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Exotic animal cafés in Japan: A new fashion with potential implications for biodiversity, global health, and animal welfare

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Abstract

Wildlife trade is a multibillion-dollar industry and concerns not only the exploitation of animals for their body parts but is also largely fueled by the demand for exotic pets. We document, in Japan, a recent phenomenon closely related to the pet trade and rapidly spreading in Asia: the display of exotic animals in a café/bar context. We surveyed 142 exotic animal cafés (EACs) by visiting their website and/or social media accounts. We recorded every available exotic animal species, their status based on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species and Appendix according to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). We compared the CITES Appendix-listed species imported in Japan during 1975–2019 to the species present in EACs. Most EACs opened in major cities between 2015 and 2017 under the label "owl café." We recorded 3793 individuals belonging to 419 different species in 137 EACs active in 2019. The most numerous exotic animals were birds (62% – owls 40%) but reptiles (21%), mammals (15%) and to a lesser extent, amphibians (2%) were also found. A total of 403 individuals belonged to 52 threatened species. The majority (60%) of the species identified were CITES-listed (Appendix I: 53 individuals, 9 species; Appendix II:2482 individuals, 235 species and Appendix III:16 individuals, 6 species). While most species present in EACs are mainly imported as "captive bred" in Japan, we found 30 species that were mainly imported as "wild-caught," "ranched" or "farmed." The increase of importations of owl species is concomitant with the openings of EACs, reflecting the demand for owls in Japan. We argue that these EACs promoted through social media: (1) might have consequences for biodiversity as they encourage the purchase of exotic animals and represent a pool of potentially invasive species with their pathogens; (2) present a risk of pathogen transmission due to frequent close interactions with consumers; and (3) raise serious concerns about animal welfare.

KEYWORDS

CITES, invasive species, IUCN Red List, owl, pet café, welfare, wildlife trade, zoonosis

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1 | INTRODUCTION

Wildlife trade is a multibillion-dollar industry which concerns not only the exploitation of animals for their body parts for medicinal purposes, bushmeat, or trophies, but is also fueled by the demand for exotic pets (Scheffers et al., 2019). The international trade of exotic animals/species (many of which do not have a history of domestication) concerns thousands of species and millions of individuals every year (Fukushima et al., 2020; Harfoot et al., 2018). The United States of America is one of the world's largest consumers of imported wildlife and wildlife products (Smith et al., 2012), with 1.5 billion live wild animals legally imported between 2000 and 2006 and nearly 90% of which were destined for the pet industry (Smith et al., 2009).

Extirpation of wild animals from their habitats to fuel the pet trade can have dramatic consequences on their persistence in the wild (Mandimbihasina et al., 2020; Nijman et al., 2012). Many bird species of South-East Asia are facing rapid decline due to the demand for cage-bird trade (i.e., Asian songbird crisis; Marshall et al., 2019). Escaped or deliberately released exotic species can establish populations in new habitats and impact native ecosystems (García-Díaz et al., 2017). Burmese pythons that were imported to southern Florida through the pet trade became established in the wild and pose a significant threat to a variety of Florida's native wildlife (Dorcas et al., 2012). Numerous examples of invasive species linked to the pet trade exist. The ring-necked parakeet (*Psittacula krameri*), a popular exotic pet bird, is one of the most successful parrot invaders established on most continents (Cardador et al., 2017). As for the red-eared slider (*Trachemys scripta elegans*), previously very common in pet shops and introduced to wetlands throughout the world, it is now banned from many countries (Kitowski & Pachol, 2009).

In addition, wildlife plays a key role in the emergence of infectious diseases by providing a "zoonotic pool" from which previously unknown pathogens may arise (Daszak et al., 2000). The global trade in wildlife has historically contributed to several infectious diseases and plays a role in the emergence of pandemics (IPBES, 2020). Exotic pets make excellent candidates for pathogen transmission due to the wide variety of species available in the trade, the housing and sanitary conditions, and the proximity with their handler (Bezerra-Santos et al., 2021). Numerous disease spillovers and outbreaks have been reported in exotic pet owners and professionals related to this business (Chomel et al., 2007). In 2003, over 70 people contracted the monkeypox virus in the United States—a neglected zoonosis endemic to central and western Africa provoked by an orthopoxvirus—through a single shipment of wild-caught rodents imported from Ghana (Giulio & Eckburg, 2004). Recent evidence is also alarming regarding the high susceptibility of several carnivore species (domestic and exotic) to Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), with the potential to spread the virus (Leroy et al. 2020).

An emerging industry that is now exacerbating issues surrounding wildlife trade involves "Animal Cafés"—also called "Pet Cafés." The first animal café opened in Taipei, Taiwan in 1998 with cats and dogs before the concept rapidly spread elsewhere in East Asian countries including South Korea, Thailand, and mainland China (Plourde, 2014). The first animal café in Japan (Osaka) opened in 2004 as a cat café. Less than two decades later, animal cafés quickly became a popular business model on the Japanese archipelago, with their number exceeding 430 facilities in 2016 (Ministry of the Environment Japan, 2016). Most apartment buildings in Japan forbid pets, which may encourage the seeking of proximity with animals elsewhere, while relaxing and having a drink. Animal cafés claim to offer *iyashi* (i.e., healing) to their customers, through engagement with animals, advertised as "healing time" (Robinson, 2019). Most recently, animal cafés started exhibiting wild species ranging from nocturnal birds and exotic snakes to critically endangered primates, often mixed with domestic species (McMillan et al., 2021).

Despite the rapid expansion of exotic animal cafés (EACs) and the potential implications for public health, conservation, and animal welfare, only few studies exist, either focusing on specific taxa (e.g., otters Harrington et al., 2019; Kitade & Naruse, 2018) or overviewing the phenomenon across Asia (McMillan et al., 2021). In this study, we aim to (1) investigate the extent of the phenomenon in Japan through the identification of places offering the opportunity to closely interact with exotic animals in a "café" or "bar" context; (2) record the diversity of exotic animal species present; (3) compare the importation records of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)-listed species in Japan with the species present; and (4) discuss the implications of EACs for biodiversity, global health, and animal welfare as well as potential venues for actions.

2 | METHODS

2.1 | Online surveys of EAC

We defined EACs as businesses housing at least one individual belonging to an exotic species and where you can consume drinks or food near or in contact with animals.

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From October 2019 to December 2020, we identified EACs throughout Japan using the following keywords in Google, Facebook, Instagram, and Twitter browsers: "animal café" (動物カフェ); "pet café" (ペットカフェ); "petting zoo" (ふれあい動物園); but also: "owl café" (フクロウカフェ); "hedgehog café" (ハリネズミカフェ); "bird café" (鳥カフェ); "otter café" (カワウソカフェ); and "reptile café" (爬虫類カフェ) – since previous reports (e.g., Kitade & Naruse, 2018), news articles and online travel companies (e.g., Tripadvisor) described these species/class of animals as popular in EACs. We visited every website and social media account associated with results found. We also visited social media accounts related to identified EACs that did not appear in our search. We surveyed 136 websites and 301 social media accounts (93 Facebook pages, 110 Instagram accounts, and 98 Twitter accounts). Many EACs only used their social media accounts to promote their activities, and some do not even have a website. In addition, we visited nine EACs including five otter cafés in Kyoto, Nagoya, Osaka, and Tokyo. We detailed all identified individuals down to the species level when possible (see supporting information S1), recorded the location of the EACs, whether they offer buying options (and if so, prices given for each species), and their opening year. For those not displaying their opening date on their website, we recorded the first online activity as a proxy.

2.2 | Diversity of species present in EACs: CITES, International Union for Conservation of Nature's Red List, and invasive species status

For each species, we recorded its status on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2021, Version 2021–3). We then compared the species listed under the CITES and imported into Japan during 1975–2019 to the species present in EACs, with a focus on the 2010–2019 period. We retrieved data for trade transactions involving live CITES-listed animal species imported in Japan from the CITES Trade Database (http://trade.cites.org). These records are derived from the mandatory annual reports compiled by the CITES parties (183 parties in 2021). We only considered transactions classified as "live" under the key "trade" term. CITES categorizes species into three appendices based on information available to assess how likely a species is threatened with extinction (see Supporting Information S1). For each species present in EACs, we also retrieved the corresponding numbers of individuals imported in Japan since 1975 and their source (i.e., captive-bred; wild-caught; ranched and farmed, see Supporting Information S1 for more details on the terminology). To assess the invasion potential of species present in EACs, we compared the recorded species to the lists of invasive and potential invasive species of Japan (National Institute for Environmental Studies, 2019). Data management and descriptive analyses were conducted using R (version 3.6.0; R Core Team, 2017).

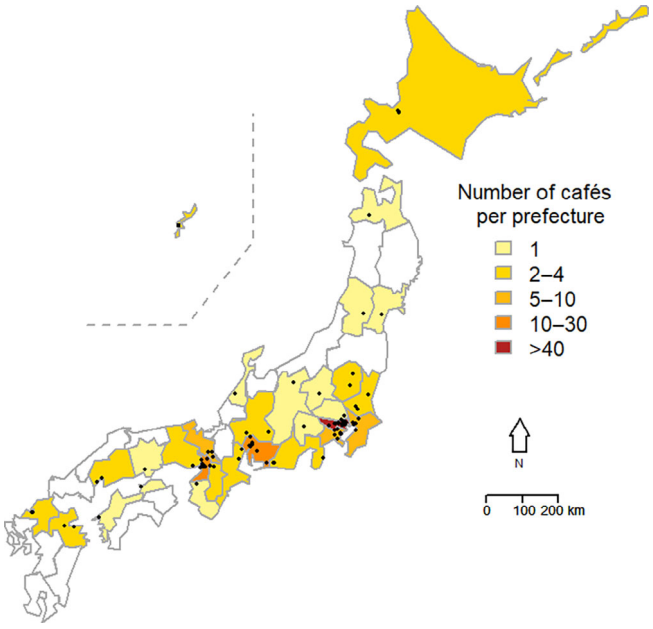


FIGURE 1 Spatial distribution of Exotic Animal Cafés ($n = 142$) active between 2010 and 2019 per prefecture across Japan.

3 | RESULTS

EACs are disseminated across Japan from Hokkaido to Okinawa with most EACs in major cities (Figure 1) such as Tokyo ($n = 44$), Osaka ($n = 24$), Nagoya ($n = 8$), and Kyoto ($n = 5$). EACs were diverse in their settings, from businesses displaying a single owl to others exhibiting as many as 93 different species on their online accounts. We recorded 142 EACs meeting our criteria and directly accessible online—with 137 still active in 2019. We recorded 64 EACs labeled "owl café,"17 "bird café," 12 "petting zoo/shelter café," 12 "animal/pet café," 12 "reptile café," 11 "hedgehog café," and 7 "otter café." More anecdotally, we recorded two "monkey bar," two "sugar glider café," one "penguin bar," one "hamster café," and one "meerkat café." The majority of surveyed EACs started being active online during the last 5 years (Figure 2a), with opening peaks in 2015 and 2016.

We recorded 3793 individuals belonging to at least 419 different species (including several potential subspecies) in EACs active in 2019 (Tables S1 and S2). Many

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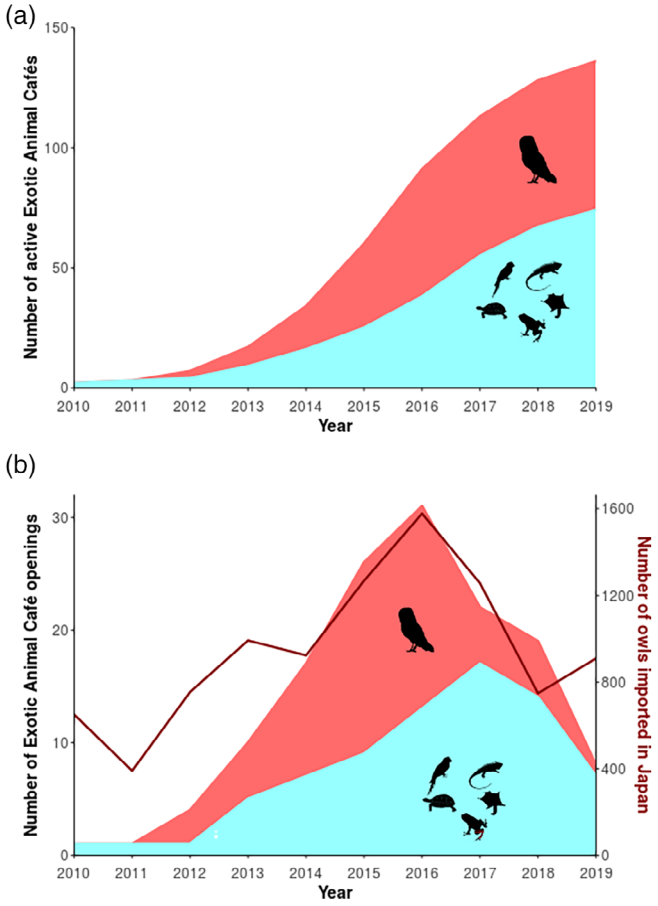


FIGURE 2 (a,b) Temporal trends of Exotic Animal Cafés (EACs, $n = 142$): (a) number of active EACs; and (b) number of EAC openings (in red: owl cafés; and in blue: every other type of EACs) with live imports of owls (for the two most common families: Strigidae and Tytonidae) for trade in Japan between 2010 and 2019. Opening information was obtained from the website or social media accounts (Facebook, Instagram, and/or Twitter) of EACs with their first online activity as an indicator. Number of owls imported in Japan during that period comes from the Convention on International Trade in Endangered Species of Wild Fauna and Flora database

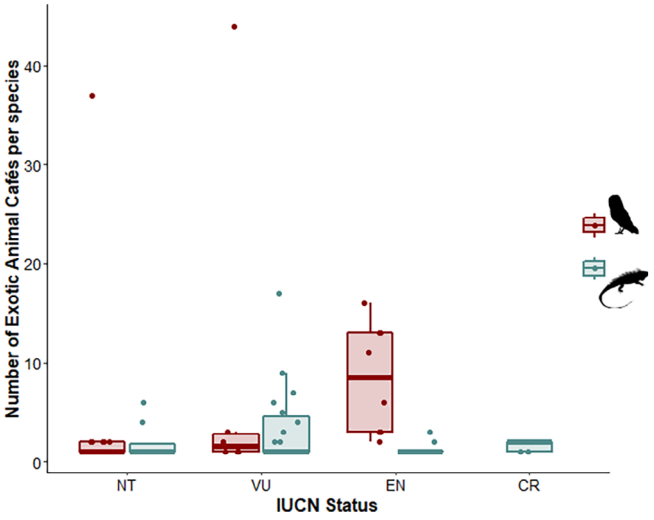


FIGURE 3 Number of exotic animal cafés (EACs) displaying at least one individual belonging to a threatened species of birds or reptiles. Most exotic animal species surveyed in EACs and listed by the International Union for Conservation of Nature (IUCN) Red List as threatened (CR, critically endangered; EN, endangered; VU, vulnerable) or near threatened (NT) belonged to the Aves (28 species, 309 individuals) and Reptilia (41 species, 165 individuals) classes (see Tables S1 and S2 for details)

species ($n = 235$) were recorded in at least two EACs. Most animals displayed were birds (62%), reptiles (21%), mammals (15%), and to a lesser extent, amphibians (2%). Owl species belonging to the Strigidae and Tytonidae families were very common and represented 40% of the total number of animals. The five most common species were the African pygmy hedgehog (*Atelerix albiventris*, $n = 245$ in 55 EACs); barn owl (*Tyto alba*, $n = 183$ in 78 EACs); the northern white-faced owl (*Ptilopsis leucotis*, $n = 111$ in 56 EACs); the Indian eagle-owl (*Bubo bengalensis*, $n = 94$ in 57 EACs); and the sugar glider (*Petaurus breviceps*, $n = 94$ in 27 EACs).

We found 403 individuals belonging to 52 species listed in the IUCN Red List threat categories (i.e., "Critically endangered," "Endangered," and "Vulnerable," Table S1) and 123 individuals of 23 species categorized as "Near threatened." The majority of threatened species exhibited in EACs were birds and reptiles (Figures 3 and S1), and the most common were the snowy owl (*Bubo scandiacus*, $n = 63$ in 44 EACs) and the chaco owl (*Strix chacoensis*, $n = 48$ in 37 EACs) listed in the IUCN Red List as "Vulnerable" and "Near Threatened," respectively. In total, 60% of the species identified were CITES-listed under Appendix II (235 species, 2482 individuals), and Appendix III (6 species, 16 individuals). Yet, 53 individuals belonged to 9 species CITES-listed under Appendix I (Table S1).

Between 2010 and 2019, Japan imported 818,062 live specimens of reptiles (77.7%, $n = 635,400$, Figure S5), birds (7.9%, $n = 65,238$; including 9468 live owls of Strigidae and Tytonidae families, Figure S4), mammals (7.3%, $n = 60,204$), and amphibians (6.9%, $n = 57,220$) under the "trade" term. The number of owl imports peaked in 2016 ($n = 1578$) with almost 44% of the owls ($n = 4102$) imported between 2015 and 2017 (Figure 2b). Since 2010, 543,575 live specimens belonging to species present in EACs were imported in Japan with 68% registered as "captive bred," 14% as "wild-caught," and 16% as "ranched" or "farmed." Numbers varied greatly across species. We found 161 species for which over 50% of individuals were imported as "captive bred" such as Java sparrow *Lonchura oryzivora* ($n = 5642$, 100% captive bred) or Chinese three-keeled pond turtle *Mauremys*

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reevesii (n = 34,126, >99% captive bred), and 31 species with over 50% of individuals being "wild-caught," "ranched," or "farmed" such as Southeast Asian water monitor *Varanus salvator* (n = 11,763, >95% wild-caught), Nile monitor *Varanus niloticus* (n = 4755, >80% ranched) or Diamondback terrapin *Malaclemys terrapin* (n = 2089, >86% farmed). According to the CITES Trade Database, we found no record of import in 1975–2019 under the "live" term for 24 individuals belonging to 7 CITES-listed species present in EACs (2 species listed in Appendix I; and 5 in Appendix II; see Table S2 and Supporting Information S1). We excluded species recently CITES-listed (e.g., *Ctenosaura* genus is listed in Appendix II since 2019). For instance, we found no record of importation of Bengal slow loris (*Nycticebus bengalensis*), spotted pond turtle (*Geoclemys hamiltonii*), or barred eagle-owl (*Bubo sumatranus*) despite their presence in at least one EAC.

We found 169 species (40% of all species found in EACs) that were not CITES-listed. Most individuals belonged to the Mammalia class with the African pygmy hedgehog and the sugar glider as the most common species. But, other species such as capybara (*Hydrochoerus hydrochaeris*), Egyptian rousette (*Rousettus aegyptiacus*), or Linnaeus's two-toed sloth (*Choloepus didactylus*) were also present. The most numerous species present in EACs but not CITES-listed (n = 90) belonged to the Reptilia class and included, according to the IUCN Red List, species considered as "Endangered" (n = 1, golden gecko *Gekko badenii*), "Vulnerable" (n = 7, e.g., crested gecko *Correlophus ciliatus*), "Near threatened" (n = 5, e.g., ocellated skink *Chalcides ocellatus*), or "Data deficient" (n = 2, e.g., Boelen's python *Simalia boeleni*). Among these non-CITES-listed species, 30 were not evaluated either by the IUCN Red List.

Remarkably, we found three species and two subspecies endemic to Japan: the Buerger's frog (*Buergeria buergeri*), the sword-tail newt (*Cynops ensicauda*), the Japanese five-lined skink (*Plestiodon latiscutatus*), the Miyako toad (*Bufo gargarizans miyakonis*) and the Yonaguni's king rat snake (*Elaphe carinata yonaguniensis*). Both the Miyako toad and the sword-tail newt are assessed "Near threatened" on the Red List of Threatened Species of Japan, while the Yonaguni's king rat snake is assessed "Endangered" (Ministry of the Environment of Japan, 2020). Moreover, we found 12 species listed as invasive and one species as potentially invasive in EACs (Table S3).

Some EACs (n = 38) offered buying options. Prices for an individual varied greatly depending on the species and the "quality" of the individual, including the rarity of its color or feathering. For instance, barn owls were offered for prices ranging from ¥36,000 ($340) for white morphs to ¥200,000 ($1860) for black morphs. Most owls were offered for prices between ¥200,000 and ¥600,000 ($5600), while rarer bird species like the red-tailed black cockatoo (*Calyptorhynchus banksii*, n = 3) or the "Vulnerable" secretary bird (*Sagittarius serpentarius*, n = 1) were offered for ¥2,480,000 ($23,250) and ¥2 200,000 ($20,500), respectively. Reptiles in general were offered at lower prices (see Table S2 for complete price list).

4 | DISCUSSION

We show that EACs are a recent and widespread phenomenon across Japan. A large variety of wildlife species are present in these cafés: from the recently discovered sword-tail newt endemic to the Nansei islands to the vulnerable snowy owl and the critically endangered pancake tortoise (*Malacochersus tornieri*). Japanese EACs display many threatened species present on the IUCN Red List and several CITES-listed species with no record of importation since 2010. Additionally, 40% of the species present in EACs were not CITES-listed. The most represented classes—birds and reptiles—counted the most threatened species, matching with global trade data in exotic pets (Bush et al., 2014). Moreover, the increase of importations of owl species is consistent with the openings of EACs suggesting these businesses reflect the demand for owls in Japan. In return, EACs likely contribute to this increase, given the important number of owls displayed and the promotion made to purchase them as pets. Reptiles were the second most common category, which is consistent with the over 600,000 specimens imported in Japan during the last decade.

The lack of effective legislation to regulate domestic trade presents a serious challenge. There is no specific regulation restricting the possession of exotic pets and no requirement to establish legality or traceability of most exotic species owned or traded in Japan, with the narrow exception of CITES Appendix I species that are protected by the Law for the Conservation of Endangered Species of Wild Fauna and Flora. The lack of a legal framework around exotic pets and the definition and regulation of Japanese zoos, aquariums, or zoo-like facilities—including EACs—combined with weak enforcement (i.e., low rates of detection and light sentencing), leaves wildlife trade poorly regulated in Japan (Ishihara et al., 2010; Kitade & Naruse, 2018, 2020; WWF Japan, 2021).

Our results support the hypothesis that EACs might be a growing component of wildlife trade. However, they do not represent the current state of exotic species and individuals present in Japan. While importations of live birds have been declining since 2000 in Japan, importations of live reptiles follow a very different pattern and

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tend to increase since 2010 (Table S5). Visiting an EAC might encourage consumers to buy exotic pets, especially when EACs sell them (as there is no legislation restricting this option), therefore contributing to the pet trade. Moreover, EACs could serve as showcases for pet shop wholesalers and/or retailers. EACs might play an overlooked role in the observed trends of wild animals legally and illegally imported in Japan. International trade in exotic pets is an important and increasing driver of biodiversity loss for many species (Sodhi et al., 2004). For instance, the ball python (*Python regius*) is the most common live species imported in Japan and was one of the most encountered snake species in EACs. According to the CITES trade database, a large portion (>46%) of ball pythons imported in Japan between 2010 and 2019 was not bred in captivity. The intensive trade of ball pythons is substantially impacting wild populations in their natural range (Auliya et al., 2016; Harrington et al., 2020).

We found that most specimens imported in Japan in 2010–2019, belonging to species present in EACs and CITES-listed, were imported under the "captive-bred" term (e.g., 89% of birds in 2005–2015; Vall-Llosera & Su, 2019; Table S4). Indeed, some individuals in EACs presented important color variations indicating their captive origin and selective breeding (e.g., leucistics Java sparrow or axolotl *Ambystoma mexicanum*). While captive breeding facilities meet some of the global demand for pets (Tensen, 2016), there is evidence that some of them launder wild-caught individuals (Lyons & Natusch, 2011; Nijman & Shepherd, 2009). Several species present in EACs were mostly imported in Japan as "wild-caught," including species listed as "Vulnerable" (e.g., the white-throated toucan *Ramphastos tucanus*) and "Endangered" (e.g., the spiny turtle *Heosemys spinosa*) as assessed under the IUCN Red List. Unsustainable rates of wildlife harvesting for the pet trade have already contributed to the decline of many species (e.g., Asian turtle crisis, Nijman & Shepherd, 2015; slow loris trade, Nekaris & Jaffe, 2007). Rare and newly discovered species are attractive targets, often with a high value fueling the demand (Courchamp et al., 2006; Stuart et al., 2006; WWF Japan, 2021). Additionally, endemic species are particularly vulnerable to overexploitation due to their very restricted range (O'Brien et al., 2003).

Japan is home to more than 120 endemic reptile and amphibian species (Yoshikawa & Hikita, 2018; Yoshikawa & Matsui, 2018). Previous research has highlighted the illegal harvest and trafficking of Japanese endemic herpetofauna and their presence on the international pet trade (Janssen & Shepherd, 2019). However, we found only three species and two subspecies endemic to Japan present in EACs. While Japanese herpetofauna demand might be growing in international trade, we found no evidence that EACs are contributing to a large domestic demand in endemic species.

A large proportion of species (40%)—including a majority of reptiles—were not listed under CITES Appendices, including "Endangered," "Vulnerable," and "Near threatened" species. A significant proportion of reptiles imported in Japan are still wild-sourced (30% when including "ranched" and "farmed" specimens; Tables S4 and S5). For instance, among the 35,662 Russian tortoises (*Testudo horsfieldii*) and the 6682 Geyr's spiny-tailed lizard (*Uromastyx geyri*) imported in Japan between 2010 and 2019, 38% and 91% were wild-caught despite the species being "Vulnerable" and "Near threatened," respectively. Over 90% of known reptile species are not regulated by CITES, thus the millions of reptiles and amphibians traded each year (Auliya et al., 2016; Carpenter et al., 2014). Species evaluated as threatened by the IUCN Red List are not necessarily endangered by local and/or international trade and therefore might not always need to be listed under a CITES Appendix. However, it takes on average 10 years after the IUCN assesses a species as threatened by international trade for CITES to list it in Appendices I or II (Frank & Wilcove, 2019), which reflects that many endangered species are traded internationally. We found that 30 species, mostly reptiles ($n = 25$), were neither CITES-listed nor evaluated by the IUCN Red List. This is consistent with the known biased taxonomic coverage of the IUCN Red List and its assessment gaps for reptiles (Bachman et al., 2019) and amphibians (Howard & Bickford, 2014). Several individuals found in EACs most likely belonged to subspecies, such as the San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) designated as an endangered species in California. Geographically isolated populations can be less resilient and therefore more impacted by the trade. For many species with well-established trade, there is a lack of fundamental knowledge on their biology and on the impacts of harvesting on populations (Auliya et al., 2016; Janssen & Gomez, 2021). This highlights the importance of a precautionary approach to identify and decide on sustainable exploitation practices (Smith et al., 2011).

Seven CITES-listed species had no matching record of importations over the past 45 years in Japan. This could be evidence of a local trade of species coming from breeding facilities in Japan or from zoos. For instance, some Japanese zoos breed otters, later selling them for the pet trade and/or purchasing them from animal dealers (Kitade & Naruse, 2018). Several rare primate species such as the vulnerable Sunda slow loris, the Senegal bushbaby (*Galago senegalensis*), and the white-faced saki (*Pithecia pithecia*), with no recent records in the CITES

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trade database, are also displayed in EACs. Recent seizures by Japanese customs of several slow loris, bushbaby, and other primate species indicate that illegal trade persists (Kitade & Naruse, 2020). This suggests that some individuals present in EACs may come from the illegal wildlife trade.

Wildlife trade indirectly places substantial pressure on biodiversity through the introduction of pathogens and invasive species, especially in islands. The globally lethal amphibian fungus *Batrachochytrium dendrobatidis* was introduced through the exotic pet trade (O'Hanlon et al., 2018). At least 40 species of non-native reptiles and amphibians are present in Japan including the giant Chinese salamanders (*Andrias davidianus*) invading river networks and provoking serious introgressive hybridization with populations of native salamanders (Fukumoto et al., 2015). Already 43 exotic bird species are established in Japan, most of them imported as pets (Eguchi & Amano, 2004). We identified 13 species in EACs that are invasive or potentially invasive in Japan (e.g., the masked palm civet *Paguma larvata*), established overall Japanese main islands (Masuda et al., 2010). Many more exotic species in EACs have the potential to establish in Japan or to reinforce existing populations if released. Previous research suggests that captive-bred species may lose their ability to establish in new environments and that the most successful invaders are wild-caught (Carrete & Tella, 2008). About 30% of the specimens imported in Japan are not captive-bred (i.e., wild-caught, ranched, or farmed), inducing a doubt for EAC ones. Once established, non-native species can impact local biodiversity through competition (Gurnell et al., 2004), predation (Medina et al., 2014), and disease transmission (Chantrey et al., 2014). The Invasive Alien Species Act from the Japanese Ministry of the Environment (2004) currently provides no preventive measures to limit the ownership of potentially invasive species.

EACs lie in between nontraditional home-like places to keep pets and zoos. A central characteristic of these cafés is that customers get the opportunity to be very close to the animals, often to touch ("pet") them, which increases the risk of zoonotic disease transmission. Zoonotic *Salmonella* infections linked to contact with exotic pets are regularly reported, involving popular species such as African pygmy hedgehogs (Anderson et al., 2017), central-bearded dragons (Kiebler et al., 2020), and ball pythons (Krishnasamy, 2018)—present in 55, 31, and 28 EACs, respectively. Novel pathogenic agents could emerge from the large diversity of species present in EACs (Johnson et al., 2020). Recent studies detected a wide range of pathogenic bacteria present in popular exotic species (e.g., ball pythons, D'Cruze et al., 2020; sugar gliders, Varriale et al., 2019). For instance, a new nematode species *Baylisascaris potosis* closely related to *Baylisascaris procyonis* (responsible for severe and potentially fatal neurologic infections in humans) was described in wild-caught kinkajous (*Potos flavus*) kept as pets in Japan (Tokiwa et al., 2014). Kinkajous were found in four EACs. Between 2007 and 2018, 195 specimens of primates and bats were seized as a violation of CITES in Japan. Imports of these taxa are also strictly prohibited by the Infectious Disease Control Law (Kitade & Naruse, 2020). Despite this, we still found 27 primates belonging to 9 species and 2 Egyptian rousettes in EACs.

Although we did not systematically survey housing conditions, we could observe from the images and videos analyzed as well as the visits made that there was room for improvement regarding animal welfare. For instance, in the otter cafés ($n = 5$) we visited, none of the housing respected the minimum recommended 60 m^2 (AZA Small Carnivore TAG, 2009) and only small bathtubs were provided for otters to express their aquatic behavior. Overall, restricted space, unsolicited physical interactions and inappropriate light conditions seemed to be often experienced by animals in EACs.

Species identification was based on the materials provided online (i.e., pictures and videos) by the EACs. While many individuals were presented in the recognizable context of the café surveyed, the possibility that some species were advertised but not present remains a potential bias in our study.

The demand for exotic animals is increasing and the quantity and diversity of species found in the pet trade are expanding (Scheffers et al., 2019). Reducing consumer demand for exotic pets and their likelihood to visit EACs is important, and could be achieved through both educational and public awareness campaigns (Wallen & Daut, 2018) as well as stronger legislation (WWF Japan, 2021). Japan's proximity to major wildlife trade hotspots (i.e., South-East Asia and Australia, Scheffers et al., 2019) place the country in suitable location and favorable conditions to participate in the exotic pet trade. Therefore, Japan's government should adapt their policies to monitor and better report the trade in wildlife species as suggested for other countries (Watters et al., 2022). Strategies aimed at influencing people's behavior (Veríssimo & Wan, 2019) could be deployed in Japan, and zoos could be at the forefront of such initiatives. Informing consumers about the zoonotic disease risks and the potential illegality associated with EACs could reduce demand, perhaps even more than ethical arguments (Moorhouse et al., 2017).

AUTHORS CONTRIBUTIONS

Marie Sigaud and Cécile Sarabian conceived the original idea and designed the study. Marie Sigaud and Cécile

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Sarabian collected and analyzed the data. Marie Sigaud drafted the first version of the article. Tomomi Kitade assessed the existing legal framework and all authors discussed the results and contributed to the final article.

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SUPPORTING INFORMATION

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