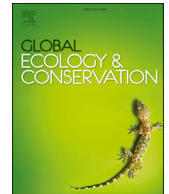




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Letter to the Editor

The CITES Trade Database is not a “global snapshot” of legal wildlife trade: Response to Can et al., 2019



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We commend [Can et al. \(2019\)](#) for bringing attention to the complex network of concerns that intersect with the international wildlife trade. In particular, they highlight the potential health risks associated with zoonotic pathogens spread through trade ([Smith et al., 2009](#)). However, the authors make a major error in interpreting their data source, the CITES Trade Database, as being representative of legal global trade in wildlife. In fact, the CITES Trade Database is meant to aggregate records of trade in CITES-listed wildlife species, and there are well-documented complexities in the data that demand nuanced analysis and interpretation ([Harrington, 2015](#); [Lopes et al., 2017](#); [Berec et al., 2018](#); [Robinson and Sinovas, 2018](#); [Berec and Šetlíková, 2019](#); [Pavitt et al., 2019](#)). Importantly, species are listed in the CITES Appendices because of concern about international trade's impact on their extinction risk (e.g., population size), in efforts to generate a mechanism for trade monitoring and regulation. Thus, Can et al. propose to evaluate the international wildlife trade using data that 1) represents only a subset of wildlife species, and 2) represents only species for which there is outstanding concern about overexploitation through trade, leading in many cases to trade limitations on those very species. Despite these significant shortcomings in the data, the assumption that they are representative of the legal global wildlife trade pervades the paper and severely compromises interpretations therein.

Ostensibly, Can et al. address the limitations of their study, yet this discussion obscures the true portion of the legal global wildlife trade that their data source fails to capture. The authors cite our work ([Smith et al., 2017](#)) to support the assertion that “non-CITES-listed species are largely undocumented” within the United States Fish and Wildlife Service (USFWS) Law Enforcement Management Information System (LEMIS), which represents wildlife products imported to the US. This statement is simply incorrect. [Smith et al. \(2017\)](#) state unambiguously that “CITES maintains a database of reported trade of CITES-listed species only,” whereas the LEMIS trade database “includes both CITES and non-CITES species considered to be wildlife per the USFWS definition.” The text that Can et al. seem to be referring to actually indicates that “non-CITES-listed species imports often lacked detail in several areas of the USFWS LEMIS database” ([Smith et al., 2017](#)). Clearly then, legal trade of non-CITES-listed species is documented in wildlife trade databases like LEMIS even if some data fields are sometimes incomplete.

How does the absence of non-CITES-listed species in the CITES Trade Database affect Can et al.'s inferences regarding the volume of the legal international trade in wildlife? Comparisons with previous literature suggest their stated trade volume is almost certainly a vast underestimate. To take one example, Can et al. report the legal international trade volume in live amphibians to be just over 200,000 individuals for the five-year period from 2012 to 2016 (227,765 live amphibians exported; 212,661 live amphibians imported) or ~45,000 individuals per year. In contrast, [Schloegel et al. \(2009\)](#) report the volume of

live legal amphibian imports into just three US cities to be ~5 million individuals per annum. What accounts for the vast differences in these trade estimates when one metric proposes to capture the totality of *international* trade in live amphibians and the other proposes to capture only a portion of the live amphibian trade into one country? A primary driver of the discrepancy must be the fact that the majority of live amphibian trade documented by Schloegel et al. (2009) consists of legal trade in individuals from the family Ranidae, no members of which are CITES-listed. These incongruous results are not limited to one taxon. Smith et al. (2017), investigating US wildlife trade, report a total of 2,434,851 live mammals imported for the period 2000–2013, for an average annual import volume of ~170,000 individuals. This estimate of the annual live mammal trade into one country is roughly equivalent to what Can et al. claim to be the volume of *international* live mammal trade over a five-year period (168,336 live mammals exported; 102,104 live mammals imported).

Furthermore, the limitations imposed by the CITES Trade Database frustrate attempts to comprehensively identify human health risks stemming from the wildlife trade. Some of the very examples that Can et al. cite to illustrate the importance of global wildlife trade for zoonotic disease transmission also serve to highlight the fact that the CITES Trade Database is insufficient for fully describing such impacts. For example, in their introduction, Can et al. mention a 2003 case of human monkeypox that was epidemiologically traced to pet prairie dogs that were themselves held in contact with African wildlife imported to the US. Taxa included in this importation event were rope squirrels (*Funisciurus* sp.), tree squirrels (*Heliosciurus* sp.), Gambian giant rats (*Cricetomys* sp.), brushtail porcupines (*Atherurus* sp.), dormice (*Graphiurus* sp.), striped mice (*Hybomys* sp.), palm civets (presumably *Nandinia binotata*), genets (*Genetta* sp.), and kusimanses (*Crossarchus* sp.), with the Gambian giant rat, dormice, and rope squirrels later confirmed positive for monkeypox (Centers for Disease Control and Prevention, 2003; Reynolds et al., 2004). Critically, none of these small mammals are CITES-listed, and thus trade in these species obviously cannot be accurately evaluated with the CITES Trade Database. Next, Can et al. reference a US outbreak of *Salmonella* Agbeni in humans linked to exposure to pet turtles. However, the CITES Trade Database is no better for evaluating the entirety of global trade in reptiles than it is for mammals. Others studying the global reptile trade using CITES data have noted the significant limitations of ignoring all non-CITES trade (Robinson et al., 2015), and a prior US-specific analysis shows that by far the most heavily-traded reptile is *Trachemys scripta* (~77% of all US reptile trade from 2001 to 2009), a turtle species that is not CITES-listed (Herrel and van der Meijden, 2014). These examples make it abundantly clear that not only does the CITES Trade Database provide a limited perspective on the global wildlife trade generally, but it also lacks comprehensive data on the legal trade of numerous wildlife species that are of potential relevance for zoonotic disease transmission. As a result, the inferences of Can et al. are similarly limited.

None of these criticisms should be taken to imply that the CITES Trade Database does not have legitimate applications or is not fit-for-purpose. This data can be extremely valuable in studies adopting a strict focus on international trade of a narrow taxa set (i.e., species or groups of species), all of which are CITES-listed (see numerous references within Berec et al., 2018 for examples). In other cases, the CITES Trade Database has been used to examine patterns of international trade across broad taxonomic groups with the acknowledgment that this data only captures a subset of the legal wildlife trade (Carpenter et al., 2014; Li and Jiang, 2014; Robinson et al., 2015). Unfortunately, Can et al. do not clearly indicate this fundamental limitation for their readers.

We agree with Can et al. that the current state of the global wildlife trade generates significant concern regarding animal welfare and biodiversity conservation efforts. We also agree that the direct links between wildlife trade and zoonotic disease transmission, with implications for human health and wellbeing, must not be overlooked. Further, their broad recommendations aimed at reducing disease risk are sensible. For the reasons previously mentioned, however, we must strongly disagree that the CITES Trade Database provides an adequate representation of the substance and tremendous scale of the legal international wildlife trade. The CITES Trade Database is not a “global snapshot” of the legal wildlife trade. Despite being the best source of trade information for a limited number of taxa (i.e., threatened and endangered species), it is an enormously incomplete picture of legal wildlife trade broadly, and any conclusions regarding the links to human health should be carefully considered.

Declarations of interest

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