

Missing teeth: Discordances in the trade of hippo ivory between Africa and Hong Kong

Alexandra Andersson | Luke Gibson 

Kadoorie Biological Sciences Building,
University of Hong Kong, Hong Kong,
China

Correspondence

Luke Gibson
Email: lgibson@hku.hk

Funding information

HKU Wildlife Trade Seed Funding Initiative

Abstract

As the global epicentre of wildlife trade, Hong Kong plays an important role in the preservation or demise of biodiversity, including species found continents away. If mismanaged, legal trade in threatened species can lead to unsustainable exploitation. Inaccurate and incomplete trade records from the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) undermine the regulation of this trade. We examine the trade of hippo (*Hippopotamus amphibius*) teeth to illustrate the extent of mismatched data between key trading nations. More than 90% of global hippo teeth trade is imported to, and re-exported from, Hong Kong. Of that imported, over 75% originated in Tanzania or Uganda, but there are notable disparities in declared trade volumes. In most transactions, Hong Kong declares more volume imported than the volume declared exported by Uganda. Overall, Hong Kong has reported the import of 3,176 kg more hippo teeth than declared exported by Tanzania. This indicates that actual trade levels may exceed internationally agreed quotas. In total, over 14,000 kg of hippo teeth is unaccounted for between Uganda and Hong Kong, representing more than 2,700 individual hippos—2% of the global population. This gross discordance in trade data undermines regulatory measures and challenges the persistence of hippo populations in Africa.

Résumé

Épicentre mondial du commerce de faune sauvage, Hong-Kong joue un rôle important dans la préservation ou la disparition de la biodiversité, y compris celles d'espèces vivant dans d'autres continents. S'il est mal géré, le commerce légal d'espèces menacées peut entraîner une exploitation non durable. Des rapports inexacts ou incomplets sur ce commerce provenant de la Convention sur le commerce international des espèces de faune et de flore sauvages menacées d'extinction (CITES) discréditent la régulation de ce commerce. Nous examinons le commerce de dents d'hippos (*Hippopotamus amphibius*) pour illustrer l'ampleur des divergences des données entre les pays clés de ce commerce. Plus de 90% du commerce de dents d'hippos sont importées à Hong-Kong et réexportées de là. De ces importations, plus de 75% proviennent de Tanzanie ou d'Ouganda, mais il y a des différences notoires dans les volumes déclarés. Dans la plupart des transactions, Hong-Kong déclare l'importation d'un volume supérieur à celui que l'Ouganda déclare exporter. En tout, Hong-Kong rapporte aussi l'importation de 3,176 kilos de dents d'hippos de plus que ce que la Tanzanie déclare exporter. Ceci montre que le véritable niveau du commerce pourrait

dépasser les quotas acceptés au niveau international. Au total, plus de 14,000 kg de dents d'hippos ne sont pas pris en compte entre l'Ouganda et Hong-Kong, ce qui représente plus de 2,700 hippos, soit 2% de la population mondiale. Ces divergences grossières des données sur le commerce discréditent les mesures de régulation et mettent en danger la survie des populations d'hippos en Afrique.

KEYWORDS

CITES discrepancies, *Hippopotamus amphibius*, Hong Kong, ivory, Uganda, wildlife trade

1 | INTRODUCTION

Trade in endangered species—legal and otherwise—is a growing, multi-billion-dollar, transcontinental business that, if mismanaged, threatens global biodiversity (Oldfield, 2014). The growth in wildlife trade has been reflected, in part, by a rise in poaching of high-value species across Africa, including elephants (Thouless et al., 2016), rhinos (Biggs, Courchamp, Martin, & Possingham, 2013), and pangolins (Challender & Hywood, 2012). Hong Kong is a major importer and transit point for wildlife trade for historical, geographical, and logistical reasons (ADM Capital Foundation et al., 2015). It has the world's busiest cargo airport, fourth-largest container port, and is a key entry point to China. With a population exceeding 7 million, Hong Kong is also a major market for rare animals and their parts (ADM Capital Foundation et al., 2015).

The presence of a black market in endangered species in Hong Kong is evident through sizeable seizures made by Hong Kong's Customs and Excise Department (HKCED) of illegal elephant ivory, pangolin scales, rhino horns, hornbill beaks, and timber (HKCED 2014, 2015, 2016). In both 2014 and 2015, there were over 100 interceptions of smuggled elephant ivory, and more than 2,000 kg of pangolin scales seized (HKCED, 2014, 2015). In 2015, over 1 million kg of trafficked rosewood was seized (HKCED, 2016). Hong Kong is also a major trade hub for legally traded wildlife—with rare species sold as ornaments, traditional medicines, cuisine, and pets. There is more ivory on sale in Hong Kong than in any other city in the world (Martin & Vigne, 2015), and there is also significant trade in live reef fish (Wu & Sadovy, 2016), turtles and tortoises (Cheung & Dudgeon, 2006), agarwood (Jim, 2015), shark fins (Clarke, Magnussen, Abercrombiea, Mcallister, & Shivji, 2006), manta ray gills (O'Malley, Townsend, Hilton, Heinrichs, & Stewart, 2017), rosewood, dried seahorses, exotic birds, and more. The ivory is sold legally under Hong Kong law under the presumption that it predates the 1989 global ban on commercial trade, though evidence of routine laundering has been documented (Knights, Hofford, Andersson, & Cheng, 2015).

Worldwide legal and illegal trade in rare species is managed through the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a multilateral agreement which 183 states are party to. Over 35,000 species are classified into three appendices depending on their conservation status and the level of threat they face due to international trade. Species in the separate appendices are subject to corresponding degrees of regulation when

in trade (import, export and re-export licences, quotas, source scrutiny, etc.). Appendix II and III species need export licences, but do not need import licences. Hippo meat, teeth, and skin are traded regularly (Lewison & Oliver, 2008), and the species has been listed on CITES Appendix II since 1995. To trade Appendix II-listed species, the exporting state must obtain export permits. Article IV of CITES states that such a permit can only be granted when the CITES Scientific Authority (SA) of that country has advised that such export will not be detrimental to the survival of that species, and the CITES Management Authority (MA) confirms that the traded items were not obtained illegally. Another mandate of the CITES SA is to monitor both the number of export permits granted and the volume of specimens actually sent. Importers of Appendix II-listed species must request presentation of export permits upon receipt. Though CITES has a central secretariat and enforcement officer, implementation and enforcement of CITES are primarily done through the member governments themselves. If parties fail to implement CITES regulations, they create a situation conducive to illegal trade and improper permit authorization—compromising the effectiveness of the convention (Koumba Pambo et al., 2016).

A brief review of CITES Trade Database figures (UNEP World Conservation Monitoring Centre, Cambridge, UK) reveals major discrepancies in trade reports relating to Hong Kong. In most cases, either the exporter or importer fail to report the quantity of rare species sent or received. In instances where both the exporting and importing nations have reported the quantity traded, there are often notable disparities in the volumes declared. For example, since 2000, records indicate that Hong Kong has received at least 2,400 fewer live, wild-caught humphead wrasse (*Cheilinus undulatus*) than reportedly sent from, mainly, Indonesia and Malaysia—discrepancies that have been linked to potential data mismanagement and shipment monitoring issues at Hong Kong ports (Wu & Sadovy, 2016). However, incidences where the importer reported an amount that is lower than the exporter reported amount can often be linked to exporting nations declaring the volume of export licences granted, rather than the actual volume of specimens sent. A more concerning situation is when the amount received exceeds the amount declared sent. This type of discrepancy is widespread in Hong Kong's trade database records. For example, since 2000 the city state has declared receipt of over 100,000 more live, wild-caught Southeast Asian box turtles (*Cuora amboinensis*) compared to records from the exporting nations Indonesia and Malaysia. This could indicate that

trade exceeds internationally agreed quotas, or that fraudulent permits have been used.

Hong Kong has been a Party to CITES since 1976, and Tanzania and Uganda have been since 1980 and 1991, respectively. Hong Kong's CITES MA is the Agriculture, Fisheries and Conservation Department (AFCD), and it enacts Cap.586, the Protection of Endangered Species of Animals and Plants Ordinance. In Tanzania, the CITES MA is the Wildlife Division in the Ministry of Natural Resources and Tourism, and in Uganda, it is the Department of Wildlife Conservation. Each state that is Party to CITES submits annual reports containing data on trade in appendix-listed species, and these are compiled on to the central CITES Trade Database. A certain degree of discordance is common in international CITES trade data, and similar issues have been documented in the literature in countries in Africa (Russo, 2015) and Central America (UNEP-WCMC, 2014), and for a variety of species (Blundell & Rodan, 2003; Poole & Shepherd, 2016). The prevalence of mismatched data stems from CITES Parties providing incomplete, inaccurate, and inconsistent annual reports that do not adhere to the "Guidelines for the preparation and submission of CITES annual reports" (CITES Notification No. 2011/019).

Hippos have been categorized as Vulnerable on the International Union for Conservation of Nature (IUCN) Red List since 2006. In 2008, global hippo populations were estimated to number 125,000–148,000 individuals, with a projected 30% decline over the next 30 years (Lewison & Oliver, 2008). Habitat loss and illegal hunting for meat and ivory are the two foremost threats to hippos (Weiler, De Meulenaer, & Vander Blook, 1994). This semi-aquatic species is particularly vulnerable to climate change and water scarcity (Lewison, 2007), exposing hippos to increasing rates of human–wildlife conflict near declining open water sources (Le Bel et al., 2011). Hippos are also the species most heavily affected by Uganda's 2004–2005 anthrax outbreak, recurrent in Queen Elizabeth National Park and linked to drought (Wafula, Patrick, & Charles, 2008).

As a hub of legal commerce in rare animals and parts, it is important that Hong Kong authorities have a precise knowledge and control of endangered species being imported, sold or exported in its territory. The city's customs authorities regularly intercept illegal shipments of rare species—indicative of the existence of a clandestine, undocumented black market of wildlife, the total trade volumes for which are difficult to quantify. Likewise, as countries with high levels of poaching, and custodians of valuable wildlife and biodiversity, Tanzanian and Ugandan authorities should exercise diligence in wildlife trade regulation and monitoring.

Here, we review existing data on global hippo teeth trade from a major importing country, Hong Kong, and two exporting countries, Tanzania and Uganda, to identify discrepancies in trade records, explore possible reasons for these discrepancies and assess the risk of potential overexploitation to wild hippo populations. We include a discussion of potential steps that could reduce the number and extent of trade discrepancies.

2 | MATERIAL AND METHODS

We focused our attention on the legal, commercial trade of teeth, tusks, carvings, ivory pieces, ivory carvings, and ivory scraps of hippos, under the term *Hippopotamus amphibius* (*Hippopotame*, *Hippopotame amphibie*, *Hippopotamus*), as specified in the CITES Trade Database, data from which were retrieved on 22 August 2016. It should be noted that CITES trade data classification does not distinguish between types of teeth, but both incisors and canines have been observed in trade in Hong Kong (A. Anderson & L. Gibson, pers. obs.).

In many cases, the importer or exporter fails to report trade volume in the transaction; such omissions could underestimate the level of trade. As such, we have followed the guidelines to calculate gross trade according to the CITES Trade Database (UNEP-WCMC 2013), such that total trade volumes listed in this paper represent the larger total quantity declared by either the importer or exporter (unless otherwise specified).

To determine the equivalent number of hippo individuals per weight of teeth, a ratio of 5.25 kg of teeth per individual was used, as specified by Williamson (2004). We consider this relatively conservative, compared to the 2.5 kg per hippo ratio deduced from figures listed in other sources (Lewison & Oliver, 2008). The majority of hippo teeth trade transactions (36/42) between Uganda/Tanzania and Hong Kong specified the unit as kg; however, for the rare incidences that did not specify unit, we assumed it was also kg. To identify possible reasons behind the mismatching data, we refer to the common departures from the "Guidelines for the preparation and submission of CITES annual reports" (CITES Notification No. 2011/019).

3 | RESULTS

CITES records detail a total of approximately 771,000 kg of hippo ivory (teeth, carvings, tusks, scraps, etc.) traded internationally for commercial purposes since 1975. Over 90% of this trade volume (>707,000 kg) was imported to, and re-exported from, Hong Kong. In this timeframe, Hong Kong imported over 223,000 kg of hippo teeth, 41% from Tanzania and 35% from Uganda. In the same period, Hong Kong re-exported over 484,000 kg of hippo teeth, 55% sent to the USA, and 8% sent to China. Pre-CITES trade volumes of hippo teeth are unknown, and this might explain the greater net volume declared re-exported by Hong Kong compared to that declared imported over the same period. However, this does not explain repeated discrepancies in individual shipments of hippo teeth trade between exporters Tanzania and Uganda and importer Hong Kong. Of all CITES-registered commercial trade of hippo teeth into or out of Hong Kong since 1975, <2% is listed as captive-bred, ranched, or preconvention. Over 97% is specified as wild caught, and the rest is of "unknown" source, or is missing source information.

Over 75% of hippo teeth imports to Hong Kong come from two countries: Tanzania and Uganda. Figures from the CITES database reveal Tanzania as the dominant supplier during the 1990s. Since 2004, Tanzanian authorities have declared just one shipment of hippo teeth to Hong Kong—though records from Hong Kong indicate otherwise, with a near-yearly receipt of between 1,600 and 6,500 kg of hippo teeth from Tanzania during the same period (Figure 1). Overall, as of September 2016, Hong Kong has reported receiving 3,176 kg more hippo teeth than declared sent from Tanzania. Of the 23 shipments of hippo teeth recorded between Tanzania and Hong Kong, all but three are specified as wild caught, with the rest lacking source information. An annual export quota of 10,598 kg of hippo teeth from Tanzania has been in place since 2001 on the recommendation of the CITES Animals Committee and Standing Committee (UNEP-WCMC, 2007)—a result of *H. amphibius* being selected for CITES Phase 4 Significant Trade Review. This process has also resulted in exports being suspended from Democratic Republic of Congo, Malawi, and Rwanda. Though the review process involved most major hippo trading nations, including Central African Republic, Ethiopia, Mozambique, Nigeria, Somalia, South Africa, Sudan, and Swaziland (CITES, 2010a,b), it did not include Uganda. The exemption to Uganda was based on the total hippo hunting ban in Uganda, and the large stocks of teeth have been accumulated by national parks and Uganda Wildlife Authority (CITES, 2009). Cameroon is still undergoing review, because importers declared over five times the numbers of teeth imported than Cameroon reported exported between 1999 and 2008—transactions involving <200 teeth in total (CITES, 2010).

Hippo ivory trade between Uganda and Hong Kong increased significantly after 2000. As with Tanzania, there is disparity between the volume of teeth declared exported by Uganda and that declared received by Hong Kong in nearly every trade transaction in the CITES database (Figure 2). For example, in 2008, Uganda declared export of 400 kg hippo teeth while Hong Kong declared import of 4,379 kg (see Table 1)—a difference of 3,979 kg, or 750 hippos.

Over the entire period, with all transaction discrepancies considered, a total of 14,232.5 kg hippo teeth are not accounted for by export permits from Uganda, or reports of receipts by Hong Kong (Table 1). This amounts to the equivalent of more than 2,700 individual hippos—as much as 2% of the global population. As mentioned, it is the duty of the Ugandan CITES MA to monitor the volume of export licences issued, as well as the actual volume of specimens sent. Under Cap.586 in Hong Kong, upon import of Appendix II-listed species, Hong Kong's CITES MA, the AFCD, must inspect the specimens and export licences. Therefore, the volume reported by Hong Kong authorities should represent the actual volume received. However, there is consistent disparity amounting to tonnes of teeth throughout the Uganda–Hong Kong hippo teeth trade history. Several attempts were made to contact the CITES MA representatives from Hong Kong, Uganda, and Tanzania, with no response from Uganda or Tanzania (CITES). Hong Kong's CITES MA, the AFCD, reviewed the discrepancies for a period of 3 weeks, drawing the conclusion that reasons for the discrepancies are unknown, and recommending we contact the Ugandan CITES MA (AFCD, 2016, Aug 5, pers. comm.). The CITES Secretariat was also approached repeatedly for explanation, but no response was received.

4 | DISCUSSION

4.1 | Data discord

We searched for possible reasons for trade discrepancies in “The guide to using the CITES Trade Database” (UNEP-WCMC, 2013). As Uganda has emerged as the dominant trading partner in the last decade, we focus our discussion here on Uganda. Because all hippo teeth trade data between Uganda and Hong Kong are recorded as *H. amphibius*, wild-sourced, and traded for commercial purposes, discrepancies due to reporting different taxonomic levels, source, and purpose are disregarded. The following, however, could theoretically apply.

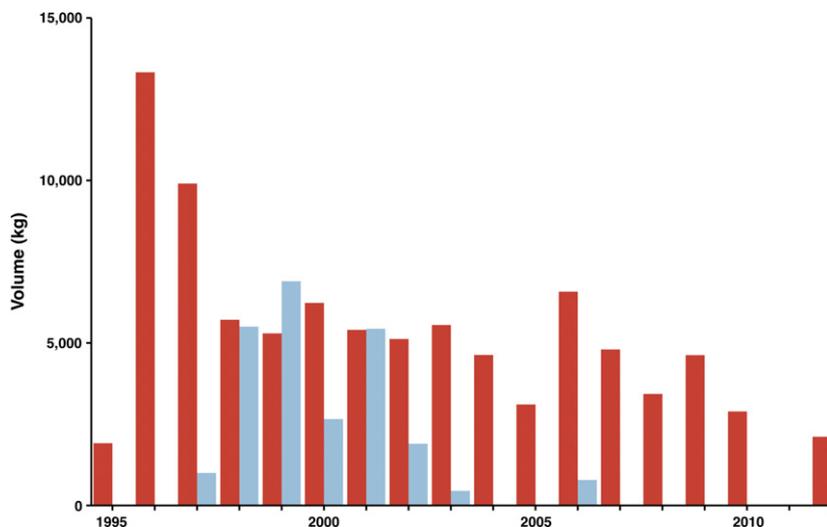


FIGURE 1 Trade in hippo teeth between Tanzania and Hong Kong, 1995–2012. Blue indicates export volume declared by Tanzania, and red indicates import volume declared by Hong Kong [Colour figure can be viewed at wileyonlinelibrary.com]

FIGURE 2 Trade in hippo teeth between Uganda and Hong Kong, 1995–2013. Yellow indicates export volume declared by Uganda, and red indicates import volume declared by Hong Kong [Colour figure can be viewed at wileyonlinelibrary.com]

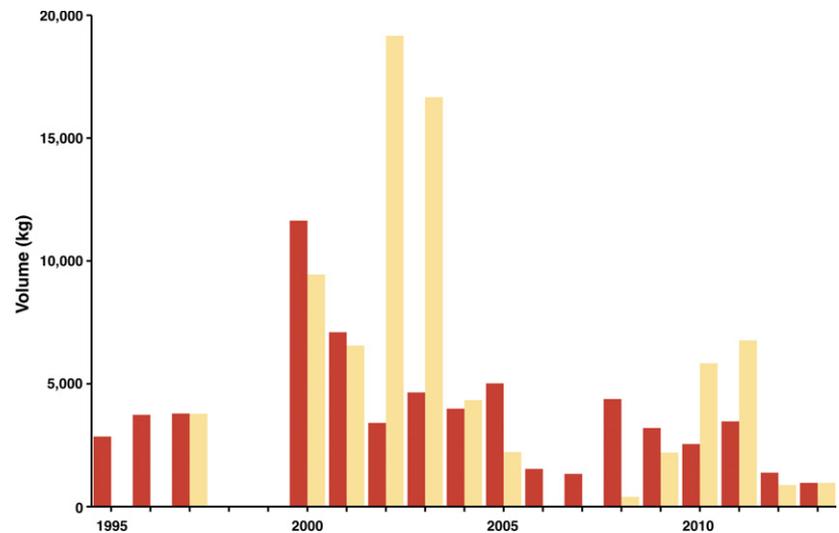


TABLE 1 Total CITES-listed hippo teeth trade between Uganda (UG) and Hong Kong (HK)

Year	HK reported quantity	UG reported quantity	Unit	Difference
1995	2,853		kg	2,853
1996	3,738		kg	3,738
1997	3,790	3,780	kg	10
2000	11,642	9,450	kg	2,192
2001	7,098	6,557	kg	541
2002	3,407	19,164	kg	-15,757
2003	4,646	15,665	kg	-11,019
2003		1,000		-1,000
2004	3,987	4,337	kg	-350
2005	5,017	2,225	kg	2,792
2006	1,537		kg	1,537
2007	1335.5		kg	1335.5
2008	4,379	400	kg	3,979
2009	3,200	2,200	kg	1,000
2010	2,550	5,834	kg	-3,284
2011	378		kg	378
2011	3,092	6,770	kg	-3,678
2012	1,381	881	kg	500
2013	970	970	kg	0
TOTAL	65,000.5	79,233	-	-14,232.5

One source of the documented discrepancy could be related to the use of nonstandard measurement units. Of the total 19 hippo teeth trade transactions from Uganda to Hong Kong, all but one shipment (of an unidentified “1,000” volume) specifies “kg” as the measurement unit. As the anomaly is low compared to the net trade volume, which is either 65,000.5 kg or 79,233 kg (depending on whether the reported importer or exporter volumes are taken, respectively), the use of inconsistent measurement units can be

discounted as a reason for the differences in trade volume reported by Hong Kong and Uganda.

Another factor contributing to the discrepancy could be that the exporting nation recorded the number of licences issued instead of the volume of specimens actually sent, because it is more convenient than measuring, itemizing, weighing, or counting the volume of specimens. This results in the importing nation receiving a smaller volume, as some permits go unused. A CITES Party cannot legally send more appendix-listed specimens than it is licensed to, so when the volume declared imported is higher than that reported sent, the “reporting licences instead of actual volume” explanation cannot apply. Eleven of the total 19 hippo teeth transactions indicate that Hong Kong received more hippo teeth than reportedly sent by Uganda, so this is not a likely discrepancy cause for the majority of transactions here.

A third factor that could explain data discordance is incomplete, late submission—or complete absence—of annual reports. According to CITES, Uganda did not submit an annual report for 2013 and 2014 until April 27, 2016. Trade data for this study were retrieved after April 2016, so should not be affected by the late submission—though the accuracy of the data itself may be compromised by lapsed time or unsystematic record keeping.

Finally, receiving a shipment in subsequent years to when it was sent could also potentially lead to mismatched trade figures. This is difficult to assess, because the CITES database does not denote the exact date or mode of transportation. Annual reports from CITES Parties may contain such detail, but are only available upon specific request. When approached for this information, officials from Hong Kong’s CITES MA, the AFCD, explained that they do not keep detailed reports of itemized annual hippo teeth imports, or transportation means by which they were received (AFCD, 2016, Jul 28, pers. comm.). Attempts to contact the Ugandan CITES MA were unsuccessful. It is worth noting that all hippo teeth trade between Uganda and Hong Kong is listed as direct, and after the last recorded hippo teeth import from Uganda in 2013, there were still

over 14,000 kg of hippo teeth unaccounted for, which could have arrived at any point in the past few years.

Further investigation is required to assess the exact reason(s) for the discrepancies in hippo teeth traded between Uganda and Hong Kong. As of now, the discrepancy amounts to more than 14,000 kg, the equivalent of around 2,600 hippos. It is difficult for anyone, including the CITES Secretariat itself, to definitively determine the reasons for the significant discrepancies in this case, as the relevant parties are either (i) not able to explain the data gaps or (ii) have not yet responded to enquiries thereof. All that can be done at this stage is to eliminate common reasons for data mismatch, and deduce that monitoring of the hippo teeth trade, in this instance, was not comprehensively exercised. Control of legal trade in this Appendix II-listed, threatened species, and possibly many others, has been compromised—as has the legal framework established to protect endangered animals from extinction.

4.2 | Hippo status and threats

Uganda's main hippo populations are found in two national parks: Murchison Falls and Queen Elizabeth. Before 1950, the latter supported a 21,000 strong hippo population (Lewison & Oliver, 2008), which has been reduced to 2,326 by 2005 (Wafula et al., 2008)—the most recent estimate available (Figure 3). Hippos there were culled in the 1950s and since then have been subjected to persistent poaching pressure, anthrax outbreaks, civil instability, and drought. These factors compromise the ability of this specific population to withstand unregulated, and mass, legal trade in their parts. Hippos have a slow reproductive rate—with females typically producing one offspring every 2 years (Lewison & Oliver, 2008), affecting the species' ability to recover from overexploitation.

An update of global hippo population estimates is overdue, as the most recent figures are from 2008. As a result, conservation status listings for hippos are over a decade old; IUCN and CITES listed the species as "Vulnerable" in 2006 and on Appendix II in 1995, respectively. Since then, thousands of tonnes of hippo teeth have been traded, and data thereof show signs of inaccurate reporting. Previous studies have noted that CITES Parties should take current and projected wildlife trade demand trends into consideration during decision-making processes (Challender, Harrop, & MacMillan, 2015). Though some studies determine the hippo teeth trade to be relatively benign (Martin & Martin, 2011), the routine, large-scale imports of teeth to Hong Kong demonstrate a robust, if not increased, demand pattern. The planned restriction on elephant ivory trading in Hong Kong, scheduled to take effect in 2021, may also stimulate demand for hippo ivory, because the period following the 1989 global ban on elephant ivory trade showed a surge in demand for hippo ivory as a legal substitute (Weiler et al., 1994; Williamson, 2004). Moreover, in 2014, trade in hippo teeth was banned in Uganda. With such a sizeable and long-established transcontinental trade in place, it is possible that—without comprehensive enforcement efforts—the network, structure, and mechanisms of this trade will simply go "underground," and maintain trade in an illegal, unmonitored manner, but on the

same scale (in this instance tonnes of teeth and thousands of hippos per year). The same happened with the pangolin trade after zero trade quotas were established (Challender et al., 2015). Unfortunately there are already signs of increased illegal trade in hippo teeth in Uganda (Fisher, 2016). Issues with demand and legality are complex, however, as it is the very persistence of a mass legal trade in pre-1989 ivory that has provided fertile grounds for the laundering of newly poached ivory (Knights et al., 2015) once international demand for ivory products resurfaced in 2005. The same may apply to hippo teeth, with illegal harvest and trade conducted under the guise of legal, regulated trade—because it features the same unstandardized levels of protection in commercial trade, with hunting and export banned in Uganda, but legal elsewhere.

4.3 | Compromised regulatory capacity at source

A possible cause for hippo teeth trade data discrepancies between Uganda and Hong Kong could be trade in illegally harvested hippo teeth—either from within Uganda or trafficked in from nearby countries. Evidence of illegal trade and poaching of hippos in the region, as well as fluidity of borders, is plentiful. In 1992, Ugandan authorities intercepted possession licences for 10,000 hippo teeth illegally issued by a Zairian local authority near Virunga National Park—the same year that 417 smuggled hippo teeth were intercepted by Zairian authorities en route to Uganda (CITES, 1994). In 1997, officials at Paris Orly Airport seized over 1,700 hippo teeth en route from Uganda to Hong Kong (TRAFFIC, 1997). From 1997 to 2003, hippo populations in the Democratic Republic of the Congo (DRC) decreased by 95% due to intense poaching (Lewison & Oliver, 2008). In October 2006, rebel groups killed 400 hippos in just 2 weeks in Virunga National Park (Zoological Society of London, 2006), which lies in the borderlands of Uganda, DRC, and Rwanda. Thus, poaching and smuggling of hippo teeth are not uncommon in the region, nor is fraud of CITES export permits (CITES, 1994). It is therefore possible that illegally harvested hippo teeth could account for the major surplus discrepancies in CITES trade data from Tanzania and Uganda to Hong Kong over the same time period. This possibility does not appear to have been considered, or investigated, by the Ugandan or Hong Kong authorities or CITES Secretariat during this period.

Many of Uganda's neighbouring countries have been up for CITES review specifically for hippo trade, including the DRC, Rwanda, and Tanzania, resulting in restrictions and suspension in hippo teeth trade for all those countries (CITES, 2007). Hippo teeth trade from Uganda, however, was not subject to scrutiny by CITES—despite the repeated, major discrepancies in trade data with importing nation Hong Kong, as demonstrated above—and trade continued unabated. Uganda thus became the dominant supplier of hippo teeth, accounting for over 65% of hippo teeth imports to Hong Kong after 2001 (over 56,800 kg), despite the hippo hunting ban being in place since 1986 (CITES, 2007). Then, in 2014, Ugandan authorities banned the trade in hippo teeth due to concern over falling hippo numbers (Fisher, 2016).



FIGURE 3 Hippo population in Queen Elizabeth National Park, Uganda. Population estimates come from Bere (1959), Field (1970), Lamprey et al. (2000), Lamprey and Michelemore (1996), Lewison and Oliver (2008), and Wafula et al. (2008)

Now that hippo teeth trade is illegal in Uganda, the trade could move into the black market or poached hippo products could be laundered into the legal trade elsewhere—unless enforcement is comprehensive. There is evidence that Uganda's capacity to deliver the level of enforcement required is impaired by a lack of resources, corruption, and well-established organized crime syndicates. Civil insecurity in Uganda during Idi Amin's rule in the 1970s and 1980s perpetuated poaching to the extent that it caused the nationwide extinction of both white and black rhinos, and certain oryx species (Harrison et al., 2015). Since then, Uganda has been in a fluctuating state of recovery that has compromised development of its security infrastructure, and law enforcement capacity (Harrison et al., 2015). The country has over 28,000 square kilometres of protected areas, but only about 1,300 rangers, averaging one ranger per 22 square kilometres (Harrison et al., 2015). This falls short of the rate recommended by the IUCN—one for every six square kilometres. In 2012, an official Ugandan military helicopter was identified on an unregistered flight over Garamba National Park, DRC, when 22 elephants were killed by shots from the air (Gettleman, 2012). Uganda is also home to the Lord's Resistance Army—reported to use illegal elephant ivory sales to generate income for its activities (Gettleman, 2012). In 2013, Uganda, Tanzania, and Kenya were officially named among the eight worst offending countries for illegal elephant ivory trade at the CITES 16th meeting of the CITES Conference of Parties (CITES, 2013). The Great Elephant Census in 2016 found Uganda to be one of few countries with increasing elephant numbers, attributed to increased management for this species (Chase et al., 2016). This demonstrates the paramount importance of high-calibre enforcement going forward—to prevent exploitation of hippo populations, and achieve similar levels of protection for this species also.

4.4 | Addressing trade discrepancies

The level and nature of data discord demonstrated between Uganda, Tanzania, and Hong Kong in hippo teeth trade is not appropriate when dealing with any threatened species. It renders CITES—the

very apparatus put in place to safeguard these species—ineffectual and exposes rare species to levels of exploitation that could cause their extinction. As signatories to CITES, the appointed MA and SA bodies in Hong Kong, Uganda, Tanzania and all other CITES parties are duty-bound to accurately report trade in appendix-listed species, something that they repeatedly and continuously failed to deliver throughout decades of hippo teeth trade. It appears that at no point was Uganda's hippo teeth trade practices investigated by the CITES Secretariat, and it took a significant fall in hippo population numbers to prompt any action—at which point it was taken independently by Ugandan authorities. A retrospective investigation should be launched into the discrepancies highlighted in this paper and into the possibility that teeth from poached hippos in Uganda or neighbouring countries were the cause of surplus quantities of teeth arriving in Hong Kong. In general, greater diligence, monitoring, and reporting should be practiced by all parties to avoid a recurrence of this scenario for hippo teeth trade, as well as for trade in other threatened species and their parts.

Updated population estimates of global hippo populations are needed. Contemporary and accurate estimates would facilitate informed review of the over decade-old conservation status listings of hippos on the IUCN Red List and the CITES Appendix. Information on the remaining hippo population in Uganda, specifically, and the quantity of hippo teeth in circulation in Hong Kong is invaluable for understanding what led to tonnes of surplus teeth arriving in Hong Kong, and for preventing illegally harvested hippo ivory from being laundered into the legal market going forward. Authorities in Hong Kong should consider mandating registration of existing hippo teeth/ivory stockpiles, and establishing a licence to possess system for this item.

Finally, support should be given to Ugandan authorities—financial, training, equipment, manpower, anti-corruption incentives, etc.—to help investigate and prevent illegal hippo poaching and teeth smuggling, as well as safeguard remaining populations of hippo. These efforts are needed to help ensure the protection of hippos—and other species of African origin—in the face of ongoing overexploitation.

ACKNOWLEDGEMENTS

We are grateful for helpful comments provided by David Baker, Timothy Bonebrake, David Dudgeon, Rebecca Lewison, and one anonymous reviewer.

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How to cite this article: Andersson A, Gibson L. Missing teeth: Discordances in the trade of hippo ivory between Africa and Hong Kong. *Afr J Ecol*. 2018;56:235–243. <https://doi.org/10.1111/aje.12441>