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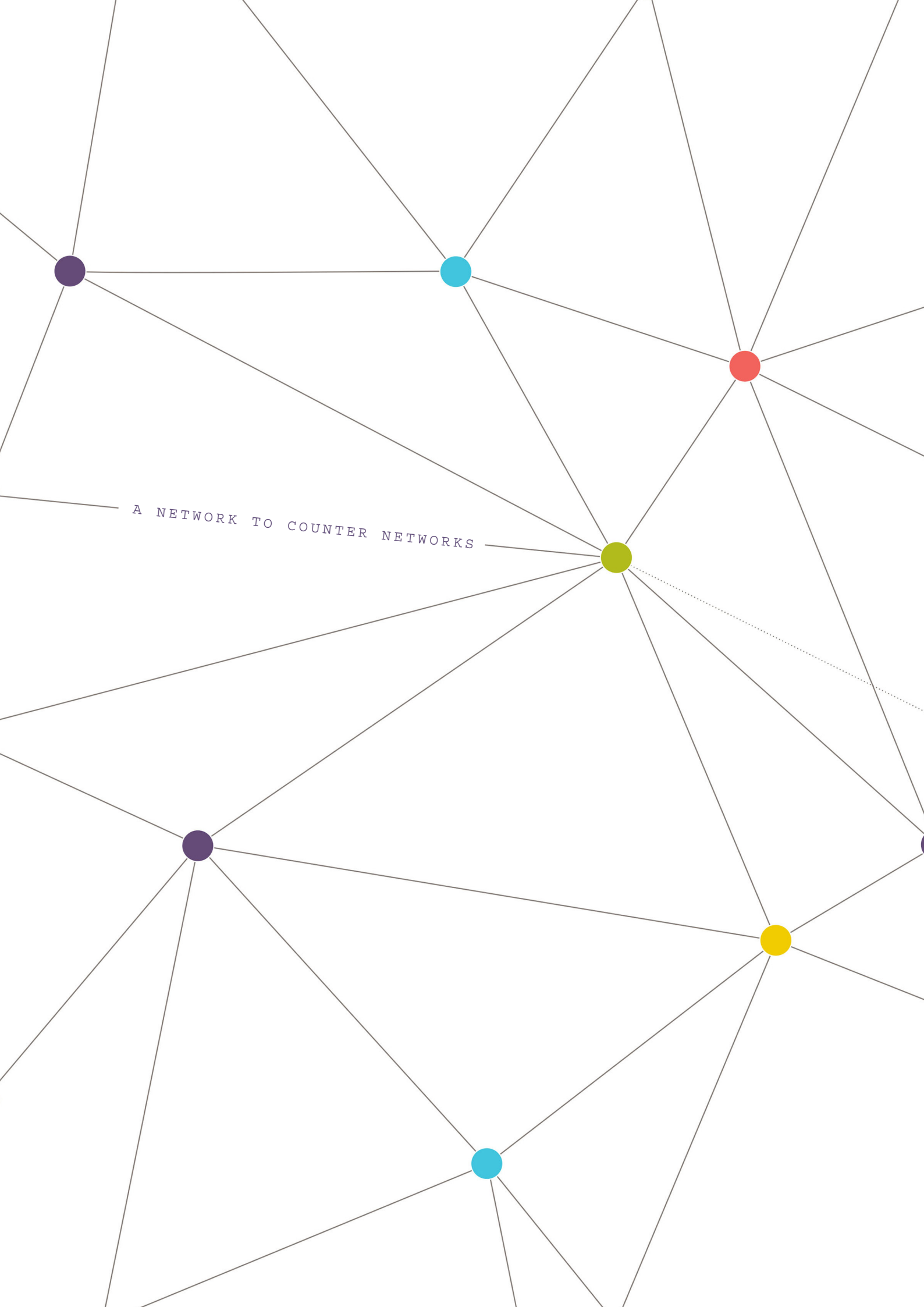
DIGITAL
DANGERS

# DIGITALLY
ENHANCED
RESPONSES

Simone Haysom
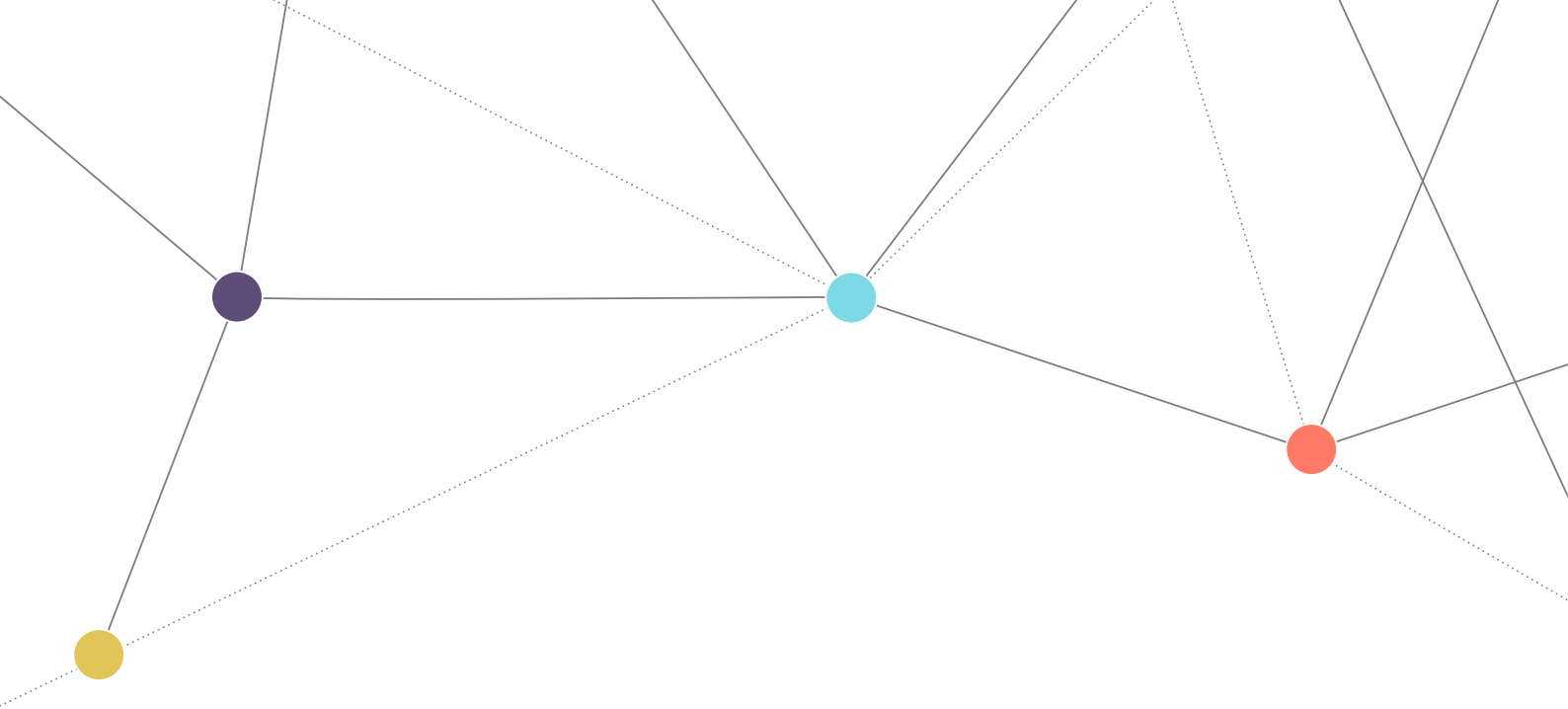
New horizons for
combating online
illegal wildlife trade

May 2018

A NETWORK TO COUNTER NETWORKS

# DIGITALLY ENHANCED RESPONSES

**Simone Haysom**

**New horizons for combating online illegal wildlife trade**

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# Contents

*'The internet provides wildlife traffickers with access to a much larger market, one that is global, open 24 hours a day, 365 days a year and provides a high degree of anonymity. Chances of detection are low while profits from selling endangered wildlife can be extremely high.'[1]*

# Summary

During the first decade of the 2000s, conservation NGOs began to identify the internet as a unique enabler of the illegal trade in wildlife. As the quote above illustrates, the internet has been seen as a virtual marketplace with unparalleled and expansive ability to advertise to consumers in any part of the world, at any time of day. As such, it can not only reach existing buyers of wildlife products, but also create whole new markets. The internet was also seen as a platform that allowed sellers and buyers alike greater powers to hide their identity and evade detection from law enforcement, in part by facilitating private communication between suppliers, dealers, traders and consumers.

In the intervening period, internet access has grown enormously and social-media platforms, with billions of users worldwide, have become incredibly powerful tools for communication. At the same time, the threat that the illegal wildlife trade (IWT) poses to endangered species has grown apace (see Figure 1). In the same way that the illegal-drugs market, as well as the trade in guns and people, has adapted to the opportunities offered by digital platforms, this shift has also manifested in the way the illicit wildlife trade has taken advantage of online marketing opportunities.

This brief sets out to describe how our understanding of the problems posed by the online IWT, and our responses to it, have evolved. It measures the progress made in exposing the threat posed by the adoption of digital platforms by traders in endangered wildlife and raises questions about what we have not yet been able to understand, and why we need to. It looks at trends in the phenomenon and suggests what they mean for the next generation of efforts to address this issue. Lastly, it describes the most pressing issues on the online IWT agenda, and explains how the Global Initiative's new project, *Digital Dangers: Disrupting Online IWT*, aims to contribute to tackling the problem.

## Acknowledgements

# Key points

- The growing importance of online marketplaces for illegal trading in wildlife globally has been established by several studies and campaigns over the last two decades. Yet it is a challenge to gauge the extent and impact of online interactions in illegal wildlife trade supply chains.

- More recently, illicit wildlife traders have shifted to the greater anonymity and protection provided by social-media platforms to advertise and trade wildlife products online.

- Several major global internet firms have imposed bans on the trafficking of wildlife on their internet channels and e-commerce sites.

- Unfortunately, despite these initiatives and those of the authorities, current enforcement efforts would seem to be ineffectual in combating the illicit online wildlife trade, instead merely temporarily disrupting it.

- Major challenges facing any enforcement response are the nature of the legal framework surrounding digital transactions and the fact that environmental crime is a low priority for law-enforcement authorities operating in a context of constrained resources.

- The information age may well equip us with the kind of digital tools needed to formulate a more effective response to this form of online crime. By empowering NGOs, activists, civil society and journalists – as well as law-enforcement bodies – to address online illicit wildlife trafficking more successfully, we will bring a whole-of-society cyber-onslaught to the cyber-criminals.

# Proving the problem exists:
# Early e-commerce campaigns

Around 2004, acting on the hypothesis that wildlife traders had already recognized the benefits of online trade and had begun to set up virtual shop, NGOs began to document the existence of online marketplaces, most often by 'scraping',[2] in labour-intensive ways, data from e-commerce sites. Significantly, in 2004, the International Fund for Animal Welfare (IFAW) demonstrated that large numbers of ivory pieces were being sold illegally over the internet in the UK and that a wide variety of animals and wildlife products could be bought online on English-language platforms.[3] In subsequent years, the IFAW has repeatedly conducted studies of online trades in specific countries and specific commodities, and the platforms that are used.[4]

Although the IFAW's early studies were important in proving that the online market existed, their data was hard to interpret and not necessarily accurate enough when compared to the size of IWT flows then being detected through seizure data at container ports and airports. Part of the problem with appreciating the significance of this work lies in being able to meaningfully interpret the numbers, as the IFAW studies primarily capture statistics on the large number of advertisements and marketplaces, and the estimated value of the products traded. Due to problems inherent in fathoming the online IWT trade, and indeed in the study of the IWT in general, this kind of data – which measures the number of advertisements and market value – cannot be placed in a context that makes them truly meaningful. Fundamentally, while these analyses have demonstrated the existence of online markets for the IWT, they have not been able to prove the significance of them.

Even so, the studies have provided cause for concern. Wu, for example, writing about the Chinese-speaking market covered in a TRAFFIC[5] study from that period, captures the reasons why one should be concerned:

> There are at least 120 million internet users in the Chinese-speaking markets covered by this study, and only 4 291 unique advertisements for CITES-listed species were found over the course of this eight-month study. This may indicate that virtual markets for wildlife trade do not yet have wide penetration. … [Yet] illegal wildlife trade on the internet needs to be viewed with alarm nonetheless, given the efficiency with which the internet brings together buyers and sellers, the diversity of the trade, the clearly illegal nature of much of the trade, and the vast size of the potential market.[6]

The growing importance of online marketplaces for trading particular species, or in specific countries, has also been noted by researchers and other interest groups. In 2006, for example, Brazilian NGO RENCTAS claimed that as law-enforcement agencies and activists have become more effective at shutting down the illegal trade in wildlife in the real, offline, world, traffickers have been driven into virtual spaces: 'The clearest evidence of this is the disappearance of open markets in Brazil where, until a couple of years ago, one could purchase huge varieties of birds, reptiles, and even primates,' noted RENCTAS.[7] In the opinion of one trade-focused conservation NGO, the market for reptiles and birds is now predominantly digitally enabled.[8]

As NGOs uncovered more and more widespread use of internet platforms for advertising endangered species, they engaged increasingly with the owners of these platforms. Between 2008 and the present, a growing number of these platforms began to ban the trade in endangered species on their sites. In 2008 Taobao, a Chinese online marketplace, banned the sale of species included in China's Wildlife Protection Law. In 2009 the ban of the sale of ivory on eBay, an e-commerce site headquartered in the US, came into effect, and Alibaba, a Chinese e-commerce site, banned the posting of a range of protected animals and plants, and their derivatives. And, in 2013, Etsy, a US-based online craft and vintage marketplace, banned the sale of ivory and all other products made from endangered species.

**Figure 1:** Digital dangers through the decades: A timeline of the online wildlife trade
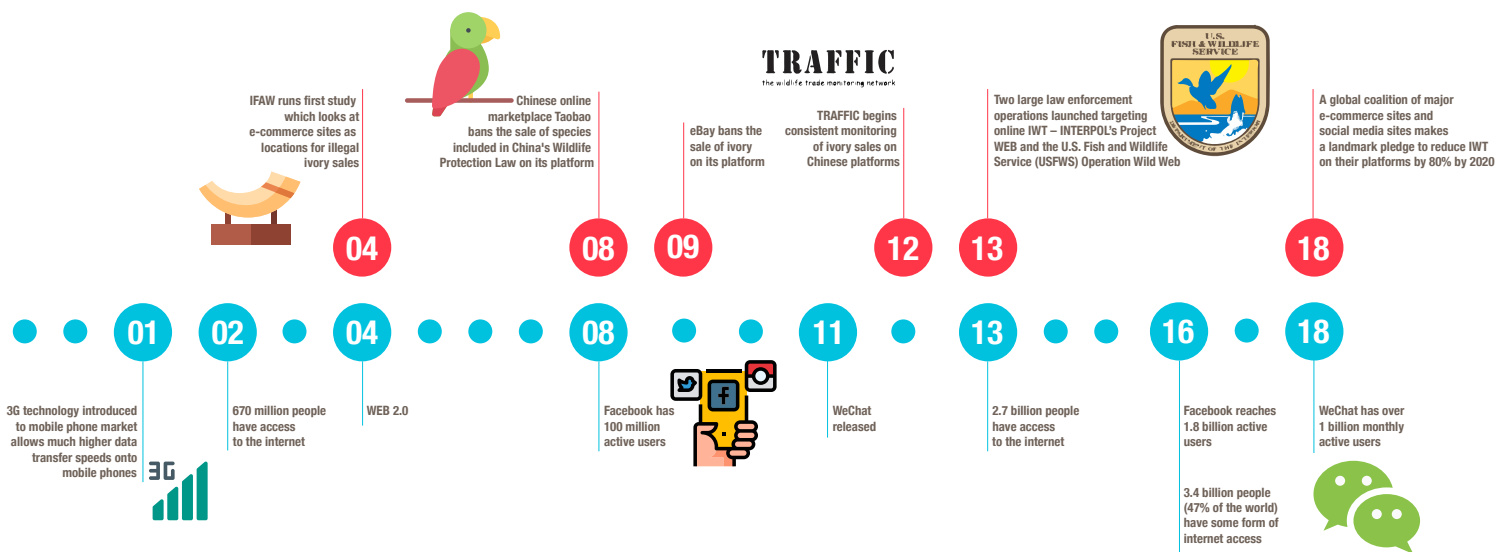
But, despite these promising efforts, over the last decade studies have uncovered growing numbers of wildlife items being traded online. In 2012 TRAFFIC began documenting the existence of online markets and developed longitudinal data on Chinese online markets, and initiated a programme of ongoing monitoring of the market, engaging with law enforcement.[9] A report published in 2014 found over 33 000 endangered animals and wildlife products had been offered for sale over a period of six weeks in 16 countries on 280 online marketplaces; these items were worth, cumulatively, at least $10.7 million.[10]

Yet, despite the information unearthed by these screening and monitoring programmes, these studies still had limitations in explaining the role of the internet in enabling the IWT. Part of the problem is that these studies have not been able to categorically identify the legality of the products they find online,[11] or to determine which advertisements are scams – a phenomenon that is rife in the online IWT, according to law-enforcement authorities and academics.[12] This, together with the challenges surrounding the data available about offline IWT, and the severe fragmentation of the online market, which encompasses numerous platforms and languages, means that it has been almost impossible to gauge the scale of the global online wildlife trade, or to establish a baseline against which to measure any attempts to curb it.

*Over the last decade studies have uncovered growing numbers of wildlife items being traded online.*

This is not to suggest that these challenges are easy to surmount. Indeed, they lie at the heart of what makes it difficult to understand the phenomenon in the first place or address it effectively. It is difficult to determine illegality online, while the internet as a 'location', rather than being a 24/7, borderless supermarket, is in fact a bazaar whose stalls are a maze, obstructing researchers with language barriers, passwords and gatekeepers that vet entry into closed social-media groups – a problem that has become much more acute in the last few years.

# The shift to social media

More recent studies (i.e. since 2015) have documented an important trend in the online IWT: there has been a shift away from e-commerce sites to the advertising and trading of animals on social-media platforms.[13] Some have attributed this to enforcement efforts made by e-commerce sites, such as routinely removing adverts for endangered species. Although there is evidence that this was, to an extent, because NGOs were monitoring sites and alerting platforms to suspicious adverts, the general shift towards social media may have occurred not because it was necessary for illegal-wildlife traders to do so, but because it was possible and, more pertinently, because social media were becoming attractive marketing channels, as the user base of social-media platforms swelled rapidly over the same period.

It is worth bearing in mind the financial implications and marketing efficacy of 'displacing' the online illegal trade in wildlife to the social-media environment. On closed social-media platforms, online traders may have more privacy, and therefore less chance of being detected, but their marketing also has a more restricted reach. At least, that is how it may appear. But, as TRAFFIC notes, the draw of social media is that they afford traders a more private environment to close the sale, while the promotional marketing of their products continues on other channels: 'The expectation is that dealers will continue to publish illegal wildlife product advertisements from their own accounts on public websites, to draw a larger audience, before closing the deal once potential buyers have become "friends" on social media.'[14]

Interviews with conservation NGOs and recent media reports bear out this dual marketing approach, though, it turns out, physical shopfronts also serve as conduits to digitally enabled sales.[15] A particularly disturbing report by a conservation activist analyzes the effects of China's ban on its domestic ivory trade. It finds that, although ivory stores have shut down in mainland China, many have opened in countries in the region, in jurisdictions that have

not enacted laws against the ivory trade, and these attract Chinese tourists. Ivory is sold directly to customers in these physical stores, but the internet is simultaneously leveraged to expand their market: 'These shops also display the usual WeChat link – the Chinese alternative to WhatsApp – and the offer of free internet access, so that the folks back home can also be shown bargain items and place additional orders via their phones.'[16] In Laos alone, one of the tourist hotspots for middle-class Chinese, there were 42 Chinese nationals trading via the internet with consumers in China. In addition, the author found that ivory stores that claimed to be closing down in China directed consumers to WeChat numbers, where their supposedly moth-balled stock was openly available for purchase: 'The trade in cyberspace is clearly the big new loophole to domestically promote and sell ivory products in China.'[17]

In response to the shift of the illicit trade to social media, advocacy has moved towards encouraging social-media platforms to implement similar bans to those taken up by e-commerce sites. (Some platforms, such as WeChat, blur these distinctions, as users can undertake commercial transactions while in messaging forums.) The corporate willingness to share cyberintelligence was positive. In 2012, fifteen of China's largest e-commerce companies, including Alibaba, Taobao and Tencent – an internet company that owns the hugely popular messaging service WeChat – joined with TRAFFIC in adopting a zero-tolerance policy towards IWT being conducted across their services.[18] In 2016, TRAFFIC, the World Wide Fund for Nature (WWF) and IFAW joined with eBay, Etsy, Gumtree, Microsoft, Pinterest, Tencent and Yahoo! to adopt a united, standardized policy framework against online IWT.[19] In 2017, eleven Chinese internet companies – led by Tencent, Baidu and Alibaba – announced an anti-IWT alliance to aid intelligence sharing with the government.[20] In 2018, a global coalition of major e-commerce sites and social-media sites made a landmark pledge to reduce IWT on their platforms by 80% by 2020 (though it is unclear what baseline they are going to use to measure this, or how it will be implemented).[21]

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Enforcement efforts also moved towards joint cybercrime operations and improving legislation. These include INTERPOL's Project WEB (2013), which focused on the ivory trade in nine European countries and, in the same year, the US Fish and Wildlife Service's Operation Wild Web led to formal charges against 145 suspects. In 2015, the UK government launched Operation Cobra 3, which focused on endangered species and led to over 300 seizures. A small number of countries – the Czech Republic, France and China – have also introduced legislation and policies specifically aimed at online IWT since 2010, while Portugal has placed an outright ban on online IWT since 2017, and the UK has committed to introducing appropriate legislation.

# Where do we stand now?
# Bringing online IWT into the cybercrime debate

This outline of the response from advocacy organizations, the private sector and law enforcement might paint a picture of gradual improvement in the quest to mitigate the detrimental effects of the online illegal trade in wildlife. And as a result of ongoing monitoring, there is arguably a relatively good sense that the problem exists, as well as some knowledge of the locations it occurs and the forms it takes, while the commitments made by major corporate internet platforms to combat the trade, on paper at least, are impressive.

Yet there is still so much we don't really know. Although currently available studies have picked up on some tactics of illegal traders, such as the use of code words and other covert signalling to consumers, because of the privacy that online portals provide, few have been able to shed light on the structure of the networks that trade online.[22] Researchers have not analyzed price data or trader and consumer information to draw out the underlying market

dynamics of online trade (or they have not had access to this data in the first place). Yet the challenge is that information about the profile of both consumers and sellers, and their place in the IWT value chains, will be crucial to designing appropriate responses.

However, we should not assume that such analysis will lead us to highly centralized networks, or indeed the converse. The fact is, there is constant evolution in the nature and significance of criminal networks. Each value chain includes a diverse set of players, and the digital space is no different as it exerts its own effect on who is involved in the IWT.[23] Evidence from the illicit orchid trade on social media demonstrates the importance of collector communities, grouped around shared languages, in driving demand and collection of prized horticultural species.[24] Evidence from Italy suggests that the internet has lowered the barriers to entry for those wishing to become illegal wildlife traders, leading to a proliferation of small online businesses run from home that sell a range of products and make large profits.[25]

Meanwhile, TRAFFIC's monitoring of the online ivory trade in China has turned up similar findings, as researchers have found that a quarter of advertisements for ivory on social media are of raw or half-finished materials. This suggests that dealers earlier in the trade chain are able, through the use of these internet platforms, to reach consumers using fewer intermediaries. This implies higher profits for them, and lower prices for consumers. Consequently:

> The ease of reaching a large audience online and sourcing products from producers seem to have stimulated both supply and demand, respectively. The convenience of supply channels, low costs and lucrative profits have attracted many users to become 'agents' for illegal wildlife products, forwarding product information to their own circles of 'friends' to attract potential consumers, which further stimulates consumption.[26]

This information is crucial because, so far, indications are that current enforcement efforts have been almost completely ineffective, except in displacing trade or temporarily suppressing it. TRAFFIC has noted, from its monitoring of online trade in China, that while efforts to step up enforcement on platforms would have an effect while an operation was under way, trade would always later rebound.[27] Academic studies have shown that online illegal wildlife traders are not discouraged by the targeting of co-offenders by law-enforcement agents or by being banned from using private sites.[28]

It is telling that very little IWT has ended up on the dark web, where listings of rhino horn or ivory are mostly found to be the by-catch of traders who specialize in other illicit trades.[29] This would suggest that there is so little fear of legal enforcement against IWT on the surface web that traders do not think it is worth hiding their activities on the dark web, as child pornographers, drug dealers and arms traffickers know they must.

Although traders may change their keywords to sidestep detection, much of the online trade is still highly overt. Krishnasamy and Stoner found, for example, in a study of the reptile trade in the Malaysian peninsula, that 'many sellers appear to operate with impunity, and any reference to legislation, legality or permits is rare. Very little effort is made to conceal the illegal nature of some of the trade, and the use of code words or any forms of text deception to describe the species is non-existent.'[30] This is in contrast, however, to how ivory traders have developed a constantly changing array of code words to hide their activity and made greater use of covert messaging groups in response to greater threat of enforcement. To the extent that reptile traders do expend effort to avoid detection, this appears to be more an attempt to avoid having their profiles or listings removed by the platforms, rather than any fear of legal

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repercussions. In instances where the number of species traded is large (such as the 26 000 species of internationally protected orchids compared to three elephant species), it is harder still to target any enforcement effectively.

Law-enforcement agencies face an array of challenges at present, which hamper their capacity to respond. For a start, determining the legal framework that applies to a digital transaction (or conversation) is an extremely difficult and convoluted process, as this case study by an ex-CITES[31] enforcement chief shows:

Although some internet auction site companies have excellent relations with law enforcement agencies and may willingly provide seller details, not all do. If they do not, the investigator may have to apply to a court for a warrant requiring the disclosure of those details. One detail subsequently obtained will inevitably be an email address used by the seller. Will the internet service provider inform the investigator of the name and address of the person to whom that email relates? If not, it is back to court again. I will presume that the investigator has the name and address of the seller. Does that person live within the enforcement agency's jurisdiction? Probably not, in many cases. The advert may, for example, have been viewed by someone in Glasgow but the seller might be in Shanghai. If there is an offence, where does it take place? In Glasgow, in Shanghai, or where the internet auction site company is based?

For the purposes of this description, I will presume that both the potential customer and the seller are in Glasgow. Detectives go to the seller's house. The householder agrees that the email address is his but he denies placing the advert. If a sale had taken place, the investigator could track the money transfer, but that would necessitate another court order to gain access to the seller's bank account. If it had not gone that far, and it is just placing the advert that needs to be proved, what would be the next step? The detectives will need to seize the seller's computer. Potentially, another court warrant would be needed. The detectives would then have to persuade their forensic computer expert to find time in his already busy schedule to search through the myriad of data in the hard drive to find evidence of the advert. If he does find it, how does one then prove that it was the householder who was using the computer that day? It might just as easily have been his wife, his daughter or anyone else in the home that could access the computer. It is an absolute nightmare of an investigation.[32]

As is often the problem with environmental crime, the online IWT also often features low on a long list of priorities for any law-enforcement body. Resources for cyber-investigations are usually directed at issues that affect citizens more directly or which require more political expediency, such as child porn or human trafficking.

Online illegal wildlife crime is also enabled by the same shifts that are a feature of the online turn of many other crime types – the evolution of online payment systems and the growth of online shopping, and, with it, small couriered deliveries of goods.[33] The huge volume of small package deliveries that now cross borders or move within jurisdictions have allowed smugglers and illicit traders to evade detection by switching to a 'small but often' mode in the marketing of their commodities. Consumers can pay for these goods using a number of online payment options, many of which offer either complete anonymity or in which individual transactions are unlikely to be flagged or traced.

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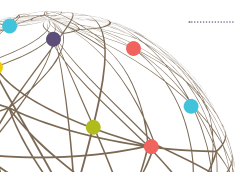
# Heightened potential for harmful online trade

The 'online' element of illicit trade chains should not, by value of its relative novelty, overshadow the fact that these are not purely 'cyber' crimes, as identity theft or malware attacks are, but are located primarily in the 'offline' world. We must therefore think carefully about what role digital platforms play in IWT value chains and if these are the most strategic points in the chain for any intervention to target.

At the same time, however, there is evidence of heightened potential for harm brought on by the digital age. This is most evident in pet and collector markets, where specialist forums expose niche collectors, all over the world, to the existence of new species and their location, and social media drive the creation of new markets for wildlife.[34] An example of the former is the possible extinction (through over-harvesting) of the slipper orchid,[35] soon after its discovery was published on the internet. An example of the latter is the social-media-enabled boom in the market for pygmy marmosets – named 'thumb monkeys' on social media – during China's Year of the Monkey.[36] Another example, mentioned above, can be seen in the ivory trade in China and South Asia, where social media and online sales have created a loophole to sidestep China's domestic ivory ban.

The examples above suggest that online platforms are a powerful means of creating new demands and markets. In addition, in many countries, the young are 'digital natives' – used to and adept at conducting their interactions and purchases online. For them, digital platforms may be not only the obvious place to look for wildlife, but also the preferred way to communicate with sellers and complete transactions. In Asia, emerging evidence is that young people are driving the trend for exotic pets.[37] These generations are the current and future consumers of illegal wildlife products.

# Cyber-opportunities to respond to cybercrime

In our discussion of digitally enabled IWT, it is also important to acknowledge the opportunities that the information age, in the form of digital platforms and data tools, offers to responders, especially in our efforts to link up initiatives across borders. Just as criminal networks can now span borders more easily, so too can networks of solidarity joining in the cause to end illegal trade. Social media can generate viral environmentalist campaigns and spread information about the impacts of buying endangered animals and plants. Journalists can use the online presence of criminal groups and high-level individual traders to gather information about their activities. And citizens, if empowered to do so, can notify digital platforms, or legal authorities, about possible breaches of the law when they see suspicious wildlife posts.[38] Such investigations and campaigns often act as catalysts for the authorities to take issues more seriously.

Brazilian NGO RENCTAS has turned this digital capacity to respond to the IWT to their advantage:

> Although we were dragged by circumstance and frustration into the information age, once online we were deliberate and aggressive in how we used our new capacity. From this point forward we chose the Internet as the primary venue for our work. The original core model of our virtual operation consisted of a website we developed to allow ordinary citizens to report tips – instances of animal capture, sale, transport, or illegal breeding. RENCTAS investigated the tips and passed the findings to local law enforcement for action.

> Our investigators also began using the Internet to scour auction sites, chat rooms, and pet and collector bulletin boards for clues to illegal animal trafficking. RENCTAS also employed old-school investigative tools such as the telephone and even a CB radio to speak with truckers. The Internet, however, proved the most efficient and effective way to gather information. As those who live by the sword die by it, those who trade on the Internet can also get caught in it: one of our techniques for identifying middlemen and sellers has been to pose as buyers on some of the more than 5 000 animal sites that cater to animal traffickers.

Many studies – and, more importantly, law-enforcement agencies – still rely on manually scraping the internet for IWT posts, and on human-led (and time-intensive) analyses to determine the legality of wildlife for sale. There is untapped potential for automated data analytic tools to provide this information, with promising developments in this direction from a range of academic institutions.[39] Such approaches could yield 'bigger' data about the dynamics of illicit markets, the nature of the networks that trade online, and automated ways to reduce consumer demand or to differentiate between legal and illegal goods.[40]

# New horizons for disrupting online IWT

In 2018, we find ourselves with a thriving global illegal wildlife trade and fast-diminishing natural resources. Some species are on the point of irreversible depletion, some ecosystems have been eradicated or approach collapse, and illegal trade bears much of the responsibility for this. While online marketing and closed platform communication become more central to illegal wildlife commodity value chains, they remain interlinked with poaching and harvesting, and transport routes and corruption, meaning there is no neat distinction between the online world of IWT and the offline one. Yet, as it is increasingly digitally enabled, this trade eradicates borders and defies legal jurisdiction with greater ease, and morphs into less centralized networks, which all present new challenges for law enforcement. We need a greater variety of tools and approaches for detecting and disrupting online IWT and for reducing consumer demand, as well as campaigns to improve the legal frameworks, financial resources and political environment for better law-enforcement responses.

*We need a greater variety of tools and approaches for detecting and disrupting online IWT and for reducing consumer demand.*

Luckily, there are a number of promising initiatives already under way in academic institutions[41] and conservation NGOs.[42] And the pre-eminent international convention regulating the international wildlife trade, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), in partnership with INTERPOL, is preparing international guidelines for member states.[43] Meanwhile, a small number of individual states are proactively trying to shape their institutions and legislation to tackle this threat.
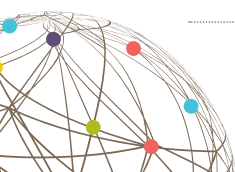
# Digital Dangers: Disrupting online illegal wildlife trade

Over the course of 2018, the Global Initiative's new project on online IWT, Digital Dangers, will be addressing the issue in three areas:

- Developing tools for the known knowns
- Understanding the known unknowns
- Anticipating the unknown unknowns

## Developing tools for the known knowns

Most of what we know about online IWT is what we struggle with – determining the legality of items advertised online, following financial transactions, and understanding the network structures and strategies of actors in online illicit markets – and we will be tackling these problems with problem-framing briefs that sketch out an agenda for action, and then with concrete support for tools, which aim to improve responses and disrupt online illegal wildlife markets. To do this, we will be drawing on people and organizations that bring in expertise from law enforcement, the private sector, conservation and academia.

## Understanding the known unknowns

We also know what we need to understand better – the market dynamics of illicit trades, including better information about where marketing and sales takes place, who is involved in transactions, and what role they play in the IWT value chain.

As a starting point, we will be doing original research drawing on cutting-edge tech-enabled data analytics on the open web, to find and categorize the locations of open web discussions of wildlife trade. This will draw on one of the opportunities presented by the digital age: the ability to use technology, in this case natural-language-driven software, to mine data online.

We will also be doing qualitative research on the trade in specific reptile, bird and flora species in three regions. These studies will place the role that digital platforms play into context, situating them in the broader threat that illegal trade poses to that species and the regional or national dynamics that affect the entry of the trade into digital spaces.

## Anticipating the unknown unknowns

It is inevitable that the way the IWT operates online will change as new technologies and opportunities become available to traders or as enforcement efforts provide more of a deterrent. The response to IWT – if it can't be one step ahead – needs at least to be able to anticipate these shifts. Developing predictive knowledge and tools is a theme that runs across all our activities.

Lastly, we will be strengthening networks for change by taking advantage of digital platforms in another respect: supporting investigative journalists to report on online IWT, and bringing together media and civil society to develop best practice on using the digital space for investigations and mobilization.

# Notes

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2. Data scraping is the process of importing information from a website into a spreadsheet or file saved on a computer.

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7. Dener Giovanni, *Taking Animal Trafficking Out of the Shadows: RENCTAS Uses the Internet to Combat a Multi-Billion Dollar Trade*. Michigan: MIT Press, 2006, https://www.globalgiving.org/pfil/1756/INNOV0102_p2535_giovanni.pdf.

8. Interview, February 2018. This is backed up by some academic research. In 2009, preliminary studies on internet-based trade in Malagasy wildlife, recorded 94 tortoises being offered for sale across 10 countries, comprising all four of Madagascar's Critically Endangered and CITES Appendix I listed species (see RCJ Walker, The internet based trade in Madagascar's critically endangered tortoise species: A preliminary study identifying the conservation threats. *Testudo*, 7: 4, 2011). Similar reports have been made about star tortoises in India (Chng, S. C. L. and Bouhuys, J. Indian Star Tortoises: Shop sales fall as internet trade increases. TRAFFIC Bulletin, 27: 2, 73-78, 2015.)

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27. In an initiative that started in January 2012, TRAFFIC monitored advertisements for illegal wildlife products placed on Chinese e-commerce and antique websites, providing information and training to help website managers deal with the issue. Ongoing monitoring by TRAFFIC showed that their efforts had led to a 'dramatic and sustained drop in the number of such advertisements appearing online'. Y Xiao, J Guan and L Xu, Wildlife cybercrime in China: E-commerce and social media monitoring in 2016. TRAFFIC, 2017, http://www.traffic.org/publications/wildlife-cybercrime-in-china-e-commerce-and-social-media-mon.html.

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38. Several such apps exist already: with the Education for Nature Vietnam (ENV) app, users can report incidents of wildlife crime in Vietnam, and ENV will contact the authorities on their behalf. TRAFFIC and the Taronga Conservation Society Australia have developed a similar app, which covers South East Asia, and the Freeland Foundation's app Wildscan allows users to report wildlife crimes to ASEAN's Wildlife Enforcement Network in English, Thai and Vietnamese.

39. The University of Kent, for example, is currently recruiting three PhD students to work on projects that will 'employ innovative algorithms based on machine learning (and potentially deep learning) to identify species for sale from images and the metadata associated with online adverts. This will allow for the automated identification and reporting of illegal wildlife trade on sale via online marketplaces, social networks and the darkweb'. See also the DICE institute's work on detecting illegal ivory: J Hernandez-Castro and DL Roberts, Automatic detection of potentially illegal online sales of elephant ivory via data mining, *PeerJ Computer Science*, 1, 10, 2015.

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41. Such as the Durrell Institute of Conservation and Ecology (DICE) at the University of Kent, and the Oxford Martin School's projects on online IWT.

42. There is also the ongoing work by IFAW and TRAFFIC, and by NGOs such as the Wildlife Justice Commission, to monitor the trade and support law enforcement.

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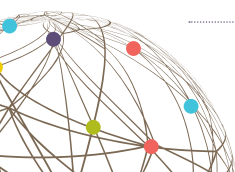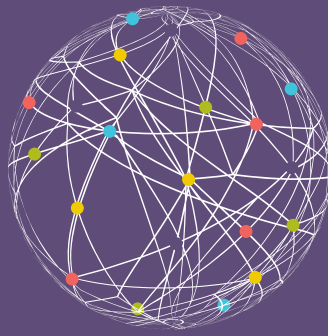
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