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Accurate characterization of wildlife trade and policy instruments: Reply to D'Cruze et al. (2022) and Frank and Wilcove (2022)

D'Cruze et al. (2022) and Frank and Wilcove (2022) suggest that Challender et al. (2021) misrepresent their research. We reiterate that our intention was not to denigrate any particular study; instead, we aimed to draw attention to contemporary issues in wildlife trade research and highlight ways for research to better inform policy processes. Here, we respond to the points raised in these articles.

D'Cruze et al. suggest that we were incorrect to deduce from Harrington et al. (2019) that their position is that "*use/trade* [in Asian otters as exotic pets] *constitutes a threat to the species or is detrimental to wild populations*." This is despite the title of that article being "*Popularity of pet otters on YouTube: evidence of an emerging trade threat*." It is difficult to reconcile this title and statements within the article with the assertion that Harrington et al. did not conclude that the pet trade posed a threat to wild populations of Asian otters.

However, our primary concern is that Harrington et al.'s analysis of trends in popularity of social media videos of pet otters makes the jump to strongly endorsing an international trade policy (specifically, including two otter species in CITES Appendix I) despite the authors acknowledging that there is no evidence of a link between social media trends and trade trends. Trade bans via CITES may be considered as a sensible precautionary measure by some, but in some instances, they may do more harm than good for species (Challender et al., 2021). To avoid this scenario, the risks and benefits of such proposals should be fully assessed (Cooney et al., 2021).

Regarding CITES source code "I," users of data with this source code should be aware that CITES Parties use this code in various ways and therefore be clear whether data refer to illegal trade or legal (re-)exports of previously seized specimens. Otherwise, trade is likely to be mischaracterized (Lopes et al., 2017). A better method of characterizing illegal trade in CITES-listed species would be to use other available databases (see Supporting Information in Challender et al., 2021) and CITES source code "I" data that can be categorically identified as referring to illegal trade. Regarding Can et al.'s (2019) conclusion that "risks posed by pathogens…associated with the wildlife trade should not be under-estimated," we agree and add that neither should they be overestimated. Both carry the risk of misleading policy processes.

D'Cruze et al. also argue that their errors relating to transaction frequency in CITES trade data were minor and do not fundamentally alter their conclusions. While we acknowledge this, our concern remains that if mistakes made in published articles on wildlife trade are not addressed, there is a risk that they will be perpetuated by other authors in the future.

We agree with Frank and Wilcove (2022) that the IUCN Red List of Threatened Species (hereafter "Red List") can be used to inform the potential adoption of trade measures in CITES. Indeed, the Red List has informed CITES processes since its inception, and the potential for closer alignment is currently being explored.

However, Frank and Wilcove (2022) claim that Challender et al. (2021) believe that "…*CITES protection (via Appendices I and II) should be reserved for vanishing species whose main threat is international trade* …" and cite the Convention text as justification for including species in CITES when trade may only be a contributing threat. They misrepresent our main point, namely that, based on lessons learnt in preceding decades (Cooney et al., 2021), species should be listed based on evidence that doing so is likely to contribute to (and not potentially undermine) their conservation. The precautionary principle which underpins conservation policy is not unidirectional and it cannot be assumed that tighter regulation of international trade, including bans, is always the most precautionary policy option.

One of our major criticisms of Frank and Wilcove (2019) was that their recommendations were poorly developed, overlooking critical factors that would impede real-world

adoption (Challender et al., 2021). There is far more exposition and "nuance" in their response to our commentary than their original article. We encourage researchers suggesting wildlife trade policy reforms to recognize and address the potential challenges in realistic terms, not least to ensure credibility with those who make and implement policy.

Finally, we do not claim in Challender et al. (2021) that specific studies have misled policy; however, where wildlife trade data are interpreted inaccurately in research articles, there is potential to mislead policy processes, and to undermine the role of academic research in informing these processes. We would welcome collaboration with researchers interested in working with us to develop best practice guidelines that ensure that wildlife trade policy is based on the best evidence, appropriately interpreted.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

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No primary data were collected for this manuscript and an ethical review process was not undertaken.

DATA AVAILABILITY STATEMENT

No primary data were collected for this manuscript.

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