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Where did all the pangolins go? International CITES trade in pangolin species

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ABSTRACT

The pangolin is greatly sought after for its various body parts, largely driven by demand from China. The mammal has been driven to the edge of extinction in Asia, with two Asian species listed as Critically Endangered in the International Union for Conservation of Nature Red List. With declining Asian pangolin populations, a shift in trade from Asian to African pangolin species has been suggested. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Trade Database provides a unique opportunity to investigate global trends in pangolin trade at the species level, across a broad temporal scale (1977–2014). We found that CITES trade in Asian pangolin species decreased through time, whilst trade in African species increased post 2000. The total number of incidents involving Asian species declined since 2000, yet they were still being traded in large volumes (more than 17,500 estimated whole Asian pangolins were traded from 2001 to 2014) despite a zero export quota for all wild sourced Asian species, traded for primarily commercial purposes. In 2014 all eight pangolin species were recorded in the CITES trade for the first time. An increasingly complex international network was identified through time, with the United States of America (US) being the dominant player in the global pangolin trade that was reported to CITES. The US was the most frequent trade country throughout the entire period and was the greatest importer of pangolins, and their products; measured both in volume as well as frequency. We hope that identifying these global trade network characteristics, and pangolin trade dynamics will help to inform pangolin conservation efforts, and guide enforcement and legislative changes in the future.

1. Introduction

Wildlife trade is a key threat to biodiversity conservation, with billions of specimens being traded globally every year (Broad et al., 2003; Smith et al., 2009; Rosen and Smith, 2010; Nijman and Shepherd, 2011). To ensure sustainability of wildlife trade, especially in threatened species, an international agreement between governments (currently 183 Parties) entered into force in 1975 (www.cites.org). The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Each country ('Party') is a voluntary member to the Convention, and all imports, exports and re-exports of

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CITES listed species are regulated, by each Parties designated Management Authority, through a licencing system (https://cites.org/eng/disc/text.php). Roughly 5600 animal- and 30,000 plant species are classified into one of three Appendices (I, II, and III) according to the level of threat that international trade poses upon them (CITES, 2013a).

The Management Authorities of each Party authorise trade by issuing permits for shipments. The issuance of permits is dependent on the status of the traded species, its CITES Appendix listing, and are sometimes subject to additional individual quotas. Parties are required to report their annual trade to the CITES Secretariat and the data is then centrally stored in the CITES trade database (accessible at http://trade.cites.org). Historically, the annual reports have only contained legally permitted transactions (but see the Discussion). However, Parties were additionally requested to report on illegal trade for some species, such as elephants (Resolution 10.10: CITES, 1997) and pangolins (Decisions 16.41/16.42: CITES, 2013b). From October 2017, all illegal trade detected by the Parties must also be included in the new illegal annual reporting system (see Notification 2016/007: CITES, 2016b).

Illegal wildlife trade (hereafter referred to as 'wildlife trafficking') is often reported in the media, and through research and non-Government organisations (e.g., www.healthmap.org; www.traffic.org), or via enforcement agencies and government reports (e.g., UNODC, 2016). Wildlife trafficking is of particular global concern, as it has become one of the largest and most profitable organised criminal activities, alongside trafficking in drugs, arms and people; and threatens the continued existence of an ever-growing list of species (Wyatt, 2013). The distinction between the regulated trade in wildlife (i.e., CITES permitted trade) and wildlife trafficking is often blurred (Wyatt, 2013). Whilst reports on wildlife seizures provide a unique opportunity to estimate trade flows (Shepherd et al., 2016), reported seizures may only represent a fraction of the actual trafficking amounts, and it is difficult to reliably estimate the volumes being traded, or the impact that trafficking is having on specific populations. Due to the illicit nature of wildlife trafficking, seizure records can be difficult to acquire and curate, particularly when information is sensitive and different enforcement agencies (i.e., countries) provide variable levels of reporting. The trade recorded in the CITES trade database (hereafter referred to as 'CITES trade') is the primary source of international wildlife trade data at the species level, which provides a consistent mechanism for estimating legal trade dynamics through time, and allows investigation of variability in trade around specific changes in international trade regulations. Whilst we acknowledge the inherent biases associated with the CITES trade data (see the Discussion), there is no comparable data available at this scale.

Pangolins (Order: *Pholidota*; Family: *Manidae)* have become "*the most heavily trafficked wild mammal in the world*" (Challender et al., 2014a). Eight species are extant — four in Asia and four in Africa. The pangolin is a medium sized, nocturnal, and elusive mammal that is covered in scales. Its various body parts, especially their scales, but also its foetuses, blood, bones and claws are believed to have healing properties in traditional medicines (Bräutigam et al., 1994; Katuwal et al., 2013; Boakye et al., 2014; Mohapatra et al., 2015; Soewu and Sodeinde, 2015). Their meat is considered a delicacy in restaurants, where its consumption is also a symbol of status (Soewu and Sodeinde, 2015; Shairp et al., 2016). All pangolin species are consumed as a local source of protein in their native range countries (Bräutigam et al., 1994; Sodeinde and Adedipe, 1994; Pietersen et al., 2014b; Mohapatra et al., 2015; Soewu and Sodeinde, 2015), although it has been suggested that this local use is in decline, due to increasing demand and high prices paid in China (Conniff, 2013). Prices for pangolin scales in China have increased tenfold in the last decade (Challender et al., 2015), and the demand from China is believed to be driving much of the global trade (Pantel and Chin, 2008; Challender, 2011; Harrison et al., 2015; Nijman et al., 2016).

Largely due to the ongoing trade, the once widespread mammal has been driven to the edge of extinction in Asia, and both the Sunda (*Manis javanica*) and the Chinese pangolin (*Manis pentadactyla*) are now listed as Critically Endangered in the International Union for Conservation of Nature (IUCN) Red List (Challender et al., 2014b,c). The remaining two Asian species, the Indian (*Manis crassicaudata*) and the Philippine pangolin (*Manis culionensis*) are listed as Endangered (Baillie et al., 2014; Lagrada et al., 2014), while the four African species — the White-bellied pangolin (*Manis tricuspis*), the Giant pangolin (*Manis gigantea*), Temmincks Ground pangolin (*Manis temminckii*) and the Black-bellied pangolin (*Manis tetradactyla*) are listed as Vulnerable (Pietersen et al., 2014a; Waterman et al., 2014a,b,c). Information on population status in the wild is largely unknown for all eight pangolin species, as they are notoriously difficult to monitor, however, all are believed to be in decline (Baillie et al., 2014; Challender et al., 2014b,c; Lagrada et al., 2014; Pietersen et al., 2014a; Waterman et al., 2014a,b,c). All pangolins are particularly vulnerable to habitat destruction, high poaching rates and overexploitation as they have a very slow reproduction rate, with female pangolins usually only bearing one offspring per year (Yang et al., 2007; Lim and Ng, 2008; Thapa, 2014; Van Thai et al., 2014; Hua et al., 2015).

Given that Asian pangolin populations are declining, and the supply is unable to meet the demand (especially in China and Vietnam), it has been suggested that there is a proportional market shift to the four African species, trafficked to supply the Asian market (Bräutigam et al., 1994; Challender, 2011; Challender and Hywood, 2012; Pietersen et al., 2014b). Prior to 2008 there were no known records of pangolins being trafficked from Africa to Asia (Challender and Hywood, 2012). Since then, increasing numbers of trafficked shipments coming from Africa have been intercepted on their way to Asia (Challender and Hywood, 2012; Gomez et al., 2016). Shipments of pangolin derivatives have been recorded as coming from Angola, Cameroon, Central African Republic, Republic of Congo, Côte d'Ivoire, Guinea, Kenya, Mozambique, Nigeria, Sierra Leone, Uganda, Zimbabwe and Zambia (Challender, 2016). Most recently, four tons of pangolin scales, worth more than 10 million US-Dollars, were seized in Hong Kong from a single shipment originating in Africa (Andersen, 2016). Apart from the decline in Asian pangolin populations (Wu et al., 2004; Baillie et al., 2014; Challender et al., 2014b,c), one major reason believed to be facilitating this shift from Asian to African species is the growing economic ties between the two continents (Challender and Hywood, 2012; Baker, 2014; Challender, 2016).