Flying Under the Radar

Wildlife Trafficking in the Air Transport Sector

Mary Utermohlen & Patrick Baine

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The USAID Reducing Opportunities for Unlawful Transport of Endangered Species (ROUTES) Partnership brings together government agencies, transportation and logistics industry companies and representatives, international conservation, development and law enforcement organizations and donors in order to disrupt wildlife trafficking activities, and forms a key element of the concerted international response to addressing wildlife poaching and associated criminal activities worldwide.

At the heart of ROUTES is a core group of partners collaborating with the U.S. Government and the transport sector that includes the Center for Advanced Defense Studies (C4ADS), Freeland, the International Air Transport Association (IATA), TRAFFIC, and WWF. The Partnership is funded by USAID and coordinated by TRAFFIC.

For more information on the ROUTES Partnership visit www.routespartnership.org.

ABOUT C4ADS

C4ADS (www.c4ads.org) is a 501(c)(3) nonprofit organization dedicated to data-driven analysis and evidence-based reporting of conflict and security issues worldwide. We seek to alleviate the analytical burden carried by public sector institutions by applying manpower, depth, and rigor to questions of conflict and security.

Our approach leverages nontraditional investigative techniques and emerging analytical technologies. We recognize the value of working on the ground in the field, capturing local knowledge, and collecting original data to inform our analysis. At the same time, we employ cutting edge technology to manage and analyze that data. The result is an innovative analytical approach to conflict prevention and mitigation.

ABOUT ROUTES AND *Flying Under the Radar*

Under the ROUTES Partnership, C4ADS aims to identify and track wildlife trafficking trends and modus operandi, as well as assess the effects of ROUTES' efforts. In Year 1, the Partners have focused on trafficking through the air transit sector, and thus this report examines the trends, transit routes, and modus operandi used by wildlife smugglers exploiting the aviation industry. To ensure the relevance of our analysis to the current state of wildlife trafficking and guarantee a timely delivery of our results prior to Year 2, C4ADS has focused initially on trafficking of ivory, rhino horn, reptiles, and birds by air from 2009 to August 2016. Future ROUTES reports will examine a broader scope of wildlife trafficking activity. This report will establish a baseline for continued analyses in Years 2 through 5 of the ROUTES project.

LEGAL DISCLAIMER

The mention of any individual, company, organization, or other entity in this report does not imply the violation of any law or international agreement, and should not be construed as such.

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Executive Summary

Environmental crime is estimated to be worth between $91 and 258 billion, with wildlife crime making up $7 to 23 billion of the total,[i] and is currently estimated to be growing at two to three times the speed of the global economy.[ii] Over the past few years, myriad studies and reports have examined the economic and environmental devastation wreaked by wildlife crime, as well as its intertwining links to transnational criminal networks.[iii] [iv] Few studies, however, have focused on the transport systems used by wildlife traffickers, despite the large benefits that traffickers have gained from the increasing interconnectedness of global infrastructure and transport systems. Flying Under the Radar examines wildlife trafficking through the air transport sector, and is designed to support law enforcement and the private sector's efforts to stem the hidden flow of illegal wildlife through their jurisdictions and supply chains.

Given the covert nature of illegal activity, wildlife traffickers' past, current, and potential future moves must be assessed by obtaining and analyzing detailed wildlife seizure data. Where this data exists, however, it exists largely in partial and incomplete form, or held disparately and privately by various intergovernmental organizations and enforcement agencies. To mitigate this challenge, C4ADS' analysts spent three months building a baseline of information by collecting and structuring open source seizure data for four categories of wildlife and wildlife products (ivory, rhino horn, live reptiles, and live birds). These categories were specifically chosen based on data availability and trafficking frequency, and collectively account for about 66% of trafficked wildlife products, according to the United Nations Office on Drugs and Crime (UNODC).[v] C4ADS' analysts collected the majority of this data from country reporting and news media, as most seizure databases do not provide the requisite detail for inclusion in an assessment of air trafficking.

The use of seizure data, while currently the best method available for investigating trafficking activity of all types, can lead to a variety of mistaken conclusions. For instance, better public seizure reporting may create the appearance of a trafficking problem where none exists. Still, seizure data, taken together with the appropriate caveats, provides a good picture of overall trafficking activity, and can be used to direct future anti-trafficking efforts.

Wildlife trafficking is a global problem that takes advantage of enforcement loopholes, lack of awareness, limited public and private sector coordination, capacity gaps, and lagging technology and procedures to move illicit products through the licit transportation system. As international travel continues to exponentially increase, particularly in the air transport sector, enforcement and the private sector should make immediate changes to better stem the international flow of illicit wildlife. Without such changes, wildlife traffickers will continue to find the illegal wildlife trade a profitable, comparatively easy and low-risk enterprise, at substantial detriment to ecosystems, economies, and global security.

Flying Under the Radar is divided into three main sections:

- *Trends and Totals* examines the overall conclusions that can be drawn from the seizure data contained within the C4ADS Air Seizure Database, such as the changes in seizure sizes over time, a Country Enforcement Index for countries involved in twenty or more trafficking instances, and an analysis of the number of trafficking instances per country.
- *Airports and Routes* maps out the international and domestic transit routes that appear in our data, evaluates countries' roles in different illicit wildlife supply chains, and assesses airport seizure numbers.
- *Modus Operandi* details the common methods used by traffickers, as well as methods that seem to be specific to one category of wildlife and wildlife products.

Introduction

Wildlife trafficking is one of the most prominent forms of international organized crime in the world, ranking just behind drugs, human, and arms trafficking in estimated annual value.[vi] The illegal wildlife trade is driven by both legal and illegal demand for wildlife products. A 2016 UNODC report found that traffickers that launder their illicit goods through legal commercial systems have access to substantially larger demand markets than those relying on the black market alone.[vii] The size of the legal wildlife trade can therefore give some indication of the growth of illegal wildlife trafficking; according to one estimate, the legal trade in wildlife products grew from around $60 billion in the 1990s to over $323 billion in 2009, a 438% increase.[viii]

Demand for a number of protected species and illicit wildlife products have experienced a similar upswing; ivory trafficking in particular has undergone a well-documented rise. A 2013 study by Fiona Underwood, Robert Burn, and Tom Milliken found that ivory trafficking was "rapidly increasing and at its highest level for 16 years, more than doubling from 2007 to 2011 and tripling from 1998 to 2011."[ix] Another Underwood, Burn, and Milliken report from September 2016 found that ivory trafficking activity, as measured by seizure weights, continued to increase through 2015, appearing to almost triple between 2007 and 2015.[x] The recently completed Great Elephant Census, a series of country surveys on the number and distribution of remaining African elephant populations, found that overall, "Savanna elephant populations declined by 30 percent (equal to 144,000 elephants) between 2007 and 2014."[xi] The Census stated that "devastatingly low numbers of elephants were found in northeastern Democratic Republic of Congo, northern Cameroon and southwest Zambia," so low, in fact, that researchers believe those populations currently face extinction.[xii] Other countries, such as Tanzania and Mozambique, lost substantial numbers of elephants – Tanzania alone lost as much as 60% of its elephant population, down from 109,051 in 2009 to 43,330 in 2014.[xiii]

Less well-documented, but just as urgent, trafficking of other wildlife species seems to have mirrored the surge in ivory trafficking. Rhino horns, for instance, frequently move along the same routes as ivory due to the animals' overlapping habitats and their associated demand countries (primarily China, Vietnam, and Thailand).[xiv] As a result, rhinos are frequently targeted by the same or connected trafficking networks, and have experienced catastrophic declines of their own within a similar timeframe. According to Save the Rhino, "By the end of 2015, the number of African rhinos killed by poachers had increased for the sixth year in a row with at least 1,338 rhinos killed by poachers across Africa…"[xv] The number of rhinos poached within South Africa alone exploded from 13 in 2007 to 1,215 in 2014.[xvi]

In addition to the current plight of elephants and rhinos, many other species are suffering, and, in some cases, have been pushed to the brink of extinction due to pressure from the illegal trade in wildlife and wildlife products. For example, the helmeted hornbill was up-listed from Near Threatened to Critically Endangered in 2015, in large part due to "intense hunting pressure" by traffickers interested in profiting off the hornbill's casque.[xvii] The population of the ploughshare tortoise, a critically endangered and highly coveted species for the pet trade, has fallen 25% over one generation to a current estimate of 200 mature individuals.[xviii]

Air Transport Sector

Enforcement and customs agencies at airports around the world are struggling to keep up with growing security and illicit goods concerns associated with rapidly increasing passenger and cargo traffic. For example, covert testing of United States' airports enforcement success rates in 2015 found that security screeners failed to identify banned material in 95% of instances.[xix] The resulting investigation by the US Transportation Security Administration (TSA) found that "Pressures driven by increasing passenger volume, an increase in checkpoint screening of baggage due to fees charged for checked bags as well as inconsistent or limited

enforcement of size requirements for [bags]...create a stressed environment at airport checkpoints."[xx] With yearly passenger traffic expected to double to 7.2 billion by 2035,[xxi] these problems will only intensify without a substantial effort to upgrade and modernize airport security procedures.

Traffickers can exploit capacity problems, corruption, and other issues within the air transport sector to move products, from something as small as an ivory bangle, to rhino horns wrapped in foil in a suitcase, to a two-ton cargo shipment. Different enforcement strategies are needed depending on which specific transport method (passenger, luggage, air freight) is chosen. Air freight shipments, for example, must be accompanied by documentation like an air waybill. Ivory shipped as cargo will therefore leave a trail of paperwork behind, likely complete with falsified information and other red flags that can be identified with the proper training or technology. By contrast, passengers carrying live animals may be identified by suspicious behavior, full-body scanners, or physical searches. Knowing how contraband is likely to be moving is therefore instrumental to preventing trafficking through airports.

An airport's exposure to trafficking of illicit goods can generally be determined by assessing the airport's size, flight routes, screening procedures, and infrastructure. Large international ports with lax screening procedures for trafficked goods, but many connecting flights, are at the highest risk;[xxii] these airports present traffickers with both plentiful flight options and a low risk of interdiction. Of those high-risk airports, the ones that are in the process of expansion are some of the most vulnerable. Traffickers seem to pay particular attention to opening flight routes, perhaps believing that enforcement and staff along new routes will be less aware of the wildlife trafficking risk than those on well-established ones.[xxiii]

Traffickers' need for a diverse assortment of international flights leads them to frequently use large, international hub airports. Dubai Airport in the United Arab Emirates, for instance, is the busiest airport by passenger traffic in the world, seeing 77.5 million passengers in 2015.[xxiv] The UAE is also the only country that appears as a prominent country for each category covered in this report, likely due at least in part to Dubai's advanced airport screening technologies.

For wildlife trafficking specifically, an airport's location will also determine the type and number of illegal wildlife and wildlife products that move through it. For example, Jomo Kenyatta Airport in Kenya is the ninth busiest airport in Africa,[xxv] and has the most seizures of any of the airports within C4ADS' Air Seizure Database. It is the busiest airport in a strategic location on the East Coast of Africa,[xxvi] with a large number of international flights that enable traffickers to move ivory and rhino horn from West, Central, or Southern Africa through Jomo Kenyatta to Asian hubs like Suvarnabhumi Airport in Bangkok.

Convergence with Criminal Networks

The high profits and low risk associated with trafficking through airports have attracted the attention of sophisticated criminal networks. These criminal organizations are able to exploit high corruption levels in some airports to move large quantities of illicit goods frequently. In one instance, a Chinese national was arrested in Guangzhou Baiyun Airport on his way back from Nigeria with 39.5 kilograms of ivory and 30.95 kilograms of rhino horn.[xxvii] The suspect told police, "Nigeria probably has the world's most relaxed custom regulations. You don't even need to be present to check your luggage."[xxviii] He was later linked to a Lagos-based trafficking syndicate that had allegedly completed 18 successful shipments to Guangzhou buyers in one year.[xxix]

In other instances, wildlife trafficking networks utilize the same individuals, routes, and modus operandi as other illicit networks. A number of seizures have highlighted the overlap between narcotics and wildlife

trafficking supply chains in particular. In June of 2010, officials at Kuala Lumpur Airport discovered 285 radiated tortoises, 14 spider tortoises, and one ploughshare tortoise packed in two suitcases with drugs.[xxx] All three species are listed under CITES Appendix I.[xxxi]

The involvement of organized criminal syndicates in wildlife trafficking subverts developing economies, and presents a substantial security risk to airports.

Health Risks

Beyond the environmental, economic, and security implications of wildlife trafficking, the illicit trade in live animals presents a potential health risk to other animals and even humans. International and national health agencies and organizations have instituted policies intended to mitigate the danger of imported live animals carrying infectious diseases from their countries of origin. For example, birds can reportedly carry over 60 diseases that are transferrable to humans, including Salmonellosis, E. coli, avian tuberculosis, and multiple bird flu virus strains.[xxxii] [xxxiii] [xxxiv] One strain, H5N1, has a mortality rate of about 60% according to the World Health Organization.[xxxv] To combat this risk, the United States Department of Agriculture (USDA) currently prohibits the importation of birds or bird eggs from 49 different countries "due to the presence of highly pathogenic avian influenza."[xxxvi] Wildlife traffickers, however, do not burden themselves with the paperwork and procedures necessary to ensure the health of their cargo: 38% of seizures contained within the bird category of C4ADS' Air Seizure Database originated in one of these 49 prohibited countries.

Wildlife Trafficking & Seizure Data

The trends, transit routes, and modus operandi associated with wildlife trafficking are intrinsically difficult to track – traffickers do not publicize their best practices. Seizure data, however, provides a window into the otherwise opaque world of trafficking activity. Compiling detailed seizure data over time allows for analysis of traffickers' techniques and the flight routes they most frequently exploit, along with their evolution over time.

C4ADS acknowledges, however, a system-wide lack of consistent, accurate, adequately detailed, and publicly available seizure information[xxxvii] for wildlife trafficking and similar crimes. A report released in September 2016, *A review of global trends in CITES live wildlife confiscations*, notes the utility of seizure data for enforcement efforts and describes one of the largest inhibitors preventing comprehensive and detailed seizure analysis:

> In order to effectively detect, monitor and address [the illegal wildlife trade (IWT)], national authorities require detailed centralized information (such as the source, date, location, species, quantity, intended destination and purpose) regarding seized shipments (UNODC 2012). Currently, a small number of countries are reported to maintain national databases that record such information (UNODC 2012)…However, of the existing IWT databases, only seizure information from the Convention on International Trade in Endangered Species of Flora and Fauna (CITES) trade database is currently made fully available to the public for subsequent interpretation and analysis.[xxxviii]

Although several wildlife seizure databases exist, those that are publicly available lack the detail necessary for incorporation into the C4ADS Air Seizure Database. In particular, the databases that C4ADS examined lacked transit method information, preventing C4ADS analysts from identifying seizures made in the air transport sector. For example, the following databases, while useful for certain purposes, could not be used for this report:

- *CITES Trade Database:* While the publicly available CITES Trade Database contains hundreds of

thousands of seizures, it does not specify seizures made by air, land, or sea, nor does it provide sufficient detail to cross-reference seizures to avoid duplication. Furthermore, not all CITES signatories report to the Management Authority as requested, and even for those countries that do report, CITES notes that seizure information is "often absent or provided in insufficient detail."[xxxix]

- *US Fish and Wildlife Service's (FWS) LEMIS Database:* C4ADS received extensive data from the LEMIS database, which tracks all wildlife seizures within the United States, through a Freedom of Information Act (FOIA) request. Although the seizures could be sorted by location (e.g. New York), the seizures were not separated by air, land, or sea transit (e.g. John F. Kennedy Airport versus the Port of New York), and therefore could not be incorporated in our analysis. C4ADS will be submitting a second FOIA request for a more detailed version of the data.

- *The Elephant Trade Information System (ETIS) Database:* The ETIS Database records all seizures of elephant specimens reported to CITES beginning in 1989, and is managed by TRAFFIC on behalf of CITES.[xl] Although the Database is likely the most comprehensive database on ivory seizures in the world, it is not publicly available.

- *The European Union (EU) Trade in Wildlife Information Exchange (TWIX):* The EU-TWIX database holds all seizures reported by the 28 EU Member States.[xli] The database is only available to wildlife law representatives from within the EU.

Even when detailed seizure data is available, the data itself is vulnerable to a number of inherent biases. For example, wildlife seizures are more likely to occur in jurisdictions where enforcement officials are aware of and trained to look for wildlife trafficking, which may lead to the perception that trafficking is worse in areas with better enforcement. In prominent transit jurisdictions, where enforcement has limited ability to screen passengers and shipments between flights, officials are less likely to make seizures, leading either to a lack of emphasis on those areas in the data, or creating the appearance of ineffective enforcement. A more detailed discussion of the various drawbacks of seizure data can be found in the **Methodology** and **Appendix I: Seizure Data Biases & Vulnerabilities**.

In *Flying Under the Radar,* we analyze the seizure data in C4ADS' Air Seizure Database to identify evident wildlife trafficking trends, while taking into account biases in the data. In some places, we rank countries, airports, and transit routes by 'prominence' – in other words, prominence within the Database – with the understanding that a more complete dataset could provide different results. The majority of our analysis should be interpreted similarly; our findings showcase the patterns visible within our Database, and should not necessarily be construed to be more broadly applicable.

Still, seizures provide enforcement and the public with a rare window into the day-to-day operations of traffickers. Compiling and analyzing seizures by type or category can begin to 'pull back the veil' shrouding illicit supply chains in secrecy, illuminating previously unknown aspects of trafficking and providing enforcement agencies with valuable information. Crafting anti-trafficking strategies based on this information may improve the likelihood that the illicit wildlife trade through airports can be stopped.

Methodology

This report is intended to provide insight into the mechanisms that allow, abet, or fail to stop wildlife trafficking through the air transport sector, focusing in particular on the most common trends, routes, and modus operandi utilized by wildlife traffickers. The information within this report is based on C4ADS' Air Seizure Database, which covers seizures from January 2009 to August 2016. The Database was compiled over a period of three months through extensive, multilingual open source[xlii] research conducted by C4ADS analysts and supplemented wherever possible by additional resources, including correspondence with law enforcement personnel and other organizations in the anti-wildlife trafficking sphere.

Throughout *Flying Under the Radar,* we refer to the data contained within the Database as both 'seizures' and 'trafficking instances.' We use the term 'seizures' to refer to the physical interdiction of wildlife or wildlife products within an airport, whereas 'trafficking instances' refer to seizures in a broader context; for instance, if a country makes no seizures but experiences a lot of trafficking activity through its airports, it would be inaccurate and misleading to quantify that trafficking activity in terms of number of seizures (e.g. 'Country X has 10 seizures, but made none'). Instead, we would attempt to quantify that activity in terms of 'trafficking instances', or the number of times illegal wildlife traffickers or shipments moved through or were intended to move through a specific country or airport (e.g. 'Country X has 10 trafficking instances, but made no seizures').

The Data

C4ADS chose to focus on ivory, rhino horn, live reptiles, and live birds in particular to establish a baseline of information that can be built upon moving forward. Focus on these particular species and categories, rather than the entirety of wildlife trafficking, allows us to obtain results that are both detailed and broadly representative of wildlife trafficking.[xliii] Together, these four categories represent 66% of trafficked wildlife products in UNODC's World Wildlife Seizure Database (World WISE).[xliv]

The number of seizures contained within each category in the C4ADS Air Seizure Database varies for a number of reasons. First, reporting standards vary by category. For example, given the popularity of elephants and their increasingly well-documented plight, ivory seizures are more likely to receive media attention than, for instance, a seizure of two endangered canaries. Second, the number of seizures in each category is in part determined by the characteristics of the animal being trafficked, such as the size of the species' population, or the ease of transporting a particular species or product. For example, rhino horn is trafficked far less frequently, and in far fewer numbers, than ivory and other animal products, in large part due to the inherent difficulty in obtaining rhino horn.

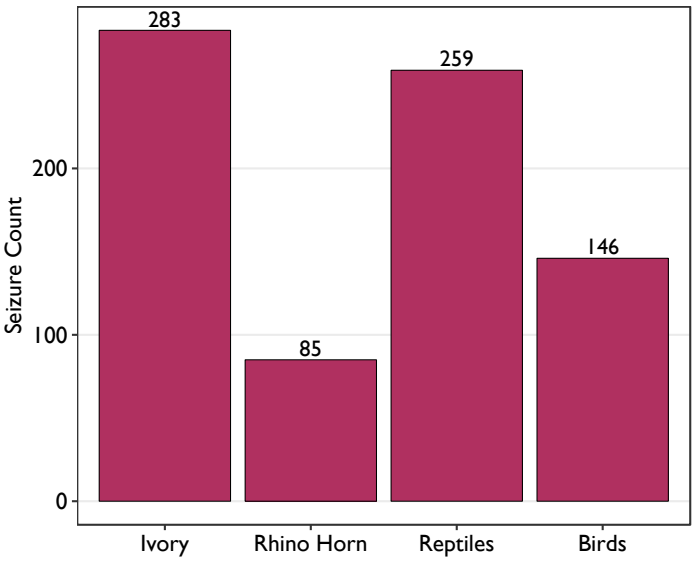


Figure 1. Number of air seizures contained within the C4ADS Air Seizure Database by category

All four categories are plagued by a lack of publicly available, detailed seizure data to varying extents. Ivory and rhino horn seizures receive the most media attention and are therefore the most complete, while information on reptile and bird seizures is by far the least detailed. Many seizures are reported simply as seizures of 'birds', or 'snakes' without much additional information. This kind of reporting can be challenging to incorporate in our analysis, as it lacks species, transit, or transport method information, which is critical to an analysis of trafficking trends. We have worked to overcome this information gap by researching every seizure we identified in order to obtain as much supporting evidence for each as possible.

C4ADS compiled information on each seizure's date, location, weight or quantity, species, detailed transit route information (city-specific wherever possible), obfuscation method, transport method, manner of detection, airline and flight number, and any relevant additional information. We defined 'transport method' as passenger clothing/items, checked luggage, or air freight, and 'obfuscation method' as the way in which contraband had been concealed (e.g. inside a shipment of timber). Some categories, like seizure location, seizure airport, and transport method, were available for well over three quarters of the seizures, while other categories, like obfuscation method, method of detection, and airline, were available for less than a quarter of the seizures we collected.

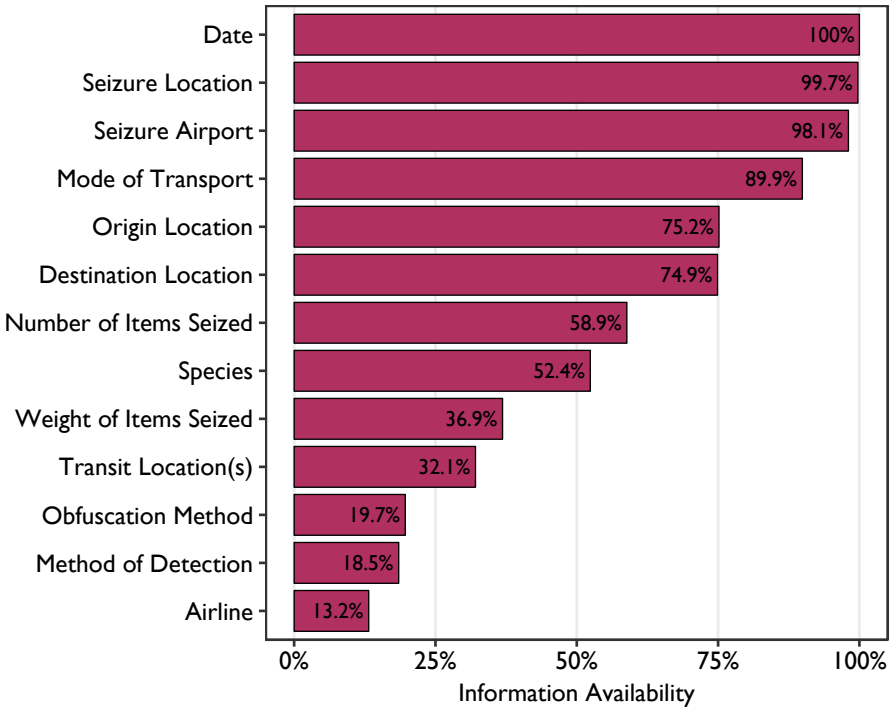


Figure 2. Data availability for each seizure within the C4ADS Air Seizure Database

The publicly available resources we used for this report included, but were not limited to:

- Local news reports
- CITES annual reports
- Robin des Bois's *On the Trail* Bulletins
- TRAFFIC Bulletins
- Academic or statistical reports (e.g. CITES ETIS reports, etc.)

As mentioned above, C4ADS analysts cross-referenced seizures across multiple sources whenever possible. Photos and videos in particular were used to verify reported seizure information, and were stored in the Database alongside relevant seizures. C4ADS analysts also relied on some confidential seizure information. This information was used to better understand our results and support our findings, although no confidential data is specifically discussed within the report.

The methodology for specific graphs and graphics from each section can be found in the appendices. The majority of the graphics developed for this report were made using R 3.3.1.[xlv] See **Appendix II: R Packages** for the R packages we used.

Data Gaps & Biases

The accuracy of the data compiled within these categories, and as a result C4ADS' associated analysis, is dependent on a variety of factors. Some airports and countries more proactively report on wildlife seizures, leading to an overrepresentation of those locations in the Database. Other countries simply have better enforcement, while still other countries have effective customs and security agencies at their ports but do not prioritize the identification of illegal wildlife. In other cases, seizures are frequently reported on, but the available seizure information is contrasting, inaccurate, or incomplete. Some jurisdictions frequently report on seizures, but fail to release crucial information, such as transit routes or transport method, further affecting the accuracy of the data. We did not include any aggregated seizure information (e.g. 'Between 2013 and 2015, 100 ivory seizures were made at X Airport') to prevent double-counting seizures, and because aggregate seizure numbers tell us little about wildlife trafficking trends, routes, or modus operandi.

One of seizure data's biggest failings is inherent to its very nature – seizures only capture trafficking strategies that have been ineffective. As a result, seizure information may reflect trafficking methods that are already known to enforcement, but entirely miss the most effective smugglers and their contraband. Furthermore, media reports on seizures are more likely to cover the most newsworthy trafficking instances – generally either large-scale shipments or unusual trafficking attempts (e.g. birds hidden in a smuggler's underwear). Small-scale, mundane trafficking, such as a couple ivory bangles carried by unwitting tourists, is far less likely to be reported on and reach the open source.

Another significant downside to seizure data is its frequent inability to determine the cause of trafficking patterns. For instance, it is often impossible to tell whether airports with high seizure counts are making so many seizures because of extremely effective enforcement strategies, or if the volume of trafficking through those airports is high enough or blatant enough to create the appearance of effective enforcement. Even so, identifying detailed route information for seizures (i.e. where did a shipment originate, what airports did it transit through, and what airport was it destined for) can help clarify this issue by revealing which airports frequently fail to stop contraband along each route. Further discussion of the various biases and failings of seizure data can be found in **Appendix I: Seizure Data Biases & Vulnerabilities.**

Despite these disadvantages, seizure data provides valuable insight into traffickers' operations. Adequately detailed and carefully interpreted seizure data can even compensate for some of its shortcomings. As a result, we base our analysis on detailed seizure data, but provide caveats as appropriate.

Trends and Totals

Identifying and tracking patterns in combined seizure data provides insight into international wildlife trafficking and how it has shifted, or remained the same, over time. This type of information has myriad uses. It can, for example, direct anti-poaching efforts on the ground as emerging poaching and trafficking hot spots shift, help enforcement agencies anticipate the most likely next moves of trafficking networks, and track relative enforcement success rates over time. In this section, we examine the geographic spread of wildlife trafficking, as well as fluctuations in the number and size of seizures made each year. Overall, according to C4ADS' Air Seizure Database, 114 countries had at least one instance of wildlife trafficking in the air transport sector between January 2009 and August 2016.

The following heat maps are a representation of the number of known trafficking instances associated with each country. Each instance is included in the maps using its country-level route information (origin, transit, and destination location), rather than its seizure location. For instance, if a cargo shipment was stopped at its origin in Uganda, we counted Uganda as its *origin* location. Similarly, if an individual was caught carrying baby birds through an airport in Brazil on their way from Peru to the United States, we counted Brazil as a *transit* location, Peru as an *origin* location, and the United States as a *destination* location for that trafficking instance. If neither origin, nor transit, nor destination information was available for a trafficking instance, it could not be included in the heat maps. The *origin* location was defined as the origin of the shipment, rather than the origin of the wildlife or wildlife product, which we defined as the *source*. Of the seizures within the Database, 120, or 15.5%, are not represented in Figure 3 due to a lack of trafficking instance information.

Figure 3 maps all of the countries that illegal ivory, rhino horn, reptile, or bird traffickers moved or intended to move their contraband through between January 2009 and August 2016, according to the C4ADS Air Seizure Database. The media and enforcement attention given to ivory, and as a result, the comparatively high number of ivory seizures within our Database, may have led to an overrepresentation of Africa and Asia in the above heat map.

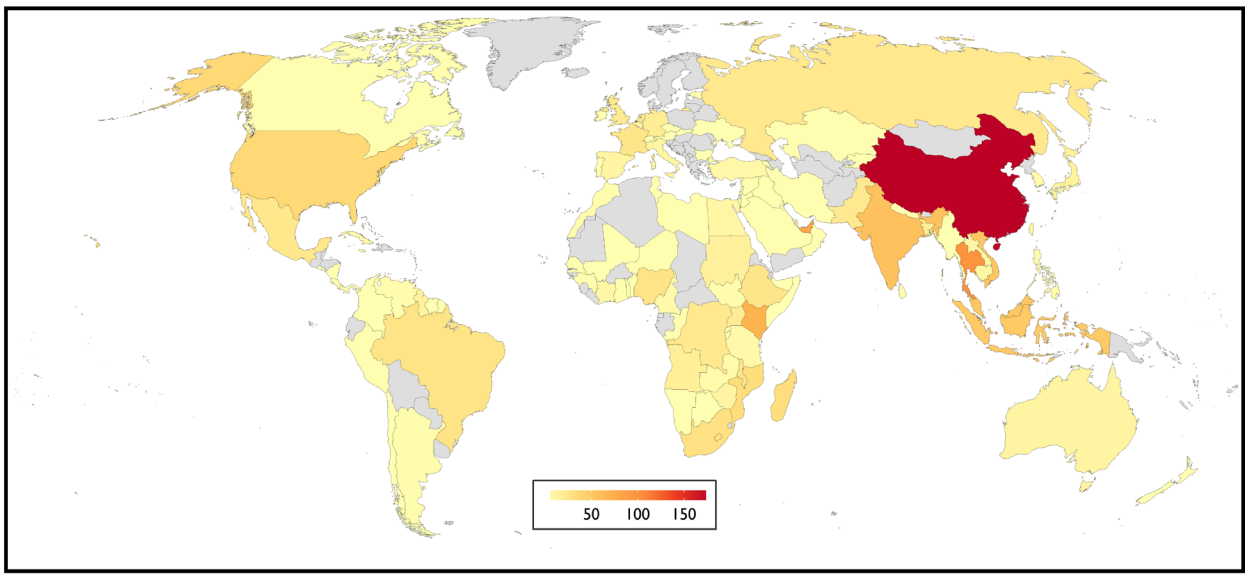


Figure 3. Global heat map for all trafficking instances in the air transport sector between January 2009 and August 2016

The heat map represents the total number of times that a successful or planned trafficking instance was recorded for each country. The map includes instances where the product did not actually enter a country because it was seized earlier in the route.

East and Southeast Asian countries constitute six of the top ten countries ranked by number of air trafficking instances in Table 1. China stands out in particular in this analysis with the most instances of wildlife trafficking overall. The disparity in trafficking instances between China and the other countries is in part caused by its central role in the ivory trade, which constitutes 101 out of China's 174 total trafficking instances. Other countries, such as Kenya and the United Arab Emirates (UAE), have had a high number of trafficking instances due to their role as transit points for products destined for markets in Asia.

Country	**Sum**
China	*174*
Thailand	*102*
United Arab Emierates	*82*
Kenya	*69*
India	*57*
Vietnam	*53*
Malaysia	*52*
Indonesia	*49*
USA	*36*
Mozambique	*32*

Table 1. Top ten countries by number of trafficking instances between January 2009 and August 2016

As shown in Figure 4, all four categories show similarly low seizure numbers in 2009 and 2010, followed by significant growth in ivory, reptile, and bird seizures in 2011 and 2012. This is likely due to steadily increasing media and public focus on wildlife trafficking in those years, largely as a result of increased interest in the illegal ivory trade. It is also possible that, as in the case of ivory trafficking, wildlife trafficking in general began to spike after 2008.[xlvi] For example, reptile seizures in the air transit sector appear to have increased almost as much ivory seizures, at their peak in 2015 recording more seizures than ivory. But despite increased law enforcement attention and awareness, the total number of rhino horn seizures has remained relatively constant throughout the reporting period, while bird seizures have declined slightly following an upsurge from 2009 to 2012.

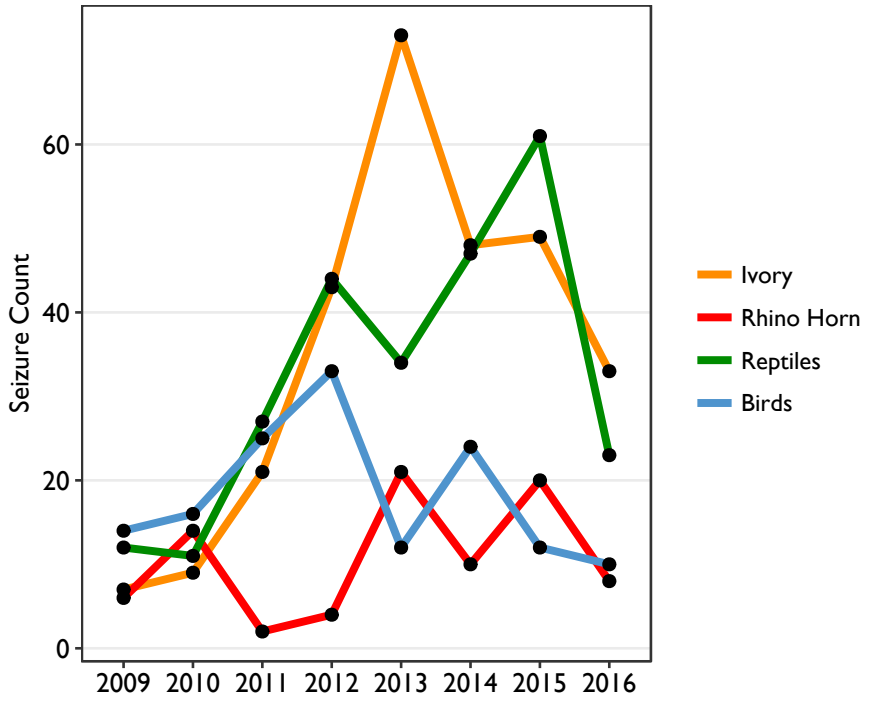


Figure 4. Seizure count timeline by category between January 2009 and August 2016

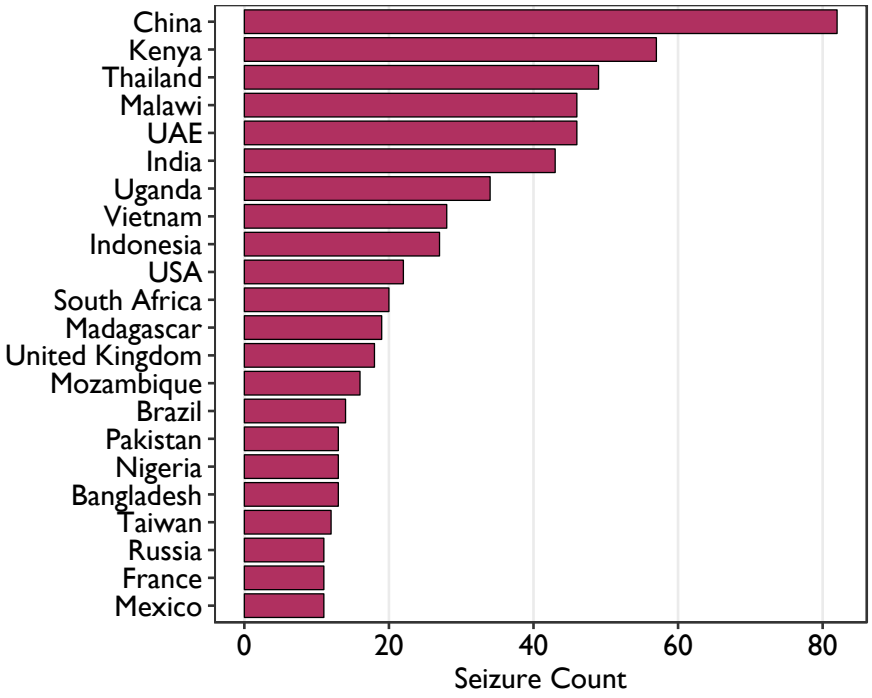


Figure 5. Number of seizures by country for those countries with more than 10 seizures between January 2009 and August 2016

Figure 5 exhibits the countries counting the highest numbers of seizures. China ranks first due to its prominent role in all four categories. With such a high volume of illicit wildlife being trafficked into the country, and simply by virtue of being such a populous country, it may be inevitable that China has the highest rate of seizures. Given the hidden nature of trafficking activity, it is impossible to know whether the size of China's ivory market or good enforcement contribute more to China's high seizure count. Recently, however, China has openly opposed the illegal ivory trade, and in 2016, committed to closing its ivory markets by the end of 2017.[xlvii] How China's ivory seizure count is affected by this change may provide some indication of whether enforcement or market activity drives the high number of seizures in Chinese airports.

Kenya, the country with the second highest seizure count, is perhaps the most common transit country for wildlife moving by air from Africa to East and Southeast Asia. Kenyan authorities have been proactive in addressing wildlife crime moving through Jomo Kenyatta Airport in Nairobi, leading to its high seizure count.[xlviii] Like China, Thailand is a major destination for wildlife products. Malawi appears prominently in the data largely due to a May 2015 report on wildlife seizures and trafficking produced for the Department of National Parks and Wildlife of Malawi.[xlix]

Countries like the United Kingdom, Nigeria, and France have high seizure counts for a variety of reasons. Nigeria has one of the largest airports in West Africa, likely contributing to its frequent use as a departure point for passengers and shipments, particularly those on their way to Europe or East Africa. France is both a frequent transit point and destination for travelers leaving Africa. The United Kingdom, like France, features as both a transit and destination point, although trafficking instances through the UK seem to involve a more diverse array of illegal wildlife and wildlife products than wildlife trafficked through France.

Other countries are specific to certain species. For example, India seems to be the epicenter of South Asian reptile trafficking. Pakistan also features prominently in reptile trafficking, although it appears to play a role in Middle Eastern bird trafficking as well. Russia comes up as a frequent origin for falcons and hawks destined for Middle Eastern raptor markets.

Country Enforcement Index

Assessing the ability of enforcement agencies to address covert crimes is inherently difficult. Seizure data combined with transit route data, however, delivers an approximation of enforcement success rates. The Country Enforcement Index is a quantitative representation of each country's ability to detect and seize illicit wildlife products traveling through its airports. Higher numbers indicate more effective enforcement and lower numbers indicate that the country is unable to detect a large number of illicit products going through its airports. Note, however, that luggage and cargo are rarely re-screened during transit stops, and therefore frequent transit airports may have better enforcement than the Index indicates. The percentages represented in this chart were derived using the following equation:

$$Country\ Enforcement\ Indicator = \frac{Number\ of\ Total\ Seizures}{Successfully\ Attempted\ Trafficking\ Instances}$$

We define 'successfully attempted trafficking instances' as the number of times illicit wildlife products were trafficked through a country, regardless of whether they were seized. Only countries linked to twenty or more trafficking instances were included in Figure 6 (See **Appendix IV** for the Country Enforcement Index for countries linked to five or more trafficking instances). Seizures made prior to arrival in a given country were removed from that country's assessment, as the country was never in a position to stop that individual or shipment. For instance, a suitcase full of turtles stopped in Miami on its way to the United Kingdom from Brazil would count as a missed shipment for Brazil, a successful seizure for the US, and nothing at all for the UK. The Country Enforcement Index can therefore be seen as a metric for the success of a country's customs and enforcement agencies, although it still suffers from the inconsistencies in reporting and biases of seizure data that trouble any analysis of global wildlife trafficking trends. See **Appendix IV** for a more thorough discussion of the biases affecting the Index.

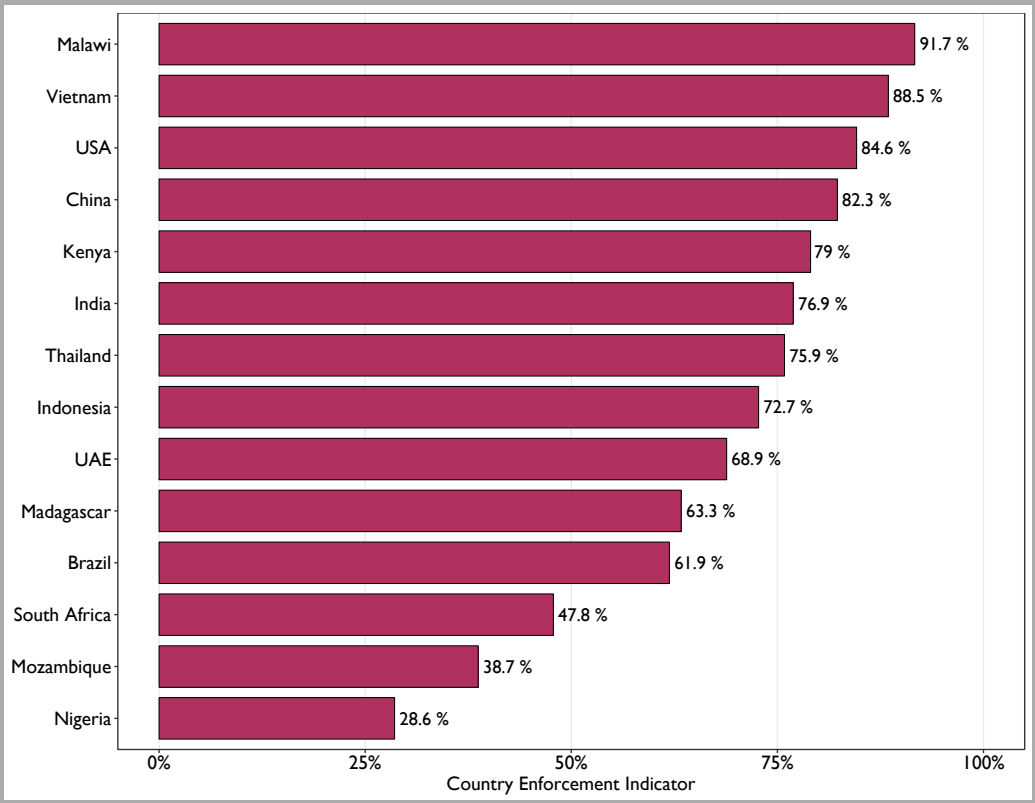


Figure 6. Country Enforcement Index for countries with twenty or more trafficking instances between January 2009 and August 2016

Malawi appears as the country with the highest enforcement ratio: around 91.7% of air trafficking instances detected involving Malawi were stopped at airports within the country. This is likely due to a May 2015 report on wildlife trafficking and seizure activity in Malawi, although it should be noted that few shipments have successfully made it through Malawi to be seized elsewhere, even after the release of the 2015 report.[1]

Another finding in the Country Enforcement Index is the fall in Thailand's ranking from third place by seizure number (Figure 5) to seventh place by Enforcement Indicator. This suggests that although Royal Thai Customs and other Thai enforcement agencies make a large number of seizures, the volume of trafficking incidents successfully moving through Thailand is even higher than the seizure number suggests.

Trends and Totals – Ivory

The C4ADS Air Seizure Database recorded 283 total seizures of ivory in airports between January 2009 and August 2016, for a total of 32,974.97 kilograms of ivory. Ivory trafficking through the air transport sector makes up about 13% of total ivory seizures by weight since 2009. Ivory seizures in the air transit sector (Figure 7) reached a peak in 2013 with 73 seizures before declining slightly in the years following. The increase in seizures from 2010 to 2013 may represent an overall growth in ivory trafficking activity. In *Illegal Trade in Ivory and Rhino Horn*, Tom Milliken notes, "the three most recent years – 2011, 2012, and 2013 – represent the three years in which the highest quantity of ivory was seized and reported to ETIS over the last 25 years."[li]

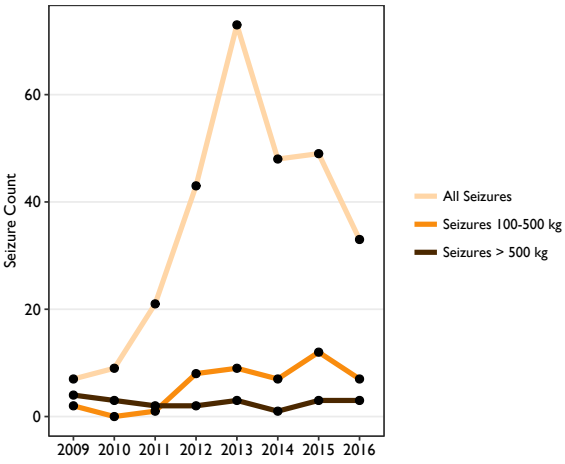


Figure 7. Timeline of ivory seizures made in airports between January 2009 and August 2016

Figure 7 reveals that large-scale seizures (greater than 500 kilograms) at airports have remained relatively constant throughout the period covered.[lii] The slight growth of medium-scale seizures (between 100 and 500 kilograms) over that period may provide some insight into the operations of ivory traffickers. Changes in the size of ivory consignments shipped by air over time (Figures 7 and 9) suggest that ivory trafficking networks may increasingly prefer breaking large-scale shipments down into multiple smaller size shipments. This may be due to a belief that smaller consignments are subject to less scrutiny, or a response to increased enforcement pressure, or an attempt to mitigate the risks associated with the seizure of a large-scale shipment. Figure 8, which displays the total weight of ivory seizures by year, shows that the weight of ivory seized in airports has demonstrated slight growth throughout the period covered by this report, reaching its highest level in 2015.

The high average weight per seizure in 2009 and 2010 suggests that the media may only have reported on large-scale seizures in those years (Figure 7). Large-scale seizures may be overrepresented in the data as a whole, since specific weight is more likely to be reported for significant seizures. In later years, as attention to ivory trafficking increased, local media reports began publishing stories on smaller-scale seizures as well. Likely in accordance with this change, the average weight of ivory seizures per year (Figure 9) dropped significantly beginning in 2011, even as the number of ivory seizures continued to rise.

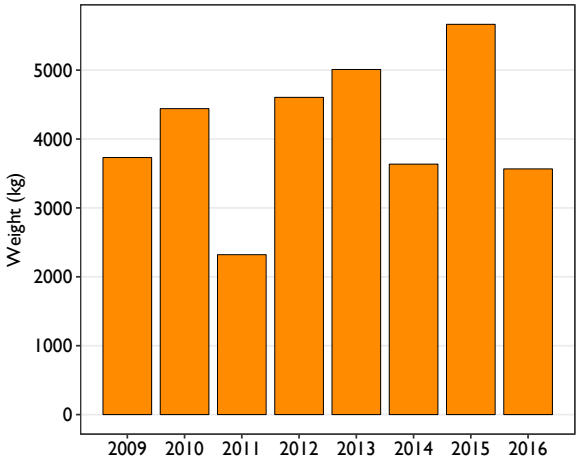


Figure 8. Weight of ivory seized (kg) per year between January 2009 and August 2016

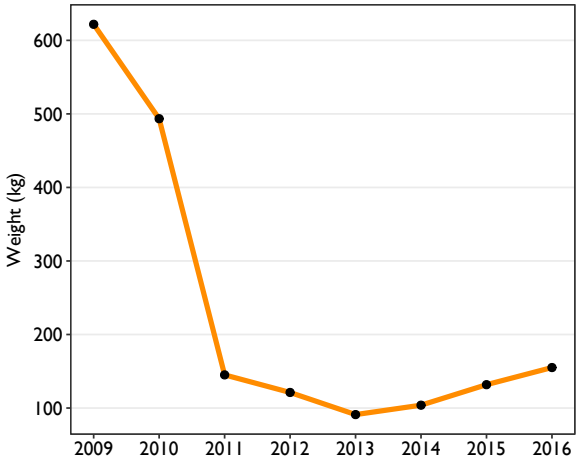


Figure 9. Average weight of ivory seized (kg) per year between January 2009 and August 2016

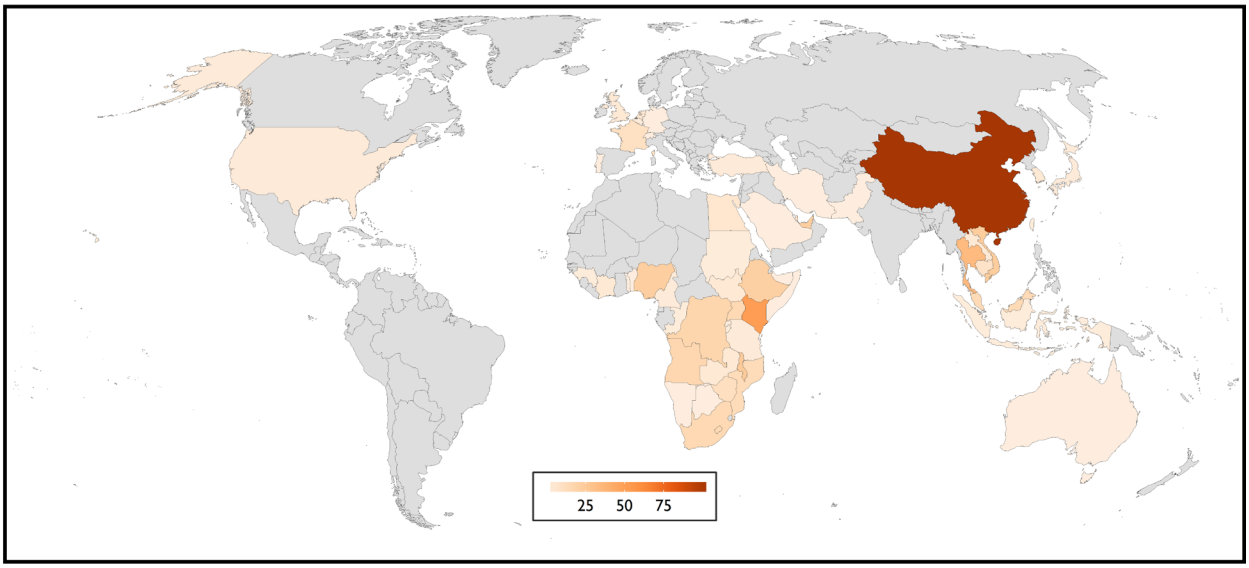


Figure 10. Global heat map for ivory trafficking instances in the air transport sector between January 2009 and August 2016

The heat map represents the total number of times that a successful or planned trafficking instance was recorded for each country. The map includes instances where the product did not actually enter a country because it was seized earlier in the route.

The heat map for ivory trafficking instances (Figure 10) highlights all the countries with intended or actual ivory trafficking activity through their airports between January 2009 and August 2016. Figure 10 indicates that Asia and Sub-Saharan Africa are the most significant regions for the illegal ivory trade through airports. The other countries featured in the heat map would be more prominent if not for China's outsized demand for ivory relative to the rest of the world. China has almost double the number of trafficking instances as compared to Kenya, highlighting the important role that it continues to play in the illegal ivory trade.[liii] Thailand and Vietnam are also significant destinations for ivory moved by air, with 34 and 23 trafficking instances respectively between January 2009 and August 2016.

In Africa, Kenya has the largest number of ivory trafficking instances by air with 52. Kenya's high rate of trafficking instances has been attributed to "...Kenya's relatively well-developed transportation infrastructure."[liv] More specifically, Jomo Kenyatta Airport's role as the busiest airport in East Africa,[lv] as well as its position between Africa and Asia, likely leads to its central role as a transit point for ivory.

Other hub airports in East Africa and the Middle East are frequently used as transit airports as well. The UAE and Ethiopia also function as transit hubs, connecting flights from Central and West Africa to Asian airports. The UAE is the only country in the top ten list for all four categories, highlighting the importance of transit hubs in facilitating the international flow of illicit wildlife.

Europe and the United States display relatively few ivory trafficking instances, although a number of European airports are increasingly used as transit points between West African and Asian airports.

Country	**Trafficking Instances**
China	*102*
Kenya	*52*
Thailand	*34*
Malawi	*24*
Vietnam	*23*
Nigeria	*22*
United Arab Emirates	*22*
Ethiopia	*21*
DRC	*17*
Angola	*16*

Table 2. Top ten countries by number of ivory trafficking instances between January 2009 and August 2016

Parisian Antiques and Excess Luggage

A number of seizures have highlighted the importance of front companies to ivory and rhino horn traffickers. In some cases, Parisian antiques stores are implicated; in other cases, more typical front companies are used, including used tire, auto, and auto parts businesses, as well as companies exporting cheap products in bulk, like plastic scrap, shredded paper, or beans.

On January 23, 2013, Dong Mou, a Chinese antiques shop owner, was caught in Shanghai Pudong Airport with three suitcases full of illegal ivory and rhino horn products.[lvi] He had arrived in Shanghai on China Eastern Airlines flight MU554 from Paris.[lvii] According to Chinese news reports on the seizure, Dong had traveled to France seven times as part of his antiques business, but claimed that he had only purchased ivory and rhino horn products on this one occasion.[lviii]

Two months later in March of 2013, Chinese media reported that two Chinese travelers on their way home from France had been discovered at Shanghai Pudong Airport carrying illegal elephant ivory, mammoth ivory, and rhino horn.[lix] The two suspects were carrying five suitcases packed with 13 kilograms of rhino horn, 42 kilograms of ivory, and 1.3 kilograms of mammoth ivory.[lx] They allegedly confessed to officials that the illicit items were purchased at antiques stores in Paris.[lxi]

Image 1. One seizure in early June 2016 further highlighted traffickers' reliance on excess luggage to move contraband. Officials discovered 142 kilograms of ivory in six suitcases in Charles de Gaulle Airport.[lxii] All six bags belonged to one passenger who was traveling from Angola to Vietnam through Paris.[lxiii] © Radio France - Adrien Bossard [lxiv]

Other seizures outside of the air transport sector have been linked to Parisian antiques as well. In September 2015, French customs officials searched a vehicle and discovered four raw elephant tusks, equaling 43 kilograms of ivory, hidden inside.[lxv] According to a French press release, French authorities investigated the three individuals present in the car at the time of the seizure and uncovered links between all three suspects and an international wildlife trafficking organization, headed by a French-Vietnamese individual who owns a Paris-based international trading company dealing in antiques, perfume, and beauty products.[lxvi] One customs official was quoted as saying, "He used [the international trading company] to organize the trafficking of ivory."[lxvii] On May 25th, 2016, officials searched the company's headquarters in Seine-Saint-Denis and discovered sixteen African elephant tusks, totaling 212 kilograms, "hidden in wooden pallets in his office."[lxviii] It was the largest ivory seizure conducted by French customs since December 2006.

These seizures showcase a number of common trafficking methods – the use of a shell or cover company to obfuscate the true nature of a trafficking business, an unusual number of suitcases per passenger – as well as a trafficking route between Charles de Gaulle Airport and Shanghai Pudong Airport.

Trends and Totals – Rhino Horn

The C4ADS Air Seizure Database recorded 85 total seizures of rhino horns in airports between January 2009 and August 2016. Rhino horn was seized along with ivory in 23 instances, or 27% of the time. Rhino horn seizure size can be reported by number of rhino horns or by weight, preventing a completely reliable estimate of total rhino horn seized in the time period analyzed.[lxix] However, using an approximate weight of 2.78 kilograms per horn,[lxx] estimates can be made.[lxxi] Rhino horn seizures (Figure 11) have remained relatively constant compared to ivory seizures, staying around the overall mean of 11 seizures per year. The upward growth in rhino horn seizures in the initial two years is followed by a significant dip in 2011 and 2012.

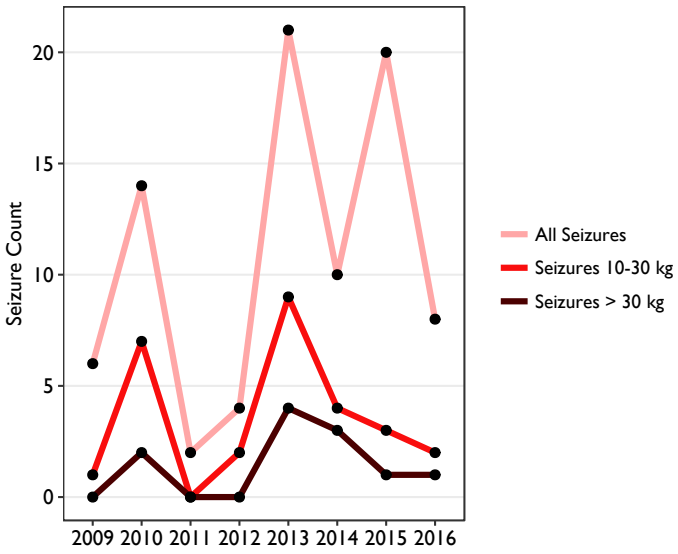


Figure 11. Timeline of rhino horn seizures made in airports between January 2009 and August 2016

Large-scale seizures in airports (over 30 kilograms), depicted in Figure 11, have been fairly infrequent, despite an increase in 2013 and 2014.[lxxii] Medium-scale seizures (between 10 and 30 kilograms) generally account for a little less than half of all rhino horn seizures each year. 2015 was an unusual year in that overall seizure numbers spiked, but medium- and large-scale seizure numbers remained low – even lower than in 2014, which had ten fewer seizures than 2015. This may signal a shift from larger to smaller rhino horn shipments.

The weight of rhino horns seized per year (Figure 12) peaked in 2013, with 359 kilograms recorded seized. There was a notable decline in the weight of rhino horns seized in 2011, which coincides with the dip in overall seizures mentioned above. The average weight of rhino horns per seizure (Figure 13) in 2011 was also low, indicating that 2011 may have been an unusual year for either rhino horn trafficking or reporting of rhino horn trafficking incidents. The average weight of rhino horns per seizure grew steadily between 2011 and 2014, but saw a temporary drop in 2015, prior to a large spike in the first part of 2016.

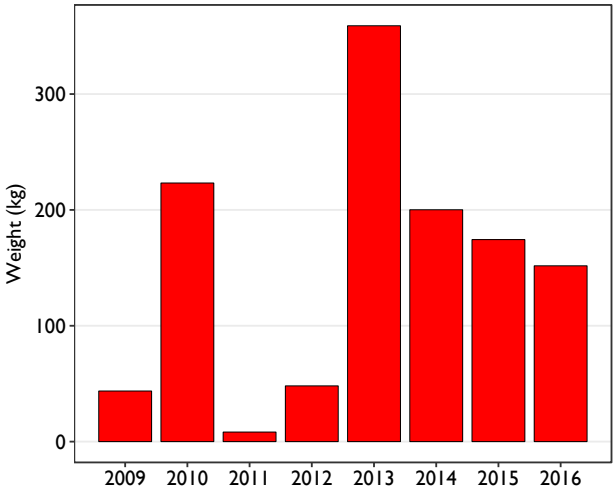


Figure 12. Weight of rhino horn seized (kg) per year between January 2009 and August 2016

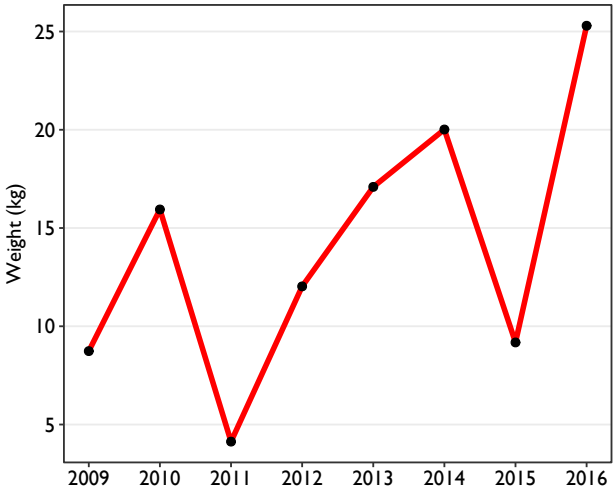


Figure 13. Average weight of rhino horn seized (kg) per year between January 2009 and August 2016

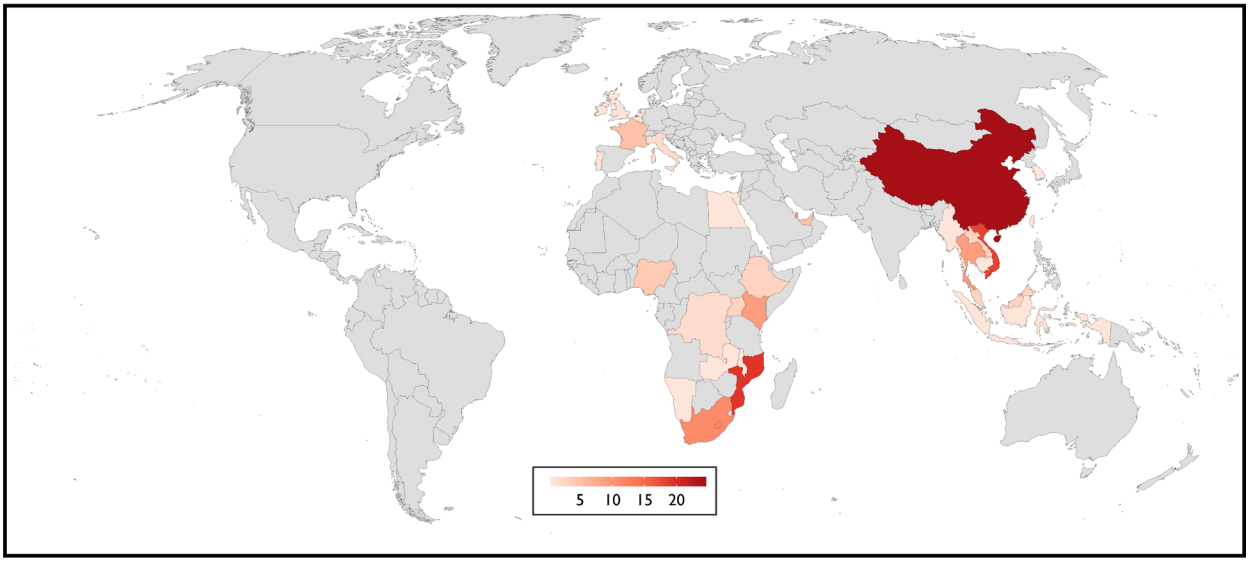


Figure 14. Global heat map for rhino horn trafficking instances in the air transport sector between January 2009 and August 2016

The heat map represents the total number of times that a successful or planned trafficking instance was recorded for each country. The map includes instances where the product did not actually enter a country because it was seized earlier in the route.

Rhino horn trafficking, although geographically similar to ivory trafficking, has the narrowest supply chain of the four categories in the C4ADS Air Seizure Database. Rhino horn trafficking is far more concentrated in Southern Africa and East Asia than ivory. The rhino horn heat map (Figure 14) depicts all countries that experienced attempted or actual rhino horn trafficking activity during the period of interest, and clearly reflects the importance of Mozambique and South Africa as supply countries. China, Vietnam, and Thailand are prominent on the demand side of the trade. Although Vietnam is widely considered to be the largest market for rhino horn,[lxxiii] C4ADS' seizure data suggests that China also plays a major role in the rhino horn trade; China was the destination for 25 seizures in the Database with a total weight of 548 kilograms, while Vietnam was the destination for 18 seizures, with a total weight of 466 kilograms (Table 3). Qatar and the UAE are also highly ranked in Table 3, likely due to their roles as transit points for traffickers headed to Asia.

Country	**Trafficking Instances**
China	*24*
Mozambique	*19*
Vietnam	*18*
South Africa	*11*
Qatar	*10*
Kenya	*9*
Thailand	*9*
France	*5*
United Arab Emirates	*5*
Nigeria	*4*

Table 3. Top ten countries by number of rhino horn trafficking instances between January 2009 and August 2016

Trends and Totals – Reptiles

The C4ADS Air Seizure Database identified 259 total seizures of live reptiles in airports between January 2009 and August 2016, for a total of 121,497 seized reptiles. Besides a minor dip in 2013, reptile seizure numbers (Figure 15) have grown steadily since 2009, reaching a peak of 61 seizures in 2015.

Large-scale seizures (greater than 1,000 reptiles) have remained constant, at approximately five seizures per year, with the exception of 2011, when no large-scale seizures were made.[lxxiv]

Medium-scale seizures (between 100 and 1,000 reptiles) have grown steadily. These seizures represent a significant portion of total reptile seizures, growing to about half of all seizures each year between 2013 and 2016.

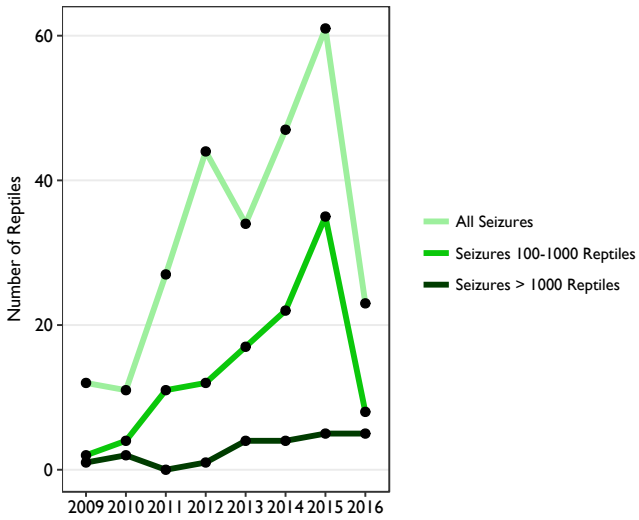


Figure 15. Timeline of reptile seizures made in airports between January 2009 and August 2016

Figure 16 depicts the total number of reptiles seized per year in the air transport sector. The number of reptiles seized per year between 2013 and 2016 is substantially higher than in the initial four years covered by this study. A peak of 30,016 reptiles were seized in 2013. The average number of animals per seizure (Figure 17) reveals a 575% increase in the number of reptiles per trafficking attempt between 2012 and 2013, growing from 158 in 2012 to 909 in 2013. This is because of a couple of unusually large seizures in 2013, including a seizure of 9,000 red-eared slider turtles in Chennai, India in March 2013[lxxv] and a seizure of 10,043 red-eared slider turtles in Kolkata, India in July.[lxxvi] However, the average number of reptiles per seizure remained comparatively high after 2013, which may signify a shift towards larger-scale reptile trafficking attempts during this time period, or an increase in enforcement capabilities or seizure reporting.

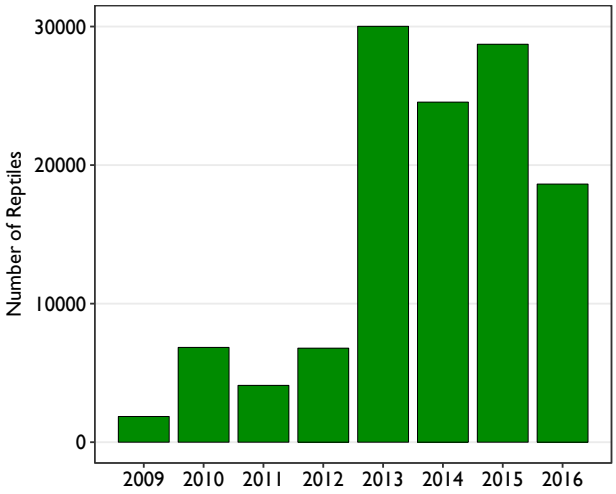


Figure 16. Number of reptiles seized per year between January 2009 and August 2016

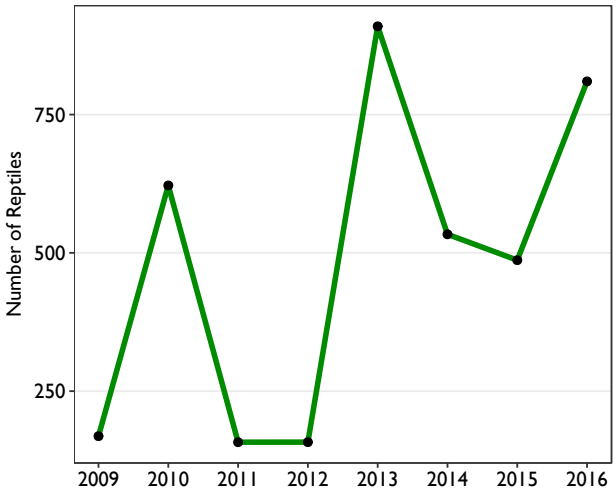


Figure 17. Average number of reptiles per seizure between January 2009 and August 2016

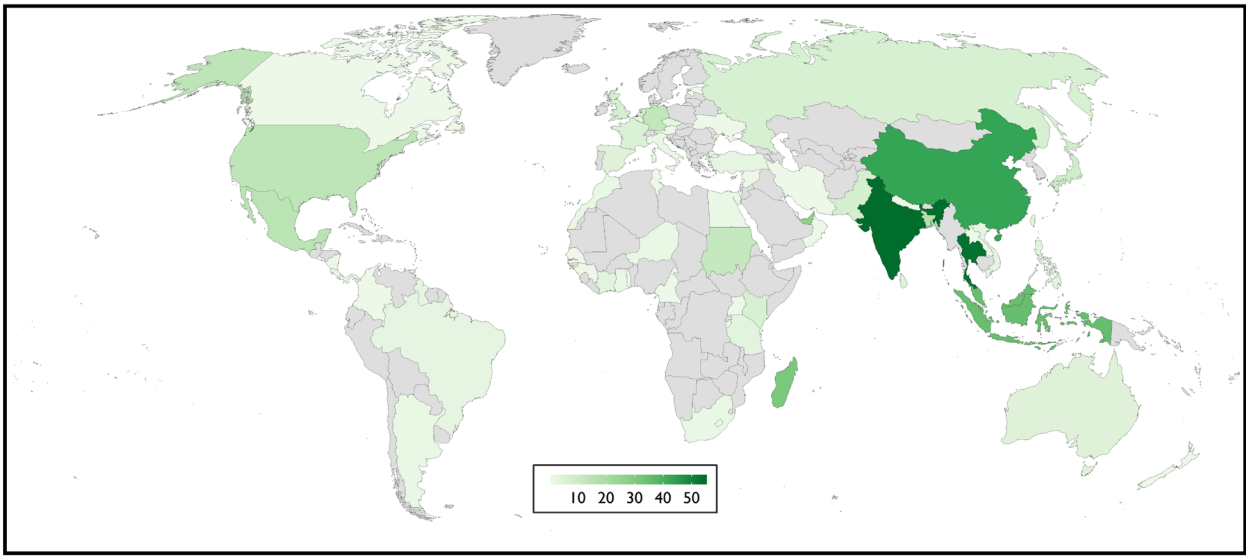


Figure 18. Global heat map for reptile trafficking instances in the air transport sector between January 2009 and August 2016

The heat map represents the total number of times that a successful or planned trafficking instance was recorded for each country. The map includes instances where the product did not actually enter a country because it was seized earlier in the route.

The heat map for reptile trafficking instances (Figure 18) is more geographically diverse than those for ivory and rhino horn, which clearly reflect an African and Asian focus. South Asia emerges as the epicenter of the illegal reptile trade, and focus shifts from Africa to the Americas. The top five countries for reptile trafficking instances (Table 4) are concentrated in and around South, East, and Southeast Asia, highlighting the importance of this region for the illicit reptile trade.

The high number of trafficking instances in India appears to be primarily driven by the export of Indian star tortoises (CITES Appendix II) and black pond turtles (CITES Appendix I). Out of 54 total reptile trafficking instances involving India, 41 originated in the country. Of these 41 instances, 24 contained Indian star tortoises and 13 contained black pond turtles. The turtles were mainly destined for Thailand, China, and Malaysia. A study documenting the illegal trade in Indian star tortoises argues that high demand for these turtles in China and Thailand is responsible for the high rate of trafficking.[lxxvii] This finding is reflected in C4ADS' data. For example, while India is mainly an origin point in the reptile trade, Thailand is mainly a destination. Out of 53 total reptile trafficking instances involving Thailand, 37 were destined for the country.

Country	Trafficking Instances
India	*54*
Thailand	*53*
China	*43*
Indonesia	*35*
Malaysia	*35*
Madagascar	*31*
United Arab Emirates	*27*
Bangladesh	*17*
Mexico	*15*
USA	*14*

Table 4. Top ten countries by number of reptile trafficking instances between January 2009 and August 2016

Although Africa is not central to the reptile category of the Database, Madagascar is an important origin for trafficked reptiles, with 31 total trafficking instances. Many of the seized animals were radiated and ploughshare tortoises (both CITES Appendix I), two critically endangered species that are native to Madagascar.

Trends and Totals – Birds

The C4ADS Air Seizure Database recorded 146 total seizures of birds in airports between January 2009 and August 2016, totaling 9,934 seized birds. The number of bird seizures (Figure 19) has remained relatively constant during this time period, hovering around an average of 18 seizures per year. There was a marked decline in bird seizures in 2013, following three years of slow but constant growth between 2009 and 2012.

Large-scale seizures (greater than 150 birds) have declined slightly, and do not correspond to the variability of the overall seizure numbers.[lxxviii] Medium-scale seizures (between 15 and 150 birds), however, do reflect the changes in overall bird seizure numbers, with the exception of 2011, when medium-scale seizures decreased rather than increased.

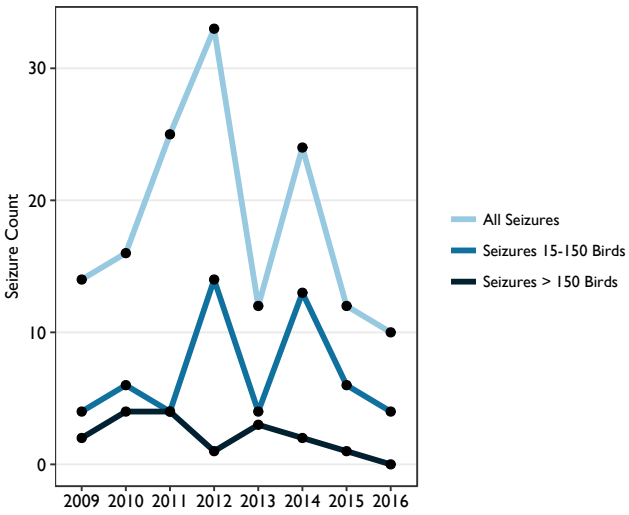


Figure 19. Timeline of bird seizures made in airports between January 2009 and August 2016

The total number of birds seized per year (Figure 20) peaked in 2010, when 3,190 birds were seized. This peak is due to two large seizures, one of 1,000 African grey parrots in Douala, Cameroon in February[lxxix] and another of 1,000 birds, mostly of protected species, in Dhaka, Bangladesh in July.[lxxx] The spike in birds seized in 2014 was driven by two large seizures of 470 and 400 birds in Ho Chi Minh City, Vietnam.[lxxxi] Other than 2014, the total number of birds seized in airports per year has declined steadily between 2010 and 2016.

The average number of birds per seizure (Figure 21) displays few large variations in the number of birds per trafficking attempt from year to year. Aside from the exceptional year of 2010, the average number of birds per seizure has remained relatively constant around 50. This low average is likely due to the difficulty of transporting a large number of birds by air freight or in carry-on baggage; the comparatively fragile nature of most bird species prevents them from being packaged tightly or in large numbers. As a result, most birds are carried on traffickers' persons, and therefore can only be moved in relatively small numbers.

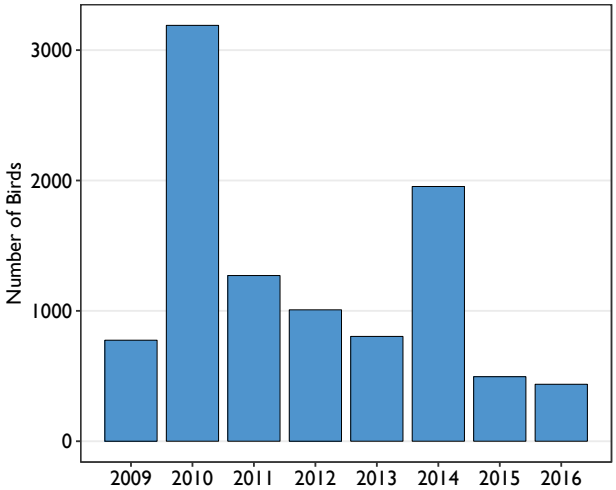


Figure 20. Number of birds seized per year between January 2009 and August 2016

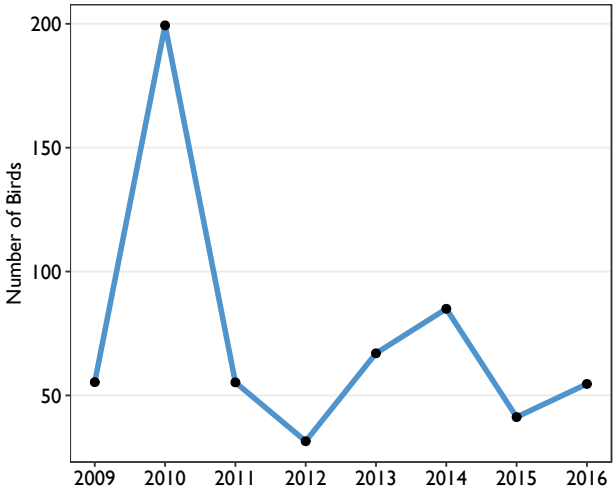


Figure 21. Average number of birds seized per year between January 2009 and August 2016

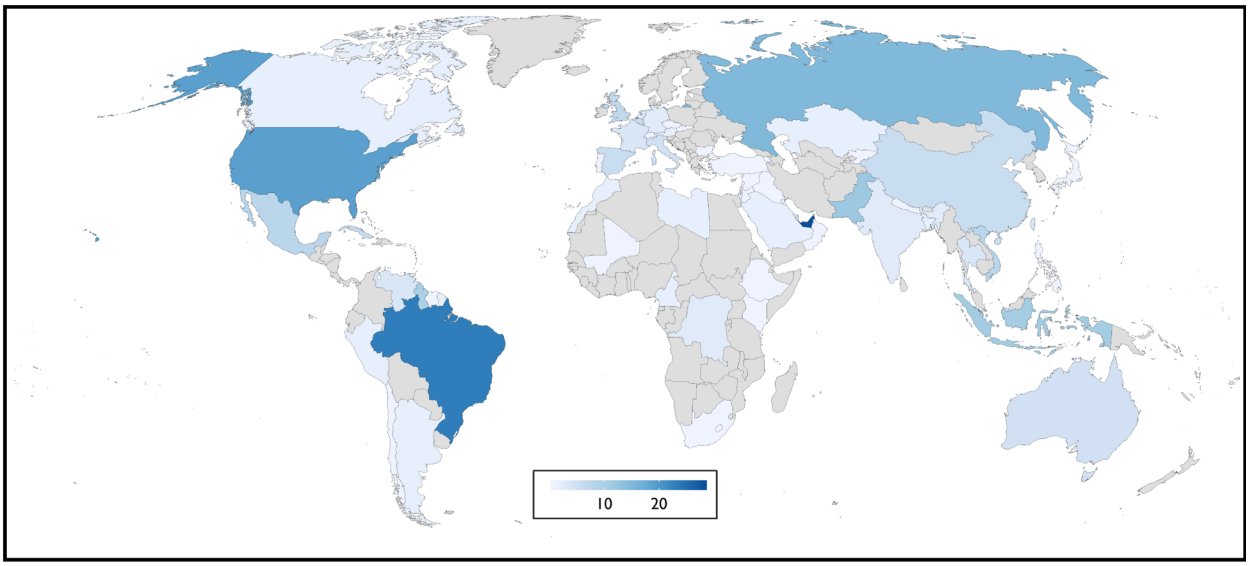


Figure 22. Global heat map for reptile trafficking instances in the air transport sector between January 2009 and August 2016

The heat map represents the total number of times that a successful or planned trafficking instance was recorded for each country. The map includes instances where the product did not actually enter a country because it was seized earlier in the route.

The heat map for bird trafficking instances through airports worldwide (Figure 22) is similar to the reptile heat map in its geographic diversity. The bird category of the C4ADS Air Seizure Database centers on North and South America, with some activity in Asia and the Middle East. The UAE has the highest number of bird trafficking instances according to the Database. This appears to be due in part to the Emirati falcon trade; 24 out of the UAE's 28 bird trafficking instances were destined for the country, and 13 of those trafficking instances involved falcons.

Brazil's high number of trafficking instances was in part the result of the domestic trade in tropical birds. Seven of the seizures recorded in the Database are from domestic flights. Since trafficking instances are counted each time a plane lands in a different airport, these domestic seizures are counted twice in Table 5, once for the origin city and once for the transit or destination city. Similar to Brazil, 10 out of Russia's 15 trafficking instances are from domestic flights. 14 of these 15 seizures involved falcons.

The United States ranks third in terms of bird trafficking instances, with 19 total instances. The US was listed as the destination for 18 of these trafficking instances, seven of which involved finches from Cuba and South America. The demand for finches appears to be driven in part by the popularity of songbird speed-singing competitions in South American immigrant communities in the US.[lxxxii]

Country	Trafficking Instances
United Arab Emirates	*28*
Brazil	*23*
USA	*19*
Russia	*15*
Pakistan	*12*
Indonesia	*11*
Guyana	*10*
Vietnam	*8*
Mexico	*8*
USA	*7*

Table 5. Top ten countries by number of bird trafficking instances between January 2009 and August 2016

Hair Curlers from Guyana

Bird traffickers, generally unable to rely on air freight to conceal their contraband, must find creative ways to store birds in their luggage or on their persons. Unlike ivory and rhino horn smugglers, bird traffickers must also find a way to keep their illicit cargo quiet throughout the journey without substantially harming them. One smuggling network devised a system utilizing bright lights, rum, and hair curlers to hide finches in their clothing or carry-on bags.

In April of 2016, two individuals, Dhanwattie Persaud and Kayun Mohammed, were found attempting to smuggle Guyanese finches and other birds out of Cheddi Jagan Airport in Guyana in two separate instances. Persaud was scheduled to fly to John F. Kennedy Airport in New York on a Caribbean Airlines flight, and Mohammed was destined to leave on a Fly Jamaica flight for Canada the next day.[lxxxiii] Both were discovered carrying birds stuffed inside hair curlers during the luggage screening process.[lxxxiv] Each received the standard six-month prison sentence for smuggling birds out of Guyana without the necessary permits.[lxxxv]

Image 2. Finches hidden inside plastic hair curlers Source: US Fish and Wildlife Service

Persaud and Mohammed were likely attempting to smuggle the birds into New York City, where they could sell them to finch 'racers.' For years, men have been packing into a park in Queens every Sunday to watch finches 'race,' or compete to hit the highest number of songs first.[lxxxvi] While some of the finches used in the competitions are imported into the US through legal channels, it seems that a large number of the birds are moved illegally, partially to avoid regulations that the competitors consider detrimental to their health. For example, one man told US federal investigators that the birds "are not the same after they go through quarantine," referencing the 30-day quarantine required to bring birds into the United States.[lxxxvii]

The upswing in bird seizures in JFK Airport resulting from the races led the US Fish and Wildlife Service (FWS) to open an investigation, Operation G-Bird, into the finch trade from Guyana.[lxxxviii] FWS agents discovered that "smugglers sometimes sedated the finches with rum or kept them awake with spotlights before they were lowered, wings pressed in a straitjacket position, into enclosure devices."[lxxxix] The traffickers frequently relied on hair curlers or cardboard tubes to smuggle the birds through security and customs without setting off airports' metal detectors. Despite the eight-years long investigation, the Guyanese finch smuggling trade still seems to be fairly prominent:

- 2006: Terrence McLean was caught attempting to smuggle 13 finches into JFK Airport inside plastic hair curlers in his carry-on bag.[xc] Airport officials allegedly became suspicious when they found grass seed in McLean's suitcase.[xci]
- 2012: US Customs and Border Protection (CBP) agents stopped Marlon Hariram after arriving in JFK Airport on an Easy Jet flight from Cheddi Jagan Airport in Guyana.[xcii] Hariram had stuffed nine finches in cardboard toilet paper rolls, and then covered them with netting and packaging tape and tucked them up his sleeves.[xciii] After investigation, agents discovered that Hariram had been caught smuggling finches three times in the US and once in Guyana.[xciv]
- 2012: Guyanese officials stopped Shivashtil Ramrattan as he moved through Cheddi Jagan Airport because he "looked suspicious."[xcv] After a pat check, the officials discovered that he had hidden two finches in hair curlers and stuffed them in the crotch of his pants.[xcvi] Ramrattan was fined for attempting to illegally export the birds.[xcvii]
- 2013: A Guyanese man was arrested on arrival at JFK Airport with a number of finches hidden in plastic hair curlers.[xcviii] He was discovered when the birds were heard singing as he moved through customs screening.[xcix] He was later sentenced to six months in jail.[c]
- 2014: Guyanese officials arrested Nazeem Karim after he was discovered attempting to smuggle 25 finches and other birds hidden in hair curlers to New York on Travel Span flight V2502.[ci] Karim was fined $100,000 and disqualified from obtaining an import/export license for five years.[cii]
- 2014: Officials at Cheddi Jagan Airport arrested Nazir Khan as he was about to board Caribbean Airlines flight BW606 to Canada.[ciii] Although he had successfully made it through security and customs, he was discovered when he stopped to help another passenger and dropped two hair curlers stuffed with finches on the tarmac in the process.[civ]
- 2014: The Canada Border Services Agency (CBSA) in Toronto Pearson Airport discovered 19 "songbirds" in Vishnu Narine's jacket. The birds were inside plastic hair curlers that had been taped together and then inserted into hidden pockets in the jacket's lining.[cv] Narine pled guilty to a charge of causing distress to an animal and was sentenced to 12 months of probation and a $400 fine.[cvi]

Airports and Routes

Analysis based on seizure data naturally over-emphasizes countries with good enforcement and under-emphasizes, or even fails to mention, countries performing poorly. This can be partially addressed by collecting detailed and thorough data on the actual or intended transit routes of illicit shipments. Compiled transit route data can help to reveal the scope of wildlife trafficking in previously overlooked jurisdictions, the overall flow of the wildlife trade over time, as well as those airports that traffickers may consider less risky. [cvii] Although transit route information cannot be considered directly reflective of the success of enforcement in certain airports, it can direct customs and enforcement to the weakest points in the air transport sector. Understanding how common transit routes shift over time in response to pressure, such as improved enforcement capabilities, can help customs anticipate changes in trafficking activity.

The following routes maps are a representation of the known flights associated with trafficking instances in the Database. Trafficking instances were only included in this analysis if more than one location along the flight route was available. For example, if a news article only reported that a bird was seized at its destination in New York, but did not contain any information about its origin or transit location, it could not be included in the routes maps. Flights were included, however, if route information was reported, but the smuggled wildlife or wildlife product did not reach its intended transit or destination location. For example, if a trafficker was intercepted in Nairobi prior to boarding a flight to Cairo, the route from Nairobi to Cairo was still included in this analysis. Note that capital cities were used in the routes maps when only country-level information was provided. Routes information was not grouped by airport, as airport-specific information is generally only available for seizure locations, while origin, transit, and destination points are generally referred to by city or country. 28.6%, or 221, of the seizures within C4ADS' Air Seizure Database could not be included in the routes maps due to inadequate flight information.

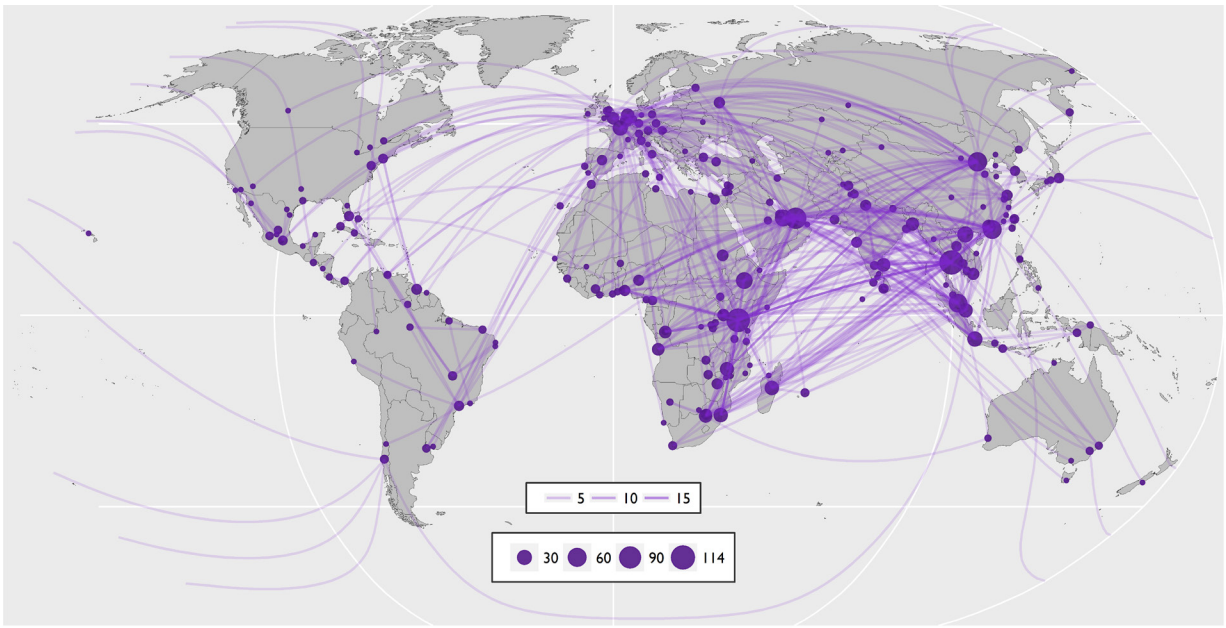


Figure 23. All trafficking routes by air recorded in the C4ADS Air Seizure Database

The trafficking routes map represents the flights used to traffic wildlife products through the air transport sector. This includes instances where the product did not actually enter a country because it was seized earlier in the route. The transparency of the line for each route represents the number of times it was used and the bubbles represent the total number of flights to and from each city.

The specific roles that airports play within the international trafficking system are largely dependent on their geographic location. For instance, most African airports are origin points for illicit ivory shipments, but airports in the Greater Horn of Africa are generally transit points. Similarly, Middle Eastern airports serve as common transit points for ivory moving from East or Southern Africa to Asia, while European airports are frequently used to move ivory from West Africa to Asia. Southeast and East Asian airports are predominantly destinations.

Figure 23 displays the wildlife trafficking routes recorded in C4ADS' Air Seizure Database. The most common routes for illicit products tend to follow the most frequent air passenger routes from hub airports near supply markets in the Southern Hemisphere to hub airports near demand markets in the Northern Hemisphere. Since hub airports are more likely to have a variety of international flight routes available for traffickers to choose from, they are more likely to be exploited by traffickers than smaller, regional airports. As a result, international airlines based at major hub airports are disproportionately exposed to trafficking. Targeting these chokepoints will have a larger impact on traffickers' operations than focusing on regional airports alone.

A few instances in the C4ADS Air Seizure Database indicate that domestic flight routes are used as well. This is particularly true in Brazil and Russia, both large countries with fairly well developed infrastructure and significant illicit bird trades. Domestic flights in these countries appear to move tropical and raptor bird species from more remote regions to prominent international airports in Sao Paulo and Moscow, where the animals are moved to international flights. Still, only 14.8% of the 128 flights in the Database are domestic flights.

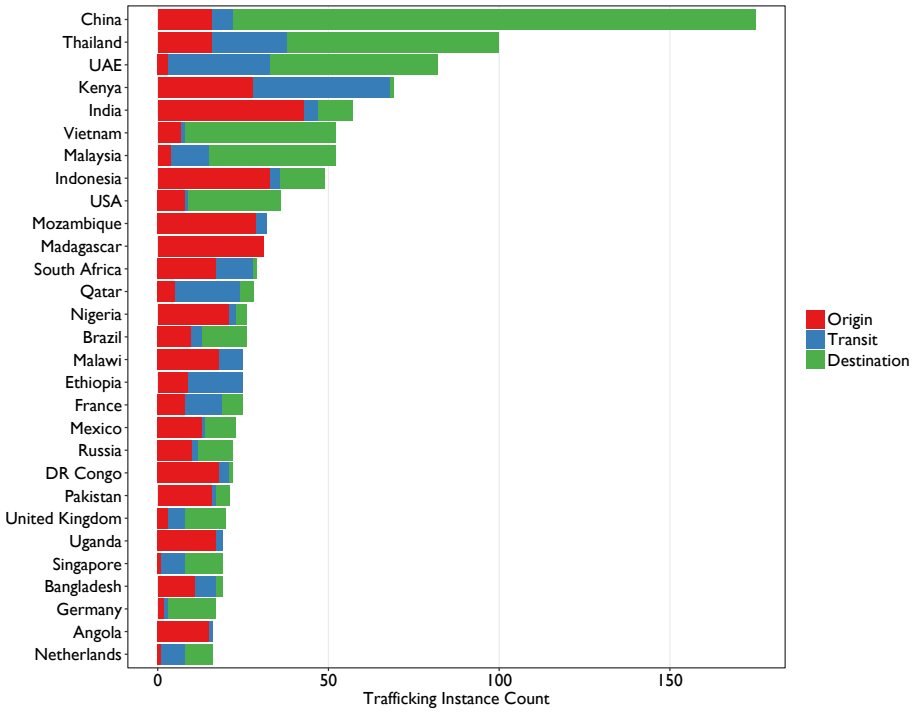


Figure 24. Country level flight route information for countries with five or more trafficking instances between January 2009 and August 2016

The total country-level transit graph (Figure 24) counts the number of times a country has been linked to an ivory, rhino horn, reptile, or bird trafficking instance. The graph is a representation of the transit data for each country, and is intended to show each country's relative role in the illicit wildlife supply chain.

Six of the top ten countries shown in Figure 24 are primarily destinations. Destination countries often count a higher number of trafficking instances, in part because illicit wildlife is generally sourced from several different countries, but tends to consolidate in demand markets. In addition, passengers and shipments are more likely to be screened on arrival at destination airports, likely leading to a higher number of seizures in those jurisdictions. Four of those six destination countries, China, Thailand, Vietnam, and Malaysia, are common destinations for ivory, rhino horn, and reptiles. The UAE is another major destination, largely due to the import of birds and reptiles into the country, although it is also used by ivory and rhino horn traffickers as a transit location on the way to Asian markets. The United States is also highlighted as a major destination point for wildlife trafficking, mainly due to its role in the bird and reptile trades.

The major origin countries are generally more geographically diverse than the destination countries, and therefore are associated with fewer trafficking instances than destination countries. Origin countries are mostly split between African countries with major international airports (Kenya, Mozambique, Nigeria, South Africa, Uganda), and countries with comparatively intact ecosystems and prominent reptile and bird populations (India, Indonesia, Madagascar). Madagascar is the only exclusively origin country in Figure 24. All of its trafficking instances represent the illegal export of native Malagasy reptile species.

At least two clear transit trends are visible in Figure 24. First, countries with high counts of transit instances are generally located between the supply habitats and demand markets for ivory and rhino horn. For example, the prominent transit countries reflect the general transit locations for ivory and rhino horn shipments – large airports in or near the Horn of Africa and the Middle East (Kenya, the UAE, Qatar, Ethiopia). Thailand, another common transit country, is occasionally used by ivory traffickers as a transit point on the way to destination airports like Hong Kong. Similarly, France and other European nations are increasingly mentioned as transit points for ivory traffickers seeking alternative routes for contraband moving from West Africa to Asia. Second, bird and reptile transit locations do not appear prominently in the C4ADS Air Seizure Database because for the most part, they do not exist. Bird and reptile traffickers seem to rely on direct flights, rather than complex trafficking routes, likely due to the difficulty of transporting live animals.

In Figure 25, airport-level seizure data is broken down by category. Certain airports, including hubs like Suvarnabhumi (Thailand), Dubai (UAE), Hong Kong (China), and Tan Son Nhat (Vietnam), see several different types of wildlife products flowing through their airports. According to the Database, Suvarnabhumi Airport is the only airport that has seized species from all four different wildlife categories covered in this report. Others seize high numbers of one specific illicit wildlife product, generally determined by the airport's geographic location. Lilongwe Airport (Malawi), for example, has the third highest number of seizures according to the Database. Over 95% of those seizures were of ivory, and the remaining 4.5% were of rhino horn, which can be expected given Lilongwe's proximity to elephant and rhino populations and poaching hotspots.

Figure 25 further indicates that ivory and rhino horn seizures generally follow the same transit routes, and are therefore often seized in the same airports. Reptile and bird seizures do not follow a similar pattern. Reptile seizures generally occur in South and Southeast Asian airports (Suvarnabhumi in Thailand, Soekarno-Hatta in Indonesia, Chennai in India, and Shahjalal in Bangladesh), with the exceptions of Dubai in the UAE and Ivato in Madagascar. Bird seizures occur less frequently and are far more geographically diverse than the other categories, although seizures tend to occur in the Middle East (Dubai in the UAE) and the Americas (Miami and Los Angeles in the US, Sao Paulo in Brazil, and Cheddi Jagan in Guyana).

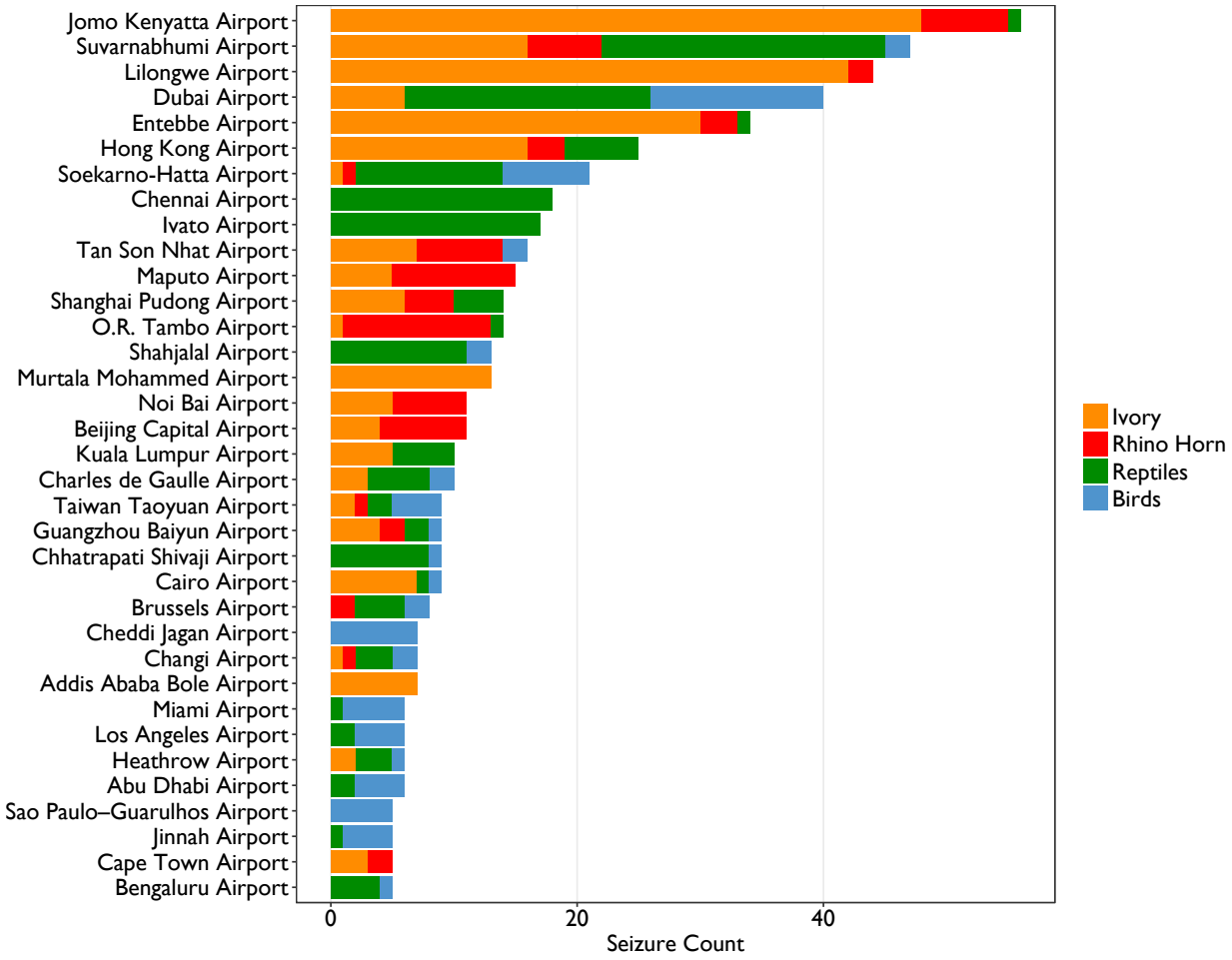


Figure 25. Airport seizure count by category for airports with five or more seizures between January 2009 and August 2016

Airports and Routes – Ivory

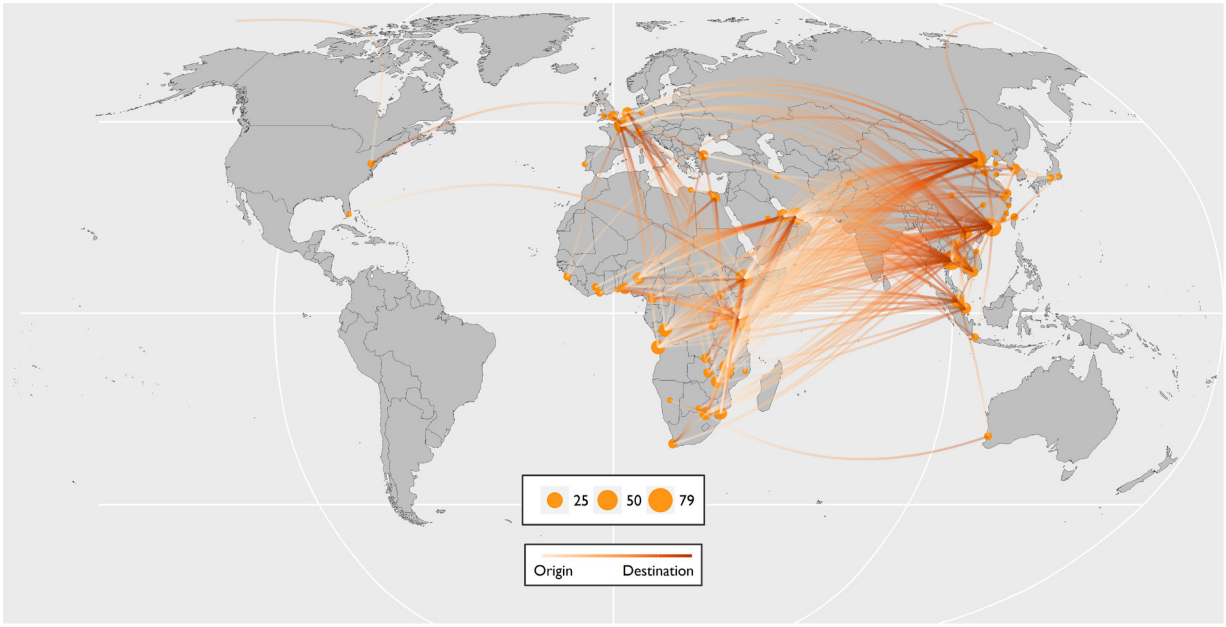


Figure 26. Ivory trafficking routes by air recorded in the C4ADS Air Seizure Database

The ivory trafficking routes map represents the flights used to traffic ivory products through the air transport sector. This includes instances where the product did not actually enter a country because it was seized earlier in the route. Each line represents one flight and the bubbles represent the total number of flights to and from each city.

Figure 26 displays the ivory trafficking routes recorded in the C4ADS Air Seizure Database. 185, or 65%, of the 283 ivory seizures recorded in the database contained sufficient information for inclusion in our ivory routes analysis. There are 54 countries linked to ivory trafficking in the Database.

While ivory trafficking routes generally move from Africa to East Asia, our data suggest that traffickers tend to utilize large hub airports along the way. This is likely due in part to the fact that hub airports are more likely to have a variety of large international flights. East Africa is the largest African exit region for ivory; shipments originating in Central or West Africa tend to fly through Nairobi, Addis Ababa, or occasionally Entebbe prior to arrival in Asia. Other common transit points include Dubai and Doha in the Middle East, as well as Paris, Amsterdam, and Istanbul in Europe.

The importance of transit hubs can be seen clearly in the data. Nairobi's Jomo Kenyatta Airport is the busiest airport in East and Central Africa,[cviii] and counted more flights associated with ivory trafficking instances than any other city in the Database.[cix] Of the 79 ivory trafficking flights associated with airports in the city, 28 arrived in Nairobi from other African airports, and 51 departed from Nairobi. Out of the 51 flights departing from Nairobi, 25 left Nairobi for Bangkok, Guangzhou, and Hong Kong. Kinshasa to Nairobi and Maputo to Nairobi are two of the most frequently used flights identified in the Database, both with seven instances. Nairobi to Bangkok is used twice as often, with 14 flights.

Figure 27 breaks down the prominent countries highlighted in the routes map by the number of times each country was listed as an origin, transit, or destination point. The data is split by country, rather than airport, to account for transit information reported at the country level. China emerges as the most common destination

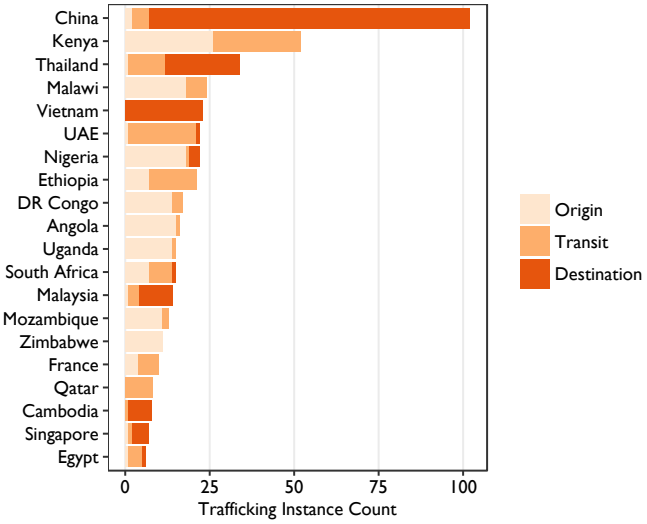


Figure 27. Country level flight route information for countries with six or more ivory trafficking instances between January 2009 and August 2016

for ivory moved through the air transport sector, with over 100 successful or attempted trafficking instances recorded in the C4ADS Air Seizure Database. Kenya has the second largest number of trafficking instances, and appears only as a transit and origin point for ivory.

Figure 27 does reveal some apparent anomalies: South Africa as a transit location, and France as a prominent country for ivory trafficking. South Africa is occasionally chosen by traffickers as an unusual transit route for ivory moving to Asia, with shipments sometimes even transiting to Australia before arrival in Southeast or East Asia. France is a fairly common transit point for ivory moving from West Africa to Asia, and can be an origin point for ivory purchased in Paris and destined for East Asian markets.

Ethiopia and the UAE are identified (Figure 27) as frequent transit points. Airports in common ivory origin locations such as Harare, Nairobi, and Abuja all have direct flights to Dubai. These routes account for 11 of the 16 total instances that have flown into Dubai Airport. Hong Kong is the most common destination for ivory trafficked through Dubai, and accounts for 10 of the 17 flights leaving of Dubai. Note that Dubai and Hong Kong are also the two busiest airports by passenger traffic in the world.[cx]

Common origin points for ivory include Malawi, the Democratic Republic of the Congo, Angola, Uganda, and Kenya. According to the Great Elephant Census, all of these countries, except for Kenya, have fairly small elephant populations, from an estimated 817 in Malawi to 4,864 in Uganda.[cxi] By comparison, elephant range states Tanzania and Botswana have an estimated 42,871 and 130,451 elephants respectively, despite significant population declines in Tanzania.[cxii] This may suggest that elephants are poached elsewhere before their ivory is moved to locations with smaller elephant populations, and perhaps lower rates of awareness, prior to entering the air transport sector.

Figure 28 ranks each airport with at least five seizures by the number of ivory seizures made in that airport. Jomo Kenyatta Airport accounted for the most seizures with 48, followed closely by Kamuzu Airport in Malawi with 42, and Entebbe Airport in Uganda with 30. Of the Asian transit and destination airports, Suvarnabhumi and Hong Kong rank highest.

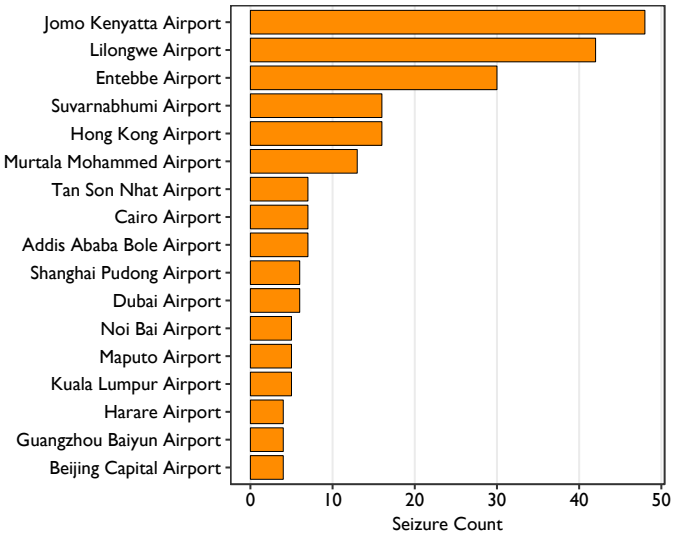


Figure 28. Airport seizure count for airports with four or more ivory seizures between January 2009 and August 2016

Repeating Routes

Traffickers rarely design unique smuggling methods for each trafficking instance. Instead, seizure information reveals that traffickers frequently utilize trafficking routes repeatedly, often in tandem with certain modus operandi, over the course of days, weeks, or even months. Two seizures in 2015 support the theory that trafficking networks use the same strategies repeatedly.

On September 2, 2015, Hong Kong Customs examined an air freight package that seemed suspicious to officials after a standard X-ray screening.[cxiii] Customs opened the package and discovered 24 kilograms of worked ivory packed in sawdust, rather than the 'decorative tiles' that had been declared on the consignment's air waybill.[cxiv] The shipment had originated in Zimbabwe and transited through Amsterdam before arrival in Hong Kong.[cxv]

Image 3. Ivory confiscated in the September 2, 2015 seizure. Source: Hong Kong Customs and Excise Department

Four days later, Hong Kong Customs officials discovered two more airmail parcels. Both were declared as 'decorative tiles,' and both had originated in Zimbabwe and transited through Amsterdam.[cxvi] Upon opening the boxes, officials discovered 51 kilograms of worked ivory pieces packed in sawdust, just as the previous shipment had been.[cxvii]

Image 4. Boxes from the September 6, 2015 seizure.

Image 5. Ivory discovered in the September 6, 2015 seizure.

Source: Hong Kong Customs and Excise Department

This example is typical of many seized ivory consignments; multiple shipments are stopped within days or weeks of each other, all having taken the same transit route, packaged in the same way, and falsely declared as the same good.

Airports and Routes – Rhino Horn

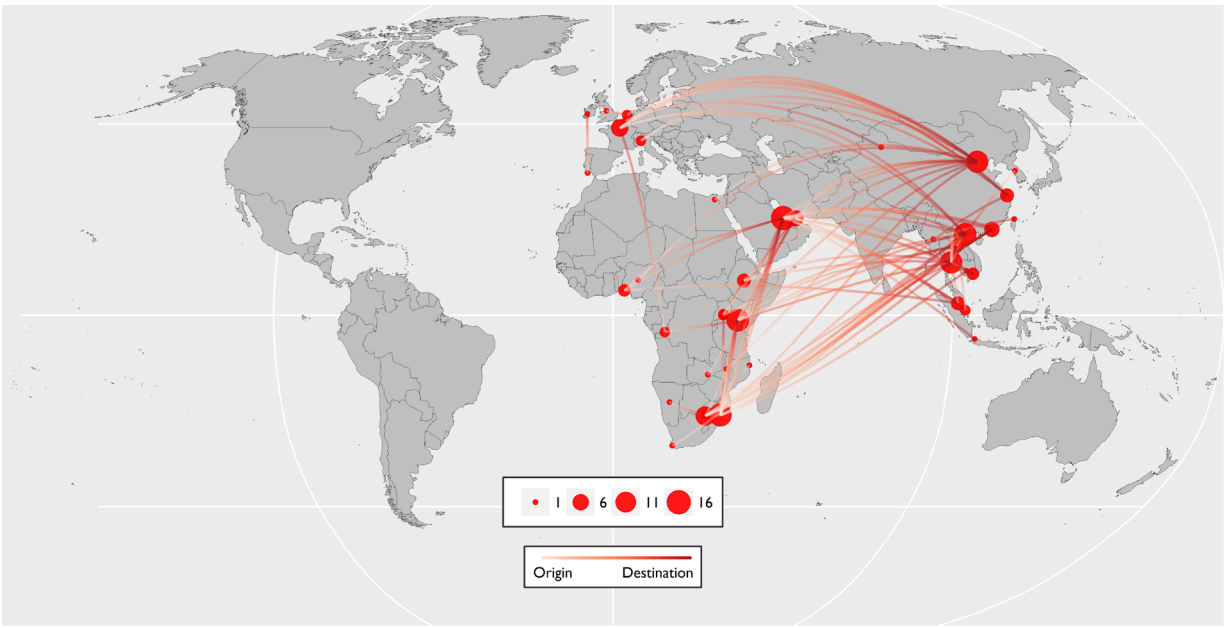


Figure 29. Rhino horn trafficking routes by air recorded in the C4ADS Air Seizure Database

The rhino horn trafficking routes map represents the flights used to traffic rhino horn products through the air transport sector. This includes instances where the product did not actually enter a country because it was seized earlier in the route. Each line represents one flight and the bubbles represent the total number of flights to and from each city.

Figure 29 maps all rhino horn trafficking routes recorded in the C4ADS Air Seizure Database. 54, or 64%, of the 85 seizures recorded in the Database contained sufficient information for inclusion in the rhino horn routes map. There are 33 countries linked to rhino horn trafficking in the Database.

The rhino horn routes map shows a clear trend of movement from Southern Africa to East and Southeast Asia. Southern Africa emerges as the most significant origin location, as criminal networks source rhino horn from the largest remaining white rhino populations in South Africa, Namibia, Botswana, and Zimbabwe,[cxviii] but regularly move their contraband through airports in Mozambique. Rhino horn leaving Southern Africa may transit through East Africa or the Middle East, or may travel directly from Maputo or Johannesburg to Asian hubs in Bangkok, Hanoi, Hong Kong, and Beijing.

Like in the ivory routes map, East African and Middle Eastern hubs facilitate the movement of rhino horn from its source to large demand markets. Jomo Kenyatta Airport in Nairobi appears in particular as a prominent transit point. For example, the most utilized route in the rhino horn category of the Database is from Maputo to Nairobi, with five separate instances of rhino horn trafficking. Alongside Nairobi, Middle Eastern (Doha, Abu Dhabi, and Dubai) and European transit hubs (Paris) are the most important transit locations for rhino horn – Doha alone counts 16 rhino horn trafficking flights. Flights from Paris have moved rhino horn to Asian hubs like Shanghai, Beijing, and Hanoi. Some Asian airports also act as important transit locations; for example, the second most common route is a flight from Bangkok to Hanoi in Vietnam, one of the most prominent destination markets for rhino horn, with four flights counted in the Database.

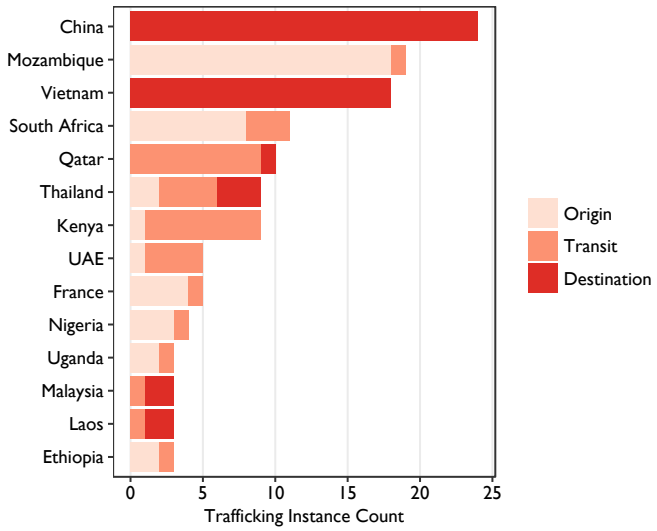


Figure 30. Country level flight route information for countries with three or more rhino horn trafficking instances between January 2009 and August 2016

Despite lower seizure numbers, rhino horn transit routes reflect those for ivory to a large extent in Figure 30. The Middle East and Greater Horn of Africa again feature as transit points, with Southeast and East Asian countries appearing as destinations. Countries like France, Nigeria, Uganda, and Ethiopia appear as origin countries, but have small to nonexistent rhino populations. This suggests that traffickers are moving horns from source countries to these origin locations before flying them to demand markets. In the case of France, rhino horns are sometimes bought at antique stores before leaving for more typical markets in East Asia.[cxix]

There are a number of significant differences between the ivory and rhino horn transit graphs, however. First, the origins of trafficking instances have condensed from 33 countries in our ivory data to just 17 countries in our rhino horn data. Rather than a diverse array of African origin points, Figure 30 reveals that Mozambique and South Africa are by far the most common origin locations for illicit rhino horn trafficked via the air transport sector, according to the C4ADS Air Seizure Database. Second, although Vietnam is a prominent destination for both ivory and rhino horn consignments, it is more significant as a destination point for rhino horn. Finally, Laos also emerges as a prominent destination point.

Figure 31 displays the airports with the largest numbers of seizures, using three seizures as a baseline for inclusion. Of the 33 countries that have had at least one instance of rhino horn trafficking by air, 21 (62%) have seized rhino horns. According to the Database, a large number of rhino horn seizures tend to occur in origin airports OR Tambo and Maputo; OR Tambo in South Africa has made the most rhino horn seizures, with 11 total seizures, followed by Maputo Airport in Mozambique with 10. This may be because rhino horn trafficking instances primarily originate in either South Africa or Mozambique, and are then dispersed across a much wider variety of transit and destination ports. Still, destination airports like Tan Son Nhat, Suvarnabhumi, Beijing, Shanghai and Noi Bai have also seized several shipments of rhino horn. Jomo Kenyatta is the only primarily transit airport to stop three or more rhino horn trafficking instances.

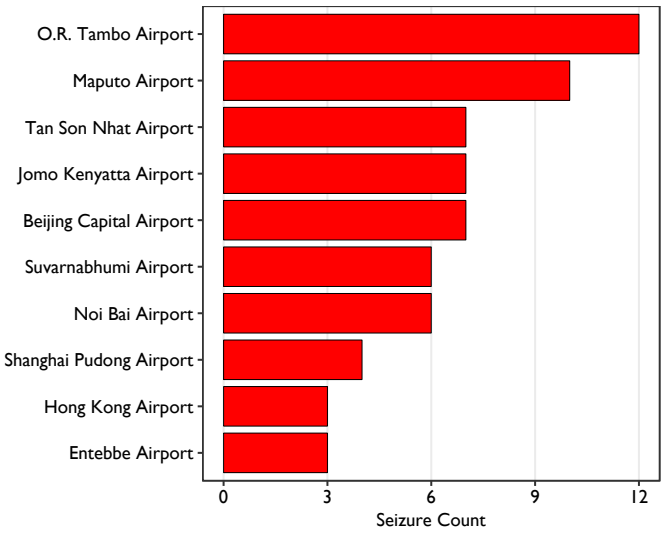


Figure 31. Airport seizure count for airports with three or more rhino horn seizures between January 2009 and August 2016

Airports and Routes – Reptiles

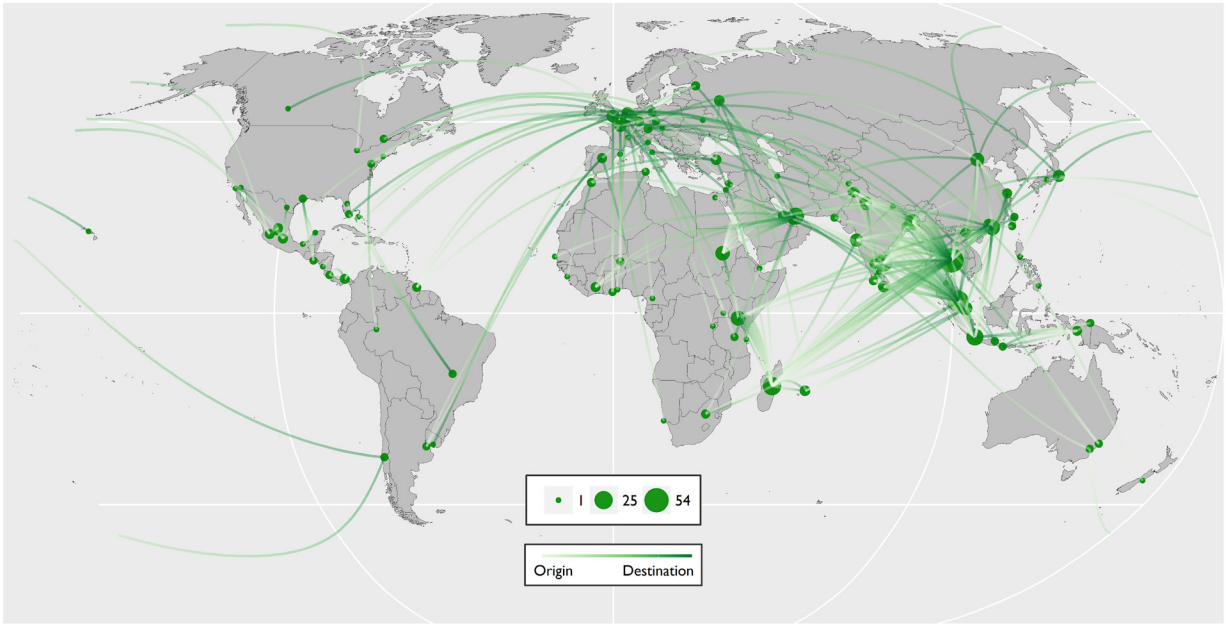


Figure 32. Reptile trafficking routes by air recorded in the C4ADS Air Seizure Database

The reptile trafficking routes map represents the flights used to traffic reptiles through the air transport sector. This includes instances where the product did not actually enter a country because it was seized earlier in the route. Each line represents one flight and the bubbles represent the total number of flights to and from each city.

The reptile routes map shows all reptile trafficking routes recorded in the C4ADS Air Seizure Database. 195, or 75%, of the 259 seizures recorded in the Database contained sufficient information for inclusion. With 73 total countries involved in at least one reptile trafficking instance, the reptile category is the most geographically diverse of the four categories used in this report. Despite the diffuse geography of the reptile trafficking instances in the Database, a majority of reptile trafficking appears to be concentrated in a few Southern Asian countries, almost entirely due to the illegal trade of two endangered turtle species.

Southern Asia has by far the highest number of reptile trafficking instances. Many of these instances are part of the trade in turtles moving from India, Bangladesh, Indonesia, and Pakistan to Thailand, Malaysia, and Singapore. Turtles originating in Northern India and Bangladesh are generally destined for Bangkok, while turtles smuggled from Southern India usually fly to Kuala Lumpur. Bangkok is associated with the highest number of reptile trafficking flights in the Database, with 54 flights, 40 of which were destined for Bangkok, and often originated in Madagascar. Kuala Lumpur is second with 38 flights, 30 of which were destined for Kuala Lumpur, and eight of which left from the airport.

In contrast to the rhino horn or ivory routes maps, the reptile map shows a marked shift away from Africa. The only African airports that appear prominently are Jomo Kenyatta Airport in Nairobi and Ivato Airport in Madagascar. The route between Ivato and Jomo Kenyatta appears to be commonly used, however, with seven different instances.

Europe appears as a prominent destination for reptiles originating in the Americas, Africa, and Asia. 17% of reptile seizures within the Database were either destined for or transited through at least one European country, compared to 9.9% in the other three categories of the C4ADS Air Seizure Database.

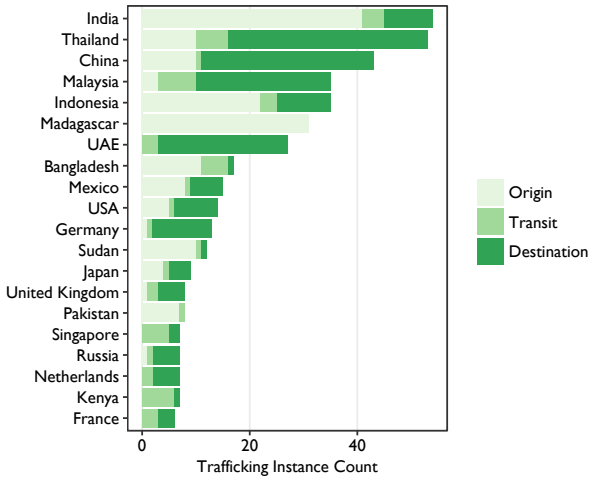


Figure 33. Country level flight route information for countries with six or more reptile trafficking instances between January 2009 and August 2016

Figure 33 reveals that the animals arriving in European hubs like London, Paris, Amsterdam, and Berlin come from a wide variety of regions. For the most part, however, seized reptiles destined for European pet markets seem to primarily originate in the Americas, followed by Southeast Asia and Africa.

The reptile routes data differs from ivory and rhino horn in another important way: transit hubs appear to be almost nonexistent. While ivory and rhino horn trafficking instances are clearly consolidated in East Africa, the Middle East, and Europe prior to export to East Asia, reptile traffickers appear to rely much more heavily on direct flights. While a circuitous route may benefit ivory and rhino horn traffickers who prefer to arrive from airports far from elephant and rhino populations, direct flights help live reptile traffickers evade multiple checkpoints and put less stress on the reptiles themselves.

The importance of South and Southeast Asia to reptile trafficking is clearly displayed in Figure 33. Although China still features prominently, particularly as a destination, the focus shifts south to India, Thailand, Malaysia, and Indonesia. This region ranks highest in the data largely due to the trafficking of black pond turtles and Indian star tortoises from India, Bangladesh, Indonesia, and Pakistan to Thailand, China, and Malaysia, the three largest destinations for reptiles according to Figure 33.

Only three African countries seem to play prominent roles in the reptile trade, according to the C4ADS Air Seizure Database: Madagascar, Sudan, and Kenya. Madagascar is a significant origin point for reptiles, ranking only behind India in its role as an origin location. Sudan is a frequent origin for Nile crocodiles destined for Dubai, and Kenya is the only primarily transit country identified by the data.

Unlike in the ivory and rhino horn routes maps, where East Asia was the only dominant destination, the UAE and Europe have shifted from primarily transit locations to prominent destinations, largely as a result of the pet trade in both regions. Russia, Mexico, and the United States, largely absent from both the ivory and rhino horn transit analyses, appear as both origin and destination markets for reptiles.

Figure 34 counts the number of reptile seizures for airports with at least three seizures. Of the 73 countries involved in reptile trafficking, 48 (64%) have made seizures. Four of the top 18 airports by seizure numbers are Indian airports, accounting for 34 seizures. Thailand follows with 23 seizures in Suvarnabhumi Airport alone. Taken together, the

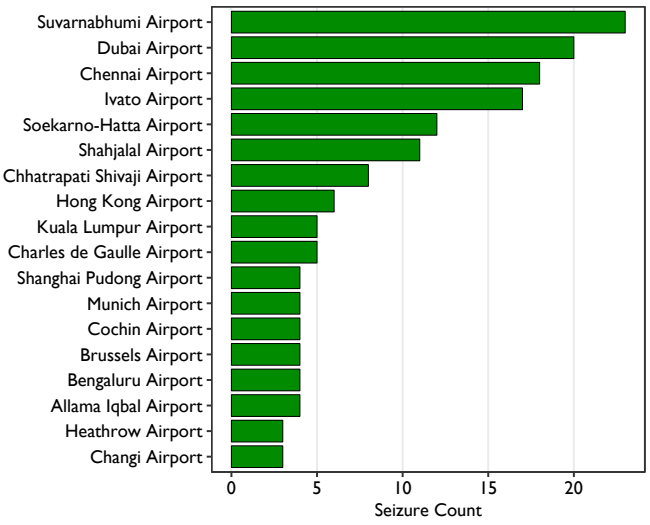


Figure 34. Airport seizure count for airports with three or more reptile seizures between January 2009 and August 2016

South and Southeast Asian regions represent 44% of the seizures within the reptile category. The remaining 56% of seizures are spread across East Asia, Europe, the Middle East, and Madagascar. With the exception of Ivato Airport in Madagascar, no individual African or American airport has made three or more reptile seizures according to the Database, even though Africa and the Americas have been involved in at least 49 and 29 reptile trafficking instances respectively. This disparity may be due to limited public reporting in those jurisdictions on reptile seizures, lower awareness of reptile trafficking amongst African and American enforcement agencies, poor training on wildlife trafficking, or, alternatively, enforcement in those areas could be choosing to prioritize seizing other types of contraband.

Shifting Transit Routes, Narcotics, and Reptiles

Past interrogations of wildlife traffickers have revealed that smuggling networks monitor not only enforcement levels within airports, but also the creation of new international transit routes, which traffickers consider to be less risky. Some cases have shown that other criminal actors support wildlife trafficking networks, or at the very least, search for the same enforcement loopholes. One seizure in 2015 revealed how different networks overlap, as well as how these networks adapt to and take advantage of situational changes.

On September 27, 2015, officials at Tamil Nadu's Madurai International Airport (India) seized a shipment of 247 Indian star tortoises.[cxx] The suspect arrested in connection with the seizure admitted to authorities that he had obtained the tortoises in Chennai, India, and was taking them to Kuala Lumpur in Malaysia through Colombo, Sri Lanka.[cxxi]

Image 6. Tortoise and narcotics trafficking suspect Abdul Alim and a few of the trafficked Indian star tortoises. Source: S. James

Although Indian star tortoises, listed on CITES Appendix II, are frequently trafficked in and around India, Malaysia, and Sri Lanka, this was the first seizure of tortoises at the airport – most previous seizures at Madurai Airport had been of either drugs or gold.[cxxii] Prior to this seizure, most illicit tortoise trafficking instances in India had moved through Chennai, Chhatrapati Shivaji, Cochin, or Bengaluru Airports. A district forest officer involved in the investigation suggested that the traffickers might have chosen Madurai because the airport was adding new international routes at the time, and the airport officials and staff were not familiar with wildlife smuggling.[cxxiii] A subsequent investigation revealed that the suspect involved in the seizure had a history of smuggling drugs, including a hallucinogenic veterinary drug Ketamine, but he insisted that this instance was his first experience transporting tortoises.[cxxiv] [cxxv]

This particular instance demonstrated how narcotics and wildlife smuggling networks operating within India can intersect, as well as how different criminal networks adapt to take advantage of the same gaps in certain airport's screening capabilities. This suggests that a diverse array of illicit commodities may be moved through the same international airports that are perceived as less risky, either due to enforcement loopholes, a lack of capacity or awareness, corruption, or rapid expansion.

Airports and Routes – Birds

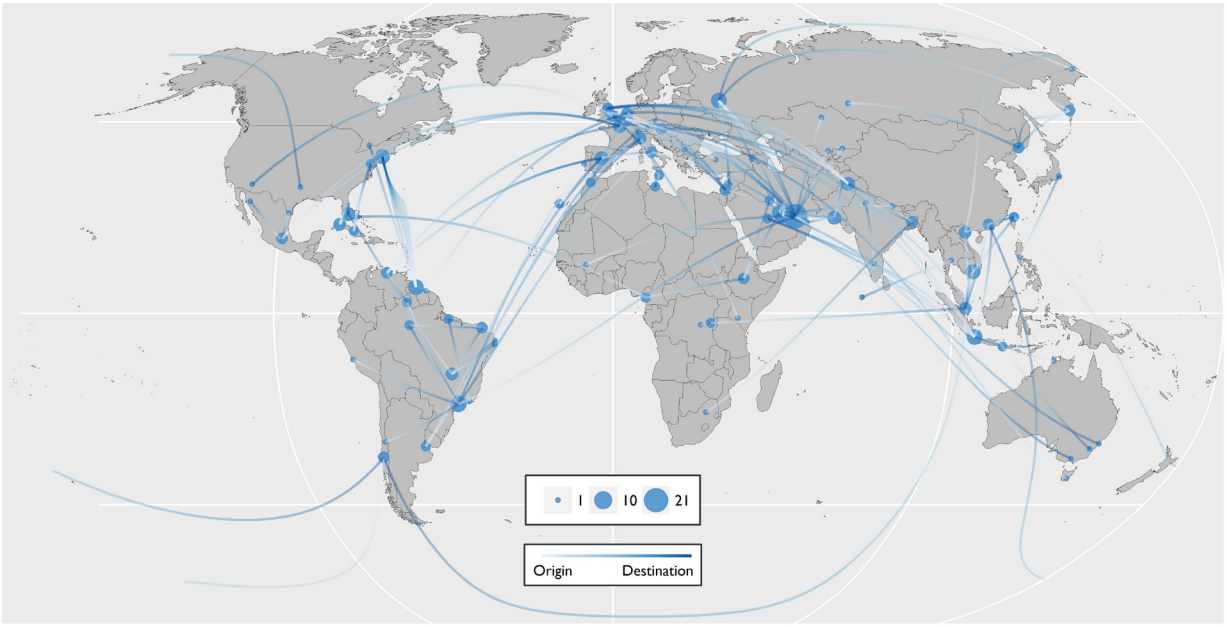


Figure 35. Bird trafficking routes by air recorded in the C4ADS Air Seizure Database

The bird trafficking routes map represents the flights used to traffic birds through the air transport sector. This includes instances where the product did not actually enter a country because it was seized earlier in the route. Each line represents one flight and the bubbles represent the total number of flights to and from each city.

The bird routes map shows all bird trafficking routes recorded in the C4ADS Air Seizure Database. 118, or 81%, of the 146 bird seizures recorded in the Database contained sufficient information for inclusion in our analysis. There are 68 total countries linked to at least one bird trafficking instance, making the bird routes data second only to the reptile routes data in terms of geographic diversity.

Unlike the ivory, rhino horn, and even reptile routes maps, there is no clear geographical flow associated with international bird trafficking routes. However, three regions of interest do appear: the Americas, Europe, and the Middle East. In contrast to ivory and rhino horn trafficking routes, the bird routes map reveals that Africa and East Asia are the least relevant regions to bird trafficking, according to the Database. The only visible pattern appears to be general movement from the Southern to the Northern Hemispheres, suggesting that birds are moved from their natural habitats in South America and Southeast Asia to live pet markets in the US, Europe, and the Middle East.

Of the three destination regions visible in Figure 35, the Middle East appears to be the most prominent. Dubai was involved in 21 of the 130 flights recorded within the bird routes data, 13 more than the next most prominent city, Sao Paulo in Brazil. The two most frequent routes associated with Dubai were Moscow and Brussels to Dubai Airport. Still, each route was only counted twice, highlighting the diverse nature of bird trafficking even in regards to its most significant airport.

The most common route overall, however, was from Georgetown, Guyana to New York City, with six total instances. Each of these instances involved finches likely destined for singing competitions in Queens. Miami and Los Angeles Airports are also common destinations for birds trafficked from Europe, South America, and Asia.

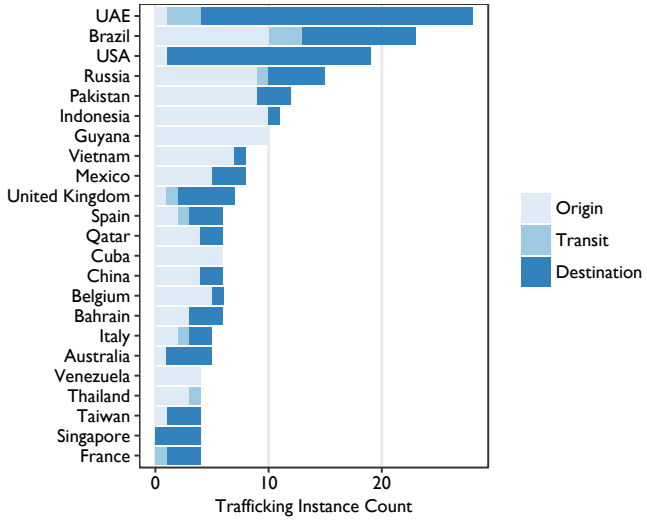


Figure 36. Country level flight route information for countries with four or more bird trafficking instances between January 2009 and August 2016

The bird routes map is also unusual in comparison to the other three maps in the high number of domestic flights counted within the bird category. For example, the majority of the routes associated with Brazil and Russia are domestic flights. Russian hawks and falcons seem to be flown through Moscow before arrival in the Middle East or Vladivostok Airport on the southeastern edge of Russia.

Bird trafficking routes are similar to those for reptiles in that trafficking route information is extremely limited (Figure 36). The Americas, Europe, the Middle East, and Southeast Asia dominate as origin and destination locations. Africa is entirely absent and China drops significantly, out of the top three for the first time, and ties with five other countries with six total trafficking instances. Of all the prominent countries, only nine have been listed as transit locations for past trafficking instances. Of those nine transit countries, four are in Europe, and two are in Southeast Asia. The four European countries – the United Kingdom, Italy, Spain, and France – seem to serve partly as transit points between South America and the Middle East.

The remaining three transit countries are the UAE, Brazil, and Russia. According to Figure 36, the UAE is both the largest destination for birds and one of the largest transit countries. Brazil and Russia appear as transit locations due to the large number of domestic flights counted within the bird category for each country. Trafficked birds in both countries seem to funnel through airports in their largest cities, Sao Paulo and Moscow, from smaller, domestic airports with limited or no international flights. As a result, Sao Paulo and Moscow are often categorized as transit points, rather than origin points, for trafficking instances originating in both countries.

Figure 37 displays the number of bird seizures made in airports, using three seizures as a baseline for inclusion. Out of the 68 countries involved in bird trafficking, 43 (63%) have made at least one seizure.

In line with its role as a major destination point for bird trafficking, Dubai also leads by actual seizure numbers (Figure 37). Russian and Vietnamese airports, despite the high numbers of trafficking instances originating in both countries, do not appear on the list of top airports for seizures. This may indicate a failure in enforcement, limited reporting, or a lack of awareness of bird trafficking. American airports, by contrast, together account for 12 seizures, and the second most prominent country, Brazil, accounts for eight, which may suggest better enforcement or reporting in those

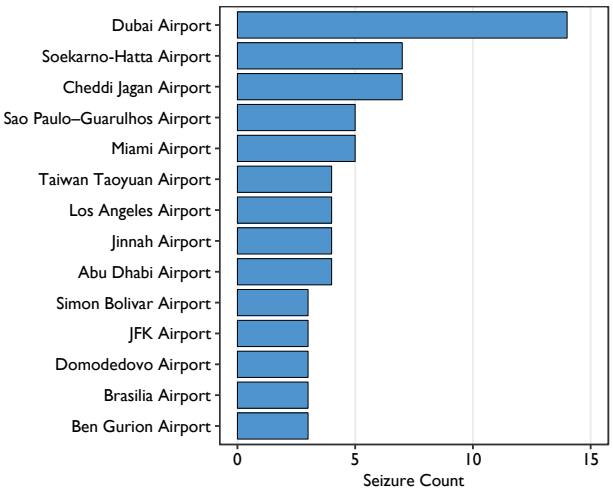


Figure 37. Airport seizure count for airports with three or more bird seizures between January 2009 and August 2016

countries. Cheddi Jagan Airport in Guyana ranks third in terms of seizures (Figure 37) and seventh in terms of trafficking instances (Figure 36), which may imply that Guyana has been comparatively successful in detecting illicit bird trafficking.

Finally, although Israel is not ranked as a prominent country for bird trafficking, it ties for fifth in terms of the number of bird seizures made at Ben Gurion Airport in Tel Aviv, and has seized 100% of known bird trafficking instances within its borders. The inclusion of Ben Gurion Airport in Figure 37 suggests that Israeli enforcement is particularly successful in identifying bird trafficking, despite Israel not being known as a wildlife trafficking hotspot.

Modus Operandi

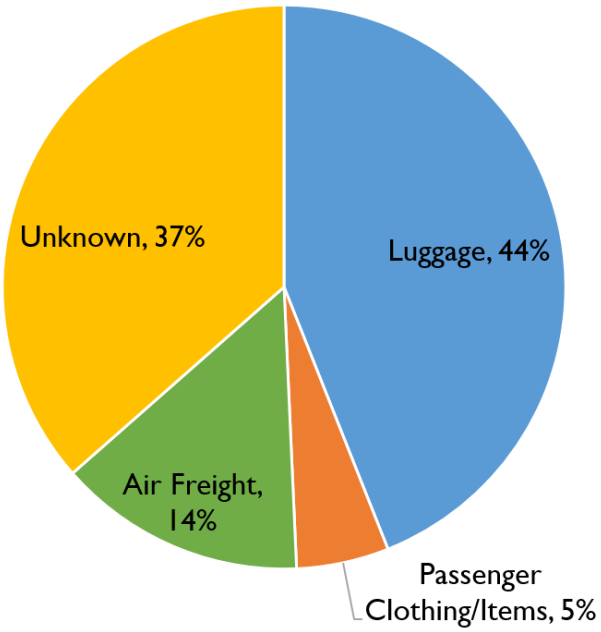


Figure 38. Methods of transport for all trafficking instances in the C4ADS Air Seizure Database between January 2009 and August 2016

Tracking wildlife seizures over time reveals certain patterns in the various ways that traffickers move their contraband through the air transport sector. Seizures reveal that traffickers often rely on the same methods to move goods over time; for instance, tin foil has been used for years to hide ivory and other illicit products. In other cases, traffickers' modus operandi shift over time in response to heightened or changed enforcement efforts, and to some extent, vary depending on the species or product being trafficked. Note that less effective trafficking methods are more likely to be caught, and therefore included in our analysis, and that the most effective tactics may never be identified. Still, understanding the various strategies that traffickers utilize, frequently successfully, to evade detection will allow enforcement to develop better targeting mechanisms, and can lead to substantially decreased vulnerability to trafficking within airports.

A crucial factor in intercepting wildlife traffickers and their contraband is knowing how it will be moved – should enforcement be prepared for individual passengers carrying illegal products on their person? Should private sector actors, such as airlines, be on the lookout as well, or does wildlife trafficking through the air transport sector primarily affect national postal services? What obfuscation methods are most common and easiest to detect? Wildlife trafficking cannot be addressed effectively without first answering these questions.

Conventional wisdom, particularly in regards to ivory trafficking, maintains that the majority of illicit wildlife and wildlife products transported by air are moved by air cargo. This belief has led some in the transport sector to argue that wildlife trafficking is a problem for cargo airlines to solve, and does not generally apply to passenger airlines. C4ADS' data suggests that this is not the case; trafficked wildlife was moved through *air freight* – all air freight and cargo shipments – only 14% of the time. *Luggage,* or checked baggage, appears to be

by far the most prominent category, accounting for 44% of the trafficking instances catalogued in C4ADS' Air Seizure Database. The next largest category, *unknown*, reflects the same lack of detail that plagues all wildlife seizure data and analyses; transport method is *unknown* for 37% of seizures.

It is possible that our transport method results reflect the success of screening methods for each transport method. For example, luggage seizures could be high as a result of comparatively effective screening methods for luggage, and air freight seizures could be low due to comparatively ineffective screening procedures for air freight.

Transport method is more frequently reported for reptile and bird trafficking instances than either ivory or rhino horn. This could be a result of the strange ways traffickers of these species move their contraband (e.g. in their underwear), or it could reflect increased public interest in the fate of live trafficked animals.

Common Modus Operandi

The various modus operandi addressed in this section include:

- Obfuscation methods (tin or aluminum foil, paper, various agricultural products, etc.)
- Prominence of repeat offenders
- Abandoned or exchanged luggage
- Use of multiple suitcases
- Incorrect or incomplete customs declarations
- Circuitous air transit routes
- Use of shell or cover companies
- Custom clothing
- Taxidermy
- Use of ketamine and other drugs to sedate live animals

Other methods not covered in this section include:

- Falsification of CITES permits
- Collusion between customs officers and smugglers
- Collusion between industry employees and smugglers

Some wildlife trafficking methods are consistently used across all four categories, and extend even to other contraband, like narcotics. For example, tin or aluminum foil is believed to prevent X-ray scanners from producing clear images, and as a result is used to obfuscate ivory, rhino horn, weapons, ammunition, etc.[cxxvi] Live birds have even been found wrapped in tin foil and stuffed inside suitcases. In one instance at Changi Airport in Singapore, officials discovered three white-rumped shamas along with six melodious laughing thrushes (CITES Appendix II) inside one man's suitcase.[cxxvii] The birds had been stuffed inside cylindrical tubes, wrapped in aluminum foil, and stored inside black trash bags.[cxxviii] None of the birds survived.

Plastic wrap and tape are also frequently used, particularly for live animals like turtles, whose movement is often restrained to prevent detection.

In 2013, Royal Thai Customs arrested a Thai man as he attempted to collect a suitcase containing 54 ploughshare tortoises and 21 radiated tortoises (both CITES Appendix I).[cxxix] The bag was the property of a woman who had flown from Madagascar to Bangkok through Nairobi, and was not the property of the Thai man who collected it.[cxxx] Further investigation revealed that the Thai suspect had previously been arrested for wildlife trafficking.[cxxxi] This instance displays a number of the hallmarks of organized wildlife trafficking: the reptiles were taped and hidden in checked luggage; the suitcase belonged to another individual, but was abandoned at the destination by its owner for pickup by someone else; and the Thai man arrested was a repeat offender.

Image 7. Ploughshare and radiated tortoises (both CITES Appendix I) discovered in a suitcase at Suvarnabhumi Airport in Bangkok, Thailand. The tortoises were wrapped in tape to obstruct their movement. Source: P. Tansom/TRAFFIC[cxxxii]

The sheer volume of air passengers and cargo that pass through large airports every day creates a substantial enforcement challenge – the real world equivalent of finding a needle in a haystack. Faced with such a task, customs and enforcement prioritize safety concerns, followed by technically 'higher-level' crimes, like narcotics trafficking. Wildlife traffickers know they will not likely be targeted, and even if they are caught, they may not be detained.

In one high profile ivory seizure in Zurich Airport in July 2015, three Chinese citizens were caught trafficking 262 kilograms of ivory, and one kilogram of lion products, in their luggage. The suspects were planning on traveling from Tanzania, through Switzerland, to Beijing, China. The ivory had been wrapped in paper and aluminum foil before being placed in suitcases. Zurich Airport Customs Chief Heinz Widmer told reporters, "We started to search the passengers, and…we found in the system that three Chinese people are traveling together and they have in total eight suitcases."[cxxxiii] The unusually high number of suitcases led the officials to detain the suspects "temporarily."[cxxxiv] Each suspect was reportedly asked to pay a fine of $102,000, although they were allegedly unable to pay such a high fine on the spot, and negotiated fines of "a lesser, undisclosed

amount of money" before their release later that day.[cxxxv] The three suspects were last reported to be safely at home in China, despite the initiation of a criminal investigation into the incident in Tanzania.[cxxxvi]

Wildlife traffickers are frequently identified as repeat offenders. The following list chronicles only a few of many trafficking instances involving repeat offenders:

- In 2010, an airline passenger refused to open his bags as he went through security screening. The Brazilian Federal Police were summoned and discovered 232 birds in his luggage. The suspect had two previous wildlife offenses.[cxxxvii]
- In 2013, 8.77 kilograms of ivory were discovered in Shenyang Xintai Airport in China. The suspect involved in the case had traveled from Kenya through Seoul, South Korea. The suspect had smuggled ivory from Kenya to China six times in one year at the time of his arrest.[cxxxviii]
- A 2015 seizure of 200 Indian star tortoises (CITES Appendix II) resulted in two arrests. The suspects identified one "Dinesh Jothimani" as the organizer of the trafficking attempt, making this the fourth seizure linked to Jothimani.[cxxxix]

Both the white-rumped shamas case and the Zurich ivory seizure case discussed above highlight two commonly used trafficking methods: the abandonment of a suitcase somewhere along the chain by its original carrier, and the use of multiple suitcases per person. The latter approach will be explored in more detail below in regards to ivory trafficking.

Image 8. 232 saffron finches and double-collared seedeaters discovered in Brasilia Airport in 2010. The trafficker moving the animals had two previous wildlife offenses. Source: Reprodução/Ibama [cxl]

Searching for examples of abandoned or exchanged luggage will yield plentiful results, including:

- Black pond turtles discovered in four suitcases abandoned by their owners on the way from India to Bangkok in 2014.[cxli]
- Indian narrow-headed soft-shelled turtles (CITES Appendix I/II) found in a large bag abandoned in Hazrat Shahjalal Airport in Bangladesh.[cxlii]
- 270 birds that had been packed in luggage and exchanged from one trafficker to the next in Eduardo Gomes Airport in Sao Paulo in 2011.[cxliii]
- Nine rhino horns discovered in a suitcase in Bangkok in 2014 after the trafficker purposefully left his

bag behind so that it would follow him as lost luggage.[cxliv]

- 110 kilograms of ivory packed in two suitcases and abandoned in Heathrow Airport when the associated Vietnamese traffickers bought tickets back to Angola rather than continue on to their destination.[cxlv]

Increased knowledge of this and other common trafficking methods can inform and direct customs, enforcement, and private sector action in airports, particularly those with a substantial trafficking problem but little visibility on the issue. Detailed seizure data can reveal shifting trafficking trends and methodologies as traffickers become aware of heightened and targeted enforcement action in specific ports. In fact, past seizure information, limited though it may be, clearly shows enforcement-driven changes in trafficking patterns.

In one 2015 seizure, the Indian Central Industrial Security Force (CISF) seized 72 black pond turtles from two smugglers in Kempegowda Airport, India.[cxlvi] The suspects had taped the turtles' legs together, covered them in cardboard and pillow covers, and placed them in two suitcases.[cxlvii] Although the smugglers were originally planning on moving the animals from Chennai to Kuala Lumpur in Malaysia, they were instructed to use Kempegowda Airport instead of Chennai, since "security was heightened at the Chennai airport."[cxlviii] In other instances, networks have shifted from carrying contraband on their persons[cxlix] to removing the contraband and stowing it in their carry-on bags prior to security screenings in response to enforcement pressure.[cl] Tracking these sorts of changes over time can help officials become as versatile as the traffickers they work to stop.

Modus Operandi – Ivory

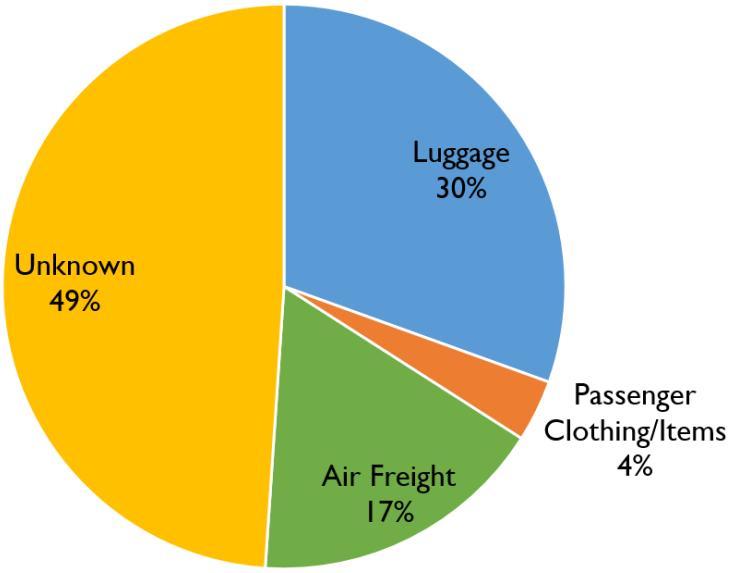


Figure 39. Methods of transport for ivory trafficking instances by air between January 2009 and August 2016

The above graph separates all of the ivory seizures within the C4ADS Air Seizure Database by transport method. Although the press frequently reports the details of ivory seizures, 49% of the ivory seizures in the Database did not have associated transport method information. By comparison, reptile and bird seizures in the Database included transport method information for around 75% of instances. Of all the categories reviewed in this report, ivory traffickers seemed to most heavily rely on air freight, although air freight shipments still only represented 17% of the total ivory trafficking instances.

Because of ivory tusks' large size, traffickers are rarely able to transport raw ivory in their carry-on baggage. In addition, ivory's high value allows traffickers to ship large ivory consignments by air freight, one of the most expensive options for air transport. Air freight shipments, however, require a fair amount of documentation, such as an air waybill, that list the shipper and consignees of the shipment, as well as the products shipped and a number of other details. Ivory traffickers must therefore falsify the information included on air waybills and any other required documentation to evade detection. Smugglers frequently declare ivory as bulk low-value goods, such as 'plastic scrap,' technological parts and pieces, 'decorative tiles,' and a wide variety of agricultural products, such as avocados and beans. In order to throw off trained sniffer dogs, traffickers often package illicit goods with products like pepper, dried fish, or garlic.[cli] Traffickers may also list nonexistent or defunct companies as the shipper and consignee, including fake addresses and phone numbers, to ensure that enforcement agencies will not be able to easily identify the true source and destination of a shipment in case of a seizure.

Modus operandi utilized by ivory traffickers have included:

- Aluminum or tin foil, paper, plastic, or cloth as obfuscation method

- Abandonment or exchange of luggage
- Additional luggage
- Custom clothing
- Shell or front companies
- Circuitous transit routes
- Missing, incomplete, or fraudulent customs documentation

Ivory is sometimes trafficked along with:

- Rhino horn
- Pangolin or pangolin scales
- Lion teeth and/or claws
- Leopard skins
- Mammoth ivory

The following case studies describe a number of other common trafficking strategies, including the use of custom-made clothing, continued use of the same transit routes, and fraudulent documentation. Compiling detailed information on wildlife traffickers' smuggling strategies provides customs and enforcement with clear red-flag indicators that can help to target high-risk passengers and shipments, thereby improving enforcement's success rate.

Handmade Vests in Hong Kong

An ongoing trafficking trend in Hong Kong highlights smugglers' repeated use of certain routes and modus operandi. On August 7, 2015, Hong Kong Customs stopped one 18-year-old man arriving in Hong Kong Airport from Harare Airport, Zimbabwe via Dubai Airport.[cliii] He was wearing a tailor-made vest containing 15 kilograms of worked ivory at the time of his arrest.[cliii] A little over two weeks later, a 42-year-old man was arrested after arrival in Hong Kong Airport with 15 kilograms of worked ivory.[cliv] He had hidden the ivory in a tailor-made vest as well, but had stowed the vest in his hand baggage prior to his arrest.[clv] Although he also transited through Dubai Airport, he was traveling from Abuja, Nigeria (likely Nnamdi Azikiwe Airport).[clvi] The seizures seemed to match another 15-kilogram seizure from July of that year, although the suspect in that case originated in Lagos, rather than Abuja, and carried ivory in his pants as well as a hand-made vest.[clvii]

Image 9. Vest seized on August 7, 2015.

Image 10. Vest seized on August 24, 2015.

Source: Hong Kong Customs and Excise Department

Since then, an additional eight individuals have been arrested under similar circumstances in Hong Kong Airport prior to September 2016. Each instance generally matches the following description:

- Transit route of Abuja, Nigeria or Harare, Zimbabwe*[clviii] to Dubai, UAE to Hong Kong
- Tailor-made vest
- About 15 kilograms of ivory per suspect
- One or two vests per male suspect

The suspects have not been found wearing the vests since the incident on August 7th. Instead, the vests are almost always discovered in their carry-on baggage. Ivory has also been found in the suspects' underwear, pants, and backpacks. No other seizures using similar vests have been publicly reported in Nigeria, Zimbabwe, or the United Arab Emirates. Although this report only focuses on events occurring between 2009 and August 2016, it is worth noting that multiple seizures made in October 2016 suggest that this trend is ongoing.

Image 11. Vest seized on November 7, 2015 in Hong Kong.

Image 12. Vest seized on November 7, 2015 in Hong Kong. The first vest is similar to the vests used in the earlier seizures, while the second vest more closely resembles those used in later seizures. Source: Hong Kong Customs and Excise Department

In this particular case, enforcement in Hong Kong have made multiple arrests, and yet the trend continues, suggesting that Hong Kong authorities may be missing enough of these instances to warrant the continued use of this strategy.

* One seizure made on April 17, 2016 matched the modus operandi of the other seizures, but originated in Abidjan, Ivory Coast.[clix]

Fraudulent Documentation

Ivory consignments shipped in air freight generally share a number of the same characteristics; for example, they are often declared as low-value bulk goods and destined for defunct or nonexistent companies.

Image 13. Officials open one of the six boxes involved in the seizure. The box reads, "Republic of South Africa."

In July of 2012, Thai officials opened six crates declared as "handicrafts" as part of a routine search and discovered 158 raw ivory tusks weighing 456 kilograms.[clx] The ensuing investigation revealed that the consignment had left Kinshasa, Democratic Republic of the Congo and transited through Jomo Kenyatta Airport in Nairobi before reaching its destination in Bangkok.[clxi] The Kenya Wildlife Service (KWS) and Suvarnabhumi Airport's Cargo Clearing Customs Bureau reported that the consignee listed on the shipment's air waybill was one Johnson Controls Air Express in Thailand.[clxii]

#	Description	Flight	Date	From	To
1	6 piece(s), at 519.0 kilos Booked	KQ886	12JUL12 15:05	NBO	BKK
2	6 piece(s), at 519.0 kilos Received From Shipper	KQ886	12JUL12 2035	NBO	BKK
3	6 piece(s), at 519.0 kilos Departed on Flight	KQ886	12JUL12 22:59	NBO	BKK
4	6 piece(s), at 519.0 kilos Departed	KQ886	12JUL12 22:59	NBO	BKK
5	6 piece(s), at 519.0 kilos Arrived	KQ550	12JUL12 00:07	FIH	NBO
6	6 piece(s), at 519.0 kilos Received From Flight	KQ550	12JUL12 00:07	FIH	NBO

Image 14. Air waybill information for the July 2012 air freight shipment. Source: track-trace.com.

Transit information associated with the consignment's air waybill number reveal that the ivory was shipped on two Kenya Airways flights, KQ550 and KQ886, on July 12th. Soon after the seizure, media outlets began reporting that "Johnson Controls Air Express" was not a real company.[clxiii] Thai documentation for the company does not appear to exist.

In another case in May 2011, Kenyan authorities discovered 1.4 tons of ivory abandoned at the "import cargo section" of Jomo Kenyatta Airport, although the shipment was destined for export to Lagos, Nigeria.[clxiv] The ivory had been packaged in metal boxes smeared with pepper.[clxv] Airport officials revealed that paperwork associated with the consignment claimed that the boxes had originated in the "Embassy of the Republic of Papua, New Guinea" and the "Embassy of Brunei" in Nairobi.[clxvi] Officials soon discovered that neither embassy existed in Nairobi, even though addresses had been listed on the air waybill for both.[clxvii] The shipment was destined for "Roadside Ventures Ltd." in Nigeria,[clxviii] but may have been intended for Roadside Ventures (Express) Ltd., a freight forwarding and customs clearance company based in Lagos. It is also possible that the name "Roadside Ventures" was used to distract from the real destination of the shipment.

A little over a year later, sniffer dogs at Jomo Kenyatta Airport discovered a 745-kilogram shipment of ivory. [clxix]According to reports, the shipment had been declared as 'motor vehicle spare parts,' was packed in crates, sprayed with pepper, and covered with aluminum foil.[clxx] The shipment was also destined for Lagos, Nigeria, [clxxi]although enforcement did not publicly release more detailed information.

Modus Operandi – Rhino Horn

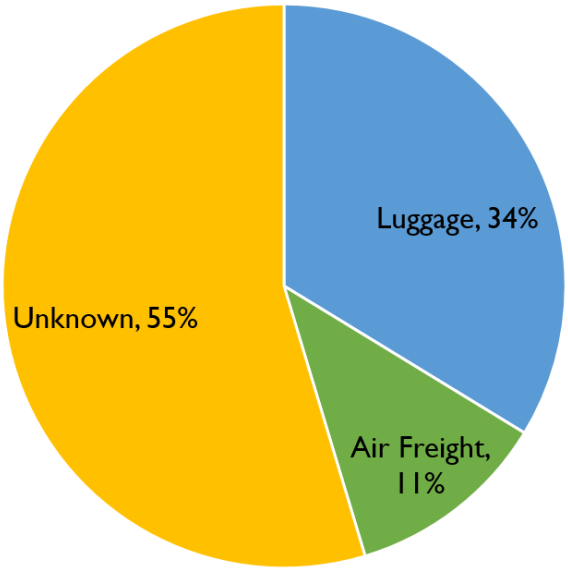


Figure 40. Methods of transport for rhino horn trafficking instances by air between January 2009 and August 2016

Figure 40 divides the rhino horn seizures within the C4ADS Air Seizure Database by transport method, and reveals that the modus operandi of rhino horn traffickers most closely matches that of ivory traffickers. Like ivory, *unknown* trafficking methods account for around half of rhino horn trafficking instances. Luggage and air freight appear to be the most common ways that both rhino horn and ivory are moved, although luggage is 5% more common for rhino horn seizures within the Database. There is one striking difference, however; according to our data, rhino horn is rarely smuggled on a person's body or in their carry-on luggage, likely due to their unwieldy size and shape. Note that it is possible that traffickers are also moving rhino horn powder through airport security in their carry-on baggage, although it seems that if this is the case, they are not getting caught.

Modus operandi utilized by rhino horn traffickers have included:

- Aluminum or tin foil, paper, plastic, or cloth as obfuscation method
- Abandonment or exchange of luggage
- Additional luggage
- Shell or front companies
- Circuitous transit route
- Missing, incomplete, or fraudulent customs documentation
- Taxidermy

Rhino horn is sometimes trafficked along with:

- Ivory
- Pangolin or pangolin scales
- Lion teeth and/or claws
- Leopard skins
- Mammoth ivory

Unlike live animal traffickers, who benefit most from direct flights, rhino horn traffickers have been known to send or take their contraband on circuitous routes through airports they suspect will not be on the lookout for rhino horn. For instance, one Vietnamese individual carrying eight black rhino horns flew from Maputo, Mozambique to Vietnam via Entebbe Airport, Uganda; Dubai Airport, UAE; Changi Airport, Singapore; and Laos.[clxxii] He was finally stopped in Singapore with 21.5 kilograms of rhino horn in his checked baggage, and eventually sentenced to 15 months in prison.

Rhino horn traffickers are also able to exploit legal loopholes for the import and export of taxidermy to smuggle rhino horn. Poachers and traffickers in the well-known Xaysavang Network, for instance, would take horns from poached rhinos to taxidermists to have them mounted as hunting trophies so that they could be exported. A former member of the network allegedly told South African police, "The trophy is just a cover for getting the horn out of South Africa and into Asia. Once in Asia, it obviously would enter the black market as rhino horn for 'medicinal purposes'."[clxxiii]

Indirect Transit Route and 'Lost' Luggage

Traffickers often go to great lengths to separate themselves from their illegal cargo, even when they pack their contraband in their own suitcases.

Image 15. Nine rhino horns discovered in the "lost" suitcase. © Royal Thai Customs

In one case from January 2014, customs officials at Bangkok's Suvarnabhumi Airport seized nine rhino horns weighing 21.8 kilograms from a lost suitcase.[clxxiv] After investigation, the officials discovered that a Vietnamese national had purposefully left the suitcase behind so that it would follow him as lost luggage. The horns were in transit from Nairobi to Hanoi at the time of their seizure, and had reportedly passed through at least one other airport prior to arrival in Nairobi.

South African Taxidermy

Other South African trafficking networks have utilized, and likely continue to utilize, taxidermists to ensure the safe passage of rhino horn and other products. In one instance in December of 2015, the South African Revenue Service (SARS) discovered two horns weighing over 10 kilograms at OR Tambo Airport in Johannesburg.[clxxv] According to a SARS press release, "Customs officials found the horn in a shipment of taxidermy that had been profiled for examination at a well-known cargo forwarding company."[clxxvi]

SARS reported that the cargo forwarding company then contacted the owner of the shipment to request the required export documentation for the rhino horns, but did not received a response within the necessary timeframe.[clxxvii] The horns were confiscated as a result.

Trafficking networks have also been known to use this same method to transport ivory from Southern Africa to Asia,[clxxviii] as well as wildlife products from Africa to the US.[clxxix]

Modus Operandi – Reptiles

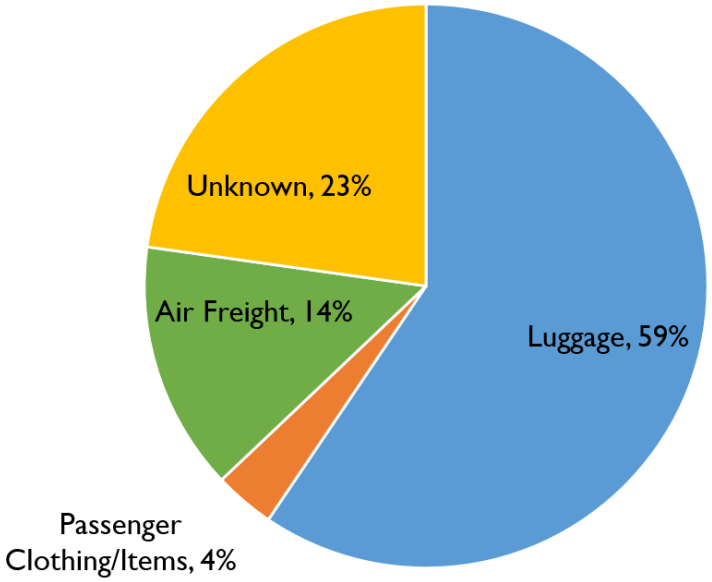


Figure 41. Methods of transport for reptile trafficking instances by air between January 2009 and August 2016

The above graph demonstrates the different transport methods used for all of the reptile seizures contained within the C4ADS Air Seizure Database. According to Figure 41, reptile traffickers appear to rely on luggage far more than any other method. Numbers of air freight shipments and passenger trafficking instances more closely resemble the transport breakdown for ivory (17% and 4% respectively). Close to a quarter of reptile seizures contained within the Database lack transport method information entirely. Despite these unknowns, the reptile dataset is the most complete of the four categories covered in this report, with a total of 77% of reptile seizures' transport methods accounted for (compared to 51%, 46%, and 74% for ivory, rhino horn, and birds respectively).

Luggage appears to be the preferred method of reptile traffickers for a variety of reasons. Most turtle species can be easily packaged by the dozens in a standard suitcase. Hardier than birds, some turtle and other reptile species can go without food or water for up to ten days, and therefore give smugglers more flexibility to choose the most advantageous trafficking method available. These species' durability allows traffickers to travel with their contraband to their destination; abandon their luggage at some point along the transit route; send the animals along a more circuitous transit route than usually used for live animals; or leave their suitcase for an extended period of time in an airport's baggage claim, with the knowledge that they can either retrieve the suitcase later or hope the airline will transport the luggage directly to the trafficker's declared address.

Modus operandi utilized by reptile traffickers have included:

- Tape, plastic, or cloth as obfuscation method
- Abandonment or exchange of luggage

- Additional luggage
- Missing, incomplete, or fraudulent customs documentation
- Fraudulent paperwork claiming the animals are captive-bred
- Use of sedatives to inhibit animals' movements

Reptiles are sometimes trafficked along with:

- Narcotics
- Arachnids
- Insects

To ensure the safe passage of their illicit cargo, traffickers frequently tape the animals or wrap them in plastic to restrict their movement. In one instance in May 2016, 60 Egyptian cobras were discovered in two polystyrene boxes in Cairo Airport. An official detected suspicious movements within the boxes during an X-ray. The snakes were discovered packed in ice to limit their movements, and with their mouths sewn shut with surgical thread, presumably to protect the traffickers and prevent the snakes from biting each other or hissing during transit.

Image 16. Six of the cobras seized in Cairo in May 2016 with their mouths sewn shut. Source: IFAW[clxxx]

In other recent cases, reptile traffickers appear to be increasingly relying on prescription and veterinary drugs to keep their contraband subdued during their journey. During a two-day workshop held by WWF-Pakistan, Syed Mahmood Nasir, the Pakistani Inspector General of Forests in the Ministry of Climate Change, noted the importance of tracking smugglers' shifting strategies to effectively tackle the wildlife trade, and cited a

recent seizure of 144 anesthetized black pond turtles in Lahore Airport as evidence of a change in trafficking methods.[clxxxi] A case from April 2014 displayed a number of the hallmarks of this apparent trend in South Asia – an airline employee found "what they thought to be mangoes" packed tightly in the check-in baggage of Abdul Harish, who was on his way from Trivandrum Airport, India to Bangkok through Colombo, Sri Lanka.[clxxxii] Customs officials detained Harish when they found him to be "extremely edgy" during customs clearance.[clxxxiii] Officials eventually discovered 460 Indian star tortoise hatchlings (CITES Appendix II) crammed in Harish's suitcase. The turtles had been "drugged and immobilized after being dipped in a sleeping pill solution."[clxxxiv] Local news outlets later reported that Harish was already listed as a 'sensitive' traveler by the Immigration Department at the time of the seizure.[clxxxv]

Image 17. Some of the Indian star tortoise hatchlings discovered in the luggage of Abdul Harish. Soure: The Hindu[clxxxvi]

Many other reptile trafficking incidents, particularly in the South Asian region, display similarities to the Trivandrum seizure: the animals are tightly packaged in check-in luggage, drugged to restrain their movement, and moved by a criminal suspect, if not a repeat offender. In some cases, seasoned drug mules have even been used to move reptiles instead of, or packaged with, their usual narcotics.[clxxxvii] Some recent seizures suggest that Ketamine, a veterinary drug popular for its hallucinogenic tranquilizing properties as well as the "most commonly used drug in wildlife immobilization,"[clxxxviii clxxxix] may be increasingly used by wildlife traffickers to sedate reptiles and other animals (see **Shifting Transit Routes, Narcotics, and Reptiles**).[cxc]

Repeat Offenders

The low penalties and comparatively limited attention paid to wildlife trafficking crimes allow wildlife traffickers to continue their operations more or less unimpeded, despite past wildlife smuggling offenses.

In the fall of 2010, Malaysian officials in Kuala Lumpur Airport discovered 95 boa constrictors, two rhinoceros vipers, and a matamata turtle in the luggage of a man named Wong Keng Liang ("Anson" Wong) after his suitcase broke open on a luggage conveyor belt.[cxci] He was only charged with smuggling the boa constrictors, as the other species were not endangered. [cxcii]

A full decade previously, Wong, or the "Lizard King", had been at the center of an animal-smuggling ring that had reportedly trafficked and sold over 300 protected Asian and African reptiles.[cxciii] After a five-year investigation involving authorities in five countries, US agents eventually arrested him in Mexico City Airport in 1998.[cxciv] In 2001, he was sentenced to 71 months in jail, a $60,000 fine, and a three-year ban from selling animals in the US, even though he had pled guilty to crimes carrying maximum penalties of 250 years in prison and a $12.5-million fine.[cxcv]

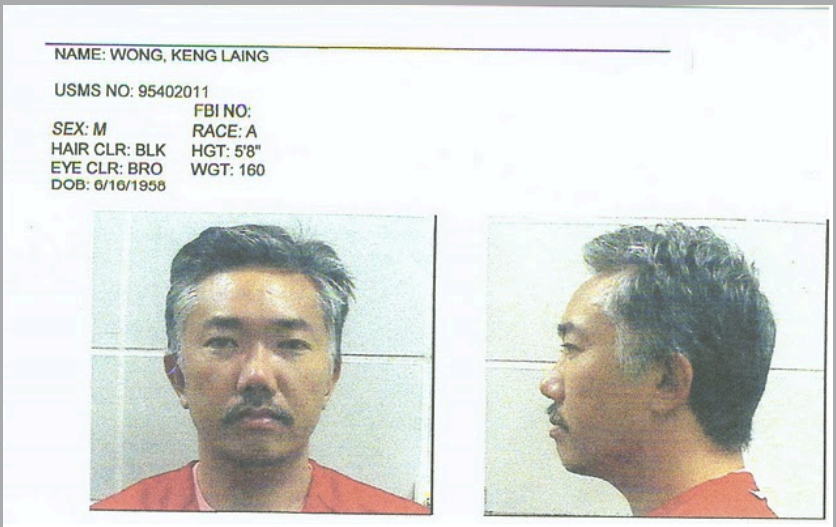


Image 18: Anson Wong

After his 2010 arrest, Wong was sentenced to five years in jail for smuggling the endangered boas, but was released in February 2012 after serving only 17 months.[cxcvii] In 2015, a documentary by journalist Steve Chao revealed that Wong continues to trade endangered reptile species, including endangered ploughshare tortoises from Madagascar, out of Penang, Malaysia.[cxcviii]

Lizards & Germany

While India and its surrounding nations remain the epicenter of turtle and tortoise trafficking, Germany is a prominent destination for illegally trafficked lizards. A 2015 article by *The Guardian* focused on a large reptile trade fair in Hamm, Germany and highlighted just how lucrative the illicit reptile trade had become there.[cxcix] The article pointed to one large loophole: "...while collecting species in the wild and exporting them is illegal in their countries of origin, they may be freely bought and sold in Europe without a crime being committed – and no extradition treaties apply."[cc] This loophole would be in prominent display at fairs like the one The Guardian covered, except for one convenient policy – the organizers ban photography.[cci]

One trader in particular at the Hamm fair has been linked to reptile trafficking. On September 9th, 2014, Costa Rican officials at the Juan Santamaría International Airport noticed Maciej Oskroba "behaving suspiciously" and "repeatedly adjusting his bag."[ccii] [cciii] A search of his luggage revealed "184 frogs, 42 lizards, nine snakes and 203 tadpoles – all in plastic food containers stuffed with leaves."[cciv] According to media reports, Oskroba was taking the animals to Dusseldorf, Germany through Panama. [ccv] Despite facing a potential fine of "40 times a monthly salary" or three years in prison, Oskroba was deported from Costa Rica about a week later.[ccvi] [ccvii]

Image 19. The animals seized from Maciej Oskroba on September 9, 2014. Source: Costa Rican Public Security Ministry.

A Facebook page for a 'Maciej Oskroba' lists information for a website, www.RARE-HERPS.de. The website contains contact information for Oskroba, as well as a list of reptiles apparently for sale. One page on the site states, in German, "Please use the contact function listed below to inquire about the species listed." The website mentions such species as the Abronia graminea, or the terrestrial arboreal alligator lizard, which is given 'Special Protection' under Mexican law, and the Varanus prasinus, or emerald monitor lizard, which is listed on CITES Appendix II and is protected in its home territory of Indonesian New Guinea. The site also lists the Varanus acanthurus, or northern blunt-spined monitor lizard, which is illegal to export from Australia, the only place where it lives in the wild.

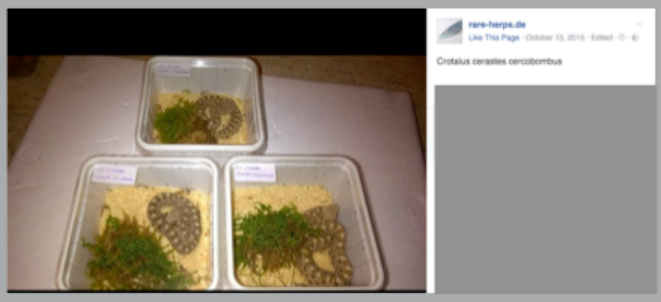


Image 20. An image of snakes in their containers posted by RARE-HERPS is similar to an image of reptiles trafficked by Oskroba in 2014. Source: Facebook.

One photo posted on RARE-HERPS's Facebook page showcases a stack of approved CITES permits alongside the comment, "A lot of nice animals can finally move to Japan and the United Staates [sic]. Cites approved. NonCites will complete the shipments."

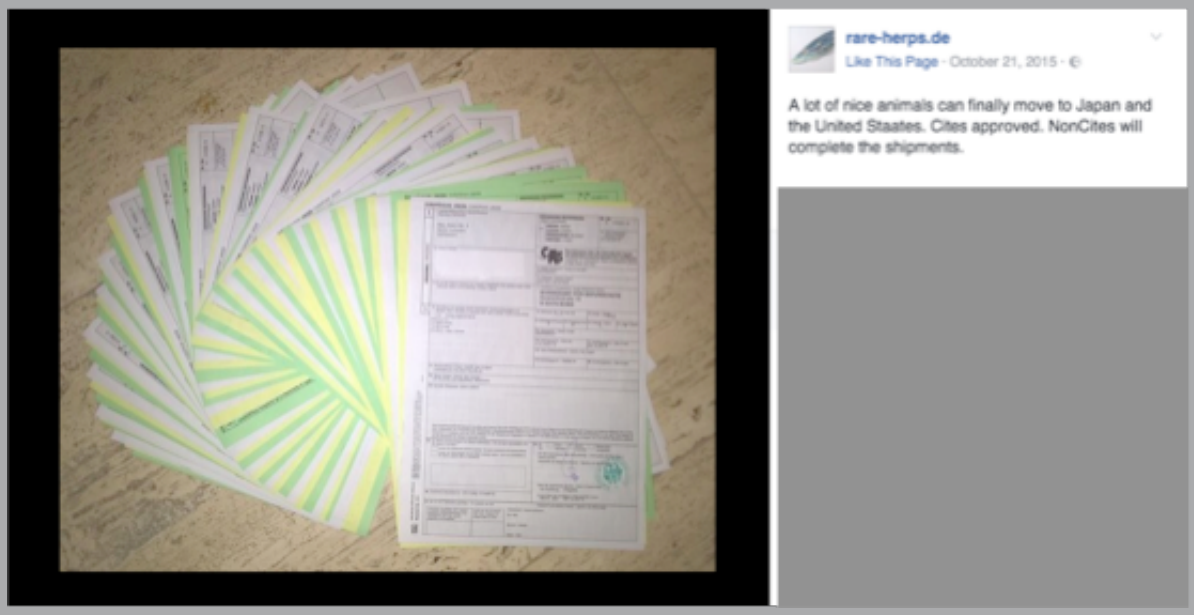


Image 21. A stack of CITES permits posted to RARE-HERPS's Facebook page. Source: Facebook

Another post on the page mentions RARE-HERPS's reliance on flights. The accompanying photo depicts a cargo parcel on the ground in front of Lufthansa Cargo – the photo itself is tagged to Lufthansa Animal Lounge. The comment on the photo seems to reveal the destinations of and species included in the company's most recent air shipments, and mentions the arrival of new inventory.

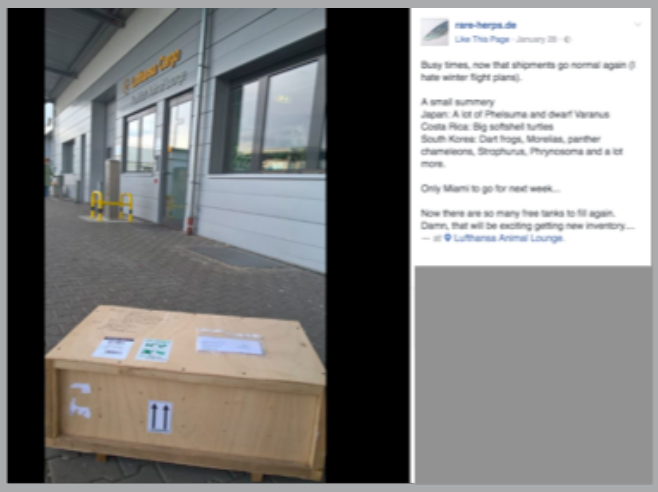


Image 22. A package waits outside of Lufthansa Cargo's Animal Lounge. Source: Facebook.

After the Costa Rican seizure in 2014, Edwin Retana, a prosecutor with the Alajuela Flagrancy Court, told the Tico Times, "These cases are very rare. But most similar cases would turn out exactly the same way."[ccviii] Rafael Gutiérrez, an official with Costa Rica's National Parks Service, added, "We don't see it that often. But then again, maybe people just don't get caught." [ccix]

Modus Operandi — Birds

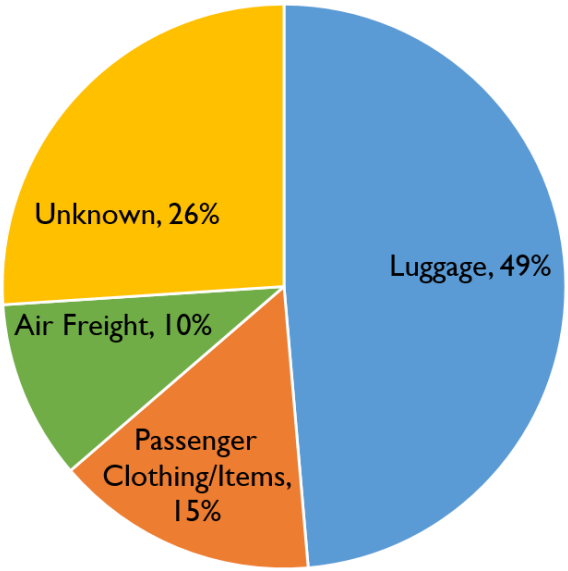


Figure 42. Methods of transport for bird trafficking instances by air between January 2009 and August 2016

Figure 42 displays the different transport methods used by bird traffickers, according to C4ADS Air Seizure Database. Figure 48 reveals that birds are found hidden on a trafficker's person or in a trafficker's carry-on luggage 15% of the time, compared to 4%, 0%, and 4% for the other categories. Bird traffickers are the least likely to use air freight, with only 10% of trafficking instances utilizing this option. Luggage remains by far the most common trafficking method. The bird data was the second most complete category of the four, with 74% of seizures' transport methods reported, compared to 77% for reptiles.

Bird traffickers' reliance on carry-on luggage and clothing is likely due to the delicate nature of most bird species. Unlike some reptiles, birds will not survive if left tightly packed in a suitcase for days at a time. They also tend to be more susceptible to changes in temperature, so it may be comparatively less risky for a trafficker to carry birds with them into the climate-controlled cabin of a plane than to leave them unsupervised in the luggage compartment.

Modus operandi utilized by bird traffickers have included:

- Cloth, hair curlers, plastic bottles, or tape to prevent movement and/or noise
- Custom-made clothing
- Abandonment or exchange of luggage
- Missing, incomplete, or fraudulent customs or health documentation
- Fraudulent paperwork claiming the animals are captive-bred
- Use of sedatives to inhibit animals' movements

Birds are sometimes trafficked along with:

- Primates
- Reptiles

Transport methods for birds are otherwise fairly similar to those for reptiles. When traffickers choose to transport birds by checked baggage, they, like reptile traffickers, attempt to prevent the animals from moving or making noise. One trafficker attempting to move 66 birds through Ignacio Agramonte Airport, Cuba to the United States attempted to keep the birds quiet by sealing their beaks shut.[ccx] Customs officials stopped him after noticing suspicious bulges in his pants.[ccxi] A number of bird seizures have directly resulted from traffickers failing to keep their contraband still and quiet. In one 2012 case, 35 birds were discovered in a suitcase after airport security heard noise emanating from the bag and could see it moving slightly.[ccxii]

Some smugglers resort to riskier means to try to keep the birds quiet. In one seizure made in Malta Airport in November 2009, a Libyan man was found with 200 sedated canaries in his jacket and bag on his way to Tripoli.[ccxiii] According to Mario Spiteri, the Animal Welfare Department Director for Malta, "They were sedated with what smelt like lighter liquid" and a number of the birds had already died.[ccxiv] A spokesman for Malta Airport reportedly told the press that airport security and enforcement officials were discovering similar cases about twice a week.[ccxv]

Image 23. Some of the canaries discovered in Malta Airport in 2009. Source: Times of Malta [ccxvi]

Illegal bird trafficking presents an unusual danger to officials and industry personnel compared to ivory, rhino horn, and reptile smuggling. Trafficked birds generally do not go through the required health screenings and precautions necessary for legal bird shipments.

The H5N1 Virus

Despite the danger involved in smuggling potentially ill birds, trafficking incidents involving the H5N1 virus and other illnesses seem fairly common.

In July of 2012, Taiwanese authorities seized 38 pet birds that had been smuggled into the country from southern China.[ccxvii] The animals tested positive for the fatal H5N1 bird flu virus.[ccxviii] The birds were discovered in Taoyuan Airport in the carry-on luggage of a trafficker who claimed he had bought the birds in Guangzhou, China on his way back from Macau.[ccxix] According to the Deputy Director-General of the Taiwanese Centers for Disease Control and Prevention (CDC), Chou Jih-haw, "This marks the third time the virus has been detected at the country's borders."[ccxx] After the seizure, all 38 birds were destroyed, and the smuggler and eight other people were monitored for signs of the disease.[ccxxi]

About a year later, 60 parrots and birds-of-paradise (CITES Appendix II) were discovered by sniffer dogs in Vienna Airport, Austria.[ccxxii] Over half of the birds had died in transit, and one tested positive for the H5N1 avian flu virus, a disease with a mortality rate of 60% amongst humans.[ccxxiii] 39 of the birds were dead at the time of the seizure, and the 21 surviving birds were put down as a precaution.[ccxxiv] The traffickers involved in the case, both from the Czech Republic, were set free to await trial.[ccxxv]

The frequency of these cases suggests that the judicial penalties for trafficking sick birds, even combined with the risk of serious illness, are not sufficient to deter bird traffickers.

Custom-made Clothing

Custom-made clothing seizures are fairly common – birds have been discovered in passengers' altered tights and leggings in Australia and the US, a specially made vest in Australia, socks in the United Kingdom, in socks taped to a passenger's arms and legs in the US, etc.[ccxxvi] [ccxxvii] [ccxxviii] [ccxxix] [ccxxx] Many of the suspects caught using custom-made clothing to smuggle birds have been repeat offenders. In one instance on May 9, 2010, customs officials in Cayenne Airport, French Guiana, stopped a Dutch tourist passing through security with a strange mass at his waist.[ccxxxi] Upon further inspection, officials found a specially made pocket sewed into the suspect's pants that was designed to carry 16 hummingbirds.[ccxxxii]

Image 24. The custom-made pouch discovered sewed into a trafficker's pants. Source: Carina Francuske Guyana.

The birds had been wrapped tightly in cloth, taped, and inserted into separate pockets.

Image 25. Some of the birds retrieved from the suspect's pants. Source: Carina Francuske Guyana.

He was sentenced to six months in prison, five suspended sentences, and a criminal fine of €6,000.[ccxxxiii] Officials later discovered that the suspect had been arrested in 2008 while carrying 53 hummingbirds.[ccxxxiv]

Conclusions

Wildlife trafficking is a global problem that takes advantage of enforcement loopholes, lack of awareness, limited public and private sector coordination, capacity gaps, and lagging technology and procedures to move illicit products through the licit transportation system. As international travel continues to exponentially increase, particularly in the air transport sector, enforcement and the private sector should make immediate changes to better stem the international flow of illicit wildlife. Without such changes, wildlife traffickers will continue to find the illegal wildlife trade a profitable, comparatively easy, and low-risk enterprise, at substantial detriment to ecosystems, economies, and global security.

In *Flying Under the Radar*, we find that ivory, rhino horn, reptile, and bird traffickers seem to frequently use large hub airports, and often exploit the same vulnerabilities within the air transport sector. Given the diverse trafficking methods used by ivory, rhino horn, reptile, and bird traffickers, we are prevented from making further general conclusions about wildlife trafficking by air. Instead, we provide brief overviews of our main findings for each category below.

Ivory

Trends

Between January 2009 and August 2016, ivory seizure numbers seemed to substantially increase. To a large extent, this growth is likely reflecting a corresponding increase in reporting on and interest in ivory seizures all over the world. It is unclear to what degree the increase indicates an increase in enforcement effectiveness and attention to ivory trafficking, although this likely had an impact as well.

Over the same period, the number of large-scale ivory seizures made each year more or less remained the same, while medium-scale ivory seizures increased slightly.

Routes

The ivory trafficking routes within the C4ADS Air Seizure Database reflect a clear Africa to Asia flow; ivory seems to be funneled through hub airports in East Africa and the Middle East prior to arrival at large Asian airports. In some instances, European hubs are used by ivory traffickers as alternate transit points. Although many enforcement agencies are prevented from screening passengers and shipments in transit, to the extent possible, targeting hubs in transit regions will help to stem the flow of ivory through airports.

Modus Operandi

We find that ivory is most often moved in checked luggage, followed by air freight. Ivory traffickers also seem to use specific trafficking methods repeatedly over time. Keeping track of known methods may therefore increase enforcement's ability to interdict illicit ivory.

Rhino Horn

Trends

There are far fewer rhino horn seizures in the Database than any other category covered in this report, and as a result, a small change in rhino horn seizure numbers can appear large. Still, overall rhino horn seizure

numbers have remained fairly steady around an average of 11 seizures per year.

Routes

Rhino horn routes follow the flow of ivory from Africa to Asia using transit hubs in East Africa, the Middle East, and occasionally Europe. While their paths are similar, rhino horn trafficking routes are far more concentrated in a few significant countries. For instance, southern Africa plays a large role as the origin of most rhino horn shipments, and China and Vietnam are by far the largest destinations in the Database.

Modus Operandi

Rhino horn is often smuggled along with ivory, and is generally moved in checked luggage or in air freight. Like ivory, around half of the rhino horn seizures within the Database do not have associated transport method information. Out of all the categories covered in this report, rhino horn is least likely to be carried onto a flight in a passenger's carry-on bag.

Reptiles

Trends

According to the C4ADS Air Seizure Database, reptile seizures have increased overall since 2009. This increase is at least partially a reflection of increased attention, reporting, and enforcement efforts.

The reptile heat map reveals that reptile smuggling is a far more global issue than either ivory or rhino horn trafficking. Asia, particularly South Asia, appears as the most prominent reptile trafficking region in the world, likely due to the turtle trade between India, Bangladesh, Malaysia, and other Southeast Asian countries.

Routes

The reptile routes map reflects the findings of the heat map, and further demonstrates the geographic diversity of reptile trafficking. Flights carrying trafficked reptiles have passed through Asia, Africa, the Middle East, Europe, and the Americas, although South Asia again dominates. Unlike with ivory and rhino horn trafficking, North and Central America appear fairly prominent as well.

Modus Operandi

Transport method information indicates that reptiles are far more likely to be moved in checked luggage than by air freight or with passengers. Of all the categories covered in this report, the reptiles category seemed to converge most with narcotics smuggling through airports.

Birds

Trends

The number of bird seizures within the C4ADS Air Seizure Database has remained relatively constant over time, although seizures did seem to spike in 2012.

The birds heat map shows bird trafficking to be a global issue, with the Americas counting the most bird trafficking instances overall. The UAE, Russia, Pakistan, and Indonesia are also prominent.

Routes

While the bird routes map reflects the international nature of bird trafficking, flights seem to be concentrated around the Middle East, Europe, and the Americas. One particularly common flight appears between South America and New York in the United States. Bird trafficking in Africa and Asia appears to be comparatively minor.

Modus Operandi

While birds seem to be primarily smuggled in checked baggage according to the Database, birds are also comparatively more likely to be hidden in the clothes of a trafficker than ivory, rhino horn, or reptiles. Birds often die in transit, and trafficked birds have been found on a number of occasions to be suffering from infections or diseases, including H5N1, that can be passed on to humans.

Recommendations

Given the truly global nature of wildlife trafficking, and therefore the number of regions that we found to be impacted by it, we have refrained from producing regional recommendations. Instead, we chose to take a wider approach, in an effort to produce broadly applicable recommendations that, if implemented, could have a large impact on global wildlife trafficking by air. Our recommendations are grouped below by topic, and are meant to be applicable to enforcement, industry, intergovernmental organizations, and nongovernmental organizations.

To expand and improve future analyses, we recommend that the appropriate stakeholders make available more detailed public seizure reports, and begin to include transport sector information (air, maritime, land) in existing databases. While public reporting processes are perhaps challenging at first to implement, improved seizure data would allow C4ADS and other organizations to provide better and more helpful support to enforcement and industry alike. We acknowledge that not all seizure information can be made available given security and other concerns, but any increase in the amount of publicly available seizure data would be beneficial to the sector as a whole.

In addition, many of the security vulnerabilities and modus operandi identified in our report are utilized by more than just wildlife traffickers. Our broadly applicable recommendations could therefore be applied to other crime types as well.

For agencies and organizations interested in taking a more proactive approach to combatting wildlife trafficking, we have included examples, possible paths forward, and organizations to contact whenever possible.[ccxxxv] The implementation of many of our recommendations can also be supported by the Reducing Opportunities for Unlawful Transport of Endangered Species (ROUTES) Partnership and United for Wildlife. ROUTES provides data and analysis, training, support, and awareness materials to interested industry and government agencies in an effort to reduce wildlife trafficking through the legal transport sector. United for Wildlife, a partnership of seven conservation organizations and The Royal Foundation, spearheaded the Buckingham Palace Declaration, an agreement committing signatories to "take real steps to shut down the routes exploited by traffickers of the illegal wildlife trade…"[ccxxxvi] Current signatories include airlines, shipping companies, conservation organizations, and trade organizations.[ccxxxvii]

We recommend the following steps be taken to improve enforcement success rates and reduce wildlife trafficking by air.

Awareness

1. **Increased awareness among air passengers, airline and airport employees, and enforcement officials.**

Increased awareness of the issue of wildlife trafficking through the air transport sector amongst all affected parties will lead to more seizures of illegal wildlife and wildlife products.[ccxxxviii] Informed passengers will be more likely to report suspicious activity to airline and airport personnel, and airport staff and enforcement will be more likely to recognize illegal consignments and suspicious behavior.

A number of airports have already implemented measures designed to heighten passenger awareness of wildlife trafficking. Jomo Kenyatta Airport, for example, clearly displays signs around the entrance to the airport declaring certain wildlife products as banned goods. A conspicuously placed display case in Keflavik

Airport in Iceland showcases illegal wildlife products seized at the airport, including brief information in English and Icelandic on CITES permitting and the dangers of the illegal wildlife trade.

Wildlife trafficking awareness training and materials can be tailored and delivered to customs, enforcement, and the appropriate personnel by government agencies such as the US Fish and Wildlife Service (FWS); nongovernmental organizations such as the World Wildlife Fund (WWF), TRAFFIC, and Freeland; trade associations like the International Air Transport Association (IATA); and broader partnerships like ROUTES and United for Wildlife.

2. **The adoption or creation of a pamphlet or tool tailored to each country to help customs and enforcement identify restricted species commonly trafficked through their territory.**

One barrier to increased wildlife seizures is the inability of customs officials to determine which wildlife products or species are in fact banned or protected.

A number of nonprofits have already begun to address this issue, including:

- Freeland, a nonprofit dedicated to tackling wildlife trafficking and human slavery, released a mobile phone application in 2016 to assist law enforcement agencies in the identification and handling of trafficked species.[ccxxxix] **WildScan** can be downloaded for free on Apple and Android devices, and is currently available in English, Khmer, Bahasa Indonesian, Thai, and Vietnamese.[ccxl]
- Tikki Hywood Trust, a Zimbabwean nonprofit dedicated to conservation, education, and legislation, has developed a handbook to assist all relevant enforcement stakeholders in assessing and docketing identified wildlife crimes appropriately.[ccxli] This approach could be repurposed to include information on the identification of species relevant to particular jurisdictions.

Training

3. **Further training on red flag indicators associated with wildlife traffickers and shipments.**

Law enforcement, as well as airline and airport staff, benefit from periodic trainings on the identification of illegal activity. While suspicious behavior exhibited by traffickers can be easy to identify, documentation associated with a shipment is not always obviously fraudulent. Additional training tailored to the detection of high-risk air freight consignments in particular will assist customs officials in more accurately identifying illicit shipments.

Common red flags for passenger behavior include anxious behavior and bulging clothing. Common red flags for air waybills include inconsistent weights, shipments of low-value bulk goods, partial or non-existent shipper or consignee information, an unusually low estimated price given the declared products being shipped, inconsistent information (e.g. used tire products being shipped to 'ABC Furniture Company'), etc.

Screening trainings can be provided by organizations like the World Customs Organization (WCO), which provides training modules on countering illicit wildlife trafficking through its Aircop project, which aims to train customs and other law enforcement officers in the air domain. Other customs and enforcement agencies like the US Transportation Security Administration (TSA), and US Customs and Border Protection (CBP) have provided similar training programs in the past.[ccxlii]

4. **Create and provide training for airline staff on how to safely handle trafficked live or dead animals after discovery.**

To ensure the safety of airline personnel and passengers, as well as the animals themselves, protocols should be developed to help airline employees handle animals immediately after discovery. In particular, staff should be trained to deal with wildlife that gets loose or is discovered in flight, as well as how to deal with dead animals without creating a health risk for employees or passengers.

5. **Incorporate training on wildlife protocols into existing training programs.**

To reduce the amount of additional time that separate trainings tailored to wildlife might entail, training on the above and below protocols should be incorporated into existing training programs whenever possible.

Enforcement

6. **Develop clear escalation procedures upon discovery of potential illegal activity.**

Developing and disseminating clear escalation procedures for relevant enforcement officials and security personnel to report or deal with identified or suspected illegal activity will help to ensure that trafficking instances are promptly addressed. In addition, all relevant airport and airline staff should be made aware of ways that they can report suspicious activity to the relevant authorities. Finally, the creation of a public tip hotline for airports will increase the chances that officials will be able to intercept and stop illegal wildlife trafficking instances. Note that creating a system that allows informants to remain anonymous will likely help encourage reporting on suspected trafficking instances.

In the case of human trafficking, a number of organizations have developed pamphlets for airline passengers and airport personnel to assist in the identification of potentially trafficked individuals, complete with risk indicators or 'Signs to Look Out For,' first response protocols, and next step protocols. See **Appendix VI** for a *Human Trafficking Assessment Tool for Airlines & Airports* by Human Trafficking Hotline that could be used as a basis for a Wildlife Trafficking Assessment Tool.

7. **Develop post-seizure procedures to safely and securely store wildlife products or ensure the proper care of trafficked live animals.**[ccxliii]

In some locations, customs officials are reluctant to stop illegal wildlife traffickers or shipments due to non-existent post-seizure procedures, such as a secure warehouse to store seized ivory.[ccxliv] In other cases, customs officials may seize illegal wildlife and store it according to existing procedures, only for the product or animals to be trafficked back into the illegal wildlife trade.[ccxlv ccxlvi]

Where post-seizure procedures do not exist, customs should work to build a comprehensive post-seizure process and disseminate it to all relevant employees. Illegal wildlife products should be stored in a secured warehouse or similar location, with multiple checks in place to prevent seized products leaking back into the illegal market. In Kenya, for example, seized ivory is stored in two vaults behind steel doors with multiple locks, defended by armed guards.[ccxlvii]

For live animals, a suitable wild animal veterinary practice, zoo, or safari park must be identified. An appropriate destination will be specially equipped to care for and rehabilitate wild animals, and will have sufficient capacity to receive dozens of animals at once. Any selected practice must be carefully vetted to ensure the security of the animals in their care. CITES provides guidelines to assist countries in identifying the proper course of action (reintroduction to natural habitat, captivity, or euthanasia) for seized animals, depending on conservation status and health needs.[ccxlviii]

8. **Dedicate additional resources to combatting the illegal wildlife trade in common hub airports exploited by wildlife traffickers.**

Additional resources and attention should be committed to addressing wildlife trafficking in hub airports, particularly in Europe, East and Southern Africa, the Middle East, and Asia.

As enforcement targets wildlife trafficking through hub airports in these regions, traffickers will naturally shift their operations away from those hubs to hubs in new locations or to smaller regional airports. As a result, it will be necessary to monitor seizure evidence of shifting trafficking patterns so that enforcement efforts can shift to match.

9. **Develop or enhance security procedures for transit flights.**

Most enforcement officials currently have limited ability to screen passengers and shipments for illicit goods in transit, putting the burden of detection entirely on origin and destination locations. If screening for illicit goods could be increased in transit, enforcement officials would have an additional opportunity to stop illegal wildlife trafficking.

This is, of course, only possible in certain circumstances. For example, when passengers and shipments have extremely short layovers, adding another layer of complication is not feasible. In instances where a flight lands to offload some passengers and re-fuel before flying to another destination, many passengers and their luggage will not even exit the plane, and therefore cannot be screened. Note that it is possible that traffickers are aware of this and take advantage of these types of flight schedules when planning their route.[ccxlix] Since enforcement will likely not be able to remove these vulnerabilities entirely, it will be necessary to develop more creative procedures to stop illicit trafficking activity under these circumstances. For example, implementing customs screening for departing passengers, baggage, and cargo will likely have a significant impact on the operations of illegal wildlife traffickers, and will reduce the risk that transiting passengers and shipments are carrying illegal wildlife or wildlife products.

10. **Develop and maintain a comprehensive internal database of entities previously involved in wildlife seizures.**

Our findings highlight the prevalence of repeat offenders involved in wildlife trafficking. To counter this threat more effectively, enforcement should take note of individuals and companies that have previously been involved in wildlife seizures in their jurisdictions through the creation of a comprehensive database of entities, or through the addition of wildlife offenders to existing databases.

A useful database would be computer-based, managed by one designated individual or agency, and continuously updated with detailed information on relevant entities. For an individual, necessary information would include: name, age, a photo (or physical characteristics), passport information, and detailed information on past seizures. For a company, the following categories would be relevant: name, phone numbers, addresses, point of contact, and detailed information on past seizures. The seizure entities database would ideally be either a part of, or linked to, the database used for seizure information (See Recommendation 13). In the absence of sophisticated technology like Palantir or i2, a simplistic way to store such information would be in an encrypted Excel file.

11. **Develop a system to test wildlife seizure protocols.**

After the implementation of updated or new customs and enforcement seizure protocols for wildlife, officials should attempt to assess the effectiveness of their new seizure procedures. Covert testing is the most reliable

way to determine enforcement success rates, as most other methods must estimate the amount of unidentified trafficking activity.

Effective testing should be convincing, varied, and occur on multiple occasions to track changes in enforcement success over time. Results and findings should be presented in de-briefs to leadership and relevant officials.

The US TSA conducts covert testing of security systems within the US and abroad using trained 'Red Teams' from the Department of Homeland Security. Red Team members generally carry fake improvised bombs and attempt to successfully pass through airport security.[ccl] This strategy could be altered slightly to test airport screening protocols for the detection of illicit contraband, including illegal wildlife.

Seizure Reporting

12. Develop a reporting mechanism for seizures.

After a seizure has taken place, reporting mechanisms should exist to ensure that seizure information is preserved, consolidated, and delivered to the appropriate agency for inclusion in a seizure database. Consolidated seizure information provides customs and enforcement officials with a way to track their own success rate, as well as monitor shifting trafficking patterns and modus operandi over time.

A successful mechanism will be relatively simple and easy to understand, and will be accompanied by training of customs and enforcement officials on reporting protocols. The more detailed seizure information is, the more can be done with it; given time and capability constraints, however, consistently compiling and storing detailed seizure information may not always be feasible; see **Appendix VII** for a seizure reporting template containing the baseline of information that should be collected and stored after seizures. The inclusion of routes information (origin, transit, and destination locations) for each seizure would go a long way to fixing many of the problems with seizure data highlighted in this report. Note that other organizations like the WCO have created more detailed seizure reporting templates (See **Appendix VII**). All collected seizure information should be stored in one centralized database (see Recommendation 13 below).

13. Store collected seizure information in one centralized database in each country.

In some countries, seizure information is held only by the agency that made the actual seizure, and is not shared amongst the relevant customs and enforcement agencies within the country.[ccliv] In these and other cases, seizure information is often stored in hard copy, preventing easy dissemination or storage of the seizure data.

Similar to Recommendation 10 above, a useful database would be computer-based, ideally managed by one designated agency, and continuously updated with detailed information on relevant entities. In the absence of sophisticated technology like Palantir or i2, a simplistic way to store such information would be in an encrypted Excel file. Regardless of the database manager, all relevant enforcement agencies would have access to the database.

Once a database is designed and put to use, officials will be able to easily organize and partition information for CITES reporting and for other purposes. For example, if an official would like to identify past seizures using a specific type of obfuscation method, they should be able to search for the method in question and quickly compile a list of relevant seizures. Maintaining detailed seizure records will assist in the prevention of trafficking instances involving repeat offenders or common modus operandi.

14. Publicly release non-sensitive seizure information.

Once a seizure reporting mechanism is developed and implemented, and after the establishment of a centralized database for seizure information, seizure details should be released to the public to whatever extent possible, preferably in the form of press releases. Publishing seizure reporting, either on a website or in periodic public reporting, provides clear evidence that enforcement efforts are effective in preventing trafficking of all types.

In addition, providing public seizure data will allow for the creation of a positive feedback loop between enforcement, industry, and nongovernmental organizations. For example, more seizure data improves the type of analysis done in this report, which in turn informs enforcement about global trafficking trends and patterns. Furthermore, publishing information on seizures can provide positive feedback to individuals who report suspicious activity, encouraging more people to come forward and do the same. Still, we acknowledge the need to keep some information confidential.

The Hong Kong Customs and Excise Department[ccli] and the South African Revenue Service (SARS),[cclii] for example, maintain websites for departmental press releases on seizures and other developments. Hong Kong Customs also releases their own statistics on their caseload, seizures, and arrests over time.[ccliii] Some customs and enforcement agencies also maintain social media accounts where they post seizure information and other relevant news. These reporting strategies are good models for those seeking to publicize their enforcement successes.

Prevention

15. Pursue shift towards electronic paperwork for air freight and updated technology for screening.

Steadily increasing passenger and cargo volume has put pressure on existing screening and enforcement procedures that are straining to effectively deal with the increase.[cclv] Furthermore, inconsistencies in documentation may be more likely to be caught if passenger and shipment paperwork become fully electronic and is scanned by a computer system, rather than an individual.

Implementing new technologies can take pressure off overwhelmed customs officials, expedite the screening process for passengers and cargo, facilitate global trade, and improve interdiction success rates. Dubai Customs World in partnership with Dubai Customs, for instance, have implemented cutting-edge technologies such as an in-house designed Risk Engine, which is designed to quickly identify high-risk shipments.[cclvi] Smart Security, a joint initiative of IATA and Airports Council International (ACI), is in the process of assessing "risk-based security concepts, advanced screening technologies, and process innovations" to create guidance materials for the aviation community and for specific airports.[cclvii]

Appendix I – Seizure Data Biases & Vulnerabilities

Although seizure data remains the most effective way to monitor trafficking, measuring intentionally hidden practices using only those practices that are discovered – and subsequently reported on – is inherently problematic. To accurately interpret the various insights that seizure data provides, it is necessary to be aware of possible biases within the data, and how they may have affected our results.

Throughout *Flying Under the Radar,* we have attempted to be as candid as possible about the limitations of data to not only identify areas for improvement, but also assess how each issue may have affected our analyses. Note that the following list is not meant to be exhaustive.

Overall

1. **No baseline of wildlife seizures in the air transport sector.**

   During our research for this report, we found little transport-specific information on trafficking, particularly in relation to wildlife crime. We did not find any other reports on wildlife trafficking through the lens of one specific transport sector. This finding was reflected in the lack of transport method-specific information in the majority of the wildlife seizure databases that we are aware of or have access to. Similarly, although there have been quite a few reports on ivory and rhino horn trafficking, we found little information on past reptile and bird seizure analyses. As a result, we were unable to reliably compare our findings to past analyses.

2. **Successful trafficking instances are not captured in seizure data, and therefore are not included.**

   Because it is impossible to measure successful smuggling activity – or trafficking instances that are never stopped – seizure data inevitably misses some of the most effective smuggling strategies. For instance:

   Because enforcement resources tend to be greater at large airports, it is possible that smaller airports are underrepresented in the Database.

   a. Domestic trafficking instances may be underrepresented as well, since domestic flights tend to move through smaller airports.

   b. Traffickers with sufficient funds may be choosing non-scheduled (e.g. private) flights over scheduled flights.[cclviii]

   The inevitable exclusion of successful trafficking instances from seizure data has a particularly large impact on determining enforcement success rates (the Country Enforcement Index, see Figure 6 and **Appendix IV**). Although the Index can only be based on trafficking that has been stopped, a true enforcement success rate would measure those shipments that successfully reach their destination as well.

3. **Human error.**

Reporting

4. **Variability in enforcement reporting processes.**

   Countries whose enforcement agencies have a well-established wildlife seizure reporting system in place

will be more likely to have a comprehensive database including wildlife seizure data. In particular, countries that have established a public seizure reporting protocol and platform (e.g. Hong Kong Customs and Excise Department's press release archive) may be overrepresented in the Database. By contrast, countries lacking reporting systems and seizure press release platforms may be underrepresented in our data.

5. Variability in local media seizure reporting.

Local media reporting of wildlife seizures varies substantially from country to country. The likelihood that wildlife seizures will make it into local news stories appears to depend on a variety of factors, including, but not limited to, local awareness of and interest in wildlife trafficking, freedom of the press, and quality of seizure reporting.

6. Variability in CITES reporting.

While some countries consistently provide CITES with comprehensive seizure information, many report sporadically or not at all. Even within reports that make it to CITES, the detail and accuracy of the contained seizure data can vary considerably from country to country. As a result, countries with a better history of CITES reporting may be overrepresented in the C4ADS Air Seizure Database, while countries without CITES reports may be underrepresented.

7. Inaccurate or contradictory reporting.

Seizure information in the media and even in confidential government reporting is often fraught with inaccuracies, particularly right after the seizure takes place. If these mistakes were never rectified, then those inaccurate reports may be included in our data. Contradictory seizure reports can both add confusion to our analyses, as well as lead to the potential duplication of seizures within our Database. Whenever possible, we attempted to clarify any apparent inconsistencies in the seizure information that we discovered by looking for additional, official sources. Still, the potential for inaccurate reporting is a constant and, to some extent, inevitable problem for seizure data.

8. Aggregated seizure reporting.

Some countries consistently release information on aggregated wildlife seizures, but do not report on individual seizures. While refraining from publishing detailed information on certain seizures may have a worthwhile purpose – confidentiality or security concerns – not publishing any seizure-specific information prevents accurate analysis of shifting trafficking trends. We did not include any aggregated seizure information (e.g. "Between 2013 and 2015, 100 ivory seizures were made at X Airport") to prevent double-counting seizures, and because aggregate seizure numbers tell us comparatively little about wildlife trafficking trends, routes, or modus operandi.

9. Non-digital reporting.

In jurisdictions where non-digital reporting remains a prominent source of news, seizure information may only make it into newspapers, and never on to the internet, where articles become more easily discoverable.

10. Seizure size biases.

Larger seizures are more likely to be considered newsworthy by local media, and are therefore more likely to reach the open source. Reports on larger seizures are also more likely to include specific details about the seizure, including route information and obfuscation methods. As a result, our data tend to be more

inclusive of large-scale and medium-scale seizures than small-scale seizures. This bias could impact the average weights of seizures within each category of the Database. Since we are more likely to have route and other information associated with larger seizures as well, our data could be missing information on common routes and trafficking methods associated with small-scale wildlife trafficking.

11. Language biases.

While a multi-lingual team of analysts worked together to compile the seizure information within our Database, we were generally not able to search for seizures in less commonly used languages such as Bengali or Laotian. Because of this, seizure reports in less common languages may not be included in our Database, even if the reports are in the open source.

Similarly, because our team is most proficient in English, news stories written in English were more likely to be discovered and included in the Database. However, many countries publish seizure information in English regardless of their native language.

Public Perceptions

12. Level of awareness and public interest.

Customs and enforcement agencies are far more likely to make wildlife seizures if they are aware of the problem in the first place. Government agencies are more likely to report on wildlife seizures if their citizens are aware of and express interest in the issue. For instance, in Kenya, where ivory trafficking is a well-known problem, many ivory seizures are publicly reported on by local media organizations.

Enforcement & Screening

13. Better enforcement leads to more seizures.

Effective enforcement strategies lead to higher seizure numbers, which may incorrectly create the appearance of a large trafficking problem. If a country couples good enforcement with robust reporting, this problem is magnified. Likewise, ineffective enforcement strategies may suggest that a country has less of a trafficking problem than it actually does, particularly when paired with poor reporting. Since successful smuggling statistics are unknowable, it is difficult to tell if good enforcement or large volumes of trafficking are behind high seizure numbers.

As discussed elsewhere, this problem can be rectified to some extent by compiling the route information associated with seizures. Route information allows for the identification of airports that consistently make fewer seizures but experience high levels of trafficking. This solution does not work as well, however, as an indicator for enforcement success in destination airports. Unlike trafficking in origin and transit airports, if an illicit commodity successfully passes by enforcement in a destination airport, no other enforcement agencies in the air transport sector will be able to catch their mistake.

14. Customs and enforcement priorities.

Enforcement agencies generally do not have the resources to prioritize every type of trafficking that moves by air. Enforcement must therefore prioritize. In some airports, trafficked wildlife is a top priority, but in many others, other types of trafficking – arms, narcotics, etc. – far outrank wildlife. For example, a survey

of customs officials by WCO in 2014 found that wildlife consistently ranked last in terms of importance in every region except for two – East and Southern Africa and Asia Pacific.[cclix] Enforcement agencies with particularly limited resources may not have the ability to provide training or guidance on wildlife trafficking at all. As a result, these jurisdictions are likely underrepresented in our analysis.

15. Limited screening of passengers and shipments in transit.

Customs and enforcement officials in most airports are not able to screen passengers or shipments that are already in transit. Seizures are therefore much more likely to take place at the origin or destination point of trafficking instances. The resulting under emphasis on transit airports in our data has likely skewed our results in the Country Enforcement Index. Note that the inclusion of wildlife categories that do not share the same supply chains as ivory and rhino horn has likely mitigated this effect to an extent.

16. Seizures made for undisclosed reasons.

Seizure reports occasionally do not include the reason for the seizure, although in ivory and rhino horn trafficking instances, the reason for the seizure is often clear. But live animal seizures can occur because the animals are of a protected or CITES-listed species, or the animals may be legal to transport, but were discovered in inhumane conditions. In the latter case, the seizure may not be indicative of trafficking activity, and therefore may not be relevant to wildlife seizure analyses, but without further information that distinction cannot be made.

17. No clear post-seizure procedure.

In some jurisdictions, customs and enforcement agencies have not developed clear post-seizure procedures to direct enforcement officials after the discovery of illegal wildlife. In other regions, enforcement does not have the resources to seize and store valuable illicit products or to care for live animals. When this occurs, officials may refrain from seizing illegal wildlife or wildlife products entirely, or they may impose a fine, but allow the trafficker to continue with their contraband.

Political

18. Freedom of the press.

In certain countries, reporting on environmental issues is discouraged. In extreme cases, environmental journalists have been killed for their articles.[cclx] This is, of course, especially true in countries where no free press exists. Public seizure reporting in many of these jurisdictions is, understandably, limited. Any seizures made in these areas are therefore unlikely to make it into the C4ADS Air Seizure Database.

19. Corruption levels.

Corruption plays a large role in determining whether seizures will be made, or whether illegal products will be allowed to pass for the price of a bribe. Although the World Bank produces numeric estimates of corruption at the country level, we found corruption levels to vary from port to port within certain countries, and so decided against quantitatively incorporating corruption in our analysis. We are, however, considering ways to incorporate corruption in future reports.

20. Perception of seizures.

Some governments proudly publicize wildlife seizures as evidence of enforcement success at their airports,

while others choose to suppress news of seizures, thinking of them instead as evidence of a weakness. This seems to be particularly true with large-scale ivory seizures. The C4ADS Air Seizure Database will naturally have more seizures from countries with a positive perception of seizures than from countries with neutral or negative perceptions.

Biases & Vulnerabilities within Routes Data

21. Overrepresentation of capitals in the routes maps.

Route information is most often reported at the country level (e.g. "The rhino horn consignment transited through Kenya and Malaysia before arrival in Shanghai"). To include country-level routes data in our analysis, we substituted capital cities when only country-level information was provided. As a result, our routes maps may overemphasize capital cities.

22. False origins and destinations.

Smuggled wildlife and wildlife products are often moved across national borders by land or sea prior to entering the air transport sector. For instance, wild birds from Peru may be driven across the border to Bolivia before being carried onto a plane at El Alto Airport. Similarly, ivory shipments are sometimes flown into Vietnam before being driven across the border into China. When this occurs, the origins and destinations recorded in our air routes data do not accurately reflect the true source and destination of the trafficking instance in question.

23. Incomplete route details.

Open source reporting on seizures frequently neglects to include route information, preventing the inclusion of a number of our identified seizures in the routes maps.

In addition, seizure reports will often state the route of a seizure, but will not explain which airports acted as origin, transit, or destination. For example, a media report might read, "Two Taiwanese citizens were intercepted in Taoyuan Airport while boarding a flight to Vietnam," but will not specify whether Vietnam was intended to be a transit or destination point. In most of these cases, further investigation can lead to a possible answer, but there is still a degree of guesswork involved in categorizing the airport in question.

Appendix II – R Packages

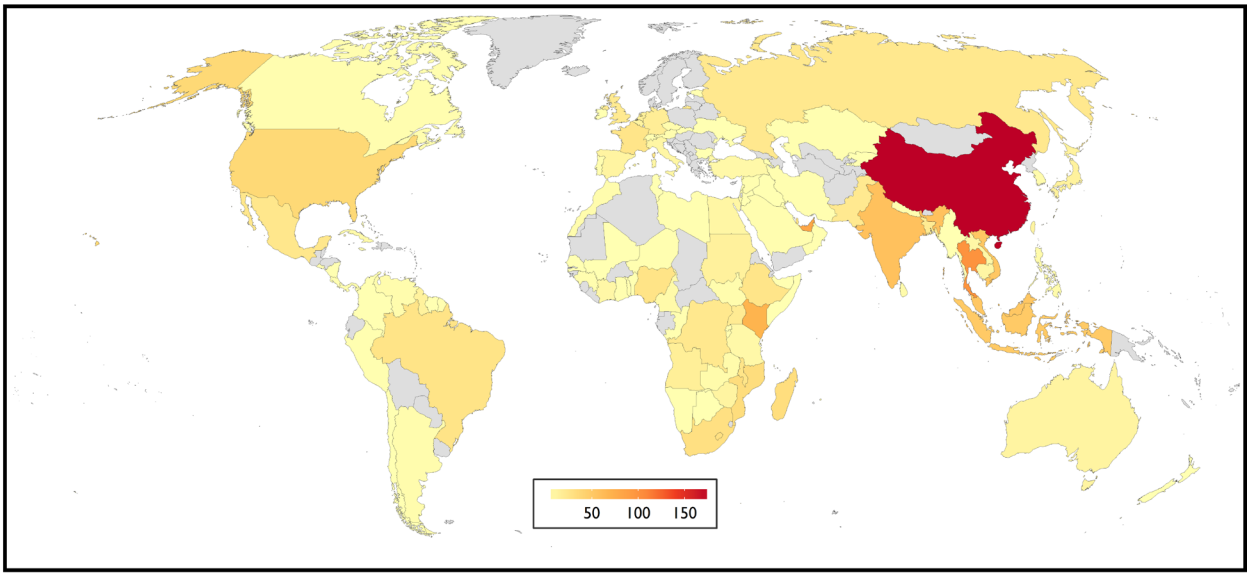
The following R packages were used in this project:

- **ggplot2** -- H. Wickham. ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York, 2009
- **plyr** -- Hadley Wickham (2011). The Split-Apply-Combine Strategy for Data Analysis. Journal of Statistical Software, 40(1), 1-29. URL http://www.jstatsoft.org/v40/i01/
- **dplyr** -- Hadley Wickham and Romain Francois (2016). dplyr: A Grammar of Data Manipulation. R package version 0.5.0. https://CRAN.R-project.org/package=dplyr
- **reshape2** -- Hadley Wickham (2007). Reshaping Data with the reshape Package. Journal of Statistical Software, 21(12), 1-20. URL http://www.jstatsoft.org/v21/i12/
- **extrafont** -- Winston Chang, (2014). extrafont: Tools for using fonts. R package version 0.17. https://CRAN.R-project.org/package=extrafont
- **RColorBrewer** -- Erich Neuwirth (2014). RColorBrewer: ColorBrewer Palettes. R package version 1.1-2. https://CRAN.R-project.org/package=RColorBrewer
- **ggalt** -- Bob Rudis (2016). ggalt: Extra Coordinate Systems, Geoms and Statistical Transformations for 'ggplot2'. R package version 0.1.1. https://CRAN.R-project.org/package=ggalt
- **maps** -- Original S code by Richard A. Becker, Allan R. Wilks. R version by Ray Brownrigg. Enhancements by Thomas P Minka and Alex Deckmyn. (2016). maps: Draw Geographical Maps. R package version 3.1.1. https://CRAN.R-project.org/package=maps
- **geosphere** -- Robert J. Hijmans (2016). geosphere: Spherical Trigonometry. R package version 1.5-5. https://CRAN.R-project.org/package=geosphere
- **cobs** -- Pin T. Ng and Martin Maechler (2015). COBS -- Constrained B-splines (Sparse matrix based). R package version 1.3-1. URL http://CRAN.R-project.org/package=cobs
- **igraph** -- Csardi G, Nepusz T: The igraph software package for complex network research, InterJournal, Complex Systems 1695. 2006. http://igraph.org

Appendix III – Trafficking Heat Maps

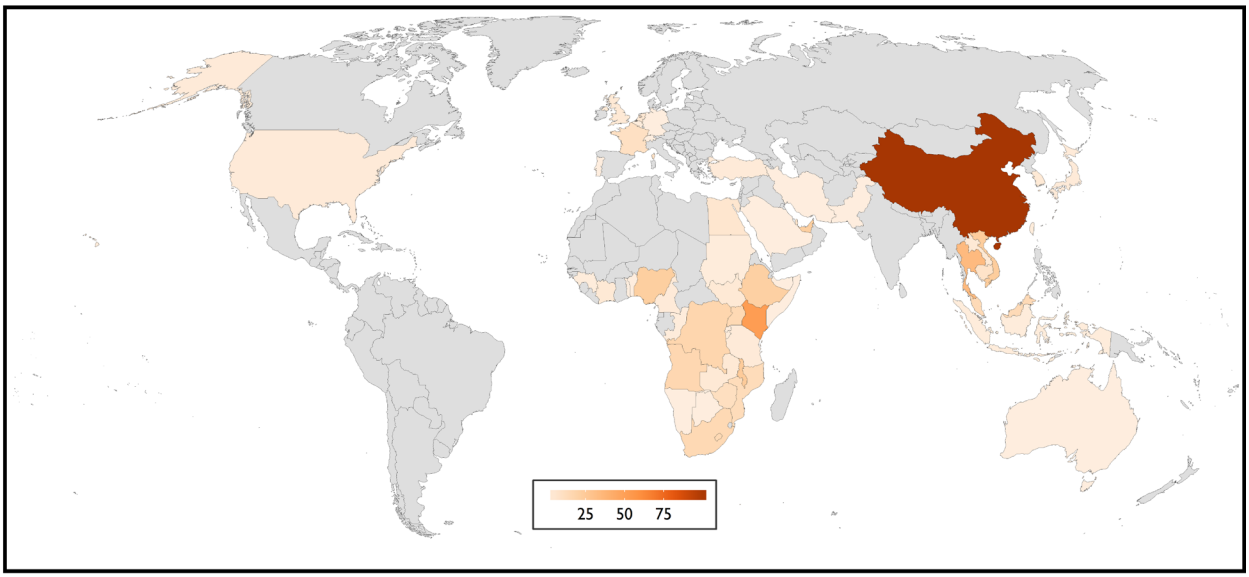
The trafficking heat maps reflect the number of trafficking instances associated with each country, as recorded in the C4ADS Air Seizure Database. Each trafficking instance is counted once for each country along its known transit route, regardless of the location of the seizure. For example, if a wildlife trafficker planned to move ivory from Nigeria to China via France, Nigeria will be counted as the origin, France as transit, and China as the destination, regardless of where the ivory was seized. Counting trafficking instances in this way, rather than by seizure count, can reveal countries with a trafficking problem but with limited enforcement or reporting capabilities.

Totals Heat Map



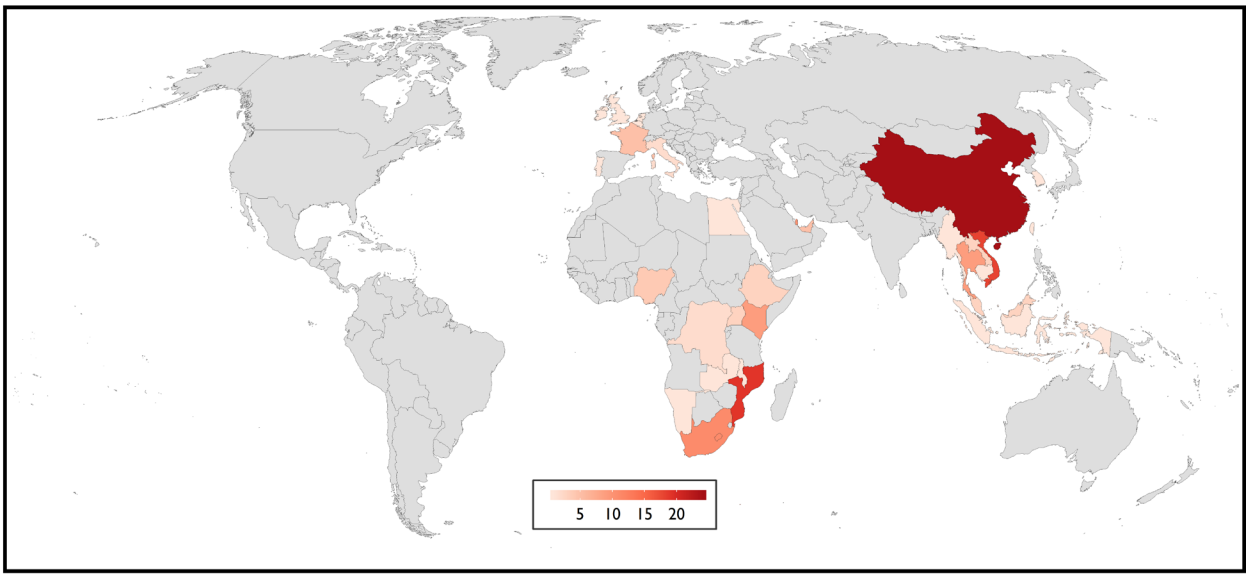
The above heat map depicts all countries involved in ivory, rhino horn, reptiles, and birds trafficking instances through the air transport sector according to the C4ADS Air Seizure Database (January 2009 to August 2016).

Ivory Heat Map



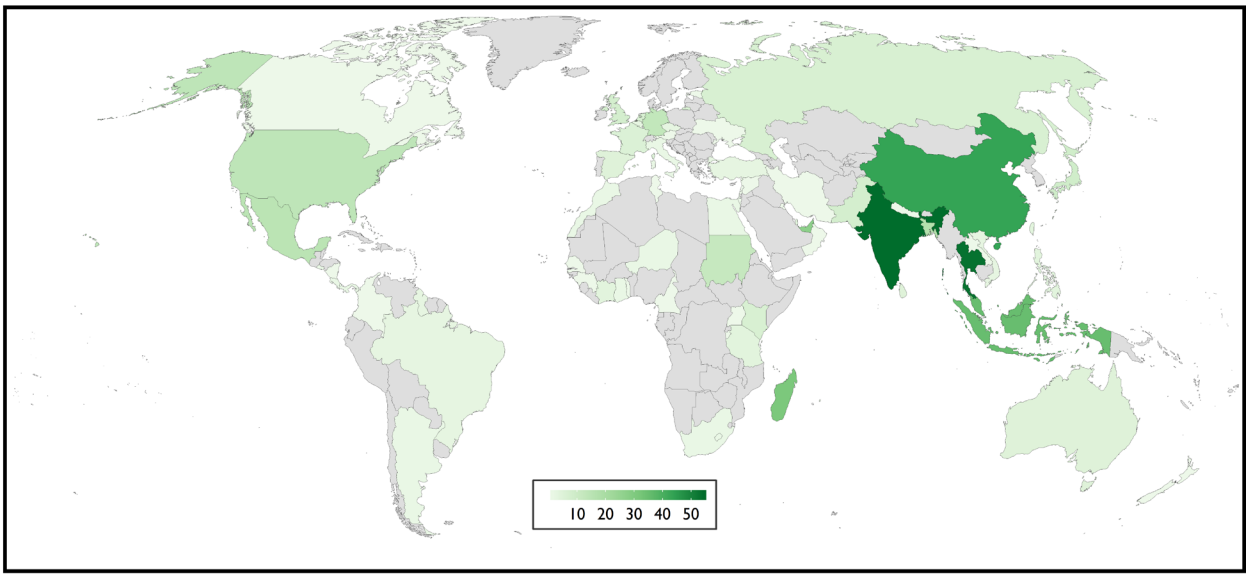
The above heat map showcases all countries involved in ivory trafficking through the air transport sector, according to the C4ADS Air Seizure Database (January 2009 to August 2016).

Rhino Horn Heat Map



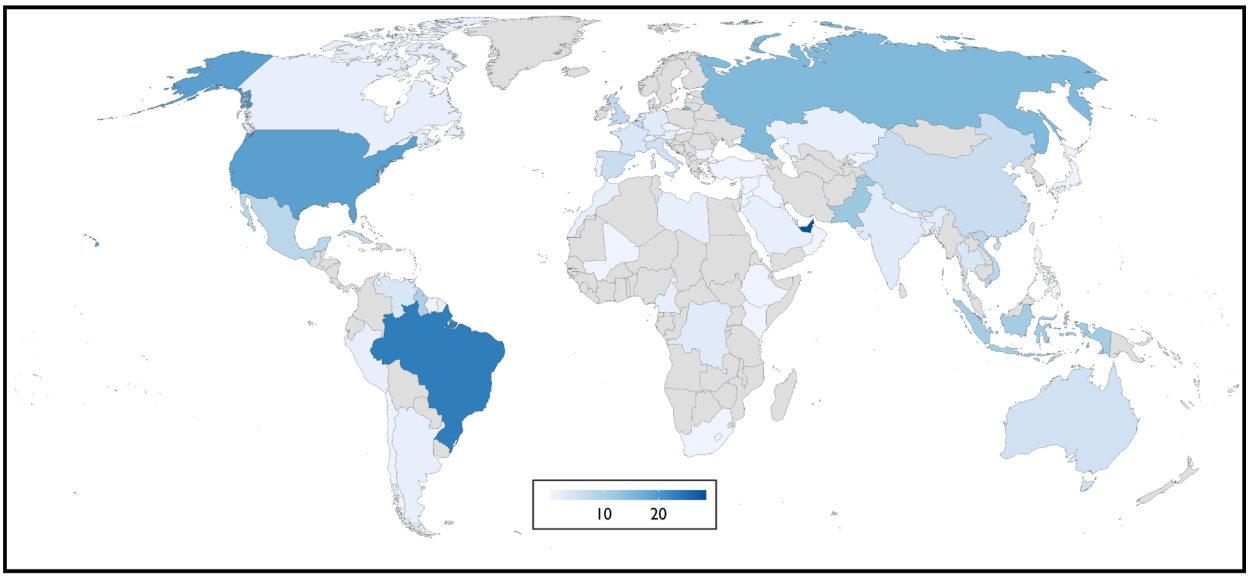
The above heat map displays all countries involved in rhino horn trafficking through the air transport sector, according to the C4ADS Air Seizure Database (January 2009 to August 2016).

Reptile Heat Map



The above heat map depicts all countries involved in reptile trafficking through the air transport sector, according to the C4ADS Air Seizure Database (January 2009 to August 2016).

Bird Heat Map



The above heat map shows all countries involved in bird trafficking through the air transport sector, according to the C4ADS Air Seizure Database (January 2009 to August 2016).

Appendix IV – Country Enforcement Index

The Country Enforcement Index is a quantitative representation of each country's ability to detect and seize illicit wildlife products traversing through its airports. Higher numbers indicate more effective enforcement and lower numbers indicate that the country is unable to detect a large number of illicit products going through its airports. The percentages represented in this chart were derived through the following equation:

$$Country\ Enforcement\ Indicator = \frac{Number\ of\ Total\ Seizures}{Successfully\ Attempted\ Trafficking\ Instances}$$

We define 'successfully attempted trafficking instances' as the number of times illicit wildlife products were trafficked through a country, regardless of whether they were seized. Only countries linked to five or more trafficking instances were included. Seizures made prior to arrival in a given country were removed from that country's assessment, as that country was never in a position to stop that individual or shipment.

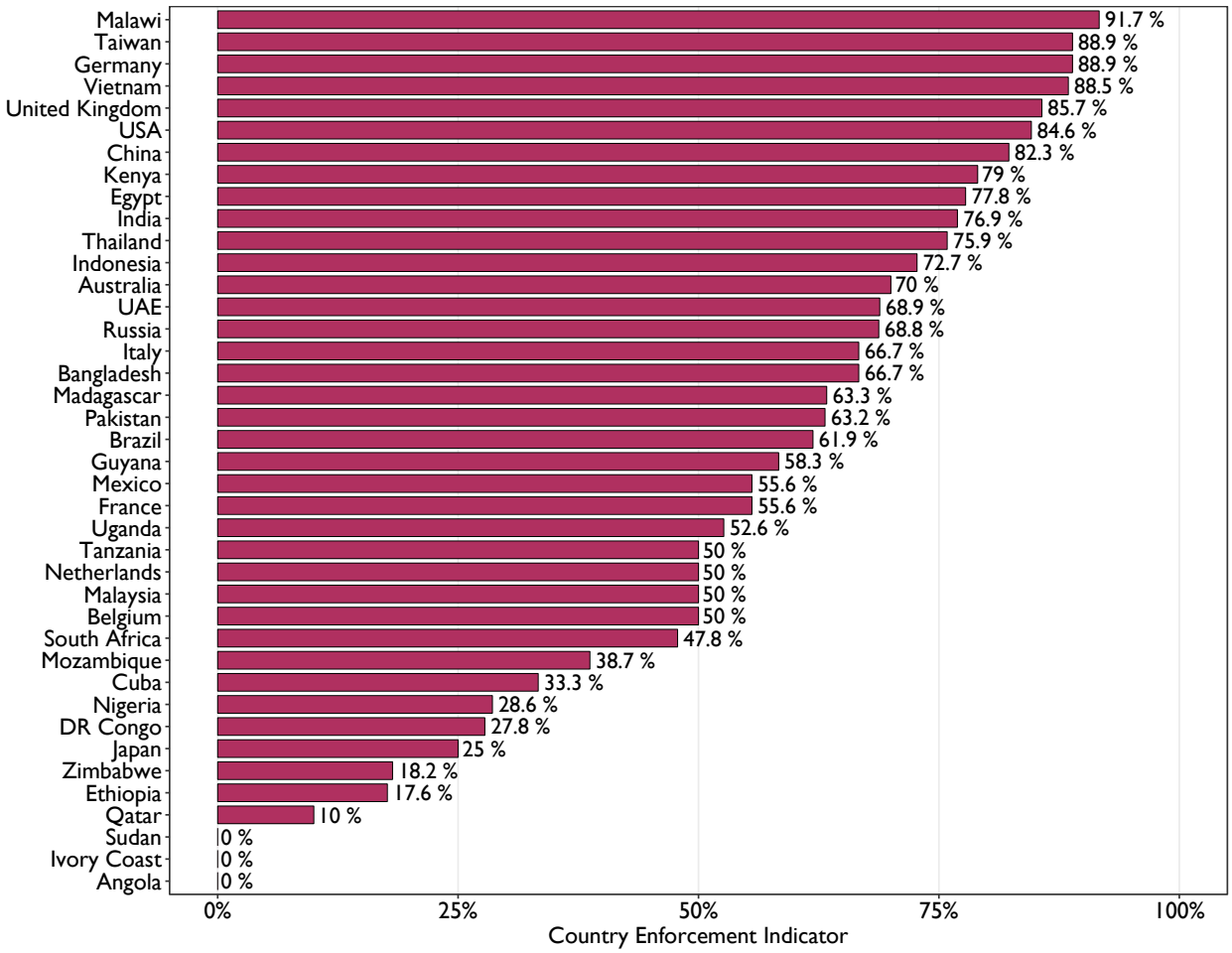


Figure 43. Country Enforcement Index for countries with five or more trafficking instances

As with all analyses based on seizure data, a number of biases may be affecting the Index's findings. For instance, enforcement in countries with better reporting regimes or greater media interest in wildlife seizures are more likely to have a higher Country Enforcement Indicator. By the same reasoning, well-performing enforcement in countries with less reporting or media interest may rank lower in the Index. The impact of

reporting differences on the Index's results can, however, be reduced by compiling detailed route information for each seizure.

Note that common transit countries are generally unable to screen or stop passengers and shipments between flights, and therefore may be misrepresented in the Index. Enforcement in air transit jurisdictions like the UAE may appear to be performing poorly compared to enforcement in origin (e.g. Malawi) and destination locations (e.g. China). This particular bias is mitigated to some extent by simultaneously analyzing wildlife products with vastly different supply chains (i.e. bird trafficking origin countries are very different from ivory origin countries). In contrast, primarily destination countries are more likely to have a higher Enforcement Indicator, since trafficking instances that are not stopped at their destination cannot be seized at another airport along their route.

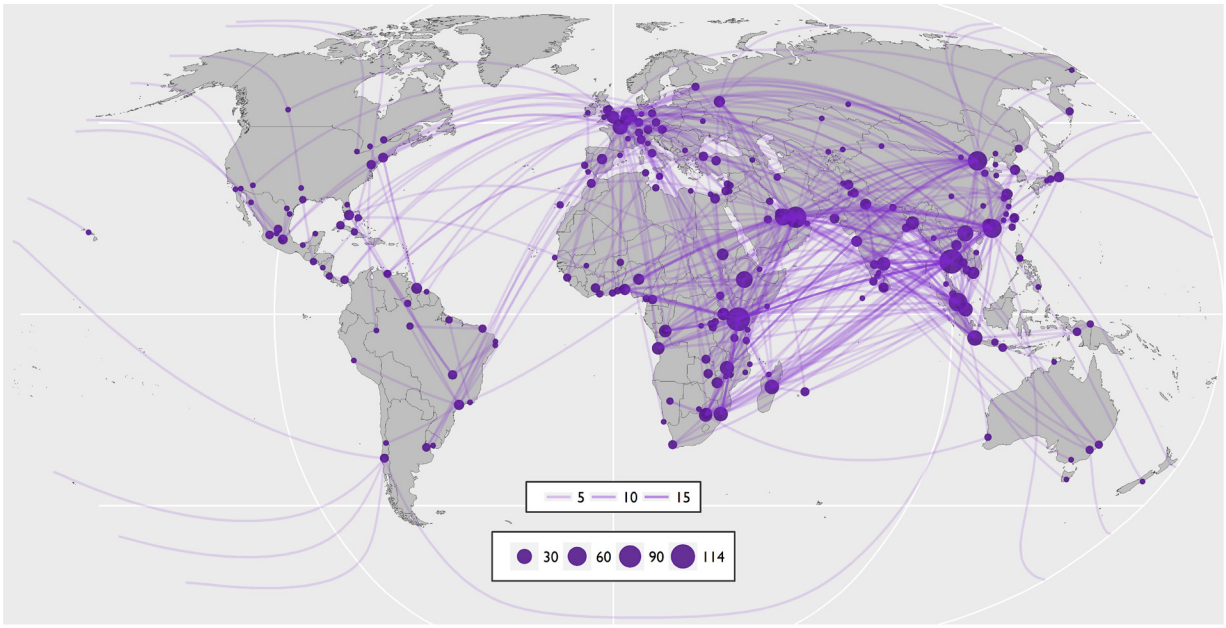
Appendix V – Trafficking Routes Maps

The trafficking routes maps display the transit routes recorded in the C4ADS Air Seizure Database. Only trafficking instances with associated route information were included in the routes maps – 28.6% of the instances within the Database did not include the requisite information for inclusion.

Lines in the Totals Routes Map below represent one specific route. The opacity of each line reflects the number of times that route was taken. Each circle represents specific cities, and the size of each circle is determined by the number of times each location appeared in the routes data. City-specific information was used wherever possible, but capital cities were used for seizure instances that only included country-level information (e.g. a seizure made in the UK after arrival from Turkey would be depicted as one line connecting Ankara and London; a trafficking instance originating in Kenya, transiting through the UAE, and arriving in Indonesia would be displayed here as two lines – Nairobi to Abu Dhabi and Abu Dhabi to Jakarta).

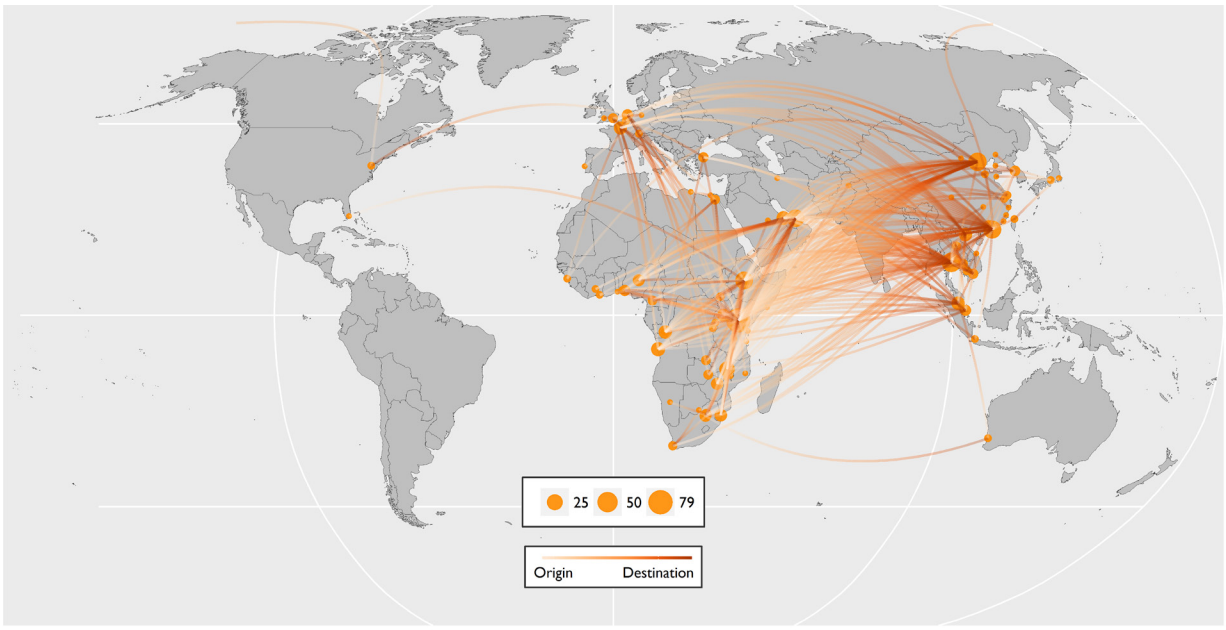
Lines in the ivory, rhino horn, reptiles, and birds routes maps represent one flight each. Lines are lighter in color at the origin of trafficking instances, and become darker as the flight approaches its destination.

Totals Routes Map



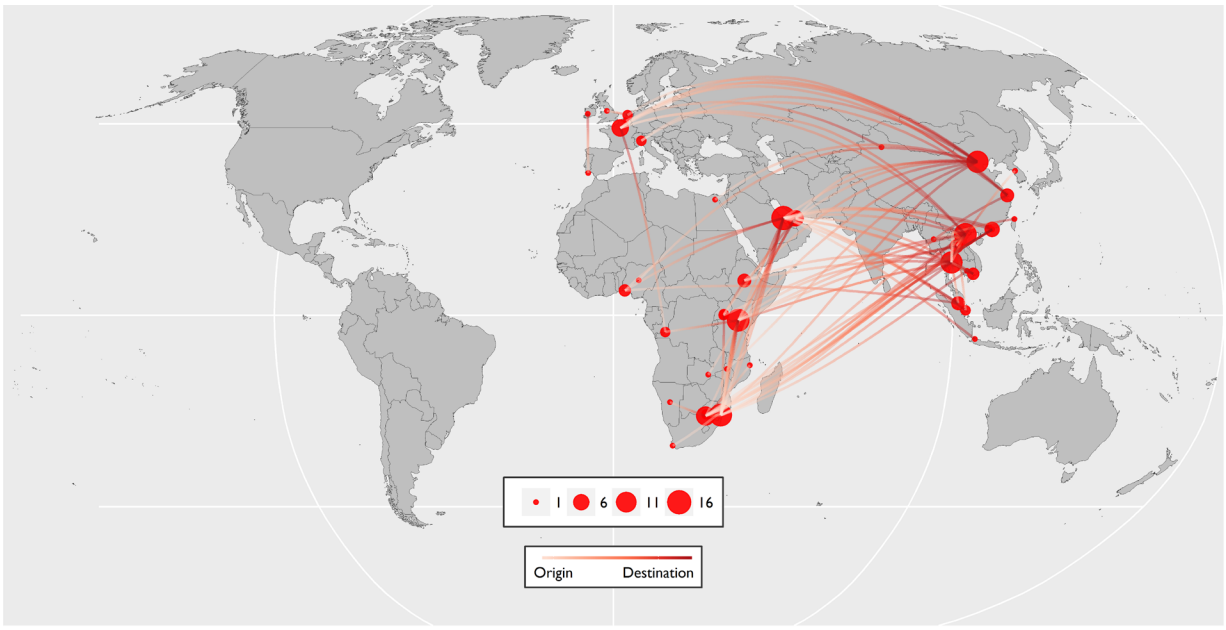
The above routes map charts all air trafficking routes contained within the C4ADS Air Seizure Database (January 2009 to August 2016).

Ivory Trafficking Routes Map



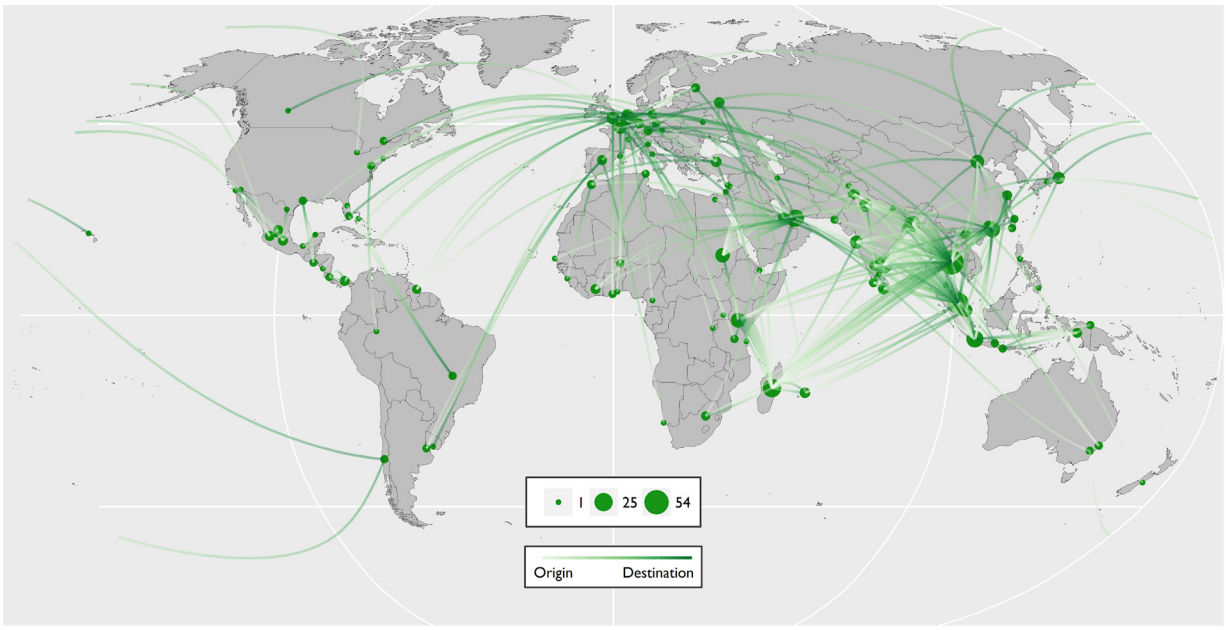
The above routes map depicts the ivory trafficking routes contained within the C4ADS Air Seizure Database (January 2009 to August 2016).

Rhino Horn Trafficking Routes Map



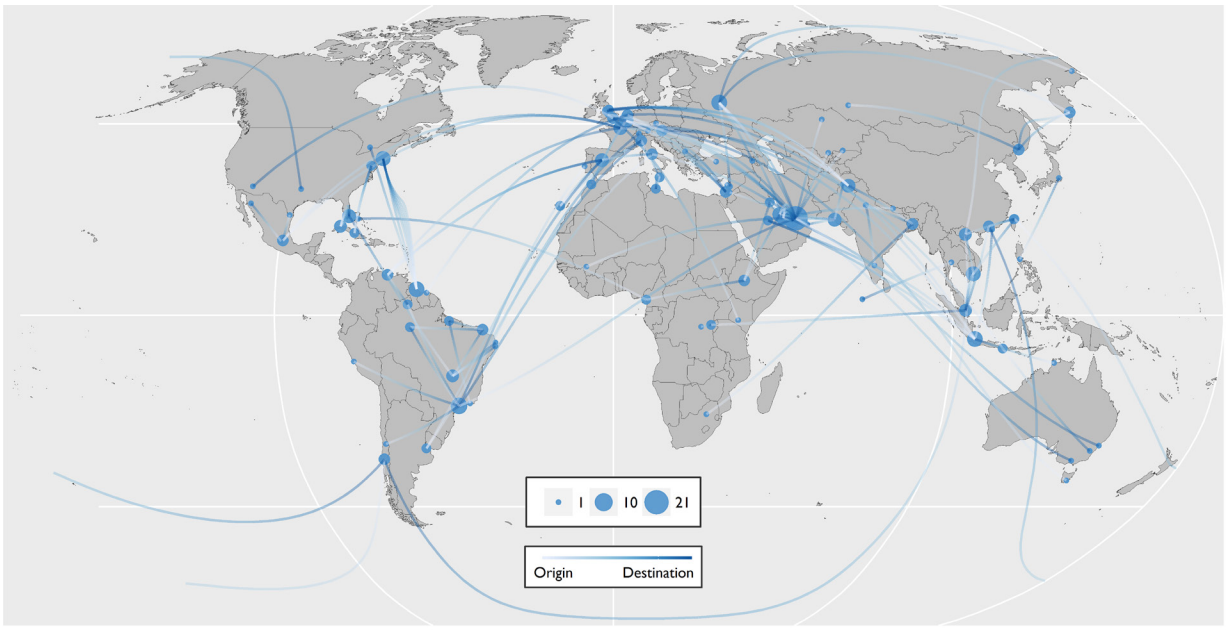
The above routes map charts the rhino horn trafficking routes contained within the C4ADS Air Seizure Database (January 2009 to August 2016).

Reptile Trafficking Routes Map



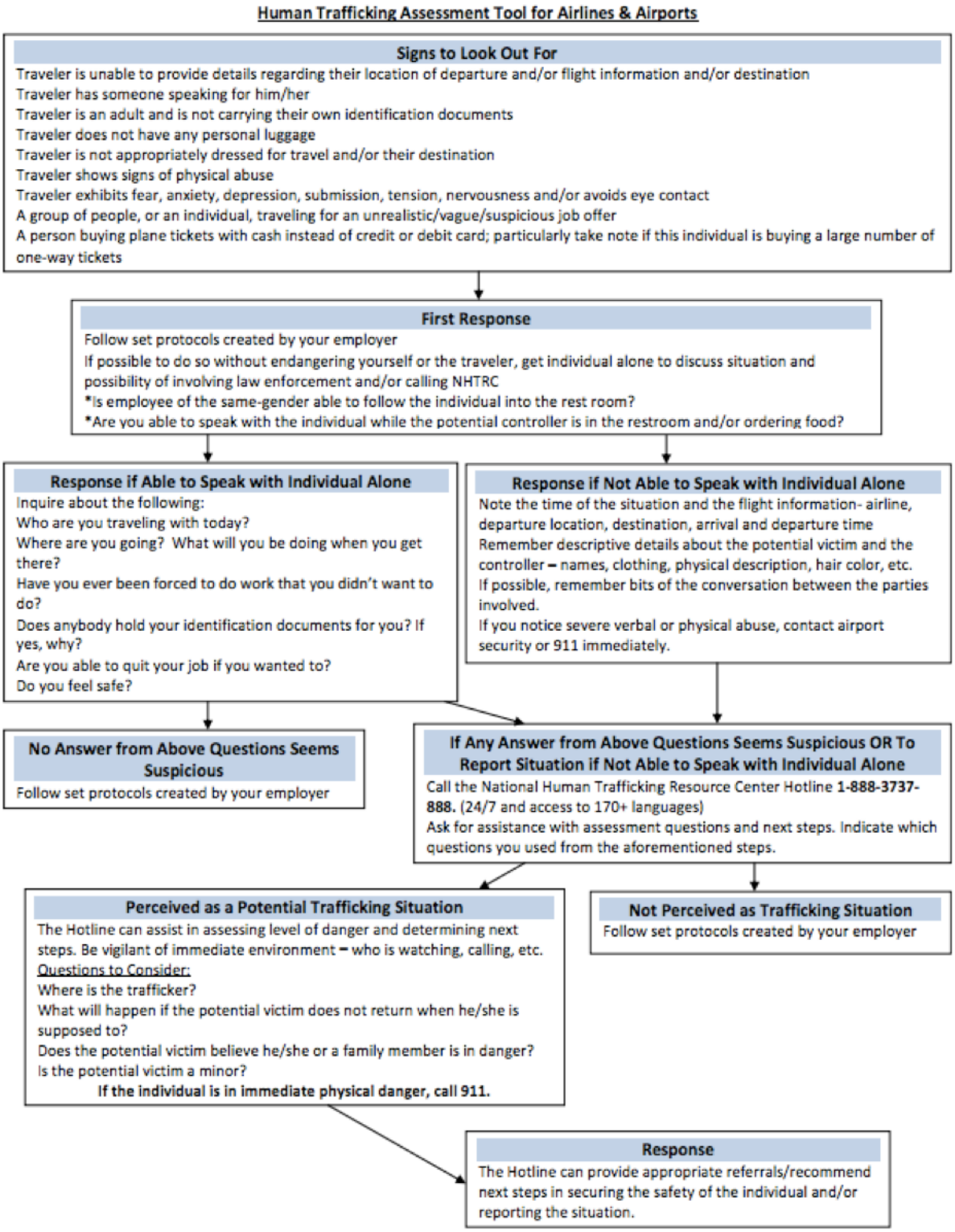
The above routes map portrays the reptile trafficking routes contained within the C4ADS Air Seizure Database (January 2009 to August 2016).

Bird Trafficking Routes Map



The above routes map plots the bird trafficking routes contained within the C4ADS Air Seizure Database (January 2009 to August 2016).

Appendix VI – Human Trafficking Assessment Tool for Airlines & Airports



cclxi

Appendix VII – Seizure Reporting

In an attempt to reduce the amount of time and effort needed to track seizures, C4ADS designed the below template as a simplistic framework for seizure reporting. A more detailed seizure reporting template is included in WCO's Customs Enforcement Network (CEN) platform.[cclxii]

Seizure Date:					
Arrested Individual 1: Name:	Sex:	Age:	Nationality:	Passport:	Repeat Offender: Y/N
Arrested Individual 2: Name:	Sex:	Age:	Nationality:	Passport:	Repeat Offender: Y/N
Contraband Seized 1:			Weight/Number:		
Contraband Seized 2:			Weight/Number:		
Airline:			Flight No.:		
Origin:		Transit Location(s):		Destination:	
Transport Method: (Check one)	Air Freight	Luggage	Passenger Carry-on	Passenger Clothes	Other
Number of Suitcases or Freight Parcels:					
Obfuscation Method (e.g. tin foil, garlic):					
Manner of Detection (e.g. X-ray revealed suspicious object):					
Suspect(s) History:					
Additional Details:					

End Notes

i Nellemann, C. (Editor in Chief); Henriksen, R., Kreilhuber, A., Stewart, D., Kotsovou, M., Raxter, P., Mrema, E., and Barrat, S. (Eds). The Rise of Environmental Crime – A Growing Threat To Natural Resources Peace, Development And Security. United Nations Environment Programme and RHIPTO Rapid Response–Norwegian Center for Global Analyses, 2016. http://unep.org/documents/itw/environmental_crimes.pdf.

ii Ibid.

iii Vira, Varun and Thomas Ewing. Ivory's Curse: The Militarization & Professionalization of Poaching in Africa. Born Free USA and C4ADS, April 2014. https://static1.squarespace.com/static/566ef8b4d8af107232d5358a/t/571a2d5459827ebe07596a71/1461333351821/Ivory%27s+Curse.pdf.

iv Vira, Varun, Thomas Ewing, and Jackson Miller. Out of Africa: The Global Trade in Illicit Elephant Ivory. Born Free USA and C4ADS, August 2014. https://static1.squarespace.com/static/566ef8b4d8af107232d5358a/t/56af83ee1f40390e88337743/1454343151910/Out+of+Africa.pdf.

v UNODC. World Wildlife Crime Report: Trafficking in Protected Species. UNODC, May 2016. www.unodc.org/documents/data-and-analysis/wildlife/World_Wildlife_Crime_Report_2016_final.pdf.

vi Nellemann, C. (Editor in Chief); Henriksen, R., Kreilhuber, A., Stewart, D., Kotsovou, M., Raxter, P., Mrema, E., and Barrat, S. (Eds). The Rise of Environmental Crime – A Growing Threat To Natural Resources Peace, Development And Security. United Nations Environment Programme and RHIPTO Rapid Response–Norwegian Center for Global Analyses, 2016. http://unep.org/documents/itw/environmental_crimes.pdf.

vii UNODC. World Wildlife Crime Report: Trafficking in Protected Species. UNODC, May 2016. www.unodc.org/documents/data-and-analysis/wildlife/World_Wildlife_Crime_Report_2016_final.pdf.

viii "Background." TRAFFIC. TRAFFIC International. www.traffic.org/trade/.

ix Underwood FM, Burn RW, and T. Milliken. Dissecting the Illegal Ivory Trade: An Analysis of Ivory Seizures Data. PLoS ONE 8(10): e76539, 2013. doi:10.1371/journal.pone.0076539.

x Milliken T., Underwood, F.M., Burn, R.W., and L. Sangalakula. "Addendum to the Elephant Trade Information System (ETIS) and the Illicit Trade in Ivory: A report to the 17th meeting of the Conference of the Parties to CITES." CoP17 Doc. 57.6 (Rev. 1) Addendum. 22 Sep. 2016. https://cites.org/sites/default/files/eng/cop/17/WorkingDocs/E-CoP17-57-06-R1-Add.pdf.

xi "Great Elephant Census Final Results." Great Elephant Census. http://www.greatelephantcensus.com/final-report/.

xii The Great Elephant Census | A Paul G. Allen Project." Great Elephant Census. Great Elephant Census, 31 Aug. 2016. https://static1.squarespace.com/static/5304f39be4b0c1e749b456be/t/57c71ec12994ca8ea022a952/147266734 4389/GEC+Results+Summary+Fact+Sheet+FINAL_8+26+2016.pdf.

xiii Mathiesen, Karl. "Tanzania Elephant Population Declined by 60% in Five Years, Census Reveals." The Guardian, 02 June 2015. www.theguardian.com/environment/2015/jun/02/tanzania-epicentre-of-elephant-poaching-census-reveals.

xiv UNODC. World Wildlife Crime Report: Trafficking in Protected Species. UNODC, May 2016.

www.unodc.org/documents/data-and-analysis/wildlife/World_Wildlife_Crime_Report_2016_final.pdf.

xv "Poaching Statistics." Save the Rhino. Save the Rhino International. www.savetherhino.org/rhino_info/poaching_statistics.

xvi Ibid.

xvii "Rhinoplax Vigil." IUCN Red List. International Union for Conservation of Nature and Natural Resources. www.iucnredlist.org/details/22682464/0.

xviii "Astrochelys Yniphora." IUNC Red List. International Union for Conservation of Nature and Natural Resources. www.iucnredlist.org/details/9016/0.

xix Fishel, Justin and Mike Levine. "TSA Director Reassigned in Wake of Security Failures." ABC News. ABC News, 2 June 2015. http://abcnews.go.com/US/tsa-director-reassigned-wake-security-failures/story?id=31458476.

xx Neffenger, Peter V. "TSA Security Gaps." Statement before the United States House Committee on Oversight and Government Reform, 3 Nov. 2015. www.tsa.gov/news/testimony/2015/11/03/testimony-hearing-tsa-security-gaps.

xxi "IATA Forecasts Passenger Demand to Double Over 20 Years." International Air Transport Association. www.iata.org/pressroom/pr/Pages/2016-10-18-02.aspx.

xxii Vira, Varun, Thomas Ewing, and Jackson Miller. Out of Africa: The Global Trade in Illicit Elephant Ivory. Born Free USA and C4ADS, August 2014. https://static1.squarespace.com/static/566ef8b4d8af107232d5358a/t/56af83ee1f40390e88337743/1454343151910/Out+of+Africa.pdf.

xxiii "Wildlife smugglers eye emerging airports." The Times of India. 29 Sep. 2015. http://timesofindia.indiatimes.com/city/madurai/Wildlife-smugglers-eye-emerging-airports/articleshow/49150160.cms.

xxiv "ACI Media Releases." Airports Council International. 9 Sep. 2016. www.aci.aero/News/Releases/Most-Recent/2016/09/09/Airports-Council-International-releases-2015-World-Airport-Traffic-Report-The-busiest-become-busier-the-year-of-the-international-hub-airport.

xxv Iyorah, Festus. "The 10 Largest Airports in Africa." The African Exponent. The Exponent Network, 13 Sep. 2016. www.africanexponent.com/post/7898-africas-10-largest-airports.

xxvi Ibid.

xxvii "象牙走私拼图：象牙贸易生了走私市场（The Paradox of Ivory Smuggling: The Legal Ivory Trade Promotes a Rapidly Expanding Black Market)." Weekly Times, 20 June 2014. http://collection.sina.com.cn/yjjj/20140620/0820155196.shtml.

xxviii Ibid.

xxix Ibid.

xxx "Rare Tortoises and Drugs Found in Abandoned Luggage." WWF. World Wildlife Fund for Nature, 15 June 2010. http://wwf.panda.org/wwf_news/?193844/Rare-tortoises-and-drugs-found-in-abandoned-luggage.

xxxi The Convention on International Trade in Endangered Species (CITES) monitors the transnational

wildlife trade, and lists endangered species on one of three appendices at the behest of its party countries. Appendix I bans all international trade in a species, except in exceptional circumstances, while Appendix II lists all species whose trade must be controlled to preserve the health of the species. Appendix III "contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade." ("How CITES Works." Convention on International Trade in Endangered Species of Wild Fauna and Flora. https://cites.org/eng/disc/how.php.)

xxxii "Birds and Their Droppings Can Carry Over 60 Diseases." Medical News Today. MediLexicon International Ltd., 22 Sep. 2014. www.medicalnewstoday.com/releases/61646.php.

xxxiii Jacob, Jacqueline P. et. al. Avian Diseases Transmissible to Humans. University of Florida – Institute of Food and Agricultural Sciences (IFAS) Extension. http://vetextension.wsu.edu/wp-content/uploads/sites/8/2015/03/Avian-Diseases-Transmissible-to-Humans1.pdf.

xxxiv Nordqvist, Christian. "What is Avian Flu? What is Bird Flu?" Medical News Today. MediLexicon International Ltd., 23 Feb. 2015. www.medicalnewstoday.com/articles/5556.php.

xxxv "FAQs: H5N1 Influenza." World Health Organization. WHO. www.who.int/influenza/human_animal_interface/avian_influenza/h5n1_research/faqs/en/.

xxxvi Import Procedures for a Pet Bird Entering (Non-U.S. Origin) the United States." USDA APHIS. USDA, 18 Oct. 2016. www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-and-animal-product-import-information/import-live-animals/sa_avian/ct_nonus_pet_bird.

xxxvii Neil D'Cruze and David W. Macdonald note, "...we raise pre-existing concerns that CITES records are incomplete, with no data on live seizures provided by 70% of countries party to CITES." (D'Cruze, N, Macdonald DW. "A Review of Global Trends in CITES Live Wildlife Confiscations." Nature Conservation 15: 47-63, 22 Sep. 2016. doi: 10.3897/natureconservation.15.10005.)

xxxviii D'Cruze, N, Macdonald DW. "A Review of Global Trends in CITES Live Wildlife Confiscations." Nature Conservation 15: 47-63, 22 Sep. 2016. doi: 10.3897/natureconservation.15.10005.

xxxix "A guide to using the CITES Trade Database." Convention on International Trade in Endangered Species of Wild Fauna and Flora. https://trade.cites.org/cites_trade_guidelines/en-CITES_Trade_Database_Guide.pdf.

xl "The Elephant Trade Information System (ETIS)." Convention on International Trade in Endangered Species of Wild Fauna and Flora. www.cites.org/eng/prog/etis/index.php.

xli "EU TWIX." EU-TWIX. 2016. http://eu-twix.org/.

xlii The "open source" here refers to all publicly available sources of information, e.g. local news reports, CITES reports, customs press releases, etc.

xliii Other species, such as pangolins and abalone, which were not initially included in our analysis due to time constraints, will be incorporated into the seizure databases in future years.

xliv UNODC. World Wildlife Crime Report: Trafficking in Protected Species. UNODC, May 2016. www.unodc.org/documents/data-and-analysis/wildlife/World_Wildlife_Crime_Report_2016_final.pdf.

xlv R Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria, 2016. www.R-project.org/.

xlvi Milliken, Tom. Illegal Trade in Ivory and Rhino Horn: An Assessment to Improve Law Enforcement Under the Wildlife TRAPS Project. USAID and TRAFFIC International, 2014. www.usaid.gov/sites/default/files/documents/1865/W-TRAPS-Elephant-Rhino-report.pdf.

xlvii "国务院办公厅关于有序停止商业性加工销售象牙及制品活动的通知." The State Council of China. 30 Dec. 2016. www.gov.cn/zhengce/content/2016-12/30/content_5155017.htm.

xlviii "Wild and Precious Exhibit Travels from Bangkok and Shanghai to Beijing and Nairobi." Convention on International Trade in Endangered Species of Wild Fauna and Flora. https://cites.org/eng/Wild_and_Precious_Exhibit_travels_from_Bangkok_and_Shanghai_to_Beijing_and_Nairobi; "Kenya Airways Backs Anti-Poaching Campaign." WildlifeDirect. 30 July 2013. http://newsroom.wildlifedirect.org/2013/07/30/kenya-airways-backs-anti-poaching-campaign/.

xlix A May 2015 report undertaken on behalf of the Department of National Parks and Wildlife of Malawi included Malawi's wildlife seizure data from 1989 to 2014. The report's authors gathered the data from a variety of different Malawian government agencies that had compiled their own internal seizure databases in hard copy. According to the report, "…reviewers found there to be a lack of reliable available data, making it is [sic] almost impossible to identify detailed crime patterns or trends. Several agencies seemed to have not historically recorded or retained wildlife crime data, and those that did often stored it in hard copy only, making it very difficult to access and analyse. In total, 50 wildlife crime cases were analysed by reviewers, the majority of which were ivory offences at airports." (Waterland, Shelley, et. al. Illegal Wildlife Trade Review Malawi. German Federal Ministry for Economic Cooperation and Development (BMZ) through Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH: German International Cooperation, Lilongwe Wildlife Trust, Born Free Foundation, and the Department of National Parks and Wildlife of Malawi, May 2015. www.lilongwewildlife.org/wp-content/uploads/IWT-Review-Malawi.pdf.)

l Ibid.

li Milliken, Tom. Illegal Trade in Ivory and Rhino Horn: An Assessment to Improve Law Enforcement Under the Wildlife TRAPS Project. USAID and TRAFFIC International, 2014. www.usaid.gov/sites/default/files/documents/1865/W-TRAPS-Elephant-Rhino-report.pdf.

lii Figure 7 depicts a timeline of all ivory seizures in the Database, as well as timelines for large-scale (greater than 500 kilograms) and medium-scale (greater than 100 kilograms) shipments. Seizures are split by weight class as different size shipments tend to share certain characteristics. Large-scale ivory shipments, for instance, indicate organized criminal involvement and generally move by air freight. Medium-scale shipments are indicative of organized crime as well, but can move in air freight shipments or in multiple checked suitcases. Medium-scale air freight shipments often follow each other in quick succession. Small-scale ivory trafficking (anything below 100 kilograms) can include anything from an uneducated tourist with an ivory bangle, to small-scale networks moving worked ivory to workshops or markets elsewhere.

liii China is the world's largest legal and illegal ivory market according to the Elephant Action League, Wildaid, and other conservation organizations. A report by Fiona Underwood, Robert Burn, and Tom Milliken titled Dissecting the Illegal Ivory Trade: An Analysis of Ivory Seizures Data attribute the rapid growth in illegal ivory trade activity since 2007 to the increased consumption in China. (Crosta, Andrea, et. al. Blending Ivory: China's Old Loopholes, New Hopes. Elephant Action League, Dec. 2015. www.elephantleague.org/wp-content/uploads/2016/02/Report-China-Blending-Ivory-Dec2015.pdf; Ivory Demand in China 2012-2014. WildAid, Save the Elephants, and the African Wildlife Foundation, 2014. http://wildaid.org/sites/default/files/resources/Print_Ivory%20Report_Final_v3.pdf ; Underwood FM, Burn RW, Milliken T. Dissecting the

Illegal Ivory Trade: An Analysis of Ivory Seizures Data. PLoS ONE 8(10): e76539, 2013. doi:10.1371/journal.pone.0076539.)

liv Weru, Sam. Wildlife Protection and Trafficking Assessment in Kenya: Drivers and Trends of Transnational Wildlife Crime in Kenya and Its Role as a Transit Point for Trafficked Species in East Africa. TRAFFIC, 2016. https://portals.iucn.org/library/sites/library/files/documents/Traf-126.pdf.

lv Iyorah, Festus. "The 10 Largest Airports in Africa." The African Exponent. The Exponent Network, 13 Sep. 2016. www.africanexponent.com/post/7898-africas-10-largest-airports.

lvi Zhao Wen. "Man gets 7 years for smuggling ivory items." Shanghai Daily. 19 June 2013. http://en.people.cn/90882/8289766.html; Wang Lin. "行李箱装象牙和犀角制品(图)." Sohu. 18 June 2013. http://roll.sohu.com/20130618/n379177909.shtml.

lvii Ibid.

lviii Ibid.

lix "Shanghai Arrests for illegal rhino horn and ivory purchases." Xinhua News. 20 March 2013. https://africanwildlifetrust.blogspot.com/2013/03/shanghai-arrests-for-illegal-rhino-horn.html.

lx Ibid.

lxi Ibid.

lxii "Plus de 350 kilos d'ivoire saisis par la douane en Ile-de-France." French Customs. 8 June 2016. www.douane.gouv.fr/articles/a12860-plus-de-350-kg-d-ivoire-saisis-par-la-douane-en-ile-de-france.

lxiii Ibid.

lxiv Aslanoff, Samuel. "Plus de 350 kilos d'ivoire saisis par la douane en Ile-de-France." France Bleu, 8 June 2016. www.francebleu.fr/infos/societe/plus-de-350-kilos-d-ivoire-saisis-par-la-douane-en-ile-de-france-1465315616.

lxv Ibid.

lxvi Ibid.

lxvii "VIDEO. Une saisie record de 350 kilos de defenses d'éléphants, en France." Normandie Actu. 9 June 2016. www.normandie-actu.fr/video-une-saisie-record-de-350-kilos-de-defenses-d-elephants-en-france_211171/.

lxviii Ibid.

lxix Milliken, Tom. Illegal Trade in Ivory and Rhino Horn: An Assessment to Improve Law Enforcement Under the Wildlife TRAPS Project. USAID and TRAFFIC International, 2014. www.usaid.gov/sites/default/files/documents/1865/W-TRAPS-Elephant-Rhino-report.pdf.

lxx In the 2014 report, Illegal Trade in Ivory and Rhino Horn: An Assessment to Improve Law Enforcement Under the Wildlife TRAPS Project, Milliken determines the average weight of trafficked rhino horns to be 2.78 kilograms. This estimate assumes that 90% of trafficked horns are from white rhinos, and combines the average weight of white rhino horns (2.94 kg) and black rhino horns (2.65 kg).

lxxi Milliken, Tom. Illegal Trade in Ivory and Rhino Horn: An Assessment to Improve Law Enforcement

Under the Wildlife TRAPS Project. USAID and TRAFFIC International, 2014. www.usaid.gov/sites/default/files/documents/1865/W-TRAPS-Elephant-Rhino-report.pdf.

lxxii Like with ivory, larger shipments of rhino horn are generally indicative of more sophisticated criminal involvement. To monitor changes in different weight classes over time, we assigned the top 10% of rhino horn seizures by weight to the large-scale weight class, and the top 10-50% to the medium-scale class. All other seizures were considered small-scale.

lxxiii Milliken, Tom. Illegal Trade in Ivory and Rhino Horn: An Assessment to Improve Law Enforcement Under the Wildlife TRAPS Project. USAID and TRAFFIC International, 2014. www.usaid.gov/sites/default/files/documents/1865/W-TRAPS-Elephant-Rhino-report.pdf; Dixon, Robyn. "Vietnam, the Biggest Hub for Illegal Rhino Horn Trafficking, Has Done Little to Stop It." Los Angeles Times. 26 Sep. 2016. www.latimes.com/world/africa/la-fg-vietnam-rhino-trafficking-20160926-snap-story.html.

lxxiv As illegal shipments grow larger, a higher degree of coordination, is necessary to increase the chances that shipments will arrive at their destinations unimpeded. In keeping with this principle, reptile shipments have been divided into large- and medium-scale categories in order to identify shifting patterns in likely organized criminal activity. The top 10% of reptile seizures by weight are considered large-scale, while the top 10-50% by weight are medium-scale.

lxxv Oppili, P. "Over 8,000 Captive Baby Tortoises Die." The Hindu. 29 March 2013. www.thehindu.com/news/cities/chennai/over-8000-captive-baby-tortoises-die/article4559180.ece.

lxxvi "Custom Officials Seize Over 10,000 Exotic Turtles at Kolkata Airport; Suspected Smugglers Detained." International Business Times. 20 July 2013. www.ibtimes.co.in/custom-officials-seize-over-10000-exotic-turtles-at-kolkata-airport-suspected-smugglers-detained-492669.

lxxvii D'Cruze, Neil, et. al. "A Star Attraction: The Illegal Trade in Indian Star Tortoises." Nature Conservation, vol. 13, 9 Nov. 2015, pp. 1-19. https://doi.org/10.3897/natureconservation.13.5625.

lxxviii Similarly to the previous categories, larger bird shipments are more likely to be associated with organized criminal activity. Tracking changes in those shipments can therefore give some indication of changes in the modus operandi of criminal networks. To that end, the top 10% of bird seizures by weight are classified as large-scale, and the top 20-50% by weight are considered medium-scale.

lxxix "1000 Grey Parrots Rescued from Trappers in Cameroon." Wildlife Extra. Feb. 2010. www.wildlifeextra.com/go/news/parrot-rescue.html#cr.

lxxx "Bird Smuggling Bid Foiled." The Daily Star. 3 July 2010. www.thedailystar.net/news-detail-145157.

lxxxi Hoang, Viet. "Police Seize Hundreds of Smuggled Birds at Tan Son Nhat Airport." Thanh Nien News. 9 Sep. 2014. www.thanhniennews.com/society/police-seize-hundreds-of-smuggled-birds-at-tan-son-nhat-airport-30887.html.

lxxxii Rueb, Emily S. "Tiny Birds, Big Drama: Inside the World of the Birdmen of Queens." The New York Times. The New York Times Company, 31 July 2015. www.nytimes.com/2015/08/02/nyregion/tiny-birds-big-drama-inside-the-world-of-the-birdmen-of-queens.html

lxxxiii "Two fined for bird smuggling." Kaieteur News. 1 May 2016. www.kaieteurnewsonline.com/2016/05/01/two-fined-for-bird-smuggling/.

lxxxiv Ibid.

lxxxv Ibid.

lxxxvi Rueb, Emily S. "Tiny Birds, Big Drama: Inside the World of the Birdmen of Queens." The New York Times. The New York Times Company, 31 July 2015. www.nytimes.com/2015/08/02/nyregion/tiny-birds-big-drama-inside-the-world-of-the-birdmen-of-queens.html

lxxxvii Ibid.

lxxxviii Ibid.

lxxxix Ibid.

xc Marzulli, John. "Time to Raid Your Nest, Bird Smuggler." Daily News. NY Daily News, 14 April 2009. www.nydailynews.com/news/crime/bird-smuggler-guyana-pleads-guilty-2006-charges-finches-article-1.360560

xci Ibid.

xcii Marzulli, John. "Clip JFK Flier with Finches Up His Sleeve." Daily News. NY Daily News, 27 June 2012. www.nydailynews.com/new-york/clip-bird-brain-jfk-9-finches-sleeve-article-1.1102965.

xciii Ibid.

xciv "Finch Smuggler Sentenced for Trafficking for 'Tweets'." U.S. Fish & Wildlife Service Northeast Blog. 6 May 2013. https://usfwsnortheast.wordpress.com/2013/05/06/finch-smuggler-sentenced-for-trafficking-for-tweets/.

xcv "US-based Guyanese found with birds in pants crotch at airport." Stabroek News. 5 Sep. 2012. http://www.stabroeknews.com/2012/news/stories/09/05/us-based-guyanese-found-with-birds-in-pants-crotch-at-airport/.

xcvi Ibid.

xcvii Ibid.

xcviii "Man caught trying to smuggle singing birds through airport." News Source Guyana. 21 Jan. 2014. http://newssourcegy.com/news/man-caught-trying-to-smuggle-singing-birds-through-airport/.

xcix Ibid.

c Ibid.

ci "Smuggler Found with Birds in Hair Curlers During Airport Search." Stabroek News. 23 Jan. 2014. www.stabroeknews.com/2014/news/stories/01/23/smuggler-found-birds-hair-curlers-airport-search/.

cii Ibid.

ciii "Would-Be Smuggler Nabbed at Airport with Birds in Curlers." Stabroek News. 17 June 2014. www.stabroeknews.com/2014/news/stories/06/17/smuggler-nabbed-airport-birds-curlers/.

civ Ibid.

cv "Brampton Man Attempts to Conceal 19 Songbirds During Visit to Toronto Pearson International Airport." Ontario SPCA. 26 Mar. 2015. http://ontariospca.ca/media-centre/media-releases/977-brampton-man-attempts-to-conceal-19-songbirds-during-visit-to-toronto-pearson-international-airport.html.

cvi Ibid.

cvii Todorova, Vesela. "Dubai 'Major Hub' for Wildlife Trafficking: Report." The National. Abu Dhabi Media, 4 Dec. 2013. www.thenational.ae/uae/environment/dubai-major-hub-for-wildlife-trafficking-report.

cviii "Air Transport in Kenya." Fortune of Africa. http://fortuneofafrica.com/kenya/air-transport-in-kenya/.

cix Nairobi's prominence in the ivory category of the C4ADS' Air Seizure Database is likely an effect of heightened awareness, stronger enforcement, and frequent reporting.

cx "ACI Media Releases." Airports Council International. 9 Sep. 2016. www.aci.aero/News/Releases/Most-Recent/2016/09/09/Airports-Council-International-releases-2015-World-Airport-Traffic-Report-The-busiest-become-busier-the-year-of-the-international-hub-airport.

cxi "Country-by-Country Findings." The Great Elephant Census. Vulcan and The Paul G. Allen Foundation, 31 Aug. 2016. https://static1.squarespace.com/static/5304f39be4b0c1e749b456be/t/57c71f5fcd0f68b39c3f4bfa/1472667487326/GEC+Results+Country+by+Country+Findings+Fact+Sheet_FINAL_8+26+2016.pdf.

cxii Ibid.

cxiii "Hong Kong Customs Seizes Suspected Ivory Cut Pieces at Airport." Customs and Excise Department: The Government of the Hong Kong Special Administrative Region. 4 Sep. 2015. www.customs.gov.hk/en/publication_press/press/index_id_1409.html.

cxiv Ibid.

cxv Ibid.

cxvi "Hong Kong Customs Seizes Suspected Ivory Cut Pieces at Airport (with Photos)." Customs and Excise Department: The Government of the Hong Kong Special Administrative Region. 7 Sep. 2015. www.customs.gov.hk/en/publication_press/press/index_id_1413.html.

cxvii Ibid.

cxviii Emslie, R. "Ceratotherium simum." The IUCN Red List of Threatened Species. 2012. http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T4185A16980466.en.

cxix Zhao Wen. "Man gets 7 years for smuggling ivory items." Shanghai Daily. 19 June 2013. http://en.people.cn/90882/8289766.html; Wang Lin. "行李箱装象牙和犀角制品(图)." Sohu. 18 June 2013. http://roll.sohu.com/20130618/n379177909.shtml; "Shanghai Arrests for illegal rhino horn and ivory purchases." Xinhua News. 20 March 2013. https://africanwildlifetrust.blogspot.com/2013/03/shanghai-arrests-for-illegal-rhino-horn.html.

cxx "Man Remanded for Smuggling Star Tortoises." The Hindu. 29 Sep. 2015. www.thehindu.com/news/cities/Madurai/man-remanded-for-smuggling-star-tortoises/article7700080.ece.

cxxi Ibid.

cxxii "Wildlife smugglers eye emerging airports." The Times of India. 29 Sep. 2015. http://timesofindia.indiatimes.com/city/madurai/Wildlife-smugglers-eye-emerging-airports/articleshow/49150160.cms.

cxxiii Ibid.

cxxiv "Man Remanded for Smuggling Star Tortoises." The Hindu. 29 Sep. 2015. www.thehindu.com/news/cities/Madurai/man-remanded-for-smuggling-star-tortoises/article7700080.ece.

cxxv "Wildlife smugglers eye emerging airports." The Times of India. 29 Sep. 2015. http://timesofindia.indiatimes.com/city/madurai/Wildlife-smugglers-eye-emerging-airports/articleshow/49150160.cms.

cxxvi "Airplane Handgun Smuggle Bid Is Foiled by Feds." The Smoking Gun. 13 May 2013. www.thesmokinggun.com/documents/flier-wraps-gun-in-aluminum-foil-784521.

cxxvii Osada, Jasmine. "Terminally Ill Man Jailed 9 Weeks for Smuggling Birds." The Straits Times. 17 Oct. 2015. www.straitstimes.com/singapore/courts-crime/terminally-ill-man-jailed-9-weeks-for-smuggling-birds.

cxxviii Ibid.

cxxix Ibid.

cxxx Ibid.

cxxxi Ibid.

cxxxii "Largest Seizure of Critically Endangered Ploughshare Tortoises Made in Thailand." TRAFFIC. TRAFFIC International, 19 Mar. 2013. www.traffic.org/home/2013/3/19/largest-seizure-of-critically-endangered-ploughshare-tortois.html.

cxxxiii Justice, Adam. "Zurich Airport Customs Seize Record 262kg of Ivory." International Business Times. IB Times Co. Ltd., 4 Aug. 2015. www.ibtimes.co.uk/zurich-airport-customs-seize-record-262kg-ivory-1514056.

cxxxiv "Eight Suitcases Full of Ivory Seized at Zurich Airport." The Guardian. Guardian News and Media Limited, 4 Aug. 2015. www.theguardian.com/environment/2015/aug/04/eight-suitcases-full-of-ivory-seized-at-zurich-airport.

cxxxv "Chinese Ivory Smugglers Return Home." Beijing International. www.ebeijing.gov.cn/BeijingInformation/BeijingNewsUpdate/t1398537.htm.

cxxxvi The incident did not appear to be isolated; Tanzanian officials at the time of the seizure noted similarities between the case and a July 2013 drug smuggling case, when two Tanzanian socialites reportedly smuggled several large bags packed full of drugs through Julius Nyerere Airport in Dar es Salaam. ("Cunning Chinese Ivory Smugglers Unmasked." The Citizen. 17 Aug. 2015. www.thecitizen.co.tz/News/Cunning-Chinese-ivory-smugglers-unmasked/1840340-2835598-s1tvfb/index.html.)

cxxxvii "Ibama Apreende Pássaros Que Embarcavam Ilegalmente No Aeroporto De Brasília." ADERJ. Associação Defensores Da Represa De Jurumirim, 16 Nov. 2010. www.aderjurumirim.org/site/noticias/Ibama-apreende-passaros-que-embarcavam-ilegalmente-no-aeroporto-de-Brasilia/1220.html.

cxxxviii Cobra II Newsletter Issue 1; Wee, Darren. "Kenya Extradites Alleged Illegal Ivory Kingpin to China." South China Morning Post. South China Morning Post Publishers Ltd, 10 Feb. 2014. www.scmp.com/news/china/article/1425650/kenya-extradites-alleged-illegal-ivory-kingpin-china.

cxxxix "On the Trail: Information and Analysis Bulletin on Animal Poaching and Smuggling | N°11 / 1st October – 31st December 2015." Robin Des Bois. ROBIN DES BOIS, 9 Mar. 2016. www.robindesbois.org/wpcontent/uploads/ON_THE_TRAIL_11.pdf.

cxl "Ibama Apreende Pássaros Que Embarcavam Ilegalmente No Aeroporto De Brasília." ADERJ. Associação Defensores Da Represa De Jurumirim, 16 Nov. 2010. www.aderjurumirim.org/site/noticias/Ibama-apreende-passaros-que-embarcavam-ilegalmente-no-aeroporto-de-Brasilia/1220.html. ; "230 Canários-da-Terra São Apreendidos no Aeroporto de Brasilia." ANDA. Agência de Notícias de Direitos Animais, 16 Nov. 2010. www.anda.jor.br/16/11/2010/230-canarios-da-terra-sao-apreendidos-no-aeroporto-de-brasilia.

cxli "230 Turtles from India Seized at Bangkok Airport: Report." NDTV. Indo-Asian News Service, 15 May 2014. www.ndtv.com/india-news/230-turtles-from-india-seized-at-bangkok-airport-report-562041.

cxlii "510 Tortoises Rescued at Dhaka Airport." Prothom Alo. 15 Dec. 2014. http://en.prothom-alo.com/bangladesh/news/57107/510-tortoises-rescues-at-Dhaka-airport.

cxliii "Ibama Pode Sacrificar Pássaros que PF Apreendeu." O Globo. 24 June 2011. https://blogmarcelolira.blogspot.com/2011/06/ibama-pode-sacrificar-passaros-absurdo.html.

cxliv "Thailand Rhino Horns." AP Archive. The Associated Press, 20 June 2014. www.aparchive.com/metadata/youtube/4081ad2f16c3885f5ec7edb366f7deef; "On the Trail: Information and Analysis Bulletin on Animal Poaching and Smuggling | N°4 / 1st January – 31st March 2014." Robin Des Bois. ROBIN DES BOIS, 9 Mar. 2016. www.robindesbois.org/wpcontent/uploads/ON_THE_TRAIL_4.pdf.

cxlv Al-Othman, Hannah. "Huge Haul of Illegal Ivory Found in Suitcase at Heathrow Airport." Evening Standard. 23 Nov. 2015. www.standard.co.uk/news/crime/huge-haul-of-illegal-ivory-found-in-suitcase-at-heathrow-airport-a3121141.html

cxlvi Gowhar, Imran. "Terrapin Smuggling Racket Busted, Two Held." The Hindu. 30 June 2015. www.thehindu.com/news/cities/bangalore/terrapin-smuggling-racket-busted-two-held/article7368630.ece.

cxlvii Ibid.

cxlviii Ibid.

cxlix "Hong Kong Customs Seizes Suspected Ivory Tusks and Ivory Products at Airport (with Photo)." Customs and Excise Department: The Government of the Hong Kong Special Administrative Region. 28 July 2015. www.customs.gov.hk/en/publication_press/press/index_id_1382.html.

cl "Hong Kong Customs Seizes Suspected Ivory Products at Airport (with Photos)." Customs and Excise Department: The Government of the Hong Kong Special Administrative Region. 17 April 2016. www.customs.gov.hk/en/publication_press/press/index_id_1586.html.

cli Momanyi, Bernard. "Airport Staff Suspects in Sh130m Ivory Probe." Capital News. Capital Digitel Media, 6 May 2011. www.capitalfm.co.ke/news/2011/05/airport-staff-suspects-in-shm-ivory-probe/; AFP. "Kenya Seizes 600 kg of Nigeria-Bound Ivory." Modern Ghana. MG Media Group, 22 June 2012. www.modernghana.com/news/402835/1/kenya-seizes-600-kg-of-nigeria-bound-ivory.html.

clii "Hong Kong Customs Seizes Suspected Ivory Products at Airport (with Photos)." Customs and Excise Department: The Government of the Hong Kong Special Administrative Region. 7 Aug. 2015. www.customs.gov.hk/en/publication_press/press/index_id_1388.html.

cliii Ibid.

cliv "Hong Kong Customs Seizes Suspected Ivory Cut Pieces and Products at Airport (with Photos)." Customs and Excise Department: The Government of the Hong Kong Special Administrative Region. 24

Aug. 2015. www.customs.gov.hk/en/publication_press/press/index_id_1401.html.

clv Ibid.

clvi Ibid.

clvii "Hong Kong Customs seizes suspected ivory tusks and ivory products at airport (with photo)." Customs and Excise Department: The Government of the Hong Kong Special Administrative Region. 28 July 2015. www.customs.gov.hk/en/publication_press/press/index_id_1382.html.

clviii "Hong Kong Customs Seizes Suspected Ivory Products at Airport (with Photos)." Customs and Excise Department: The Government of the Hong Kong Special Administrative Region. 3 Nov. 2015. www.customs.gov.hk/en/publication_press/press/index_id_1455.html.

clix "Hong Kong Customs seizes suspected ivory products at airport (with photos)." Customs and Excise Department: The Government of the Hong Kong Special Administrative Region. 17 April 2016. www.customs.gov.hk/en/publication_press/press/index_id_1586.html.

clx "Customs Seized Smuggled Ivory Worth 22.80 Million Baht." Suvarnabhumi Airport Cargo Clearance Customs Bureau. www.customs-ccs.com/index.php?option=com_content&view=article&id=338&Itemid=28&lang=th.

clxi Ibid.

clxii Ibid.

clxiii "Thailand seizes half-tonne of ivory from Kenya." Agence France-Presse. 17 July 2012. www.thephuketnews.com/thailand-seizes-half-tonne-of-ivory-from-kenya-32080.php.

clxiv Momanyi, Bernard. "Airport staff suspects in Sh130m ivory probe." Capital News. 6 May 2011. www.capitalfm.co.ke/news/2011/05/airport-staff-suspects-in-shm-ivory-probe/.

clxv Ibid.

clxvi Ibid.

clxvii Ibid.

clxviii Ibid.

clxix Momanyi, Bernard. "700kgs of ivory netted in Kenya." Capital News. 22 June 2012. http://www.capitalfm.co.ke/news/2012/06/700kgs-of-ivory-netted-in-kenya/.

clxx Ibid.

clxxi Ibid.

clxxii "男子走私市值140万美元黑犀牛角被查遭严惩(图)" China News Network. 17 Jan. 2014. www.chinanews.com/gj/2014/01-17/5750568.shtml.

clxxiii "Thailand Rhino Horns." AP Archive. The Associated Press, 20 June 2014. www.aparchive.com/metadata/youtube/4081ad2f16c3885f5ec7edb366f7deef.

clxxiv "Thailand Rhino Horns." AP Archive. The Associated Press, 20 June 2014. www.aparchive.com/metadata/youtube/4081ad2f16c3885f5ec7edb366f7deef.

clxxv "Customs Officials Confiscate Rhino Horns at ORTIA." SARS. 23 Dec. 2015. www.sars.gov.za/Media/MediaReleases/Pages/23-December-2015---Customs-officials-confiscate-rhino-horns-at-ORTIA.aspx.

clxxvi Ibid.

clxxvii Ibid.

clxxviii Ndlazi, Sakhile. "Tusks of R17m Seized." Pretoria News. 3 March 2016. www.pressreader.com/south-africa/pretoria-news/20160303/281479275501302

clxxix Moseley, Brandon. "Rhino Poachers Indicted in Montgomery." Alabama Political Reporter. www.alreporter.com/rhino-poachers-indicted-in-montgomery/.

clxxx Kous, Dima Abo. "Smuggled Cobras Rescued at Cairo Airport Thanks to Our Trainings." International Fund for Animal Welfare. 9 May 2016. www.ifaw.org/united-states/news/smuggled-cobras-rescued-cairo-airport-thanks-our-trainings.

clxxxi "Workshop on Illegal Wildlife Trade Held in Islamabad." Islamabad Scene. 10 Feb. 2016. http://islamabadscene.com/workshop-on-iillegal-wildlife-trade-held-in-islamabad/.

clxxxii "When 'Mangoes' Stirred to Life." The Hindu. 29 April 2014. www.thehindu.com/news/cities/Thiruvananthapuram/when-mangoes-stirred-to-life/article5959091.ece.

clxxxiii Ibid.

clxxxiv Ibid.

clxxxv Ibid.

clxxxvi Ibid.

clxxxvii "Trafic de Tortues de Madagascar." Madagascar Tribune. 16 June 2010. http://mg.chm-cbd.net/news/trafic-de-tortues-de-madagascar.

clxxxviii Davis, Kathleen. "Ketamine: Facts, Effects and Hazards." Medical News Today. MediLexicon International Ltd., 18 Nov. 2015. www.medicalnewstoday.com/articles/302663.php.

clxxxix "Most Frequently Used Drugs." www.vetandwild.com/drugs.html.

cxc "On the Trail: Information and Analysis Bulletin on Animal Poaching and Smuggling | N°10 / 1st July – 30th September 2015." Robin Des Bois. ROBIN DES BOIS. www.robindesbois.org/wp-content/uploads/ON_THE_TRAIL_10.pdf.

cxci "Malaysia Jails Man Who Smuggled 95 Snakes on a Plane." BBC News. 9 Sep. 2010. www.bbc.com/news/world-asia-pacific-11203270.

cxcii "Smuggler caught after bag holding 95 boa constrictors bursts open at airport." The Guardian. Guardian News and Media Limited. 3 Sep. 2010. www.theguardian.com/environment/2010/sep/03/smuggler-boa-constrictors.

cxciii Christy, Bryan. "Asia's Wildlife Trade." National Geographic. National Geographic Partners, LLC, Jan. 2010. http://ngm.nationalgeographic.com/2010/01/asian-wildlife/christy-text.

cxciv Ibid.

cxcv Ibid.

cxcvi "Anson Wong." Notable Ansons. 28 Aug. 2010. https://notableansons.blogspot.com/2010/08/anson-wong.html.

cxcvii Lim, Balqis. "On the trail of wildlife smugglers." News Straits Times. 24 Nov. 2013. https://wildsingaporenews.blogspot.com/2013/11/on-trail-of-wildlife-smugglers.html.

cxcviii Chao, Steve. "Return of the Lizard King." Al Jazeera. Al Jazeera Media Network, 21 April 2015. www.aljazeera.com/programmes/101east/2013/11/return-lizard-king-2013111683648328719.html.

cxcix Neslen, Arthur. "Lizard traffickers exploit legal loopholes to trade at world's biggest fair." The Guardian. Guardian News and Media Limited. 11 Nov. 2015. www.theguardian.com/environment/2015/nov/11/lizard-traffickers-exploit-legal-loopholes-to-trade-at-worlds-biggest-fair.

cc Ibid.

cci Ibid.

ccii "Costa Rica police seize 170 wild animals from German tourist's luggage." The Tico Times. 9 Sep. 2014. www.ticotimes.net/2014/09/09/costa-rica-police-seize-170-wild-animals-from-german-tourists-luggage.

cciii Fendt, Lindsay. "German tourist busted at Costa Rica airport smuggling 400 animals is released with no fine." The Tico Times. 20 Sep. 2014. www.ticotimes.net/2014/09/20/german-tourist-busted-at-costa-rica-airport-smuggling-400-animals-is-released-with-no-fine.

cciv Hamilton, Megan. "Costa Rica Deports German Caught Smuggling Hundreds of Animals." Digital Journal. 20 Sep. 2014. www.digitaljournal.com/news/environment/costa-rica-deports-german-caught-smuggling-hundreds-of-animals/article/404339.

ccv Ibid.

ccvi "Costa Rica police seize 170 wild animals from German tourist's luggage." The Tico Times. 9 Sep. 2014. www.ticotimes.net/2014/09/09/costa-rica-police-seize-170-wild-animals-from-german-tourists-luggage.

ccvii Fendt, Lindsay. "German tourist busted at Costa Rica airport smuggling 400 animals is released with no fine." The Tico Times. 20 Sep. 2014. www.ticotimes.net/2014/09/20/german-tourist-busted-at-costa-rica-airport-smuggling-400-animals-is-released-with-no-fine.

ccviii Fendt, Lindsay. "German tourist busted at Costa Rica airport smuggling 400 animals is released with no fine." The Tico Times. 20 Sep. 2014. www.ticotimes.net/2014/09/20/german-tourist-busted-at-costa-rica-airport-smuggling-400-animals-is-released-with-no-fine.

ccix Ibid.

ccx Robinson, Julian. "Budgie Smuggling: Passenger Arrested at Cuba Airport with 66 Tiny Birds Sewn into His Trousers after Customs Officer Spots 'Bulge'." DailyMail.com. Associated Newspapers Ltd., 3 June 2014. www.dailymail.co.uk/news/article-2647135/Budgie-smuggling-Man-arrested-trying-enter-Cuba-66-tiny-birds-sewn-trousers-customs-officer-spots-bulge.html.

ccxi Ibid.

ccxii Stagno-Navarra, Karl. "Smuggled Birds Get Radiation Dose by Airport Security." Malta Today. Media

Today Co. Ltd., 28 Feb. 2012. www.maltatoday.com.mt/news/national/16413/smuggled-birds-get-radiation-dose-by-airport-security-20120228.

ccxiii "Man Caught Carrying 200 Canaries at Airport." Times of Malta.com. 21 Nov. 2009. www.timesofmalta.com/articles/view/20091121/local/man-caught-carrying-200-canaries-at-airport.282637.

ccxiv Ibid.

ccxv Ibid.

ccxvi Ibid.

ccxvii Hsu, Christine. "Taiwan Finds 3rd Case of Deadly H5N1 Virus in Birds Smuggled from China." Medical Daily. IBT Media Inc., 17 July 2012. www.medicaldaily.com/taiwan-finds-3rd-case-deadly-h5n1-virus-birds-smuggled-china-241383.

ccxviii Ibid.

ccxix Ibid.

ccxx Ibid.

ccxxi Ibid.

ccxxii "On the Trail: Information and Analysis Bulletin on Animal Poaching and Smuggling | N°1 / 1st April – 30th June 2013." Robin Des Bois. ROBIN DES BOIS. www.robindesbois.org/wp-content/uploads/ON-THE-TRAIL-1.pdf.

ccxxiii Ibid.

ccxxiv Ibid.

ccxxv Ibid.

ccxxvi Malkin, Bonnie. "Man caught smuggling pigeons in his trousers." The Telegraph. Telegraph Media Group Limited. 3 Feb. 2009. http://i.telegraph.co.uk/multimedia/archive/01252/pigport_1252075f.jpg

ccxxvii Dell'Amore, Christine. "PHOTO: Smuggler Caught With 14 Birds in Pants." National Geographic News. National Geographic Society. 6 May 2009. http://news.nationalgeographic.com/news/2009/05/090506-bird-smuggling-picture.html

ccxxviii TRAFFIC Bulletin Seizures and Prosecutions: March 1997 – October 2014. TRAFFIC. 2014

ccxxix "Man jailed for trying to smuggle peregrine falcon eggs out of Birmingham Airport." Birmingham Post. Birmingham Post. 30 May 2013. www.birminghampost.co.uk/news/local-news/man-jailed-trying-smuggle-peregrine-3928774

ccxxx "Rare birds found taped to passenger's body at LAX." LA Now. Los Angeles Times. 29 Aug. 2011. http://latimesblogs.latimes.com/lanow/2011/08/bird-smuggling.html

ccxxxi Longbottom, Wil. "The Man Packing a Dozen Peckers in His Pants: Traveller Arrested Smuggling Live Hummingbirds in His Trousers." DailyMail.com. Associated Newspapers Ltd., 27 Sep. 2011. www.dailymail.co.uk/news/article-2042474/Traveller-arrested-trying-smuggle-live-HUMMINGBIRDS-special-pouches-sewn-pants.html.

ccxxxii Ibid.

ccxxxiii Ibid.

ccxxxiv Ibid.

ccxxxv The examples mentioned in the Recommendations are not meant to be an exhaustive list of all organizations working on these issues.

ccxxxvi "The Buckingham Palace Declaration." 15 March 2016. www.unitedforwildlife.org/#!/2016/03/the-buckingham-palace-declaration?_escaped_fragment_=.

ccxxxvii Ibid.

ccxxxviii CITES SC66 National Ivory Action Plan Progress Report. Convention on the International Trade in Endangered Species, SC66, doc. 29, annex 9, Sep. 2015. https://cites.org/sites/default/files/eng/com/sc/66/E-SC66-29-Annex9.pdf

ccxxxix "WildScan." Freeland. Freeland Foundation. www.freeland.org/programs/wildscan/.

ccxl Ibid.

ccxli "Legislation." Tikki Hywood Trust. www.tikkihywoodtrust.org/legislation/.

ccxlii See www.cbp.gov/travel/travel-industry-personnel/carrier-liaison-prog for information regarding CBP's Carrier Liaison Program.

ccxliii See "A Review of Global Trends in CITES Live Wildlife Confiscations" for an assessment of current CITES protocols for live wildlife seizures and associated recommendations. (D'Cruze, N, Macdonald DW. "A Review of Global Trends in CITES Live Wildlife Confiscations." Nature Conservation 15: 47-63, 22 Sep. 2016. doi: 10.3897/natureconservation.15.10005.)

ccxliv Actman, Jani. "What Happens to Smuggled Animals After They're Seized?" National Geographic. National Geographic Partners, LLC, 30 Sep. 2016. http://news.nationalgeographic.com/2016/09/wildlife-watch-animals-seized-smugglers/.

ccxlv In one instance in 2015, Vietnamese officials seized "42 live, critically endangered" pangolins and delivered them to forest rangers, presumably for rehabilitation. The forest rangers instead sold all 42 animals to local restaurants, claiming that "the animals were too weak to be rescued anyway." (Bryce, Emma. "Critically Endangered Pangolins Rescued, Then Sold as Food." The Guardian. Guardian News and Media Limited, 20 Feb. 2015. www.theguardian.com/environment/world-on-a-plate/2015/feb/20/critically-endangered-pangolins-rescued-then-sold-as-food.)

ccxlvi Before Spain designated a rescue center to receive rescued wildlife, "some of its seized animals went to a zoo now under investigation for ties to the illegal wildlife trade." A nonprofit organization, Animal Advocacy and Protection, is now Spain's designated rescue center. According to Raquel Garcia, head of public policy for the organization, "We bring [the animals] in, rehabilitate them if they're social animals, and make sure they're placed in a legitimate location." (Actman, Jani. "What Happens to Smuggled Animals After They're Seized?" National Geographic. National Geographic Partners, LLC, 30 Sep. 2016. http://news.nationalgeographic.com/2016/09/wildlife-watch-animals-seized-smugglers/.)

ccxlvii "Inside the Vault Holding 80 Tonnes of Illegal Ivory." ITV. ITV PLC, 15 March 2016. www.itv.com/news/2016-03-14/inside-the-warehouse-holding-80-tonnes-of-illegal-ivory/.

ccxlviii "Gaps in Data Place Thousands of Illegally Traded Wild Animals at Risk, Say Researchers." University of Oxford. 22 Sep. 2016. www.ox.ac.uk/news/2016-09-22-gaps-data-place-thousands-illegally-traded-wild-animals-risk-say-researchers-1.

ccxlix "South Africa seizes two Vietnamese with record 41kg of rhino horns." Toi Tre News. 2 Nov. 2014. http://tuoitrenews.vn/society/23744/south-africa-seizes-two-vietnamese-with-record-41kg-of-rhino-horns.

ccl Fishel, Justin, et. al. "EXCLUSIVE: Undercover DHS Tests Find Security Failures at US Airports." ABC News. 1 June 2015. http://abcnews.go.com/US/exclusive-undercover-dhs-tests-find-widespread-security-failures/ story?id=31434881.

ccli See http://www.customs.gov.hk/en/publication_press/press/index.html for Hong Kong press releases.

cclii See http://www.sars.gov.za/Media/MediaReleases/Pages/default.aspx for South African press releases

ccliii See http://www.customs.gov.hk/filemanager/common/pdf/statistics/enforcement_cases_en.pdf for an example.

ccliv A May 2015 report undertaken on behalf of the Department of National Parks and Wildlife of Malawi included Malawi's wildlife seizure data from 1989 to 2014. The report's authors gathered the data from a variety of different Malawian government agencies that had compiled their own internal seizure databases in hard copy. According to the report, "…reviewers found there to be a lack of reliable available data, making it is [sic] almost impossible to identify detailed crime patterns or trends. Several agencies seemed to have not historically recorded or retained wildlife crime data, and those that did often stored it in hard copy only, making it very difficult to access and analyse. In total, 50 wildlife crime cases were analysed by reviewers, the majority of which were ivory offences at airports." (Waterland, Shelley, et. al. Illegal Wildlife Trade Review Malawi. German Federal Ministry for Economic Cooperation and Development (BMZ) through Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH: German International Cooperation, Lilongwe Wildlife Trust, Born Free Foundation, and the Department of National Parks and Wildlife of Malawi, May 2015. www.lilongwewildlife.org/wp-content/uploads/IWT-Review-Malawi.pdf.)

cclv Neffenger, Peter V. "TSA Security Gaps." Statement before the United States House Committee on Oversight and Government Reform, 3 Nov. 2015. www.tsa.gov/news/testimony/2015/11/03/testimony-hearing-tsa-security-gaps.

cclvi "Dubai Customs: World Class Standards." Terminal Operator. www.terminaloperator.com/customs-security-surveillance/dubai-customs-world-class-standards.

cclvii Smary Security. International Air Transport Association and Airports Council International. www.iata.org/whatwedo/security/Documents/SMART%20SECURITY%202016_WEB.pdf.

cclviii Vanishing Point: Criminality, Corruption and the Devastation of Tanzania's Elephants. Environmental Investigation Agency. Nov. 2014. https://eia-international.org/wp-content/uploads/EIA-Vanishing-Point-lo-res1.pdf; Lee, Vicky. "Tanzania's ivory problem more than Chinese diplomatic bags." Environmental Investigation Agency. 10 Nov. 2014. https://eia-international.org/tanzanias-ivory-problem-more-than-chinese-diplomatic-bags.

cclix Chang-Ryung Han. A Survey of Customs Administration Perceptions on Illegal Wildlife Trade. World Customs Organization. July 2014. www.wcoomd.org/~/media/wco/public/global/pdf/topics/research/

research-paper-series/34_wildlife_han_en.pdf?la=en.

cclx Elbein, Saul. "Dying for the Planet: Attacks on Environmental Journalists in the Age of Climate Change." Pulitzer Center on Crisis Reporting. http://pulitzercenter.org/project/asia-indonesia-environment.

cclxi "Human Trafficking Assessment Tool for Airlines & Airports." Human Trafficking Hotline. https://humantraffickinghotline.org/sites/default/files/Assessment%20Tool%20-%20Airlines%20%26%20Airports.pdf.

cclxii For more information on CEN, see www.wcoomd.org/en/topics/enforcement-and-compliance/instruments-and-tools/cen-suite/cen.aspx.

The USAID Reducing Opportunities for Unlawful Transport of Endangered Species (ROUTES) Partnership brings together government agencies, transportation and logistics industry companies and representatives, international conservation, development and law enforcement organizations and donors in order to disrupt wildlife trafficking activities, and forms a key element of the concerted international response to addressing wildlife poaching and associated criminal activities worldwide.

For more information on the ROUTES Partnership visit www.routespartnership.org.