RESEARCH ARTICLE

WILDLIFE TRADE

Global wildlife trade across the tree of life

Brett R. Scheffers[1]*†, Brunno F. Oliveira[1,2]*, Ieuan Lamb[3], David P. Edwards[3]†

Wildlife trade is a multibillion dollar industry that is driving species toward extinction. Of >31,500 terrestrial bird, mammal, amphibian, and squamate reptile species, ~18% (*N* = 5579) are traded globally. Trade is strongly phylogenetically conserved, and the hotspots of this trade are concentrated in the biologically diverse tropics. Using different assessment approaches, we predict that, owing to their phylogenetic replacement and trait similarity to currently traded species, future trade will affect up to 3196 additional species—totaling 8775 species at risk of extinction from trade. Our assessment underscores the need for a strategic plan to combat trade with policies that are proactive rather than reactive, which is especially important because species can quickly transition from being safe to being endangered as humans continue to harvest and trade across the tree of life.

The tree of life is being pruned by human activities at an unprecedented rate (*1*). Yet, although we understand the global footprint of land degradation and deforestation and how that manifests in species loss (*2*), we have a limited understanding of the global extent and patterns of the wildlife trade. The trade of wildlife for luxury foods and medicinal parts and as pets is now so substantial that it represents one of the most prominent drivers of vertebrate extinction risk globally (*3*). Each year, billions of wild plants and animals are traded to meet a rapidly expanding global demand (*4*, *5*), a demand so insatiable that, globally, US$8 billion to $21 billion is reaped annually from the illegal trade, making it one of the world's largest illegitimate businesses (*5*, *6*).

The high demand for wildlife products and pets has driven pronounced losses in enigmatic species such as tigers, elephants, rhinos, and poison dart frogs (*7*). Some subspecies are already extinct [e.g., the last Javan rhino, *Rhinoceros sondaicus annamiticus*, was shot for its horn in 2010 in Vietnam (*8*)] or on the cusp of extinction in the wild (e.g., Bali myna, *Leucopsar rothschildi*)—all because of trade. There is an insidious aspect to this market force in that these emblematic species only represent a tiny, though well publicized, fraction of animal species traded. If cultural preferences change, wildlife trade can rapidly drive a species toward extinction. For instance, the emergence of widespread demand in East Asia for pangolin scales and meat has triggered major declines in some species [e.g., Sunda pangolin (*Manis javanica*)] in just two decades (*9*), and growing demand for the ivory-like casque of the helmeted hornbill (*Rhinoplax vigil*) resulted in tens of thousands of birds traded annually since around 2012 (*10*). Both species are now critically endangered (*11*). Moreover, wildlife trade indirectly places substantial pressure on biodiversity through the introduction of pathogens, including the globally lethal amphibian fungus *Batrachochytrium dendrobatidis* (*12*), and invasive species, such as the Burmese python (*Python bivittatus*) in Florida, USA (*13*).

The enormous trade in wildlife begs the question whether we can better protect species from human demand, a concern that is at the forefront of the wildlife trade crisis. Combating wildlife trade requires, first, the identification of what species are being traded and, second, the identification of where traded species occur. In this study, we searched the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the International Union for Conservation of Nature Red List of Threatened Species (IUCN Red List) databases to identify traded terrestrial vertebrate species (birds, mammals, amphibians, and squamate reptiles). Using our compiled list, we provide an evaluation of the global extent of wildlife trade across the tree of life to determine whether trade targets specific evolutionary branches. We then used species range maps to identify global hotspots of wildlife exploitation and to determine how those hotspots vary between trade for pets or products (i.e., medicine, luxury foods, skins). Although emerging gene- and web-based techniques can help to identify the precise sources of traded individuals, our approach allows us to identify the likely global epicenters of diversity in traded animals.

What species are traded?

Trade in wildlife affects ~18% of all extant terrestrial vertebrate species on Earth. Our assessment shows that 5579 of the 31,745 vertebrate species have been reported as traded, with a higher percentage of all birds (23% of 10,278 species) and mammals (27% of 5420 species) globally traded than reptiles (12% of 9563 species) and amphibians (9% of 6484 species) (Fig. 1 and table S1). Our assessment across the CITES and IUCN databases yields a total that is 40 to 60% higher than prior recorded estimates [e.g., (*3*, *14*, *15*)]. Traded species are

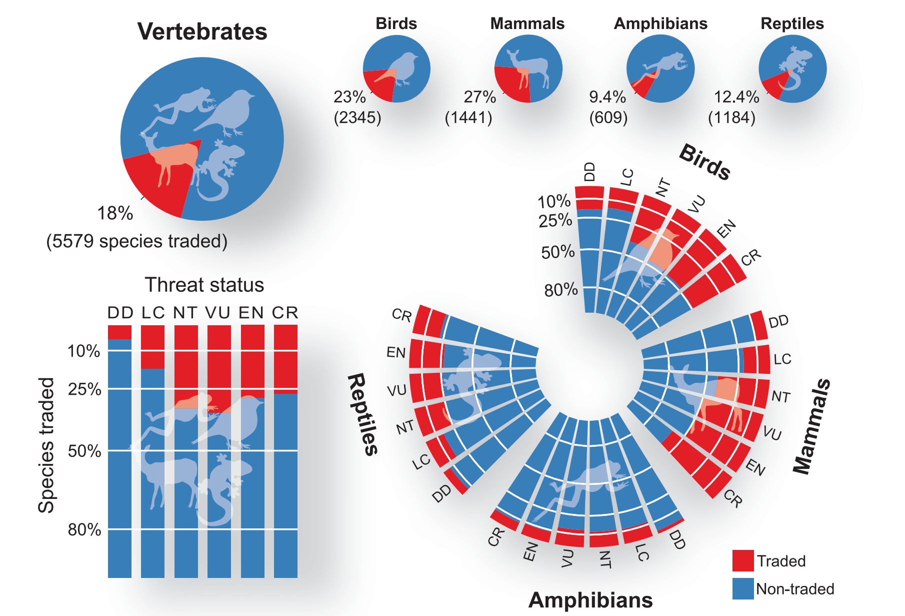

Fig. 1. Wildlife trade in terrestrial vertebrates (birds, mammals, amphibians, and reptiles) affects ~18% of species globally. Numbers in brackets are the total number of traded species. IUCN threat status codes: data deficient, DD; least concern, LC; near threatened, NT; vulnerable, VU; endangered, EN; and critically endangered, CR.

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in higher categories of threat compared with nontraded species (especially among mammals and birds; Fig. 1 and table S2), confirming wildlife trade as a driver of extinction risk.

We found that trade occurs in 65% of all terrestrial vertebrate families (312 of 482 families; table S1). This pattern is evident across all terrestrial vertebrate groups considered, with mammals and reptiles showing the highest percentage of families traded (mammals: 81%, $N = 110$; reptiles: 73%, $N = 53$), followed by amphibians (55%, $N = 41$) and birds (55%, $N = 108$). Despite this broad exploitation, humans are targeting specific components of the tree of life (Fig. 2 and fig. S1), as indicated by a significant phylogenetic signal in wildlife trade for all taxa (fig. S2). Mammals and birds showed a signal as strong as expected under a Brownian motion model of evolution (fig. S2), indicating higher levels of phylogenetic clustering relative to reptiles and amphibians (*16*). Highly traded families—those with >50% of their species traded—make up more than one quarter (27%; 128 of 482 families) of the total families, which breaks down to 51% of mammal ($N = 69$), 32% of reptile ($N = 23$), 16% of bird ($N = 32$), and 5% of amphibian ($N = 4$) families (tables S1 and S3).

Nonrandomness in trade across the tree of life implies high susceptibility for select clades, likely because of similar traits (such as voice quality, folklore, ivory, etc.). In exploring this, we found that large-bodied species are more traded than small-bodied species, a pattern that holds regardless of IUCN threat category (fig. S3 and table S4), and that the probability of being traded is positively related to body size (fig. S4). Over millennia, primitive human societies affected large-bodied species through hunting for subsistence, which changed contemporary biogeographical patterns of animal body size (*17*, *18*). Our analysis shows that this pattern continues with modern humans through the wildlife trade.

Trade also targets species that are unique and/or distinctive in traits. In our assessment of evolutionary distinctiveness (a measure of phylogenetic isolation) (*19*), which may yield species with unique traits (*19*, *20*), our results suggest that, for birds—but not for mammals, amphibians, or reptiles—traded species are more evolutionarily distinctive than nontraded species (fig. S5). Furthermore, mean

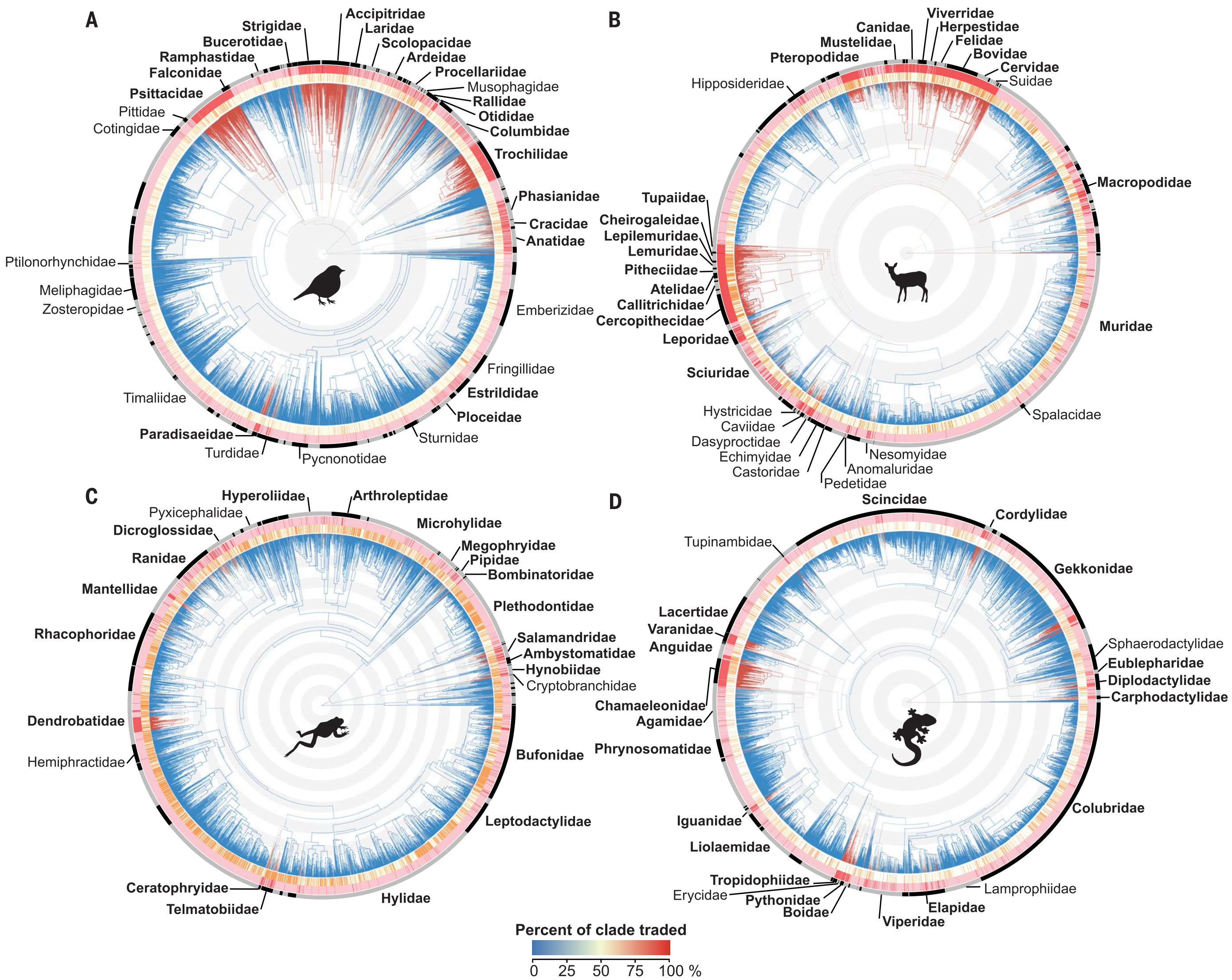

Fig. 2. Wildlife trade occurs across the tree of life, but some clades are more heavily targeted than others. Phylogeny branches for (**A**) birds, (**B**) mammals, (**C**) amphibians, and (**D**) reptiles are colored to represent the impact of wildlife trade up to each node (i.e., clade). Warmer colors (red) represent heavily traded branches (i.e., high percent of traded species). The 20 highest traded families are labeled (bold name indicates high richness, nonbold name indicates both high richness and proportion of total). The first outer band indicates threatened (VU, EN, CR, and DD; orange) and non-threatened (LC and NT; yellow) species. DD species were considered threatened because of their small geographic range size. The second outer band indicates traded (red) and nontraded (pink) species. Gray concentric circles scale a 20-million-year period.

family-wide evolutionary distinctiveness predicts the proportion of traded birds (fig. S6) (linear model: standardized coefficient = 0.18, P value = 0.01) but, again, not for traded mammals, amphibians, or reptiles. Humans have long admired birds' aesthetic attributes, including song and plumage complexity, and perhaps this long-standing admiration is reflected in the bird trade.

Because we show that trade nonrandomly targets species in specific clades and with specific traits, we were able to predict the species not yet (or not yet known to be) traded but at high risk of future trade as congeneric species become rare or go extinct, or as their ranges become accessible to hunters. On the basis of identified correlates of current trade, we provide meaningful estimates of future trade with >95 and >90% probabilities (Fig. 3 and table S5). First, considering species in highly traded families, we predict between 5 and 48 species (i.e., 95 and 90% probability, respectively) that are not yet traded but are at high risk of being traded in the future. Second, for all nontraded species with available phylogenetic information (N = 29,132), we identified between 303 and 3152 species at risk of future trade given their high phylogenetic similarity with conspecifics known to be traded. Third, we used a phylogenetic logistic regression framework to identify which species are at high risk of future trade based solely on their body size. Here, we found between 11 and 35 species (all mammals) at risk of future trade. Our fourth approach used evolutionary distinctiveness, which did not predict any species at risk of future trade.

In total, on the basis of those species with a probability >95 and >90% in any one of the four assessment schemes described above, we predict that future trade will affect between 317 and 3196 additional species (Fig. 3 and table S5), amounting to between 101 and 826 bird, 121 and 241 mammal, 9 and 268 amphibian, and 86 and 1861 reptile species, with a >95 and >90% probability of future trade, respectively. As a precaution, we recommend that conservation attention be given not just to currently traded species but also to those species with the highest probabilities of being targeted by trade in the future (see table S5 for the complete list of species and their probability of future trade).

Where are the hotspots of traded species?

Although the footprint of trade spans all of Earth's habitable continents, we uncovered a pantropical dominance in the trade for vertebrates (Fig. 4 and fig. S7). Biogeographical patterns in trade richness closely match patterns in species richness (Fig. 4 and table S6). South America, Central to Southeast Africa, the Himalayas, Southeast Asia, and Australia are the main epicenters of the wildlife trade, containing areas with the highest numbers of traded species (i.e., top 5 and 25% richest cells in trade) (Fig. 4 and fig. S7).

Regional differences exist across taxa (Fig. 4, fig. S7, and table S7). For example, in South America, the Andes, Atlantic forest, and eastern Amazon all contain a high diversity of traded birds, whereas the western and central Amazon contains a high diversity of traded amphibians. Although many mammals are traded in South America (as revealed by a large area containing the top 25% of trade richness), the main hotspots for mammal trade are in Africa and Southeast Asia (Fig. 4). The African tropical savanna-woodland belt consists of hotspots for all taxonomic groups (fig. S7). In Asia, Indonesia and Malaysia, as well as the Himalayas, are hotspots for trade (fig. S7), especially that of amphibians and mammals. Australia and Madagascar stand out as the main trade hotspots for reptiles. Perhaps surprisingly, Indonesia, which is considered an epicenter of bird trade (*21*), was not identified as a hotspot. Although Indonesia contains a lower diversity of traded bird species relative to some other areas (e.g., the Andes and Atlantic coast of South America), birds in Indonesia are traded in very high abundance (*21*). Thus, across vertebrates, some species may only be collected for trade in small pockets of their entire distribution range, with higher trade volumes in certain countries, outside of protected areas, or closer to human settlements (*21*–*23*). However, absent such fine-scale data for the majority of species and regions, our global maps reveal the spatial idiosyncrasies in hotspots of trade diversity among taxa.

Focusing on specific kinds of trade reveals that amphibians and reptiles are most commonly traded as pets (including species traded as household pets and for expositions, circuses, or zoological gardens), birds are traded both as pets and products (those used for commercial meat, trophy hunting, clothing, medicine, or religious purposes), whereas mammals are predominately traded as products (Fig. 5 and table S8). The pet trade flourishes across the tropics, whereas species traded as products are concentrated in tropical Africa and Southeast Asia, including the Himalayas. Although for birds and mammals there is a strong association between the richness of species traded as pets and as products, there are important geographical differences in these trade types for all vertebrate groups (Fig. 5). For instance, the pet

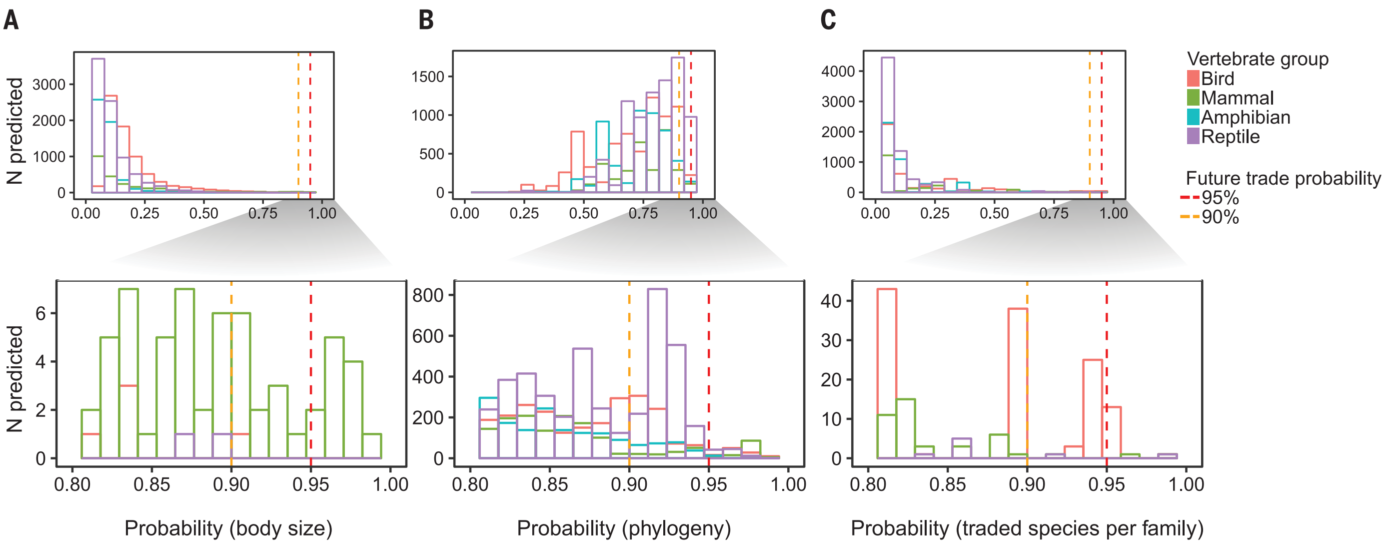

Fig. 3. Predicted future traded species. Probability of a species being traded in the future based on (**A**) body size, (**B**) phylogenetic relatedness, and (**C**) the proportion of species traded in respective families. Upper panels show the probability of trade across all currently nontraded species, and lower panels reflect the probability distribution of trade around the 0.9 and 0.95 confidence intervals.

trade of reptiles occurs mostly in Australia and Madagascar, whereas most amphibians are collected from the Amazon as pets and collected from Africa and Southeast Asia as products.

Tackling global wildlife trade

Species possessing rare phenotypes, such as conspicuous plumage color, body shape and size, behavior, and/or (perceived) medicinal value tend to bring high market prices. Trade follows a rarity-value feedback model, whereby increasing rarity drives both higher demand and higher prices for a species (*22*, *24*), with this positive feedback loop shown in both legal and illegal wildlife trade. For example, in Europe, CITES-listed pets command a higher price than non–CITES-listed species (*24*). Trade also quickly shifts to conspecifics as the availability of a targeted species declines, which likely explains why we uncovered a strong phylogenetic signal in the trade of all vertebrate groups (fig. S2). For instance, as Asian pangolin species decline, they are increasingly replaced in trade by African pangolins, with strength of demand for African pangolin meat and scales in Asia now high despite a relative price increase of 211% versus 4.6% baseline inflation (*25*). On the basis of identified morphological and phylogenetic correlates of trade, we predict an increase between 5 and 57% (probabilities >95 and >90%, respectively) in the total number of traded vertebrate species (Fig. 3 and table S5), which amounts to as many as 8775 species at risk of current and future trade.

That trade tracks cultural [e.g., the Harry Potter–inspired trade of owls in Asia (*26*)] and economic vogue suggests that abundant species may not be safe. Often, species are flagged for conservation only after a severe decline is documented [e.g., pangolins (*25*)]. Our study offers two possible rectifications of this issue.

First, with the strong predictive strength of phylogeny revealed in our analysis, we can circumvent cryptic, yet-to-come declines by flagging species that are currently of little concern but have a high likelihood of being traded in the future because of their evolutionary proximity to traded species (Fig. 3 and table S5). For instance, some highly colorful bird groups at high risk of future trade include *Tangara* tanagers (*n* = 46), *Serinus* finches (*n* = 35), and *Ploceus* weavers (*n* = 37), whereas *Rhinella* beaked toads (*n* = 55) and *Rhinolophus* horseshoe bats (*n* = 55) are the highest-risk amphibian and mammal genera, respectively. Reptiles yielded the largest number of species at risk of future trade. Here, *Liolaemus* iguanian lizards (*n* = 229), *Atractus* (*n* = 135) and *Tantilla* (*n* = 61) colubrid ground snakes, *Bothrops* (*n* = 43) pit vipers, and *Lycodon* wolf snakes (*n* = 48) are all genera at high risk of future trade. We caution, however, that our identification of a species as potentially traded in the future does not reveal the potential trade volume of this species.

Second, the IUCN Red List, the largest assessor of species threat for conservation, needs to ensure that any evidence of trade is recorded in species threat accounts, regardless of current IUCN status. For example, we found that IUCN indicates 1641 traded species omitted by CITES, whereas CITES indicates an additional 2029 traded species omitted by IUCN (fig. S8). In turn, future IUCN assessments would benefit from different analytical approaches that incorporate extinction risk from trade [e.g., (*21*, *27*)], as well as increased communication among all

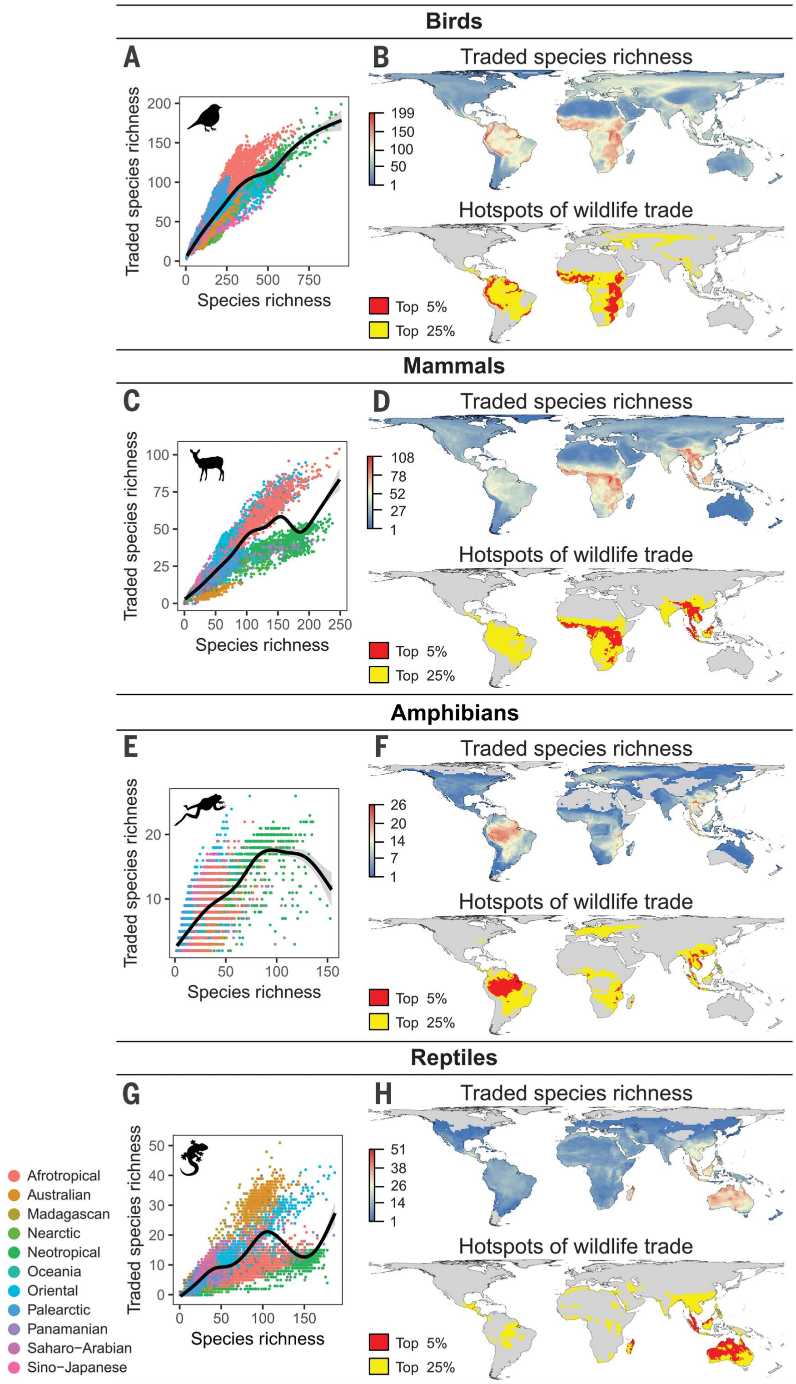

Fig. 4. The geography of wildlife trade in terrestrial vertebrates. Wildlife trade richness increases with the number of species in a cell for (**A**) birds, (**C**) mammals, (**E**) amphibians, and (**G**) reptiles. (**B**, **D**, **F**, and **H**) Wildlife trade richness and hotspots of wildlife trade are concentrated in tropical regions. Top 5% and top 25% indicate areas with the largest number of traded species per cell globally. Points are color coded by the geographic realm. Black lines in scatterplots indicate a locally estimated scatterplot smoothing (LOESS) fit.

conservation groups that document and monitor trade (27).

More broadly, our global assessment of wildlife trade underscores the need for a strategic plan to combat trade. Evolutionary history's ability to predict trade suggests that policies can be proactive rather than reactive in approach. Both online black markets and mainstream marketplaces, such as eBay or Facebook (28), facilitate a large volume of transactions with few regulations to stifle trade activity. Advanced machine-learning computer systems can be used by vendors to monitor and stem this activity (29, 30). Stricter penalties to merchants of trade, as well as consumer pressure for more sustainable and cheaper alternatives [e.g., humanely harvested horn from the least-rare rhino species (31)], may hasten the adoption of these techniques. Our comprehensive list of traded and at-risk species can inform these computerized search systems.

Our global maps of trade hotspots are an important first step in prioritization. The identification of many tropical regions as epicenters of traded species diversity suggests that combating the surge of illegal wildlife trade will likely require action at the local community level (32), combined with targeting key countries that import and export wildlife (33), especially those countries in hotspot areas that share continuous borders (34). In many areas, hunting for wildlife trade occurs out of sheer necessity—that is, it occurs in impoverished areas where harvesting wildlife to sell to middlemen represents the only source of cash income (32). Borrowing from other programs to halt criminal trading of humans, arms, and drugs, wildlife trade policies would gain strength if they were linked to transnational agreements such as the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation (REDD). This may also offer economic incentives for protection rather than exploitation within local communities. For instance, carbon-trading schemes could increase the value of carbon in areas that are combating wildlife trade—with the ecological co-benefit of areas that maintain large-bodied vertebrates yielding higher carbon stocks over the long term (35).

Methods summary

We compiled information on traded birds, mammals, amphibians, and squamate reptiles using the CITES list and IUCN Red List. We identified species traded through the IUCN application programming interface platform and classified each as being traded as pets and/or products (see supplementary materials for details). We superimposed range maps of all species in a 110 km × 110 km global grid and recorded species presence or absence in each cell. We determined total (pet and product) trade richness as the number of traded species

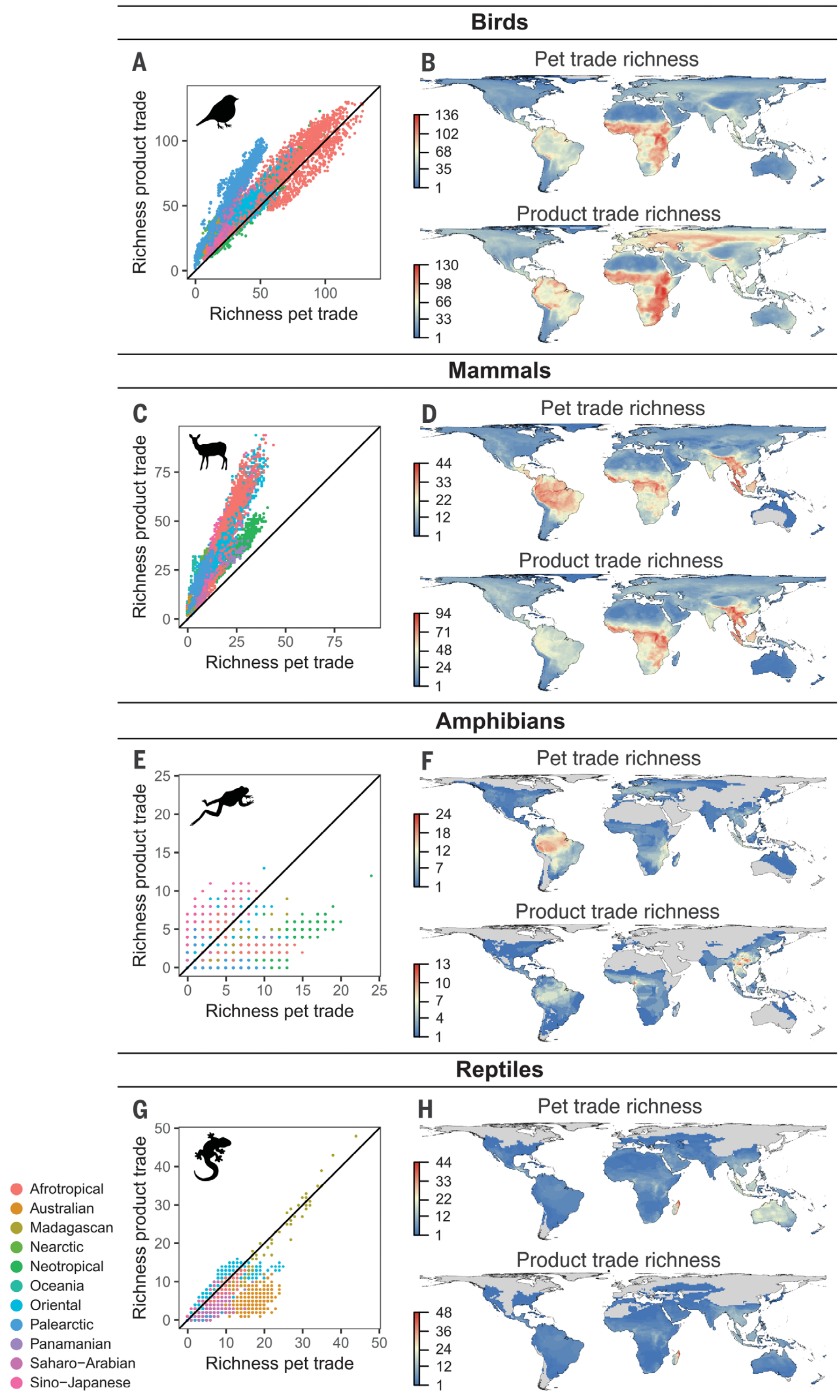

Fig. 5. Geographical patterns in wildlife trade type across birds, mammals, amphibians, and reptiles. Pet and product trade richness for (**A** and **B**) birds, (**C** and **D**) mammals, (**E** and **F**) amphibians, and (**G** and **H**) reptiles. Pet trade includes species traded as household pets, for expositions, circuses, or zoological gardens. Species traded for products include those used for bush meat, trophy hunting, clothing, medicine, or religious purposes. Points are color coded by the geographic realm. Points occurring above the 1:1 equivalency line indicate higher levels of trade as products than as pets.

in each cell. We defined hotspots as the upper 25% and upper 5% richest cells for traded species and assessed the correlation between spatial patterns in total, traded, and threatened species richness.

We used updated time-calibrated species-level phylogenetic trees for each vertebrate group from which we obtained one maximum clade credibility tree, and we used these trees in downstream analyses. We tested whether closely related species are traded more than random ones using the *D*-statistic. We used phylogenetic analysis of variance to test whether traded and nontraded species differ in body size and evolutionary distinctiveness, and phylogenetic logistic regression to test whether these traits influence the probability of a species being traded. We determined risk of future trade by (i) identifying for each nontraded species the proportion of all species traded in their respective family and (ii) for each nontraded species, averaging its phylogenetic distance with the 10 closest related species that are traded.

REFERENCES AND NOTES

1. S. L. Pimm *et al*., *Science* **344**, 1246752 (2014).
2. L. Gibson *et al*., *Nature* **478**, 378–381 (2011).
3. S. L. Maxwell, R. A. Fuller, T. M. Brooks, J. E. M. Watson, *Nature* **536**, 143–145 (2016).
4. V. Nijman, *Biodivers. Conserv.* **19**, 1101–1114 (2010).
5. TRAFFIC, Wildlife Trade Monitoring Network, Illegal Wildlife Trade; www.traffic.org/about-us/illegal-wildlife-trade/.
6. L. S. Wyler, P. A. Sheikh, "International illegal trade in wildlife: Threats and U.S. policy," CRS Report for Congress (Library of Congress, Congressional Research Service, 2008).
7. E. L. Bennett, *Oryx* **45**, 476–479 (2011).
8. D. S. Wilcove, X. Giam, D. P. Edwards, B. Fisher, L. P. Koh, *Trends Ecol. Evol.* **28**, 531–540 (2013).
9. D. Challender *et al.*, "Sunda Pangolin: *Manis javanica*," The IUCN Red List of Threatened Species (2014); www.iucnredlist.org/species/12763/45222303.
10. C. Beastall, C. R. Shepherd, Y. Hadiprakarsa, D. Martyr, *Bird Conserv. Int.* **26**, 137–146 (2016).
11. N. J. Collar, *BirdingASIA* **24**, 12–17 (2015).
12. S. J. O'Hanlon *et al*., *Science* **360**, 621–627 (2018).
13. R. Engeman, E. Jacobson, M. L. Avery, W. E. Meshaka Jr., *Curr. Zool.* **57**, 599–612 (2011).
14. BirdLife International, Data zone; http://datazone.birdlife.org/home.
15. CITES, The CITES species; www.cites.org/eng/disc/species.php.
16. S. A. Fritz, A. Purvis, *Conserv. Biol.* **24**, 1042–1051 (2010).
17. L. Santini, M. González-Suárez, C. Rondinini, M. Di Marco, *Divers. Distrib.* **23**, 640–649 (2017).
18. G. Rapacciuolo *et al*., *Glob. Ecol. Biogeogr.* **26**, 1022–1034 (2017).
19. D. W. Redding, C. V. DeWolff, A. Ø. Mooers, *Conserv. Biol.* **24**, 1052–1058 (2010).
20. R. I. Vane-Wright, C. J. Humphries, P. H. Williams, *Biol. Conserv.* **55**, 235–254 (1991).
21. W. S. Symes, D. P. Edwards, J. Miettinen, F. E. Rheindt, L. R. Carrasco, *Nat. Commun.* **9**, 4052 (2018).
22. J. B. C. Harris *et al*., *Conserv. Biol.* **31**, 394–405 (2017).
23. A. Benítez-López *et al*., *Science* **356**, 180–183 (2017).
24. F. Courchamp *et al*., *PLOS Biol.* **4**, e415 (2006).
25. M. M. Mambeya *et al*., *Afr. J. Ecol.* **56**, 601–609 (2018).
26. V. Nijman, K. A.-I. Nekaris, *Glob. Ecol. Conserv.* **11**, 84–94 (2017).
27. E. G. Frank, D. S. Wilcove, *Science* **363**, 686–688 (2019).
28. J. R. Harrison, D. L. Roberts, J. Hernandez-Castro, *Conserv. Biol.* **30**, 900–904 (2016).
29. J. Hernandez-Castro, D. L. Roberts, *PeerJ Comput. Sci.* **1**, e10 (2015).
30. E. Di Minin, C. Fink, T. Hiippala, H. Tenkanen, *Conserv. Biol.* **33**, 210–213 (2019).
31. N. Hanley, O. Sheremet, M. Bozzola, D. C. MacMillan, *Conserv. Lett.* **11**, e12417 (2018).
32. R. Cooney *et al*., *Conserv. Lett.* **10**, 367–374 (2017).
33. N. G. Patel *et al*., *Proc. Natl. Acad. Sci. U.S.A.* **112**, 7948–7953 (2015).
34. W. S. Symes, F. L. McGrath, M. Rao, L. R. Carrasco, *Biol. Conserv.* **218**, 268–276 (2018).
35. C. A. Peres, T. Emilio, J. Schietti, S. J. M. Desmoulière, T. Levi, *Proc. Natl. Acad. Sci. U.S.A.* **113**, 892–897 (2016).

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SUPPLEMENTARY MATERIALS

science.sciencemag.org/content/366/6461/71/suppl/DC1
Materials and Methods
Figs. S1 to S8
Tables S1 to S10
References (*36–61*)

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Science

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A heavy toll

Trade in wildlife, and their parts, is well recognized for a few key species, such as elephants and rhinos, but it occurs globally, across a wide array of species. Scheffers *et al.* looked across tens of thousands of vertebrate species and found that one in every five species is affected by trade of some sort. The impacts of trade tend to be concentrated in certain phylogenetic groups, thus the potential for long-term impact on certain lineages is substantial. This analysis allows for prediction of potential for trade where it does not yet occur, facilitating proactive prevention.

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