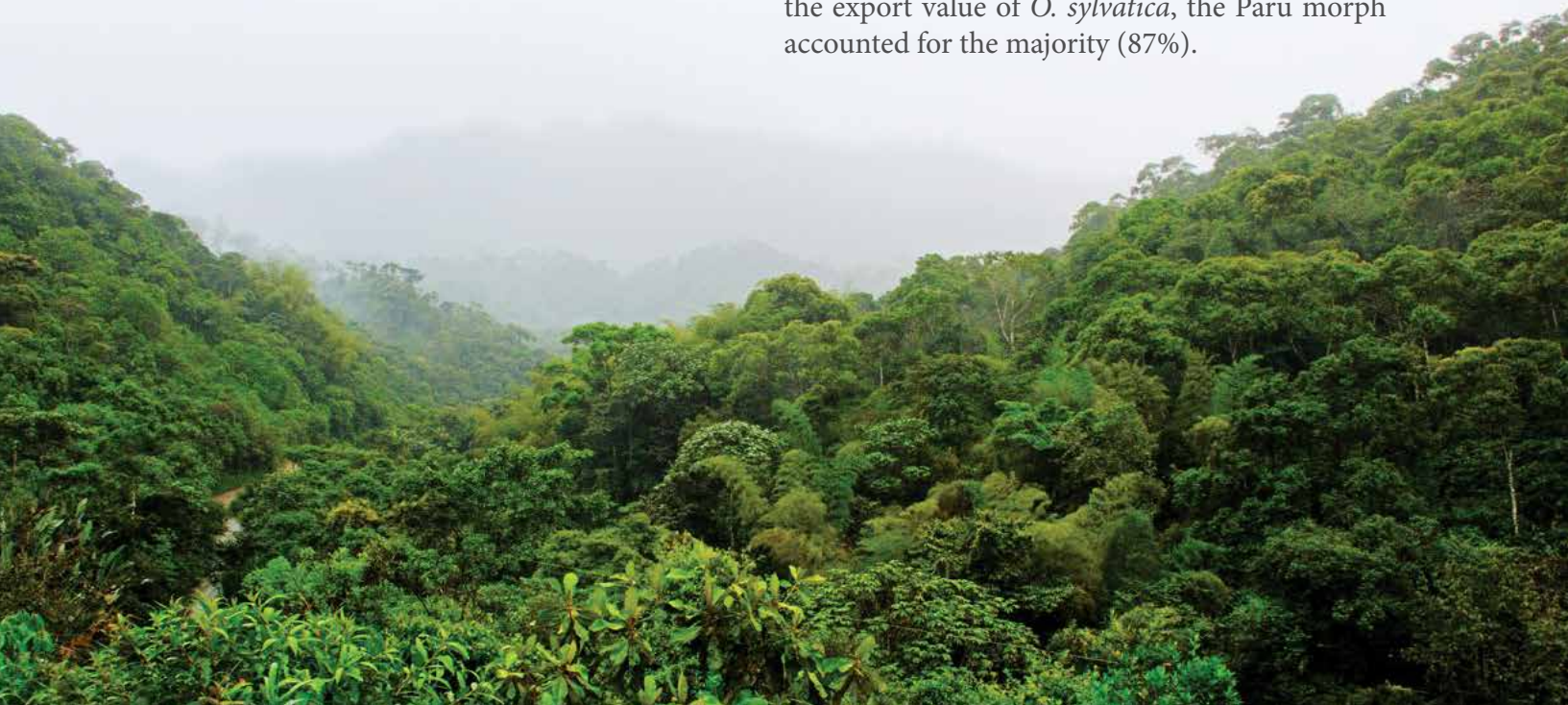


Figure 6. Main importers of live CITES-listed amphibians from Ecuador, by taxon (2005-2014). Source: CITES Trade Database, UNEP-WCMC.

Despite accounting for only 19% of the exported quantity, *O. sylvaticus* accounted for the majority of total export value (58%) during the period September 2010-August 2015. This high export value can be attributed to the species’ high unit price, at an average of US \$298 per unit (with price variation depending on the colour morph). Of the export value of *O. sylvatica*, the Paru morph accounted for the majority (87%).



3.1.1.3. Trade in Live Amphibians for the Food Market

Based on data of amphibians imported into the United States from the United States Law Enforcement Management Information System (LEMIS) dataset (see Annex A for further details on datasets), more than 99% of the nearly 4.5 million amphibians recorded in trade during 2005-2014 were live imports, and of these, 99% (4,443,331 individuals) were of a single species: *Lithobates catesbeianus* (American Bullfrog, reported as *Rana catesbeiana* in the LEMIS database). All *L. catesbeianus* imports were for commercial purposes.

Between 2005 and 2014, United States imports of live amphibians declined significantly, from approximately 740,000 specimens imported in 2005 to 210,000 in 2014, a decline of more than 70% (Figure 7). The data suggest that the decline may be levelling off in recent years at around 200,000 specimens per year.

To put Ecuador's exports of *L. catesbeianus* in global context, when national data for aquaculture production submitted to the Food and Agriculture Organisation of the UN (FAO) is considered, global aquaculture production of *L. catesbeianus* averaged at 1.6 million kg per year between 2005 and 2012, before increasing to more than 4 million kg in 2013 (no data were available for 2014). A comparison with Ecuador's export quantities to the United States alone (as reported by LEMIS) suggests that Ecuador is a major global

producer and potentially responsible for, in some years, at least a fifth of the global market trade in this species.

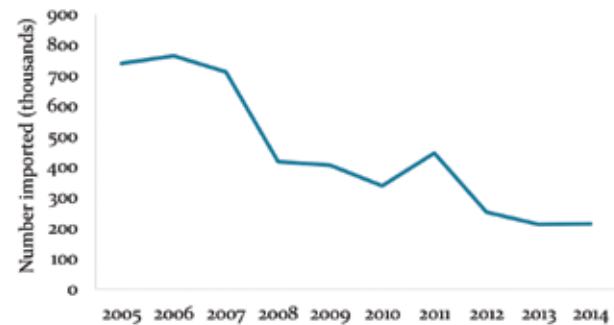


Figure 7. Imports of live amphibians by the United States from Ecuador, 2005-2014. Source: LEMIS database.



3.1.1.4. Value of Exports of *Lithobates catesbeianus* (Bullfrog)

Exports of *L. catesbeianus* from Ecuador to the United States between 2005 and 2014 reached an estimated annual value of approximately US \$600,000, with a ten-year total estimated value of US \$4.5-7.5 million. The value of this trade declined by roughly 64% over the ten-year period 2005-2014, from approximately US \$900,000 in 2005 to US \$320,000 in 2014.

3.1.1.5. Domestic Trade

Data from WIKIRI S.A. for the period September 2010 to August 2015 suggest that the domestic market for live amphibians was smaller than the international market, with less than 100 individuals sold to domestic buyers over this period. The most highly traded species reported during this period was *Agalychnis spurrelli* (28%; Figure 8).

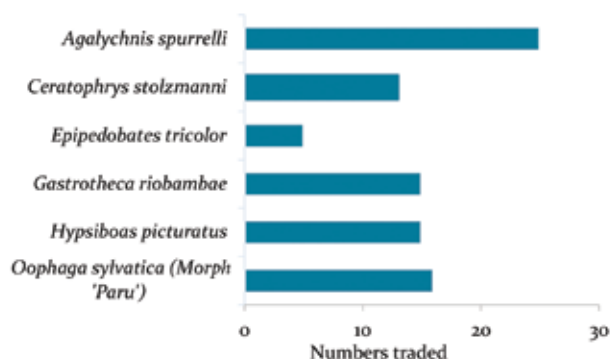


Figure 8. National trade in live amphibians by taxa for the period September 2010 to August 2015. Source: WIKIRI S.A.

3.1.1.6. Value of Domestic Trade

In the national market, total sales during the period September 2010-August 2015 were valued at approximately US \$6,000. Whilst *Agalychnis spurrelli* was the species traded in the highest volumes nationally, *O. sylvatica* contributed 43% of the value of national trade due to its higher unit price (US \$164 per unit for *O. sylvatica* morph Paru compared to US \$55 per unit for *A. spurrelli*).



3.2. Sharks

A total of 92 shark species were reported to occur in Ecuadorian waters (SRP, 2009) and sharks are recognized by Ecuador to represent a very important resource to the country's fishing and tourism industries (SRP, 2009; MAGAP, 2015). This case study provides a detailed overview of shark trade from Ecuador, on the basis of information collected by the Ministry of Agriculture, Livestock and Fishing (MAGAP) and FAO.

A national legal framework is in place to regulate the fishing and trade of sharks (MAGAP, 2015), a key element of which is that trade in sharks is only allowed when these have been captured in bycatch (Executive Decree No. 486 of 20 July 2007, as amended by Executive Decree No. 902 of 15 February 2008). In addition, bycatches of *Rhincodon typus* (Whale Shark), *Cetorhinus maximus* (Basking Shark) and *Carcharodon carcharias* (White Shark), as well as of *Pristis* spp. (Saw Fishes) and a number of Ray species (*Manta birostris*, *Mobula japanica*, *Mobula thurstoni*, *Mobula munkiana* and *Mobula tarapacana*) must be returned to the sea (Executive Decree No. 902 of 15 February 2008 and Ministerial Agreement No. 093 of 26 August 2010). Bycatches of *Sphyrna lewini* (Scalloped Hammerhead Shark) and *S. zygaena* (Smooth Hammerhead Shark) cannot be kept on board or traded if captured by industrial vessels, and smaller artisan fishing vessels are subject to a limit of five individuals per vessel per trip (Ministerial Agreement No. 116 of 26 August 2013).

3.2.1. Landings

On-board shark finning is not permitted in Ecuador. Therefore, shark landings must be with fins attached and the finning can only be undertaken on land at the landing ports on the continental coast. The main ports for shark landings in Ecuador are those of Manta, Santa Rosa, Anconcito, Esmeraldas and Puerto Bolívar (SRP, 2009).

According to fisheries data reported to FAO by its members or directly by customs authorities (Dent and Clarke, 2015), Ecuador's capture of Chondrichthyan fishes (including sharks and rays) averaged 3,600 tonnes per year for 2000-2011, with a total capture of 43,000 tonnes over the entire period. Reported landings of sharks and rays increased notably over the period from 807 tonnes in 2000 to 9,160 tonnes in 2011 (Figure 9).

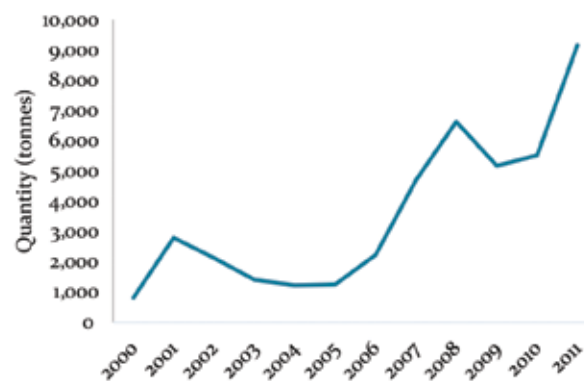


Figure 9. Total captures of Chondrichthyan fishes in Ecuador during 2000-2011, as reported to FAO. Source: FishStatJ, FAO (2013), redrawn from data presented in Dent and Clarke (2015).

According to data from MAGAP, over 65,700 tonnes of sharks were landed in Ecuador between 2008 and 2014, which represents an average of over 9,000 tonnes per year. Landings increased by 62% between 2008 and 2010 to over 10,000 tonnes, before gradually declining to around 9,500 tonnes in 2014 (Figure 10).

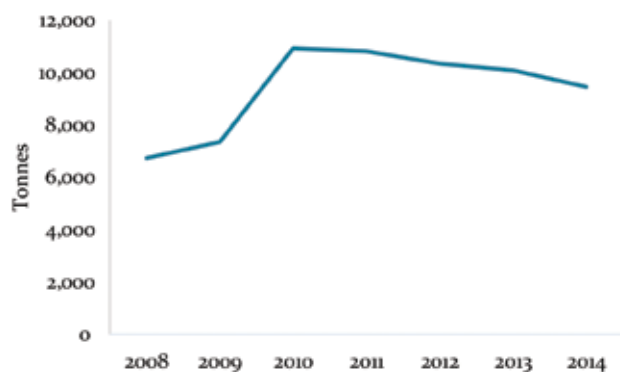


Figure 10. Total shark landings in Ecuador (in tonnes) during 2008-2014. Source: MAGAP (2015).

landings by weight and 24% of individuals. Nearly 14,500 *Sphyrna lewini* (Scalloped Hammerhead Shark) individuals and 4,000 *S. mokarran* (Great Hammerhead Shark) specimens, both of which are categorized as “Endangered” by the IUCN, were landed between September 2007 and April 2015.

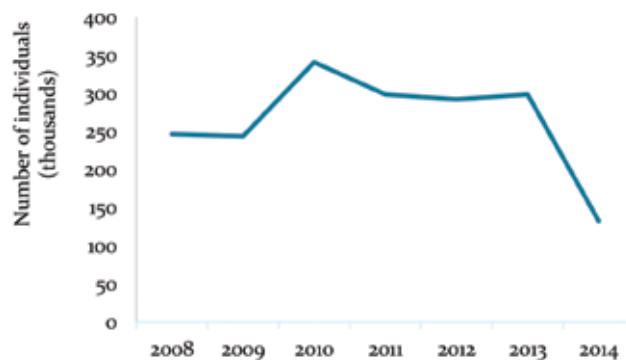


Figure 11. Total shark landings in Ecuador (in number of individuals) during 2008-2014. Source: MAGAP (2015).

Consistent with trade in tonnes, the number of individuals landed also peaked in 2010 at over 340,000 individuals, and then declined by more than half in 2014 to around 130,000 individuals (Figure 11). *Alopias pelagicus* (Pelagic Thresher) was the most commonly landed species, accounting for two-thirds of shark landings in tonnes (Figure 12) and half of landings in number of individuals; this species is listed as globally “Vulnerable” in the IUCN Red List. *Prionace glauca* (Blue Shark), considered “Near Threatened” globally by the IUCN, accounted for 18% of



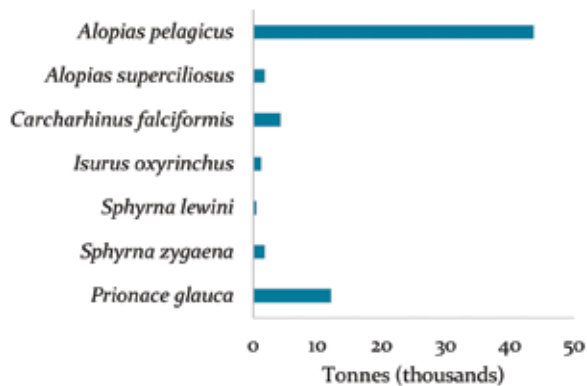


Figure 12. Shark landings in Ecuador by species (in tonnes), during 2008-2014 for species landed in quantities over 500 tonnes over this period. Source: MAGAP (2015).

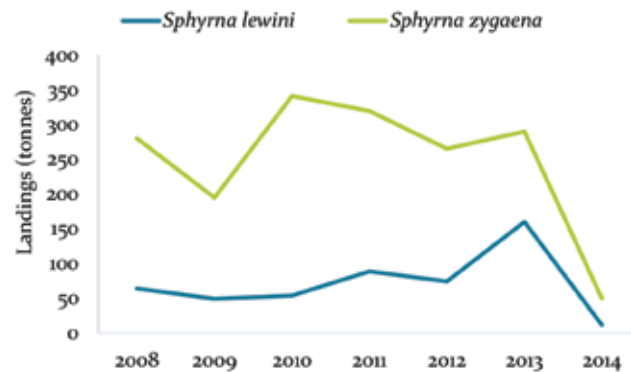


Figure 13. Landings of *Sphyrna zygaena* and *S. lewini* in Ecuador, 2008-2014. Source: MAGAP (2015).

While it is too early to assess the impact of the recent (September 2014) entry into force of CITES Appendix II listings of some shark species on shark trade in Ecuador based on CITES trade data, landings of two CITES-listed species (*S. zygaena* and *S. lewini*) declined sharply between 2013 and 2014 based on data from MAGAP (Figure 13).

3.2.2. Exports

On average, Ecuador exported 100 tonnes of shark fins per year for 2000-2011, which totalled 1,200 tonnes for the entire period (FAO, 2013 reported in Dent and Clarke, 2015). On this basis, Dent and Clarke's (2015) analysis of the global market for shark products placed Ecuador as the 16th highest exporter of shark fins in the world. This represented just 0.01% of global exports (including re-exports). Total exports of shark fins by Ecuador has fluctuated considerably over time based on data from Dent and Clarke (2015), rising to a high of 184 tonnes in 2011, which also coincides with a 2011 high in capture quantity. The trade and export of shark fins was banned in Ecuador between October 2004 (Executive Decree No. 2130) and July 2007 (Executive Decree 486) and this is reflected in a significant decrease in reported exports during that period (Figure



14). According to these data, virtually all shark fins exported from Ecuador were imported by Hong Kong SAR (89%) and by mainland China (11%) (Figure 15).

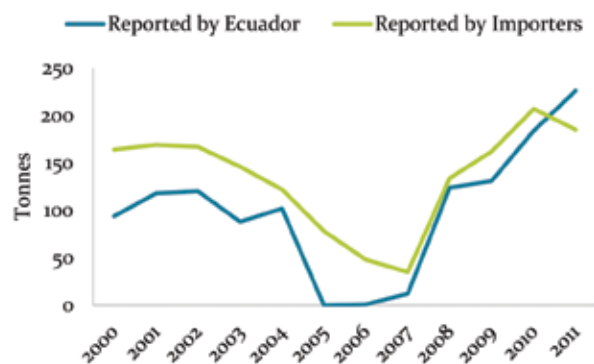


Figure 14. Exports of shark fins from Ecuador during 2000-2011, as reported to FAO by Ecuador and by importing countries. Source: FishStatJ, FAO (2013), redrawn from data presented in Dent and Clarke (2015).



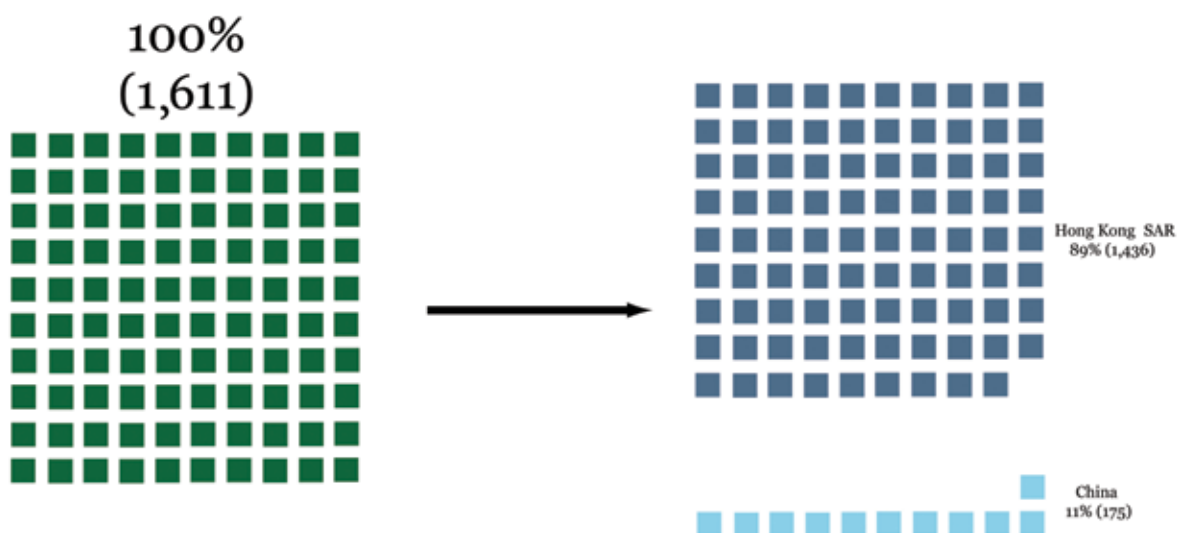


Figure 15. Imports of shark fins from Ecuador during 2000-2011. Source: FishStatJ, FAO (2013), redrawn from data presented in Dent and Clarke, 2015.

According to MAGAP (2015), between 2007 and April 2015, almost 800 tonnes of shark fins were exported from Ecuador, of which 54% belonged to *Alopias pelagicus* (Pelagic Thresher). Four tonnes of *Sphyrna lewini* (Scalloped Hammerhead Shark) fins were exported during this period (Figure 16).

Concerns have been raised over illegal shark fishing in Ecuador. For instance, SRP (2009) noted that an unknown amount of shark fins is exported illegally from the country, mainly towards Peru; Lindsey *et al.* (2013) reported illegal fishing within the Galápagos Marine Reserve; and in May 2015, news reports highlighted the confiscation of 200,000 shark fins in Manta (e.g. Palma, 2015; Anon, 2015).

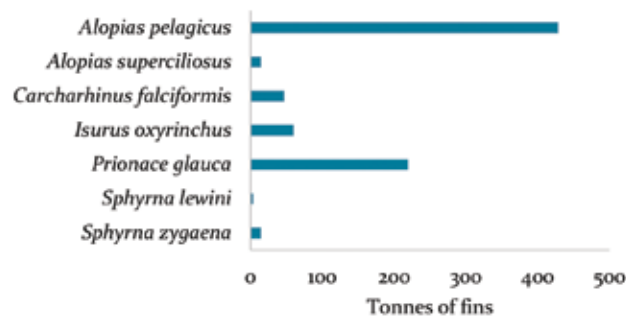


Figure 16. Exports of shark fins by species (in tonnes) from Ecuador during 2007-April 2015, for species with >1 tonne exported during this period. Source: MAGAP (2015).

Exports of meat from Ecuador between 2007 and April 2015 comprised three species: *Prionace glauca* (Blue Shark), *Isurus oxyrinchus* (Shortfin Mako Shark) and *Alopias pelagicus* (Pelagic Thresher) (MAGAP, 2015), with the United States, the United Kingdom, Spain and Japan being the main import markets for shark meat. However, shark meat is reportedly chiefly destined to the national market (SRP, 2009). On the basis of 2008, an average of 713 tonnes per month (or *ca.* 8,500 tonnes per year) were reported to be sold in the domestic market (SRP, 2009).

3.2.3. Value of Shark Exports

The economic value of shark fins and meat in the domestic market varies depending on the species, as well as fin size, the port at which the catch is landed and also the point in the trade chain (SRP,



2009). According to data from SRP (2009), over the 19-year period 1990-2008, over 62,000 tonnes of shark products were exported from Ecuador, with a total value of around US \$64.5 million.

Based on FAO importer-reported quantities and values from FAO FishstatJ, Ecuador's international trade in shark fins during the period 2000-2011 had an estimated total value of US \$44 million, with an average of US \$3.4 million per year.

FOB values for the main destinations between 2000 and 2008 included a total of US \$6.6 million for the export of 479 tonnes of fins to Hong Kong SAR and US \$4.8 million for the export of 2,853 tonnes of fresh shark meat to the United States (SRP, 2009).

3.3. Ornamental Fish

Trade in ornamental fish often goes unreported, with potential conservation implications. Gaining a better understanding of the scale of this trade is therefore relevant.

The United States LEMIS dataset provides the most comprehensive information on trade in ornamental fish from Ecuador. In total, over 13.2 million ornamental fish were exported from Ecuador to the United States between 2005 and 2014. The total number of live fish imported into the United States per year has declined over time, from approximately 1,600,000 live fish in 2005 to roughly 1,000,000 in 2014. Of the live exports, 79% were reported as tropical freshwater species, with a further 20% reported as ray-finned species (class *Actinopterygii*), although there is potentially a considerable overlap between these two categories (Figure 17). Due to a lack of taxonomic specificity in the LEMIS database entries, further detailed analysis into the most commonly traded fish species was not possible. When looking at



trends over time for the taxonomic breakdown provided by the LEMIS data, the number of tropical freshwater fish imported by the United States declined by nearly 50% between 2005 and 2014 (Figure 17). Conversely, the numbers of ray-finned fish increased over the years 2005- 2014, peaking in 2013.

Even if the absence of further information on the species involved or their origin (farm-raised

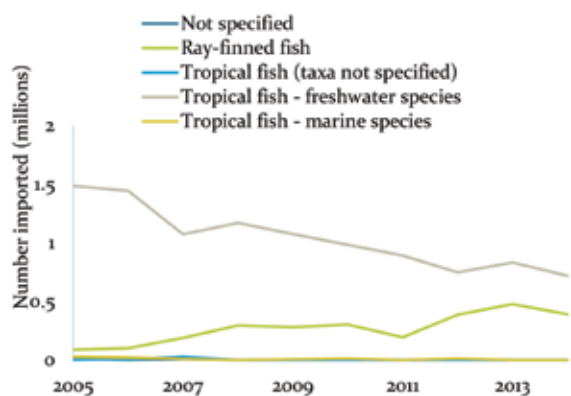


Figure 17. Imports of live fish from Ecuador by taxonomic group, 2005-2014. Source: LEMIS database.

or wild-sourced) makes it impossible to draw conclusions on the conservation significance of this trade, the relatively high volumes of imports reported by the United States suggest that a more detailed assessment may be warranted.

3.4. Sea Cucumbers

Sea-cucumber fishing started in the Galápagos Islands in the early 1990's, following the collapse of this fishery in mainland Ecuador (Toral-Granda, 2008). The Galápagos Islands are known to host 38 species of shallow-water sea cucumbers. The only species harvested legally for commercial purposes was reported to be *Isostichopus fuscus*, although some illegal catches of other species (*Stichopus horrens*, *Holothuria atra* and *Holothuria kefersteini*) were also reported (Toral-Granda, 2008). *Isostichopus fuscus* is distributed from the Pacific Coast of Mexico to northern Peru, including the



Galápagos Islands, and is categorized as “Endangered” with a decreasing trend in the IUCN Red List; overharvesting is considered the main threat (Mercier *et al.*, 2013).

A population density of 11 *Isostichopus fuscus* individuals per 100 m² in the western Isabela macro-zone was established as the “critical reference point” for the species in the fishery management chapter of the Galápagos Marine Reserve’s management plan (Toral-Granda, 2008; Reyes *et al.*, 2013). Due to population reductions as a result of overharvesting, fishing this resource was banned in 2006, 2009 and 2010. A population estimate of 12 individuals per 100 m² in 2011 triggered the reopening of the fishing season in that year. However, bans have been in place in consecutive years to date, although recovery appears to be slow (Reyes *et al.*, 2013).

Reyes *et al.* (2013) reported that between 1999 and 2011 the total annual capture of sea cucumbers declined from a peak of around 8.3 million in 2002 to just under one million in 2011 (Figure 18).

Isostichopus fuscus was listed in CITES Appendix III by Ecuador in 2003. In number of individuals, it was the top CITES-listed species exported by Ecuador between 2005 and 2014, although in this ten-year period reported exports of this species have ceased all together due to fishing bans.

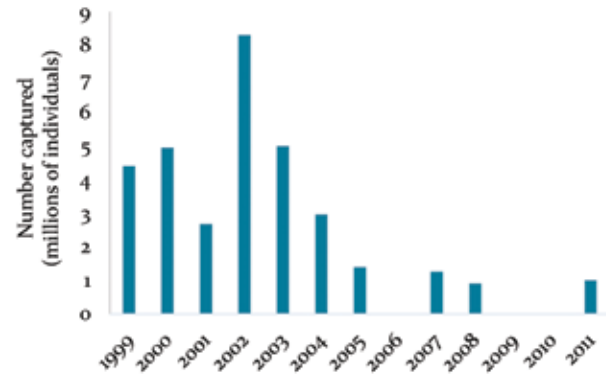


Figure 18. Total annual capture of *Isostichopus fuscus* from 1999-2011. Fishing bans were in place in 2006, 2009 and 2010. Source: Reyes *et al.* (2013).



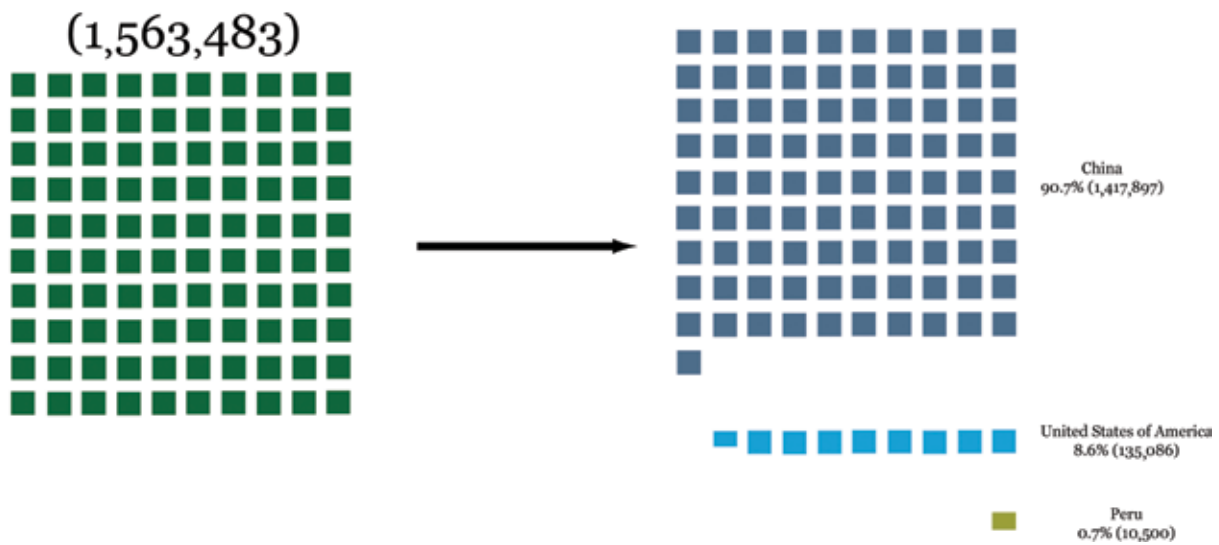


Figure 19. Exports of *Isostichopus fuscus* bodies from Ecuador reported in number during 2005-2014, by destination country. Source: CITES Trade Database, UNEP-WCMC.

Virtually all trade in *Isostichopus fuscus* was reported as wild-sourced bodies directly exported for commercial purposes. All exports of this species during 2005-2014 were reported in 2007 (1,064,463) and 2008 (499,020), accounting for 93% of exporter-reported global trade in this species reported by number during 2005-2014. Outside of this ten-year window, Ecuador reported the export of around 2.6 million (wild-sourced) bodies in 2004.

The main importer of *I. fuscus*, according to exporter-reported data, was China (91%) with the reminder of trade imported by the United States (8%) and Peru (1%) (Figure 19). China did not report any imports of this species from Ecuador, while the United States reported the import of 40 sea cucumbers in 2013.

3.4.1. Value of Sea Cucumber Trade

Based on the average 2007 value of US \$1.41 per sea cucumber provided by Murillo and Reyes (2008), exports of *I. fuscus* reported by Ecuador in their annual reports for 2004, 2007 and 2008 had a total estimated value of US \$5.8 million.

3.5. Timber

Forests were reported to cover approximately 10 million hectares in Ecuador in 2010, with the majority in the Amazon (Mejía and Pacheco, 2014). Domestic demand for timber was found to be the key driver of forest timber extraction in Ecuador between 1983 and 1992 (Sierra, 2001). Although international trade represents an important part of the market, the main destination for the 458,000 m³ of Amazon forest timber harvested in 2011, for example, was the domestic timber market in Quito (Mejía and Pacheco, 2014). Of the total volume authorized by the Ministry of the Environment for forest management activities during 2011-2014, 58% are forest plantations, 17% pioneer formations, 14% agroforestry systems and 11% native forests (MAE, 2015). In total, the species with the highest volume approved for forest management during this period were *Eucalyptus globulus* (Southern Blue-gum), *Ochroma lagopus* (Balsa Tree) and *Tectona grandis* (Teak), mainly from plantations.

3.5.1. Domestic Consumption

According to the ITTO Biennial Report 2013-2014, domestic consumption in Ecuador has represented the vast majority (around 85%) of timber production in the country during 2010-2014, with an annual average of about 2 million cubic meters during the period. However, these figures should be taken with caution as there have been discrepancies between ITTO statistics

and data maintained by MAE for timber exports, especially with regard to roundwood.

3.5.2. Exports

In general, there are few specific data available on wood trade in Ecuador. Although there are general statistics from ITTO and UN COMTRADE on Ecuador's timber exports, these data contrast with official statistics recorded by MAE.

For example, unlike ITTO statistics, official data do not reflect recent exports of roundwood. In fact, Ecuador does not allow the export of roundwood from natural forests since the 80's, based on the Law of Forestry and Conservation of Natural Areas and Wildlife. According to the provisions of Book III of the Unified Text of Secondary Legislation of MAE (TULSMA), exports of roundwood can only be made if they come from forest plantations, upon request to MAE and after producing documents that support the legal use of the resource.

MAE statistics of authorized exports have been used as a basis for describing timber exports of the country. Based on data on timber authorized exports for the period 2012-2014, these exports consisted of an annual average of approximately 87,000 m³, of which the vast majority (annual average during this period 82,000 m³) were *Tectona grandis* (Teak), a species native to South and Southeast Asia but present in forestry plantations in Ecuador. Most other exports authorized by MAE during this period were of the native species *Samanea saman* (Saman). Virtually all exports of these species were reported as logs (squared and edged) bound for India, with small volumes to China.

Additional species information is available for CITES-listed species. According to Ecuador's CITES annual report with data included in the CITES Trade Database, the country exported over 800 m³ of *Swietenia macrophylla* (Big-leaf Mahogany) and 550 m³ of *Cedrela odorata* (Spanish Cedar) over the ten-year period 2005-2014, with



exports reported between 2005 and 2010 (Figure 20). There have been no *Cedrela* exports since 2010 nor *Swietenia* exports since 2009 due to national bans to exploit these species. The top country of import for both species was the United States, accounting for 85% of *S. macrophylla* exports and 41% of *C. odorata* exports.

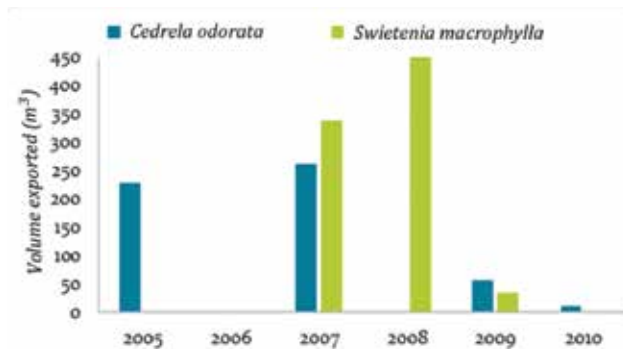


Figure 20. Direct exports of timber from Ecuador 2005-2010, by species. No exports of timber were reported by Ecuador 2011-2014.

Source: CITES Trade Database.



3.5.3. Value of Timber Exports

Species specific data from COMTRADE (provided by ITTO) for sawn wood indicate that *Swietenia* spp. (Mahogany) had the highest price per cubic metre, with an average value of over US \$1,500 per m³ during the ten-year period. However, focusing on the most recent period 2012-2014 in reported exports consist mainly of *Tectona grandis* (Teak), and taking a value of approximately US \$350 per cubic meter for this species, the estimated average annual value of timber exports is at least US \$29 million.

3.6. Orchids

Ecuador harbours an extremely high diversity of orchids, with over 4,000 species reported to occur in the country and approximately a third of them considered to be endemic (Mites, 2008). Orchids are also one of the most highly traded groups of wildlife in Ecuador.

3.6.1. Exports

The family Orchidaceae is listed in CITES Appendix II, with the exception of some taxa (including *Phragmipedium* spp.) listed in CITES Appendix I. Seedpods, seedlings obtained in vitro, cut flowers of artificially propagated plants and artificially propagated hybrids of the genera *Cymbidium* (Ship Orchids), *Dendrobium*, *Phalaenopsis* (Butterfly Orchids) and *Vanda* (Aerial Orchids) that meet certain conditions are not subject to the provisions of the Convention.

Therefore, CITES trade records largely refer to trade in live orchids.

Artificially propagated live orchids were the CITES commodity exported at the highest volumes from Ecuador for commercial purposes for the period 2005-2014. Based on CITES trade statistics, live orchids comprised more than 99% of the 421,139 live plants exported by Ecuador during 2005-2014, of which almost all were artificially propagated (source “A” or “D”; for full definitions of source codes see Annex B). More than 99% of orchid exports from Ecuador were direct exports; the majority of indirect exports originated in Colombia. On average, over 46,000 live orchids were exported per year during 2005-2014, with exports peaking in 2011 (Figure 21). This peak can be attributed to Ecuador reporting the export of over 15,700 live orchids to Singapore; Singapore did not report the import of any live orchids from Ecuador for the period 2005-2014. In 2013 importer-reported values were approximately 50% greater than those reported by Ecuador, which can principally be explained by Germany and the United States reporting higher levels of trade than Ecuador.

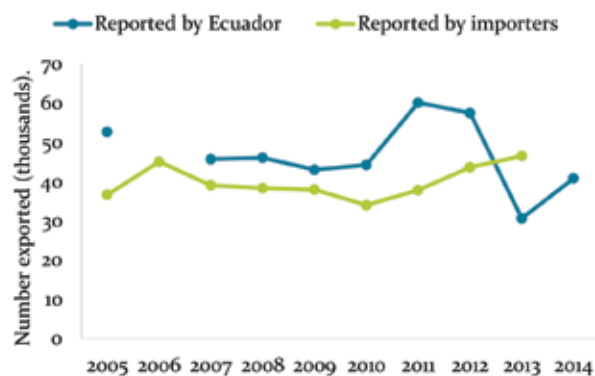


Figure 21. Direct exports of live orchids as reported by Ecuador and importers, 2005-2014. Ecuador has not submitted a CITES annual report for 2006. Source: CITES Trade Database, UNEP-WCMC.



It is also worth noting that the United States reports all imports of artificially propagated Appendix-II orchids as “Orchidaceae spp.” (or “Orchidaceae hybrid” in the case of hybrids), and therefore discrepancies can be seen between data reported by Ecuador and the United States when analysing trade at species or genus level.

For the period 2004-2013, Ecuador was the twelfth highest global exporter of orchids, accounting for 0.2% of the global trade in a market dominated by Thailand (41%) and China (33%) (Source: CITES Trade Database, UNEP-WCMC). The main importers of live plants from Ecuador were Germany and the United States, together accounting for over half of live orchid exports

from the country (28% each; Figure 22). Imports into Germany were considered to be supplying the EU market (Hinsely, 2015). Other key trading partners include Japan and Canada (Figure 23).



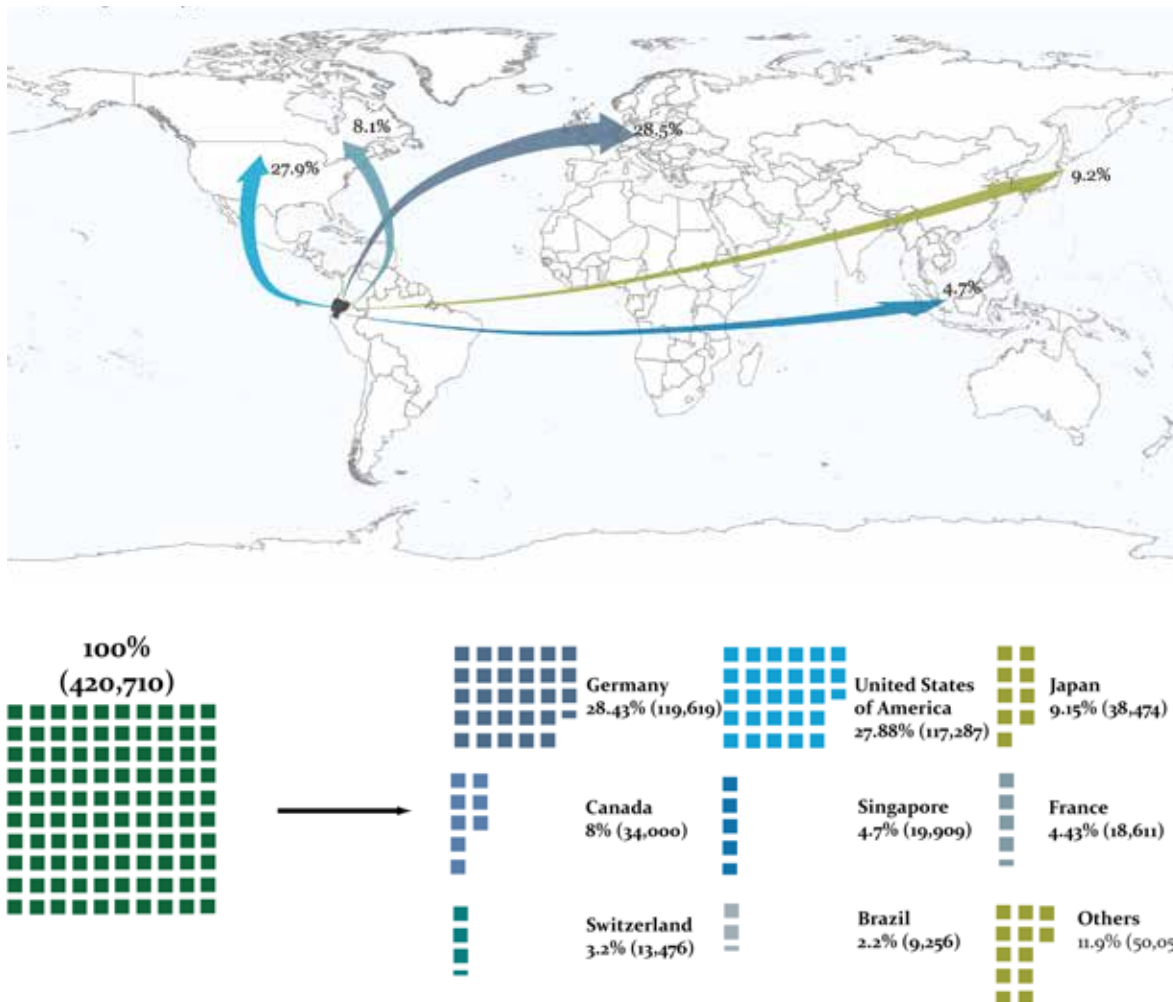


Figure 22. Main destination countries of live orchids exported by Ecuador during 2005-2014, as reported by Ecuador. Ecuador has not submitted an annual report for 2006. Source: CITES Trade Database, UNEP-WCMC.

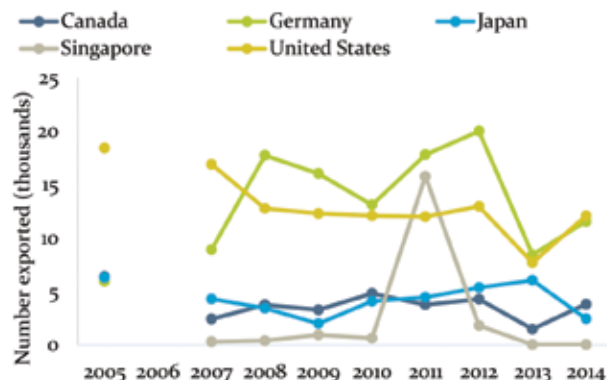


Figure 23. Top five importers of live orchids exported by Ecuador during 2005-2014, as reported by Ecuador. Ecuador has not submitted an annual report for 2006. Source: CITES Trade Database, UNEP-WCMC.

The top exported taxon reported to the species level was *Cattleya maxima* (Largest Cattleya), with 15,316 live orchids exported, accounting for 4% of total orchid exports. Exports of *C. maxima* from Ecuador accounted for two-thirds of global direct exports of this species during 2005-2014.

When trade by genus was considered, three genera (*Masdevallia*, *Cattleya* and *Pleurothallis*) accounted for more than 25% of the total quantity of orchid exports between 2005 and 2014, reported orchids in despite Ecuador having more than 250 genera of trade (Figure 24).

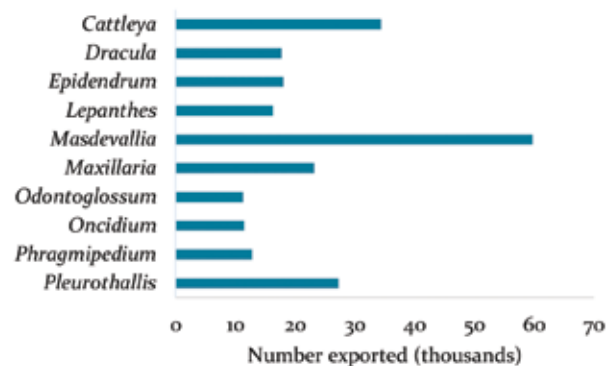


Figure 24. Top 10 orchid genera directly exported by Ecuador during 2005-2014. Source: CITES Trade Database, UNEP-WCMC.

The vast majority (97%) of live orchid exports from Ecuador were species listed in Appendix II; the proportion of trade represented by Appendix I species fluctuated over the ten-year period, rising to 5% of live orchid exports in 2014, its highest level for 2005-2014. Trade in Appendix-I orchids was dominated by *Phragmipedium* (Lady's Slippers) species (98%; Figure 25).



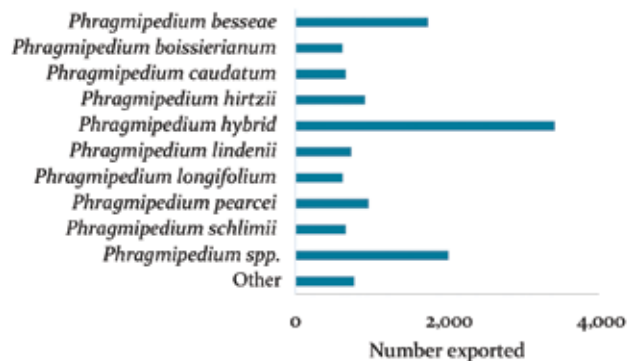


Figure 25. Direct exports of Appendix-I orchids from Ecuador during 2005-2014, by taxa. Source: CITES Trade Database, UNEP-WCMC.

3.6.2. Value of Orchid Exports

Value data provided by Ecuagenera for 2015 were applied to CITES trade data for direct exports of live orchids from Ecuador for the years 2005-2014 to provide an estimate of the value of this trade. Further details on this methodology are presented in Annex A.

In total, international orchid exports over the ten-year period 2005-2014 are estimated to have a value of US \$6.2 million, with values peaking in 2012 at just over US \$900,000. This total figure is likely to be an underestimate, given the absence of CITES export data for 2006.

When value by genus is considered, *Masdevallia* and *Cattleya* were the top two genera, which corresponds with the levels of export. While Ecuador exports more than 250 genera of orchids, these two genera alone made up almost one quarter of the total export value between 2005 and 2014 (24%; Figure 26).

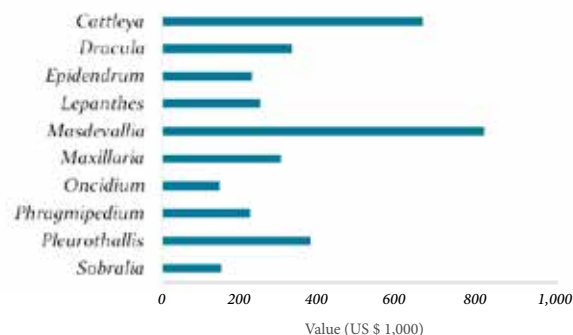


Figure 26. Top ten orchid genera directly exported by Ecuador, 2005-2014, by value. Based on values estimated on the basis of data from the CITES Trade Database (trade statistics) and Ecuagenera website (for value data).



As with export quantities, the most important trading partners in terms of value were Germany and the United States, accounting for 29% and 27% of export value, respectively. In 2011, Singapore accounted for 26% of the total value of exports, whereas in all other years, Singapore accounted for 5% or less of the total export value of orchids. This corresponds with a spike in exports to Singapore in 2011 (see Figure 23).

3.6.3. National Trade

Data on domestic trade in orchids was provided by the Ecuadorian company Floare, and are based on the availability of “Baby orchid” products at the national level. According to this data, 25,685 live orchids were traded domestically over the period January 2007-August 2015.

Stanhopea florida was the most widely traded species at the national level, accounting for 26% of domestic trade in these orchid products. National levels of trade increased from 150 live orchids to a peak of 7,217 live orchids in 2013 before declining in subsequent years (Figure 27).

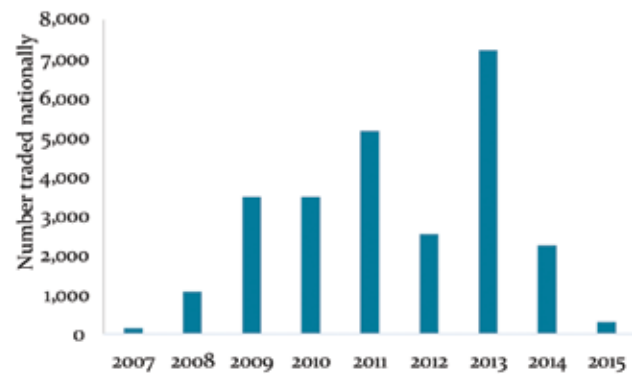


Figure 27. National trade in live orchids during 2007-2015. Data were amalgamated for 2009 and 2010, so this graph presents an average of trade for these two years. The 2015 data do not represent the whole year. Source: Floare.



4. Species Showing Noteworthy Trends Globally

A number of noteworthy patterns of exports from Ecuador were discussed in the case studies presented in chapter 3, including an emerging increasing trend in live frog exports for the pet trade since 2011, a decrease in live frogs for the meat market between 2005 and 2014, and an increase in sawn wood trade over the ten-year period 2004-2013.

This chapter provides a geographically wider assessment, based on the methodology that is used in the context of the CITES Review of Significant Trade to help identify species of potential concern. As the CITES Review of Significant Trade process is of relevance to all countries in the distribution range of species selected, the aim of this chapter is to support Ecuador by identifying native species that may be selected as part of the CITES Review of Significant Trade process on the basis of global trade levels.

Global trade data for Ecuadorian species that were wild-sourced, ranched or of unknown/unspecified source were analysed for the period 2003-2012. Patterns were identified according to one or more of the following criteria: high volume of trade, high volume of trade in a globally threatened species, or sharp increase in trade. Details on the process of selection according to these criteria are summarized in Annex C.

A summary of the species that were selected according to the criteria outlined above, along with key information on the criteria met, the top global exporter and importer, and the top commodity (e.g. live, meat, etc.) and purpose (e.g. commercial, scientific, etc.) reported in trade, is provided in Table 5.

In total, 40 species met the criteria for selection. Of these, four were Appendix-I species, 28 were Appendix-II species, and three were Appendix-III species. Five species selected are split-listed species, two of which were selected on the basis of Appendix I trade and the rest on the basis of Appendix II trade. Birds was identified as the group with the highest number of species showing noteworthy trends, with fourteen species of bird meeting the selection criteria. This was followed by reptiles (nine species), mammals (eight species), fish (four species), timber (two species), corals (two species) and invertebrates with one species. Thirty of the taxa selected were mainly exported for commercial purposes.

Thirty-five species met the criteria on the basis of high volume, with 21 of these considered globally threatened. Eight species showed sharp increases as well as high volume, with seven of these considered globally threatened. Five species, none of which are globally threatened, met the criteria on the basis of sharp increase alone.

Of all of the species meeting the criteria, only three were exported by Ecuador over the period 2003-2012: *Swietenia macrophylla* (Big-leaf Mahogany), *Cedrela odorata* (Spanish Cedar) and *Isostichopus fuscus* (Brown Sea Cucumber). In the case of the latter species, Ecuador was the top global exporter over this period.

Table 5. Species selected on the basis of noteworthy trends (species native to Ecuador exported globally).

Group	Taxon (Common Name)	CITES Appendix	IUCN Red List *	Top Commodity and corresponding quantity and purpose** of global exports	Top Exporter	Top importer	Selection criteria
Appendix I							
Mammals	<i>Balaenoptera acutorostrata</i> (Common Minke Whale)	I/II	LC	170,053 kg meat, T	Iceland	Japan	High Volume, Sharp increase
	<i>Balaenoptera physalus</i> (Fin Whale)	I	EN	1,870,000 kg meat, T	Iceland	Japan	High Volume (GT), Sharp increase
	<i>Physeter macrocephalus</i> (Sperm Whale)	I	VU	1,481 teeth, P	Mexico	United States	High Volume (GT)
Reptiles	<i>Crocodylus acutus</i> (American Crocodile)	I/II	VU	1,538 skins, (no purpose)	Honduras	Panama	High Volume (GT), Sharp increase
	<i>Chelonia mydas</i> (Green Turtle)	I	EN	3,681 live, S	Malaysia	United Kingdom	High Volume (GT)
	<i>Eretmochelys imbricata</i> (Hawksbill Turtle)	I	CR	1,099 live, S	United Kingdom	Malaysia	High Volume (GT)
Appendix II							
Mammals	<i>Pecari tajacu</i> (Collared Peccary)	II	LC	361,117 skins, T	Peru	Italy	High Volume
	<i>Tayassu pecari</i> (White-lipped Peccary)	II	VU	97,927 skins, T	Peru	Italy	High Volume (GT)
	<i>Lycalopex culpaeus</i> (Andean Fox)	II	LC	45,861 skins, T	Argentina	Germany	High Volume
	<i>Puma concolor</i> (Puma)	I/II	LC	2,046 teeth, S	Canada	United States	High Volume
	<i>Myrmecophaga tridactyla</i> (Giant Anteater)	II	VU	38 live, T	Panama	United States	Sharp increase

Group	Taxon (Common Name)	CITES Appendix	IUCN Red List *	Top Commodity and corresponding quantity and purpose** of global exports	Top Exporter	Top importer	Selection criteria
Appendix II							
Birds	<i>Colibri thalassinus</i> (Green Violet-ear)	II	LC	166 bodies, S	Guatemala	United States	Sharp increase
	<i>Phoenicopterus ruber</i> (American Flamingo)	II	LC	5,544 live, T	Cuba	China	High Volume
	<i>Ramphastos tucanus</i> (Red-billed Toucan)	II	VU	975 live, T	Guyana	South Africa	High Volume (GT)
	<i>Ramphastos vitellinus</i> (Channel-billed Toucan)	II	VU	1,132 live, T	Suriname	South Africa	High Volume (GT)
	<i>Amazona amazonica</i> (Orange-winged Amazon)	II	LC	36,539 live, T	Guyana	United Kingdom	High Volume
	<i>Amazona farinosa</i> (Southern Mealy Amazon)	II	NT	6,102 live, T	Guyana	Russian Federation	High Volume (GT)
	<i>Amazona festiva</i> (Festive Amazon)	II	NT	1,479 live, T	Guyana	South Africa	High Volume (GT)
	<i>Amazona ochrocephala</i> (Yellow-crowned Amazon)	II	LC	9,134 live, T	Guyana	Singapore	High Volume
	<i>Ara ararauna</i> (Blue-and-yellow Macaw)	II	LC	10,390 live, T	Guyana	Thailand	High Volume
	<i>Ara chloropterus</i> (Red-and-green Macaw)	II	LC	17,492 live, T	Guyana	Singapore	High Volume
	<i>Aratinga erythrogenys</i> (Red-masked Parakeet)	II	NT	165 live, T	Peru	Singapore	Sharp increase
	<i>Aratinga wagleri</i> (Scarlet-fronted parakeet)	II	-	10,299 live, T	Peru	Mexico	High Volume
	<i>Pionites melanocephalus</i> (Black-headed Parrot)	II	LC	8,296 live, T	Suriname	Singapore	High Volume
	<i>Tyto alba</i> (Common Barn-owl)	II	LC	186 live, S	Togo	Japan	Sharp increase
Reptiles	<i>Caiman crocodilus</i> (Common Caiman)	I/II	LC	482,653 skins, T	Bolivia	Italy	High Volume
	<i>Melanosuchus niger</i> (Black Caiman)	I/II	NT	303 skins, T	Brazil	Thailand	High Volume (GT), Sharp increase
	<i>Iguana iguana</i> (Common Iguana)	II	-	64,561 live, T	Suriname	United States	High Volume
	<i>Podocnemis unifilis</i> (Yellow-spotted River Turtle)	II	VU	241,101 live, T	Peru	Hong Kong, SAR	High Volume (GT), Sharp increase
	<i>Chelonoidis denticulata</i> (Yellow-footed Tortoise)	II	VU	7,197 live, T	Guyana	United States	High Volume (GT)

Group	Taxon (Common Name)	CITES Appendix	IUCN Red List *	Top Commodity and corresponding quantity and purpose** of global exports	Top Exporter	Top importer	Selection criteria
Appendix II							
Fish	<i>Arapaima gigas</i> (Arapaima)	II	DD	12,668 kg meat, T	Bolivia	Colombia	High Volume (GT)
	<i>Hippocampus ingens</i> (Giant Seahorse)	II	VU	299,377 bodies, T	Peru	China	High Volume (GT), Sharp increase
	<i>Carcharodon carcharias</i> (Great White Shark)	II	VU	1,576 teeth, Q	Australia	United States	High Volume (GT)
	<i>Rhincodon typus</i> (Whale Shark)	II	VU	3 bodies, Q	China	United States	Sharp increase
Corals	<i>Tubastraea coccinea</i> (Orange-cup Coral)	II	-	46,655 live, T	Indonesia	United States	High Volume
	<i>Pocillopora eydouxi</i>	II	NT	5,493 raw corals, T	Solomon Islands	United States	High Volume (GT)
Timber	<i>Swietenia macrophylla</i> ■ (Big Leaf Mahogany)	II	VU	350,558 m ³ timber, T	Peru	United States	High Volume (GT)
Appendix III							
Birds	<i>Crax rubra</i> (Great Curassow)	III	VU	742 trophies, H	Mexico	United States	High Volume (GT)
Invertebrates	<i>Isostichopus fuscus</i> ▲ (Brown Sea Cucumber)	III	EN	4,185,620 bodies, T	Ecuador	China	High Volume (GT), Sharp increase
Timber	<i>Cedrela odorata</i> ● (Spanish Cedar)	III	VU	276,762 m ³ timber, T	Peru	United States	High Volume (GT), Sharp increase

*“CR” = Critically Endangered, “EN” = Endangered, “VU” = Vulnerable, “NT” = Near Threatened, “LC” = Least Concern, “DD” = Data Deficient, “-” = Not evaluated.

**“T” = Commercial purposes, “S” = Scientific purposes, “Q” = Circus or travelling exhibition, “P” = Personal purposes

▲Ecuador exported a total of 780 m³ of *Swietenia macrophylla* to the United States, Dominican Republic and Puerto Rico between 2007 and 2009.

■Ecuador was the main exporter of *Isostichopus fuscus* between 2003 and 2013, with 4,148,394 bodies primarily exported to China.

●Ecuador exported a total of 254 m³ of *Cedrela odorata* timber to the United States, Colombia and Mexico in 2005 and 2007.

5. Trade in Species Native to Ecuador by Other Countries

This chapter examines direct exports of species native to Ecuador from other countries over the ten-year period 2004-2013. It focuses on the top commodities in trade, some of which are also highlighted in the previous chapter as they meet specific criteria.

Trade in Ecuadorian species by other exporting Parties can be of relevance to Ecuador for a number of reasons, including:

- To ensure that utilisation of these species in other areas of their range is not detrimental to their survival;
- To inform discussions on access and benefit-sharing of biological resources;
- To highlight cases where the sharing of relevant conservation and captive production information by countries that are not in the distribution range and that are breeding the species may be of benefit to Ecuador;
- To help identify global demand and existing sustainable use systems already in place in other countries. This would help inform the potential establishment of similar use programmes in Ecuador. Sustainable use of species currently not being used in Ecuador

has the potential to provide positive incentives for the conservation of the species concerned and their habitats, as well as result in economic benefits to the country.

According to exporter-reported data recorded within the CITES Trade Database, 832 CITES-listed species recorded as occurring in Ecuador (according to Species+) were reported in trade during 2004-2013.

The chapter focuses first on wild-sourced trade in species that are native to Ecuador by other countries, followed by captive-produced or artificially propagated trade. It then examines notable trade in species endemic to Ecuador by other countries.

5.1. Wild-sourced Trade

Forty-four -Appendix-I-listed- species, 372 Appendix-II-listed species and 18 Appendix-III-listed species native to Ecuador were reported as wild-sourced exports from countries other than Ecuador.

Table 6 presents the details of trade in commodities exported in quantities greater than 100,000 units over the period 2004-2013.

Ecuadorian species most highly traded as wild-sourced by other countries included *Balaenoptera* (Common Minke and Fin Whales) meat, *Caiman crocodilus* (Spectacled Caiman) skins, tails and meat, *Vicugna vicugna* (Vicugna) hair, and live *Podocnemis unifilis* (Yellow-spotted Amazon

River Turtle). For all commodities exported at greater than 100,000 units, the main purpose of trade was commercial (76% or greater). The main exporters of wild-sourced species were countries from the South American region, namely Bolivia and Peru. Key markets for wild-sourced exports included Japan (*Balaenoptera* meat), the United States (*Isostichopus fuscus* bodies, *Swietenia macrophylla* timber and *C. crocodilus* meat) and Italy (*C. crocodilus* skins and tails, and *Pecari tajacu* skins). Of the main species commodities in trade with over 100,000 units during 2005-2014, exports from Ecuador accounted for less than one per cent of global exports of *Cedrela odorata* and *Swietenia macrophylla* timber, while accounting for 95% of total global exports of *Isostichopus fuscus* bodies reported in number.



5.2. Captive Produced Trade

Six hundred and seventeen species occurring in Ecuador were exported as captive-produced or artificially propagated by countries other than Ecuador during 2004-2013. Table 7 presents details of trade for species commodities exported at quantities greater than 100,000 units over the ten-year period. Ecuador did not report any trade in the top traded commodities during 2004-2015.

Highly traded commodities of species occurring in Ecuador comprised live Cactaceae and Cactaceae derivatives, live reptiles, derivatives of *Cairina moschata* (Muscovy Duck) and *Arapaima gigas* (Paiche) commodities. For the majority of “high volume” exports, the main exporting countries were range States; however, for artificially propagated *Euphorbia lactea* (Spurge) and *Opuntia stricta* (Erect Prickly Pear) the main exporter was China (71% and >99%, respectively), whilst Canada was the main exporter of artificially propagated *Espostoa lanata* (Old Peruvian Man), which is native to Ecuador and Peru. The main import markets were the Netherlands (live plants and plant derivatives), the United States (live reptiles, live plants and *Arapaima gigas* meat) and East Asia (Japan, Hong Kong SAR and China).

Table 6. Top commodities of species native to Ecuador exported as wild-sourced by the rest of the world during 2004-2013 at levels above 100,000 units, according to exporter-reported data. The table is ordered by quantity, and in cases where more than one commodity of the same species met the inclusion criteria, these are presented together.

Taxon	Commodity (unit)	Quantity exported by Parties other than Ecuador	Main exporter (%)	Main importer (%)	Main purpose
<i>Balaenoptera physalus</i> (Fin Whale)	meat (kg)	2,335,000	Iceland (100%)	Japan (99%)	T (100%)
	specimens (kg)	165,046	Iceland (>99%)	Japan (>99%)	T (>99%)
<i>Vicugna vicugna</i> (Vicugna)	hair (kg)	669,652	Bolivia (95%)	Argentina (88%)	T (>99%)
<i>Caiman crocodilus</i> (Common Caiman)	skins	401,775	Bolivia (72%)	Italy (44%)	T (>99%)
	tails	267,855	Bolivia (100%)	Italy (56%)	T (100%)
	meat (kg)	196,419	Bolivia (98%)	United States (37%)	T (100%)
<i>Podocnemis unifilis</i> (Yellow-spotted River Turtle)	live	392,558	Peru (99%)	Hong Kong SAR (88%)	T (100%)
<i>Cedrela odorata</i> (Spanish Cedar)	timber (m ³)	370,834	Peru (40%)	China (32%)	T (>99%)
	veneer (m ²)	137,792	Mexico (100%)	Cuba (100%)	T (100%)
<i>Pecari tajacu</i> (Collared Peccary)	skins	343,671	Peru (98%)	Italy (60%)	T (>99%)
<i>Hippocampus ingens</i> (Giant Seahorse)	bodies	299,377	Peru (100%)	China (100%)	T (100%)
<i>Swietenia macrophylla</i> (Big Leaf Mahogany)	timber (m ³)	287,344	Bolivia (33%)	United States (75%)	T (>99%)
<i>Isostichopus fuscus</i> (Brown Sea Cucumber)	bodies (kg)	152,163	Mexico (100%)	United States (56%)	T (99%)
	bodies	106,172	Mexico (100%)	United States (94%)	T (100%)
<i>Balaenoptera acutorostrata</i> (Common Minke Whale)	meat (kg)	120,735	Iceland (65%)	Japan (71%)	T (76%)

Source: CITES Trade Database, UNEP-WCMC.



Table 7. Top commodities of species native to Ecuador exported as captive- produced/artificially propagated by the rest of the world during 2004-2013 at levels above 100,000 units, according to exporter-reported data. The table is ordered by quantity, and in cases where more than one commodity of the same species met the inclusion criteria, these are presented together.

Taxon	Commodity	Total	Main exporter (%)	Main importer (%)	Purpose
<i>Euphorbia lactea</i> (Spurge)	live	6,649,894	China* (71%)	Netherlands (51%)	T (97%)
<i>Iguana iguana</i> (Common Iguana)	live	3,740,767	El Salvador (88%)	United States (49%)	T (>99%)
<i>Cairina moschata</i> (Muscovy Duck)	medicine	2,934,844	France** (100%)	Russian Federation (44%)	T (100%)
	feathers (kg)	2,322,618	France** (100%)	China (62%)	T (100%)
<i>Rhipsalis baccifera</i> (Mistletoe cactus)	stems	1,008,500	Kenya (100%)	Netherlands (87%)	T (>99%)
	flowers	529,783	United Republic of Tanzania (100%)	Netherlands (88%)	T (100%)
	live	181,318	South Africa (50%)	Netherlands (67%)	T (70%)
<i>Opuntia stricta</i> (Erect Prickly Pear)	live	310,777	China* (>99%)	Japan (88%)	T (>99%)
<i>Arapaima gigas</i> (Arapaima)	meat (kg)	283,485	Peru (79%)	United States (94%)	T (100%)
	live	194,699	Peru (87%)	Hong Kong SAR (67%)	T (>99%)
<i>Espostoa lanata</i> (Old Peruvian Man)	live	265,937	Canada* (95%)	United States (94%)	T (97%)
<i>Boa constrictor</i> (Boa constrictor)	live	191,433	Colombia (62%)	United States (80%)	T (>99%)
<i>Podocnemis unifilis</i> (Yellow-spotted River Turtle)	live	109,652	Peru (96%)	Hong Kong SAR, (70%)	T (>99%)

*Main exporter is not a range State. **French Guyana is an overseas territory of France.

Source: CITES Trade Database, UNEP-WCMC.

5.3. Species Endemic to Ecuador

Low levels of trade in species endemic to Ecuador were reported globally during 2003-2014, the vast majority of which involved artificially propagated live orchids. Two endemic species were reported in quantities greater than 1,000 units: the cactus *Cleistocactus sepium* (Pitaya) and the frog *Epipedobates tricolor* (Phantasmal poison- arrow frog) (9,845 and 1,162, respectively).

5.3.1. *Cleistocactus sepium* (pitaya)

Cleistocactus sepium is a cactus species of the dry valleys of northern and central Ecuador and categorized as of “Least Concern” by the IUCN (Loaiza, 2013). While the CITES Cactaceae checklist (Hunt, 1999) lists this species as endemic to Ecuador, more recent sources suggest that it also occurs in one area of Colombia (Loaiza, 2013). The Netherlands accounted for all exports of artificially propagated *C. sepium* and Turkey accounted for virtually all imports. Exports were first reported in 2009, and increased year-on-year 2009-2013 (Figure 28). No direct exports of *C. sepium* from Ecuador to the Netherlands were ever reported by either Party; however, the Netherlands reported direct live imports from Ecuador at the family (Cactaceae) level in 1997 and 1998.

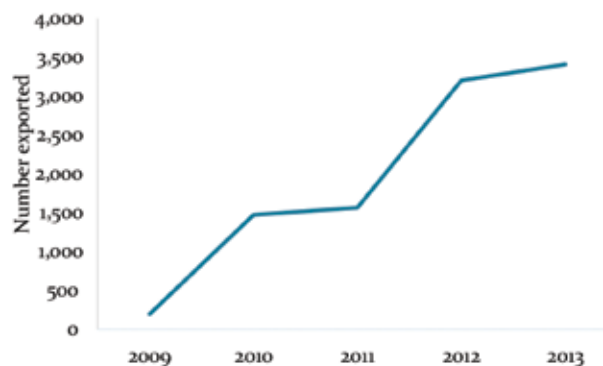


Figure 28. Exports of artificially-propagated *Cleistocactus sepium* from the Netherlands, 2009- 2013. Source: CITES Trade Database, UNEP-WCMC.



5.3.2. *Epipedobates tricolor* (phantasmal poison-arrow frog)

Epipedobates tricolor is a frog species endemic to the Andean slopes of the Bolívar Province of Ecuador and categorized as “Endangered”, with a decreasing population trend, by the IUCN (Coloma, 2004). During the ten-year period 2004-2013, over 1,000 captive-produced, live *Epipedobates tricolor* were exported by non-range States, the vast majority of which were for commercial purposes (93%). Canada was the main exporter, accounting for 43% of exports by non-range States, followed by the Netherlands (17%) and Germany (16%). Exports were variable over the ten-year period, peaking in 2010 (Figure 29). The main markets for *E. tricolor* were Japan (28%), the Netherlands (24%) and Taiwan (21%).

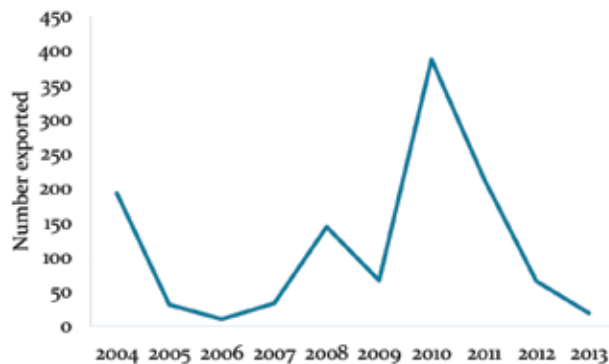


Figure 29. Exports of live *Epipedobates tricolor* by non-range countries, 2004-2013. Source: CITES Trade Database, UNEP-WCMC.

When global exports in *E. tricolor* over the ten-year period are considered (all sources), trade from Ecuador represents 2% of trade (Figure 30).

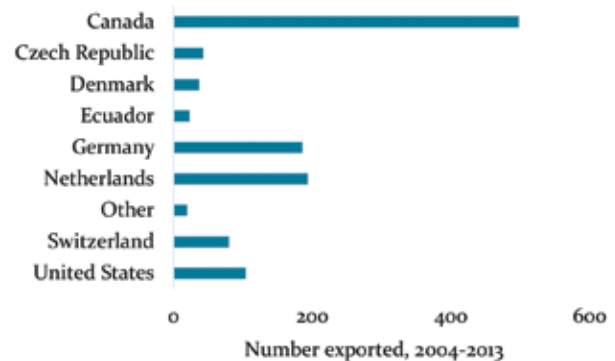


Figure 30. Global direct exports of *Epipedobates tricolor*, 2004-2013, all sources, by exporter. Source: CITES Trade Database, UNEP-WCMC.

When value data for *E. tricolor* supplied by Wikiri S.A. was applied to trade levels recorded in the CITES Trade Database, an estimation of the value of trade in this species to non-range countries was over US \$250,000 for the period 2004-2013.



6. Recommendations

6.1. Reporting of trade in CITES-listed species

A number of issues were identified that relate to the quality and completeness of data recorded by Ecuador in their annual reports to CITES. The *Guidelines for the preparation and submission of CITES annual reports* specifies the information that should be included in the reports. These data provide the basis for monitoring the implementation of CITES and support key decision making, including the making of non-detriment findings. Accurate reporting is therefore key in ensuring that international trade in wildlife is sustainable.

6.1.1. Use of accepted nomenclature: Accepted scientific names for species should be used on permits and in annual reports, as opposed to synonyms or common names, to avoid confusion. For example, the 2014 annual report included trade records for *Dendrobates sylvaticus*, which is a synonym of both *Oophaga sylvatica* and *O. histrionica*. In addition, many records of live, artificially propagated orchid hybrids were reported with commercial names, such as *Cymbidium* ‘Lovely Smile’. Ecuador may wish to consider the use of the Species+/CITES Checklist Application Programming Interface (API)¹ to facilitate the automatic transfer of up-to-date taxonomic and legal information from the CITES Checklist/Species+ directly to national systems,

to help ensure that accepted nomenclature is used in all permits.

6.1.2. Timely submission of annual reports: Parties are required to submit their annual report by October 31, following the year for which they are due. Reports for 2011 and 2012 were received by the CITES Secretariat from Ecuador on 20/07/2014. No report has been received from Ecuador for 2006. Ecuador is encouraged to submit annual reports within the deadline, to ensure that the most up-to-date information is available to Parties and decision makers for monitoring wildlife international trade. There are ongoing discussions in the CITES arena regarding the development of electronic permitting systems, which have the potential to enable monitoring of trade transactions in near-real time. Ecuador is encouraged to engage with the Working Group on CITES Electronic Permitting in future discussions on this topic.

6.1.3. Basis of reporting: Annual reports should, whenever possible, be compiled on the basis of actual trade rather than on the basis of permits and certificates issued, to avoid overestimation of trade volumes. The basis of reporting should be specified in the annual report; for the period 2004-2015 Ecuador did not specify the basis on which reports were compiled.

6.1.4. Adoption of standard references for orchid species: At present, CITES standard references have been adopted for only some Orchidaceae genera in trade. The lack of standard references

¹ <http://api.speciesplus.net/>

for most orchids makes the standardization of taxonomies used across Parties difficult, with implications for monitoring the impact of trade on species. Given the importance to Ecuador of orchid trade, Ecuador is encouraged to provide input into CITES plant nomenclature discussions relating orchid nomenclature, including the possible adoption of further standard references.

6.2. Management and conservation measures

6.2.1. Monitoring of the effect of CITES-listings on sharks: Recent inclusion of a number of shark species in Appendix II (including *Sphyrna lewini* [Scalloped Hammerhead Shark] and *S. zygaena* [Smooth Hammerhead Shark]) at CoP16 in 2013 provides an opportunity to monitor the effect of CITES listings on these species and any potential changes in the species composition and volume of shark landings. This could also provide a basis for the collection of information on populations to inform future management and sustainable use of this resource, including the making of non-detriment findings.

6.2.2. Monitoring recovery of sea cucumber fisheries: Efforts should continue to monitor the impact of harvests and fishing bans on populations of sea cucumbers in Ecuador, particularly in the Galápagos Islands.

6.2.3. Shark bycatch reduction measures: Shark landings are only permitted for sharks caught as bycatch. However, given the relatively high volumes of landings reported, measures should

be put in place to reduce the levels of bycatch of sharks, including the introduction of policies and/or modifications to fishing gear and procedures, such as those outlined by Cosandey-Godin and Morgan (2011).

6.2.4. Invasive species: *Lithobates catesbeianus* is listed as invasive in Ecuador according to the Global Invasive Species Database (www.issg.org) and has been implicated in the spread of chytridiomycosis, a fungal disease that has led to declining amphibian populations in Central America and elsewhere. Given the high concentration of threatened amphibians in Ecuador, measures should be put in place to reduce the risk of escape and invasion from farms breeding this species in the country.

6.3. Further work

6.3.1. Ornamental fish: An assessment should be conducted of the potential conservation implications of the ornamental fish trade from Ecuador, given the high volumes of live fish exported to the United States. The development of a method to record data relating to ornamental fish exports, including key information such as species and source of trade, would aid such an assessment and provide a basis for future management plans, if necessary.

6.3.2. Amphibian production: The CITES Authorities of Ecuador are encouraged to produce an information document to share with CITES Parties, e.g. at a future Animals or Standing Committee meeting, to share Ecuador's pioneering efforts on amphibian ranching.

6.3.3. Potentially under-utilized species: The analysis identified a number of species native to Ecuador that are exported in high volumes from other countries. Ecuador may wish to assess the potential for sustainable use of such species that are potentially under-utilized, as it has the potential to provide economic benefits and in turn may have a positive impact on the species concerned in terms of creating incentives for improved management or habitat conservation.

6.3.4. Conservation benefits of captive-breeding/ artificially propagated trade: The analysis highlighted that the majority of current CITES trade from the region is in artificially- propagated orchids or captive-bred/ranched amphibians. While trade from these sources is likely to reduce pressure on wild populations, it might also remove incentives for local communities to manage wild populations sustainably. An assessment of the benefits of captive or artificial production towards conservation, as well as of the potential for sustainable use from the wild, should be undertaken.

6.3.5. Access and benefit sharing: Excluding trade in *Isostichopus fuscus*, the main wild- sourced CITES exports were for scientific purposes and principally destined for the United States and Italy. Ecuador may wish to investigate opportunities to collaborate with relevant scientific institutions in these countries to ensure the equitable sharing of knowledge and benefits arising from Ecuador's biological resources.

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Annex A: Data Included and Methodology

This report draws together data from a number of sources, to provide a comprehensive overview of trade in wildlife from Ecuador.

CITES Trade Data

Trade data reported by Ecuador in their annual reports to CITES for the years 2005-2014 were downloaded from the CITES Trade Database on 29/06/2015. It should be noted that Ecuador did not submit its CITES annual report in 2006 and therefore no CITES data as reported by Ecuador are available for that year. Where data reported by other Parties are included, the period 2004-2013 was considered the most recent complete decade at the time of analysis, as the reporting deadline for submission of annual reports for 2014 is 31 October 2015.

LEMIS Data

Data on all wildlife and wildlife products imported into the United States from Ecuador between 2005 and 2014, as tracked by the United States Law-Enforcement Management System (LEMIS), was obtained via a Freedom of Information request on 4th August 2015. As far as possible with the data available, each entry was taxonomically classified according to accepted nomenclature, and divided into broad species groups. To ensure consistency and comparability, the units and corresponding quantities of all entries were converted to either kilograms or number of individuals.

Timber trade

Data on timber exports were obtained from the Ministry of the Environment (MAE) and from the Statistical Database of the International Tropical Timber Organization (ITTO) and the Appendices of ITTO Biennial Report 2013-2014. ITTO provided data from the database of the United Nations Commodity Trade Statistics Database (UN COMTRADE) on exports of logs and sawn timber with specific harmonized codes. ITTO also provided advice on the interpretation of these data. Because of discrepancies between the data provided by the MAE and those recorded by ITTO and UN COMTRADE, those submitted by MAE were considered more accurate and therefore used for the analysis.

Data on shark trade

Several shark species were listed in CITES as recently as 2013 and therefore, at the time of writing, there was virtually no historical CITES trade data for sharks. Data on shark trade were extracted from reports produced by MAGAP and shared by the Ministry of the Environment of Ecuador.

In addition, data on shark trade were extracted from Dent and Clarke (2015), which uses data from the Food and Agriculture Organisation (FAO) FishStatJ capture and aquaculture databases. Capture production is as reported by individual countries to the FAO, but it is worth noting that under-reporting is common,

particularly in developing countries when there is a high proportion of small- scale and/or artisanal vessels in the national fleet. Estimated import volumes are a summation of export volumes reported by the national statistics or customs authorities of China, Hong Kong SAR, India, Indonesia, Malaysia, Singapore, Thailand, Taiwan and the United States. Volumes are as reported and no adjustment has been made for water content of frozen shark fins.

Value Data

Estimated unit values for importing countries were derived from annual import of shark fins in tonnes and annual import of shark fins in thousands of US \$ (tables 2 and 3 in Dent and Clarke, 2015), which are based on FAO 2013 data. These unit values give snapshot unit price estimates for each country for each year, but as they are at the level of importers, they do not reflect variations in prices from different exporters, and do not necessarily accurately value Ecuador's specific export prices. Value data included in SRP (2009) are also presented.

Data on amphibian trade

In addition to trade data on CITES-listed amphibian species reported in the annual reports to CITES, data on international and domestic amphibian sales were provided in August 2015 by WIKIRI (wikiri.com.ec), an Ecuadorian commercial enterprise dedicated to legal and sustainable trade of amphibians, locally and internationally.

Trade data provide by WIKIRI was limited to the five-year period September 2010-August 2015, and was a summary of all trade during that period, as opposed to individual transactions.

Data from the United States Law Enforcement Management Information System (LEMIS) for wildlife and wildlife products indicated that *Lithobates catesbeianus* (reported as *Rana catesbeiana* in the LEMIS dataset) was exported to the United States in considerable volumes. Since *Lithobates catesbeianus* is not a CITES-listed species, the LEMIS data is the only consistent and reliable source of data for trade in this species, and as a result, only exports to the United States could be analysed as opposed to a global analysis.

Value Data

The dataset provided by WIKIRI included unit prices for each species, but these prices were not specific to any given year during the trading period, and there was no indication of variation in prices over time. As such, no inflation factor could be applied. We have therefore assumed a constant price per species over the entire period, equal to that given in the WIKIRI data.

Price data for *Lithobates catesbeianus* was sourced from the Cultured Aquatic Species Information Programme factsheet for *Lithobates catesbeianus* (Flores Nava, 2005). This factsheet, written in 2004, was the best source of reliable data that could be identified and stated that wholesaler prices ranged between US \$2.25-3.75 per kg of whole frog. In order to assign this price data

to the LEMIS export data, inflation factors from the US Inflation Calculator (<http://www.usinflationcalculator.com/>) were applied for each year of trade analysed. As *Lithobates catesbeianus* trade data from LEMIS were recorded in number of bodies, a weight conversion of 0.4 kg per individual, as provided in Schloegel *et al.* (2009), was used in order to apply the available price data per kilogram.

Orchid Valuation

Orchid price data for 2015 was obtained from Ecuagenera (<http://www.ecuagenera.com/>), Ecuador's leading and largest supplier of orchids. Price data were assigned to CITES trade data for the period 2005-2014 on the basis of the methods below.

In order to correct for inflation, an inflation factor was applied to the 2015 species prices, depending on the year of trade. Cumulative rates of inflation were obtained from the US inflation calculator (<http://www.usinflationcalculator.com/>).

Price data with zero price values were omitted from the analysis.

Exporter-reported CITES trade data were used, with only live exports reported in number included in the analysis.

Where the species names in the price database and the CITES Trade Database matched exactly, the species price was assigned.

In cases where:

- a) no species-level price data were available in the price database;
- b) no species-level taxonomic data were available in the CITES Trade Database;
- c) and, an intra-genus hybrid was reported in trade in the CITES Trade Database, a genus median price was calculated and assigned. This median was calculated using price data from only true species and intra-genus hybrids (according to Ecuagenera's allocation).

In cases where:

- a) no genus-level price data were available in the price database;
- b) no genus-level taxonomic data were available in the CITES Trade Database and Orchidaceae median price was calculated and assigned. This median was calculated using price data from all Orchidaceae species, excluding any inter-genus hybrids (according to Ecuagenera's allocation).

In cases where an inter-genus hybrid was entered into the CITES database, an Orchidaceae hybrid median price was calculated and assigned. This median was calculated using price data from all Orchidaceae inter-genus hybrids (according to Ecuagenera's allocation).

The values derived from this methodology are based on the following assumptions:

- The sample of species and hybrids for which price data is available in the Ecuagenera price list are representative of the entire population of species, hybrids, and their respective genera in the Orchidaceae family.
- Ecuagenera's allocation of which species are true species or intra-genera hybrids and which species are inter-genera (i.e. Orchidaceae) hybrids is accurate.
- There is no systematic variation between prices for true species and prices for hybrids that are within the same genera.

Trade in native species

All direct exports of species native to Ecuador (according to Species+), whether exported by Ecuador or other Parties for the years 2004-2013, were extracted from the CITES Trade Database on 12/08/2015. Data were not included for 2014 as, while Ecuador has submitted an annual report for this year, the deadline for submission of reports for 2014 is 31 October 2015 and therefore the 2014 dataset is considered incomplete. During the analysis, trade reported by exporters was used; "wild-sourced" includes trade reported as source "W", "R", "U" and trade reported without source, while "captive-produced/artificially propagated" includes trade reported as source "A", "C", "D" and "F".

Internet survey

A web survey was undertaken to assess the trade and demand for wildlife from Ecuador for sale both inside Ecuador and in the United States (a main importer of Ecuadorian wildlife). Web surveys consisted of the use of the US and EC Google search engines (google.com and google.com.ec respectively). Searches were performed in Spanish and in English using wildlife terms such as "shark", "bird", "reptile", "frog", "snake", "turtle" and "tortoise" combined with terms such as "buy", "wanted", "for sale", "pet" and "exotic" in English, and terms such as "tiburon", "aves", "pájaro", "reptil", "rana", "serpiente" and "tortuga" combined with terms such as "comprar", "doméstico", "mascotas" "exóticas" and "huevo" in Spanish. "Fin" was also used in combination with shark-related searches to produce results for shark fin products. Search results were followed up to the tenth page of results.

Annex B: CITES Source codes

Code	Description
A	Plants that are artificially-propagated in accordance with Resolution Conf. 11.11 (Rev. CoP15), as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5 (specimens of species included in Appendix I that have been propagated artificially for non-commercial purposes and specimens of species included in Appendices II and III)
C	Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5
D	Appendix-I animals bred in captivity for commercial purposes in operations included in the Secretariat's Register, in accordance with Resolution Conf. 12.10 (Rev. CoP15), and Appendix-I plants artificially-propagated for commercial purposes, as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 4, of the Convention
F	Animals born in captivity (F1 or subsequent generations) that do not fulfil the definition of “bred in captivity” in Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof
I	Confiscated or seized specimens
O	Pre-Convention specimens
R	Ranched specimens: specimens of animals reared in a controlled environment, taken as eggs or juveniles from the wild, where they would otherwise have had a very low probability of surviving to adulthood
U	Source unknown (must be justified)
X	Specimens taken in “the marine environment not under the jurisdiction of any State”
W	Specimens taken from the wild

Source: Resolution Conf. 12.3 (Rev. CoP16)

Annex C: Methodology for Species Showing Noteworthy Trends

The process of selection of species for inclusion in this section was based on proposed revisions to the methodology for selecting species under the “extended analyses” of the CITES Review of Significant Trade process by the CITES Advisory Working Group on the Evaluation of the Review of Significant Trade.

Data Included

All exporter-reported direct exports from wild, ranched and “unknown” sources, as well as trade reported without a source specified, were considered. Commodities that cannot easily be related to numbers of individuals (e.g. feathers, hair, specimens) were not included within the selection process, with the exception of certain commodities² that were considered to be traded in sufficiently high quantities to merit further scrutiny.

² Bark, caviar, extract, meat, musk, powder, raw corals, roots, timber and wax.

Selection Criteria

The criteria for selection of species showing noteworthy patterns of trade are summarized in Figure 31, followed by a detailed description of each criterion. Species were selected for inclusion if they met at least one of the criteria.

High Volume

Species qualified for selection on the basis of “high volume” trade if exports during 2012 exceeded pre-determined thresholds based on

taxa-wide assumptions of general reproductive biology (Table 8).

High Volume (globally threatened)

The high volume trade thresholds were adjusted for all species categorized as Critically Endangered (“CR”), Endangered (“EN”), Vulnerable (“VU”), Near Threatened (“NT”) or Data Deficient (“DD”) in the 2015 IUCN Red List of threatened species (Table 8).

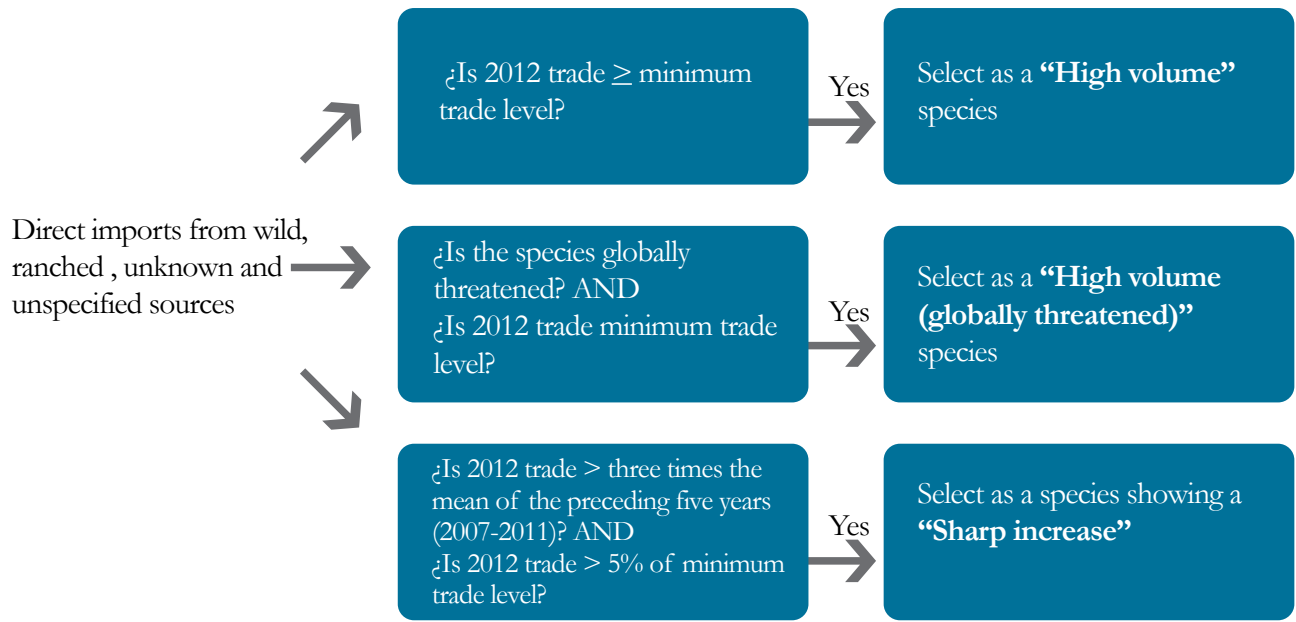


Figure 31. Criteria for selection of species showing noteworthy patterns of trade.

Table 8. Minimum quantity of specimens from wild, ranched, unknown and unspecified sources exported in 2012 to qualify for selection on the basis of high trade volume.

CITES Appendix / IUCN Red List status							
Taxonomic group	I	II		III		I/II/III (kg)	
		CR, EN, VU, NT, DD*	-	CR, EN, VU, NT, DD*	-	CR, EN, VU, NT, DD*	-
Mammals	50	50	5,000	50	25,000	50	5,000
Birds	50	50	5,000	50	25,000	50	5,000
Reptiles	50	50	25,000	50	50,000	50	25,000
Amphibians	50	50	25,000	50	50,000	50	25,000
Fish	50	50	25,000	50	-	50	25,000
Invertebrates (non-corals)	250	250	25,000	250	50,000	250	25,000
Corals	-	10,000	25,000	10,000	50,000	10,000	25,000
Plants (non-trees)	250	250	25,000	250	50,000	250	25,000
Plants (trees)	250 m ³	250 m ³	500 m ³	250 m ³	2,500 m ³	2,500	25,000

* CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, DD = Data Deficient according to IUCN Red List (<http://www.iucnredlist.org/>)

Sharp Increase

Species qualified for selection on the basis of a sharp increase in trade if the volume of importer-reported imports during 2012 was more than three times the average trade volume of the preceding five-year period (2008- 2012). Species that, despite a sharp increase in trade, were still only traded in very low volumes in 2012 (less than 5% of the high volume thresholds, not taking into account threat status; see Table 7), were not selected on the basis of this criterion. Newly-

listed species, or species newly named following a nomenclature change, that met this criterion artificially due to the absence of trade records in previous years were also excluded.

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