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The Illegal Trade in Live Western Chimpanzees (*Pan troglodytes verus*) in Guinea-Bissau and Proposed Conservation Management Actions

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ABSTRACT

The western chimpanzee (*Pan troglodytes verus*) is classified as Critically Endangered by the International Union for Conservation of Nature (IUCN), with an 80% decrease decline between 1990 and 2014. A major threat to its survival is the illegal trade in live chimpanzees (ITLC), a highly organized criminal activity with national and international scope. Here, we compile the existing information on ITLC in Guinea-Bissau, highlight relevant knowledge gaps, and suggest immediate conservation management actions. ITLC in Guinea-Bissau is likely extensive and is a major factor contributing to the declining of the chimpanzee population. The most urgent measures needed to prevent the ITLC in Guinea-Bissau are to (i) build a centralized database containing information on wildlife kept as pets, (ii) train officials on national and international laws and regulations related to the wildlife trade and to identify protected and threatened species, (iii) define/update penalties for perpetrators holding live chimpanzees, (iv) raising awareness in society on the risks of maintaining wildlife, (v) investigate the ITLC supply trade-chain and the actors' profile, and (vi) build a sanctuary or rehabilitation center within Guinea-Bissau. Considering the high risk of extinction of the subspecies, addressing the ITLC in Guinea-Bissau and elsewhere in West Africa is urgent.

1 | Introduction

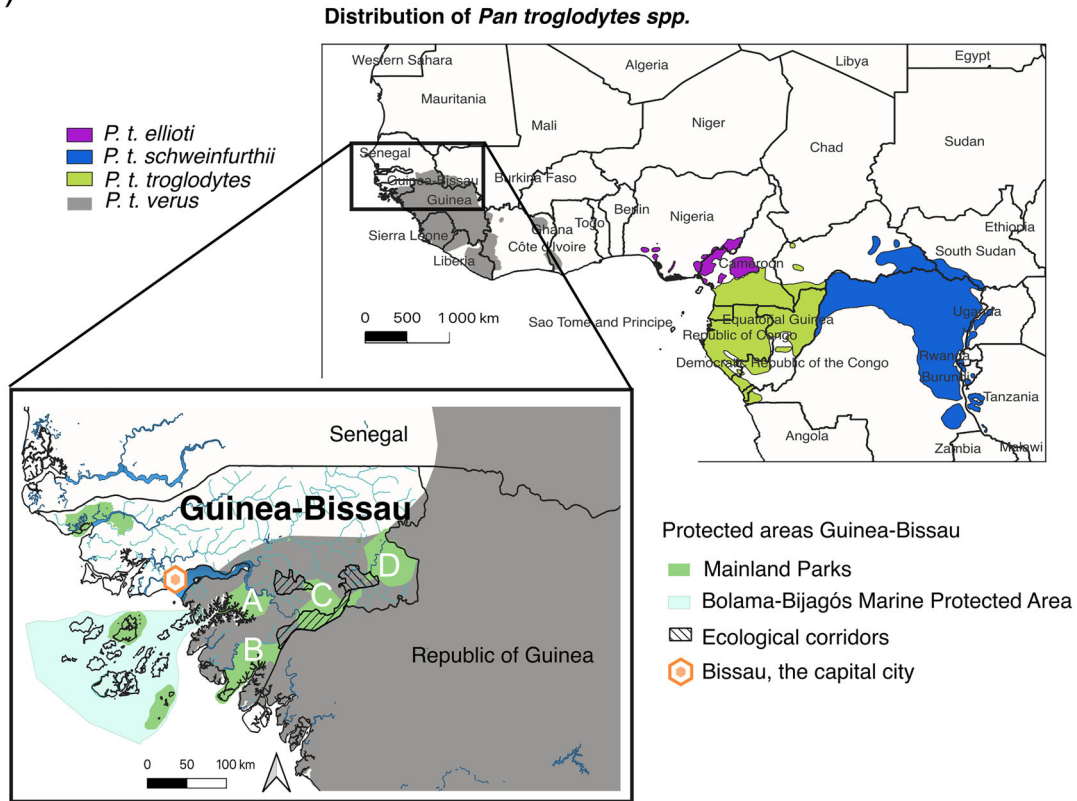
The western chimpanzee (*Pan troglodytes verus*), endemic to West Africa (Figure 1), is classified by the International Union for Conservation of Nature (IUCN) as Critically Endangered. The taxon suffered an 80% decrease in abundance between 1990 and 2014 (Humle et al. 2016; Kühl et al. 2017), reaching a total estimated population size between 17,577 and 96,564 individuals (95% confidence intervals; Heinicke et al. 2019). The

subspecies' most prominent conservation threats are habitat loss and fragmentation, direct killing, and propagation of diseases (Humle et al. 2016). Habitat fragmentation increases accessibility to natural habitats which, in turn, may increase poaching and transmission of disease between chimpanzees and humans (Humle et al. 2016). *Pan troglodytes verus* is hunted to supply the trade in wild meat, live animals, and body parts (Humle et al. 2016; IUCN SSC Primate Specialist Group 2020; Sá et al. 2012; The Arcus Foundation 2020).

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a)



b)



c)



FIGURE 1 | (a) Distribution of *Pan troglodytes* subspecies and location of Guinea-Bissau in West Africa. The map of Guinea-Bissau shows the distribution of the western chimpanzee (*Pan troglodytes verus*), the network of protected areas, and the capital city—Bissau. The distribution of the western chimpanzee is represented in grey. Natural and national parks are represented by green areas, and ecological corridors are marked by striped areas. A—Cufada Lagoons Natural Park (CLNP), B—Cantanhez National Park (CNP), C—Dulombi National Park (DNP), and D—Boé National Park (BNP). Bissau is indicated by an orange-and-white hexagon. (b) Camera-trap photos of a wild group of chimpanzees (credits by L. Palma, TROPIBIO-CIBIO). (c) A confiscated chimpanzee (named Bo) at CLNP headquarters in 2016 waiting to be relocated to a sanctuary abroad (credits by Maria Joana Ferreira da Silva).

The illegal trade in live western chimpanzees (ITLC) is considered a major conservation threat (The Arcus Foundation 2020). Data from several sources suggest that more than 643 western chimpanzees were trafficked globally between 2005 and 2011 (Stiles et al. 2013). Extrapolation estimates suggest that during the same period, an average of 2021 chimpanzees were killed (Stiles et al. 2013). Online platforms and social media are used by traffickers to advertise the sale of western chimpanzees and communicate with buyers (Clough and Channing 2018), a trend which increased in 2020 during the COVID-19 pandemic and lockdowns (Nijman

et al. 2021; Stiles 2023). Between 2016 and 2020, 153 chimpanzees, the majority of which belonged to the western subspecies, may have been traded at the global scale (Stiles 2023).

The ITLC is a criminal activity with national and international dimensions (information on the traffickers' profile and methods in Stiles 2023; Stiles et al. 2013; The Arcus Foundation 2020). Chimpanzees are used as pets and as symbols of wealth and commercial entertainment (The Arcus Foundation 2020). Individuals are often displayed in African hotels and commercial

establishments (Stiles et al. 2013; The Arcus Foundation 2020). The primary buyers of live chimpanzees are in Africa, Eastern Europe, the Middle East, and China, while the primary source countries are Cameroon, DR Congo, and the Republic of Guinea (PASA 2020) (Figure S1). The list of countries involved in the ITLC is large¹, and primary and secondary routes to foreign markets change overtime (Stiles et al. 2013; Stiles 2023) (Figure S1). In West Africa, the ITLC has been perpetrated by family networks operating in tandem across various countries for long periods of time (Clough and Channing 2018; The Arcus Foundation 2020). The international routes of ITLC may follow the ones used for the traffic of drugs and weapons, and apes are often discovered in mixed shipments alongside other illicit goods (The Arcus Foundation 2020).

The ITLC has been linked to widespread local corruption, which offers an opportunity to bribe or threaten local customs officers, law enforcement agents, government officials, and judges (PASA 2020; Stiles et al. 2013; The Arcus Foundation 2020). Chimpanzees are listed under Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the appendix which includes the most endangered species. Therefore, the international trade of chimpanzees (or their parts) is prohibited due to the detrimental impact this may have on the survival of the species and, import and export permits are only issued in specific circumstances. Nevertheless, fraudulent CITES permits issued in the 1990s allowed the export and import of live chimpanzees from West and Central Africa² (Clough and Channing 2018; Stiles et al. 2013).

Multiple factors need to be addressed to stop the ITLC in West Africa, such as weak law enforcement, incongruities in legislation across countries, insufficient financial and logistical resources for conservation management, and lack of suitable sanctuaries³ or rehabilitation centers in-country (IUCN SSC Primate Specialist Group 2020). Underlying factors thought to contribute to deficient law enforcement include (i) corruption and poor training of law enforcers, judges and CITES focal persons; (ii) weak court rulings that do not discourage criminal activities⁴; (iii) lack of collaboration and coordination between agencies in different countries; and (iv) the impossibility or difficulty in placing the confiscated individual in accredited sanctuaries or rehabilitation centers (PASA 2020).

Sanctuaries, which were previously considered to primarily only benefit the welfare of rescued, orphaned, or confiscated animals and not contribute toward in situ conservation efforts, have been acknowledged in the last decades to play a significant role in improving wildlife law enforcement (Ferrie et al. 2014; Schoene and Brend 2002; Trayford and Farmer 2013). Besides providing a safe place to house and care for confiscated animals, sanctuaries can also improve the effectiveness of wildlife law enforcement by incentivizing seizures of live animals and prosecution of hunters and traffickers (Ferrie et al. 2014; Fultz 2017; Schoene and Brend 2002; Stiles et al. 2013). In contrast, the absence of a suitable wildlife sanctuary in-country can hinder wildlife law enforcement efforts (Carter 2003; Ferrie et al. 2014).

Little is known about the trade of chimpanzees in Guinea-Bissau (GB), a country located at the northwestern limit of the subspecies distribution and home to 5%–6% of the total estimated

size of the global population (Figure 1). In this perspective article, we discuss the illegal trade of live chimpanzees in GB. We compile existing information, highlight relevant knowledge gaps, and suggest management actions to address this urgent conservation issue. We aim to raise awareness of conservation scientists and practitioners and local and international civil society organizations to collaborate on addressing this urgent conservation issue.

2 | The Illegal Trade of Live Chimpanzees in Guinea-Bissau

GB (36,125 km², population: 2.08 million, CIA 2024; <https://stat-guineebissau.com/>) consists of a mainland area and the Bijagós archipelago (Figure 1). The country is a recognized biodiversity hotspot and a regional stronghold for endangered species, such as the western chimpanzee (locally called *Dari*) (Bersacola et al. 2018; Sousa 2015). Biodiversity conservation and ecotourism are nationally acknowledged as important drivers for human and economic development, which has resulted in formally protecting almost 26.3% of the country's area (Figure 1a). National authorities consider the western chimpanzee as a flagship for forest conservation (Costa et al. 2013).

Biodiversity conservation management faces many challenges in GB. The country is considered low-income, and most of the population subsists on less than US\$ 2 a day (CIA 2024). Moreover, the political and military instability for many decades contributed to poor maintenance of infrastructure and inefficient management of governmental institutions (Ferreira 2022; Sangreman 2019). People living in the capital city, Bissau, are often unaware of the environmental problems prevalent in the rural, forested areas (Ferreira da Silva et al. 2024a).

The western chimpanzee is found mainly in the south of the Corubal River and in protected areas (Bersacola et al. 2018; Carvalho et al. 2013) (Figure 1a). The most recent estimated population size of chimpanzees in GB is between 923 and 6121 individuals (95% confidence intervals; Heinicke et al. 2019). The populations inhabiting Cantanhez National Park (CNP) and Cufada Lagoons Natural Park (CLNP) (Figure 1) are considered a priority for the global conservation of the subspecies (IUCN SSC Primate Specialist Group 2020). Their effective population size was estimated to be below 500, and CNP and CLNP may be at a high risk of extinction (Ferreira da Silva et al. 2024b). The main conservation threats are habitat loss and fragmentation, hunting, and disease propagation, namely leprosy (*Mycobacterium leprae*) that was detected in CNP (Hockings et al. 2021; Hockings and Sousa 2013; Sá et al. 2012).

Chimpanzees are hunted in GB to supply the illegal trade of live individuals (Ferreira da Silva et al. 2021a; Stiles 2023). The trade of body parts to be used in traditional medicine practices was observed in the capital city markets although the origin of these products is unknown (Sá et al. 2012). Moreover, the trade and consumption of chimpanzee meat does not seem to occur in GB (Ferreira da Silva et al. 2021b; Minhós et al. 2013).

Chimpanzees are commonly observed living as pets in private residencies and hotels. Individuals are often tied up by their

hips or necks to trees or metal posts with metal chains or living alone in small metal cages, frequently lacking a permanent source of water, and not being able to walk or jump (Figure S4). They often present stress-related stereotypic behaviors. Captive chimpanzees tend to die of diseases or are killed because they become aggressive when reaching puberty.

The owners may admit outright in a public space that they have a chimpanzee on their premises and invite strangers to take pictures (Figure S4). They openly discuss how they obtained the chimpanzee, the purchase price, the specifics of the chimpanzee's personality, and how these or other individuals have died. The owners are often ignorant of practices to maintain the animals in good welfare and the negative consequences for themselves or their family members' health and security in keeping wild animals in their residence. Maintaining an infant chimpanzee is considered expensive, mainly because of the amount of food required. There is no specialized veterinary care available in the country. Overall, their behaviors suggest that it is socially acceptable to own a chimpanzee or any other wild animal and that they are unaware of the illegality of the practice. Some of the owners mention that they have "saved the animal from dying of starvation," which suggests a positive intention toward the animals but a lack of awareness of how their actions are contributing to the local extinction of the western chimpanzee.

A GB-wide systematic study of the number of wild-born chimpanzees being kept as pets has not been conducted. However, in 2020, several national governmental organizations⁵ carried out a 2-month joint regional survey in the administrative regions of Bafatá, Tombali, Quinara, and the Bissau sector to assess the extent to which primates are kept as pets and evaluate their welfare conditions (Instituto para a Biodiversidade e Áreas Protegidas et al. 2020). They found 98 people owning a living wild-born primate (Table S2). Most of the primates found were *Erythrocebus patas*, but five chimpanzees were recorded (Table S1⁶). The owners reported to have bought the animals directly from hunters, who were either targeting the infants or killed lactating mothers for meat consumption and sold the babies (Instituto para a Biodiversidade e Áreas Protegidas et al. 2020). Moreover, 18 chimpanzees were recorded living in people's houses or hotels between 2006 and 2022 by Maria Joana Ferreira da Silva during fieldwork for other purposes and not actively searching for primates kept as pets (Figure S4 and Table S2⁷). Considering that 5–10 adults may be killed to harvest one infant (Teleki 1980; The Arcus Foundation 2020), our observations suggest that a minimum of 90–180 adult chimpanzees may have been killed to acquire the 18 chimpanzees being kept as pets. The killing of 90–180 chimpanzees can represent up to 20% of the population size of GB chimpanzees if the lowest value of abundance in 95% confidence interval reported by Heinicke et al. (2019) for the country is considered. These figures likely underestimate the true extent and impact of the ITLC during this 16-year period. Overall, these anecdotal data suggest significant negative consequences for the conservation of chimpanzees and primates in general.

The profile of the final buyers of live chimpanzees in GB has not been systematically characterized. The information collected so far suggests they are expected to have a high socioeconomic status (Ferreira da Silva et al. 2021a). The price of an infant

is often mentioned to be 10-fold of other primates sold as pets (Ferreira da Silva et al. 2021a)⁸. Participants of qualitative studies who are knowledgeable of hunting techniques justify the higher price of chimpanzees compared to the other species because capturing live individuals is challenging and usually requires specific techniques and killing of adult individuals. In their own words: "it is not easy to catch a chimp baby; you have to kill his mother. You need to shoot during the day. With mauser [rifle], you can kill the mother without hurting the baby" (participant ID #6 in Ferreira da Silva, et al. 2021a).

To our knowledge, there have been no systematic study to characterize those individuals responsible for procuring and selling the infant chimpanzees (e.g., hunters, middlemen, and international traffickers) and methods of the traffickers trading chimpanzees sourced in GB to supply the international trade.

3 | Law Enforcement and the ITLC

National governmental agencies face various difficulties in addressing the ITLC and other environmental crimes. First, the ITLC is only one of several illicit trafficking activities occurring in the national territory. GB has a recognized international organized criminal network that traffics people, weapons, drugs, and natural resources such as timber (e.g., illegal logging of rosewood), bushmeat, traditional medicines, and live terrestrial and marine animals captured from the wild (Africa Organized Crime Index 2023; Ferreira da Silva et al. 2021b; Ferreira da Silva et al. 2021a; Minhós et al. 2013; Sá et al. 2012). Second, the country lacks trained and equipped judiciary-related units that can effectively address environmental crime. Third, national law enforcement officials controlling the political borders lack training and equipment and receive low and irregular wages (Africa Organized Crime Index 2023). In general, these officials tend to be uninformed on national or international laws and regulations, including CITES (A. Regalla, personal observation). This has contributed to the description by international agencies of GB political borders as "porous" and "vulnerable" to the smuggling of illicit goods (Africa Organized Crime Index 2023).

Protected area effectiveness is constrained due to a number of factors. These include resources to recruit, train, and equip the rangers to effectively deter illegal extraction of natural resources (Information for CLNP in Table 1, Amador et al. 2014 and for CNP in Costa 2010; Ferreira da Silva 2012; Sousa et al. 2017). Staff often lack technical knowledge of the species occurring in the protected areas, including those protected by national laws and international agreements, and are unaware of the national laws related to hunting regulations. Additionally, protected areas are relatively novel in GB, and local hunters and farmers are not well informed of their legal rights to use the land and its resources, and they may not be aware of nor have the capacity to transition to alternative income earning activities (CNP: Costa 2010; Ferreira da Silva 2012; Sousa et al. 2017; CLNP: Amador et al. 2014). Formalizing protected areas has been creating conflicts between local communities and national organizations managing natural resources and has limited patrolling actions by governmental agencies staff (Costa et al. 2017; Sousa et al. 2017; Temudo 2009).

TABLE 1 | A resume of the five most important challenges in addressing the illegal trade of live chimpanzees in Guinea-Bissau, suggestions of immediate conservation management actions to address each identified issue, and the institutions involved.

Issues	Actions	Institutions involved
1. Chimpanzees living as pets in private premises	(a) National inventory of animals living in captivity and creation of a centralized database containing information on age, sex, geographic origin, and the owner's contact details.	DGFF, IBAP, and DGP (would fill database with information)
	(b) Registration of wildlife owners and information on details on purchase (number of animals and suppliers). The information would be gathered in the database mentioned in (a).	DGFF
	(c) Collecting information on the welfare of animals regularly.	DGFF and veterinarians working in collaboration with DGP
	(d) Defining regulations, penalties, and welfare guidelines for owners.	DGFF and DGP
	(d) Schedule confiscation of animals and organize logistics of relocation (including funding to cover costs) and destination sanctuaries.	IBAP, DGFF, and DGP
	e) Raising awareness in society on the risks of maintaining wildlife (e.g., posters and pamphlets in Portuguese and Guinea-Bissau Kriol available in IUCN specialized group in huma-primates' interactions ¹⁵).	NGOs
	(f) Training sessions on international regulations (particularly CITES) and national laws directed to specific professional groups, such as military forces and officials at terrestrial borders and at international airport.	DGFF and IBAP
2. Need to empower officials	(g) Create national sanctuary or rehabilitation center for wildlife to house confiscated individuals.	DGFF, IBAP, DGP, and NGOs
	(a) Assembling national specialized task force or working group to address wildlife crime.	DGFF, IBAP, DGP, NGOs, and BPNA ¹⁶ and support from analogous agencies from other countries
	(b) Create specific line of funding to support working-related costs (i.e., petrol for patrolling, equipment and uniforms).	
	(c) Training on national and international legislations and on updated techniques to investigate wildlife trafficking/environmental criminology.	BPNA, DGFF, and INTERPOL
3. Outdated and inefficient national legislation to discourage illegal activities	(d) Improve environmental education and empower communities living in Protected Areas to work together with officials and stop capture of live individuals, specifically in understanding the importance of wildlife and the western chimpanzee for national development and economic activities based in nature, such as ecotourism.	NGOs, IBAP, and Ministry of Education
	(a) Define/update penalties for wildlife hunters, middlemen traders, and owners/final consumers.	DGFF
	(b) Raising awareness of judges and policy makers of environmental crimes occurring in Guinea-Bissau (beyond the trade of rosewood) and the conservation status of the western chimpanzee and other emblematic species.	DGFF and NGOs
	(b) Training judges and policy makers on international regulations ratified by Guinea-Bissau.	DGFF and NGOs

(Continues)

TABLE 1 | (Continued)

Issues	Actions	Institutions involved
4. Monitoring illegal trade of chimpanzees originating from GB	(a) Assembling geo-referenced genetic data to assign confiscated chimpanzees in international routes to Guinea-Bissau (e.g., following initiative for gorillas ¹⁶).	Local universities supported by CIBIO
	(b) Investigating and characterizing the supply chain of wildlife (live individuals and products) and the profile of actors (e.g., hunters and owners, and the traders who sell the chimpanzees to overseas buyers). Research to identify alternative livelihoods and activities generating income.	Local university supported by CIBIO. INEP
5. Lack of a rescuing center or sanctuary within country	(b) Return of confiscated individuals with suspected origin of Guinea-Bissau (dependent of 5).	
	(a) Start process to build a sanctuary or rehabilitation center for confiscated wildlife. This will involve training of caregivers and specialized veterinarians in wildlife and the construction of infrastructures.	DGFF, IBAP, NGOs, and PASA

Abbreviations: BPNA, Brigada de Proteção Natureza e Ambiente, Guinea-Bissau; CIBIO, Centro para a Biodiversidade e Recursos Genéticos, Portugal (<https://www.cibio.up.pt/en/>); DGFF, Direção Geral das Florestas e Fauna, Guinea-Bissau; DGP, Direção Geral de Pecuária, Guinea-Bissau; IBAP, Instituto da Biodiversidade e das Áreas Protegidas, Guinea-Bissau; INEP, Instituto Nacional de Estudos e Pesquisas, Guinea-Bissau; INTERPOL, <https://www.interpol.int/en>; PASA, Pan African Sanctuary Alliance (<https://pasa.org/>).

Chimpanzees are included in the list of species receiving protection in the legislation regulating hunting (Decree No. 21/1980, Chapter II, Art. 5° § 4° § 1 and section 5S in Supporting Information) due to its rarity, but the monetary sanctions to people who hunt protected species or trade live or parts of chimpanzees are defined in this decree in a currency that no longer exists⁹. GB ratified CITES in 2017 (Decree No. 3/2017¹⁰) and it is illegal to export, import, re-export, or transport live chimpanzees across borders without a license or a valid CITES certificate. In the legislation regulating CITES and the illegal trade of wildlife products, it is stated that the specimens or products from the species listed in Appendices I and II (e.g., chimpanzees and other primates, respectively) that are found without a valid CITES permit must be seized¹¹ and sanctions should be applied. For the species listed in Appendix I, the monetary sanctions predicted vary between 3,000,000 and 4,000,000 West African CFA Franc (XOF)¹² (Decree No. 3/2017, chapter VI, art. 23° and art. 27° § 1a). However, law enforcers within the main institutions (i.e., IBAP—Institute for Biodiversity and Protected Areas and DGFF—General Directorate of Forests and Fauna) state that they do not have the financial, logistical, or technical ability to enforce CITES. They claim they cannot seize chimpanzees living in private premises because they lack the financial capacity and infrastructure to keep the animals afterward (Ferreira da Silva, personal observation; Ferreira da Silva et al. 2021a). By enforcing the law, they would have to take full responsibility for the confiscated animals which could be highly dependent infant chimpanzees who require 24-h care. Confiscated chimpanzees cannot be simply relocated within country since GB lacks public or private sanctuaries or rehabilitation centers. Officials often feel powerless with the situation and are therefore reluctant to enforce the law.

GB was listed as a confirmed source in international illegal trafficking routes (Africa organized Crime Index 2023), specifically as exporting individuals to the Republic of Guinea (Stiles 2023). Nevertheless, there are no records of successful confiscations by

national officers of live chimpanzees to be illegally exported. The country does not figure in data tables compiling information on the international trade of the subspecies, and the scale of the trade with an origin in GB is unknown (Clough and Channing 2018; Stiles 2023; Stiles et al. 2013). Large numbers of illegal exports have been detected for Republic of Guinea (Clough and Channing 2018; Stiles et al. 2013), and consequently, the number of individuals originated from GB may be considerable. However, to the best of our knowledge, individuals intercepted in international trade routes were never identified to be from GB.

4 | Confiscation of Chimpanzees in GB and Relocation to a Sanctuary Abroad

At present, the only ethically sound solution for confiscated chimpanzees in GB is to place individuals in a sanctuary located in another country.

In January 2015, Maria Joana Ferreira da Silva (CIBIO-InBIO), the local agency IBAP (Dr. Aissa Regalla), and the Embassy of the European Union (focal person, Dr. Helena Foito) initiated the first placement process for GB of confiscated chimpanzees to the Sweetwater's chimpanzee sanctuary at Ol Pejeta Conservancy, Kenya. This operation aimed to (i) set up a prototype for an operational protocol for local institutions to rescue confiscated chimpanzees to sanctuaries and (ii) tighten the collaboration of national and international institutions dedicated to fight the ITLC and rescue of confiscated individuals (e.g., PASA, PEGAS). Both aims were aligned with objectives of the Regional Action Plan. Two female chimpanzees confiscated in 2014 and 2015 and one female living in a private residency were intended to be transferred (Figure S4)¹³.

The process to re-locate the chimpanzees abroad was very complex, lasted 2.5 years, involved 17 institutions, and has cost € 20,124 (calculated in 2018, MJFS personal communication). The costs

were supported by the Born Free Foundation, the nongovernmental organization (NGO) CHIMBO, IBAP, and the European Union. The five phases of the relocation are described step-by-step in section 6S in Supporting Information. Other outcomes were accomplished, such as (i) training of local professionals on wildlife veterinarian procedures through a workshop; (ii) construction of two permanent cages to keep seized wildlife, which is currently located at IBAP's headquarters; (iii) training of inmates of GB prisons on the construction of cages by the MANI TESE NGO operating in GB; and (iv) production of a documentary¹⁴ broadcast in the African branch of the Portuguese National Television (RTP). In 2022, four chimpanzees were seized and relocated to the Liberia Chimpanzee Rescue & Protection Sanctuary following the general procedure of the operational protocol. Nevertheless, given the high costs and complexity of the operation and the large number of chimpanzees living in private premises, relocation of confiscated individuals to a sanctuary outside of GB is not considered a viable long-term solution (A. Regalla, personal communication, 2025).

5 | Possible Immediate Actions to Address the ITLC in GB

We summarize important challenges to addressing the ITLC in GB and suggest immediate conservation management actions to address each identified issue and the institutions involved (Table 1).

Implementing the proposed conservation management actions will require coordination between environmental, wildlife conservation, and law enforcement national and international agencies. However, the mechanisms for governmental agencies to work collaboratively are not developed. Bureaucratic fragmentation and unclear jurisdictional responsibilities can limit the implementation and enforcement of policies. In particular, the lack of resources for monitoring illegal activities, the presence of outdated and unclear legislation, and the lack of awareness by the public on the subspecies poor conservation status can undermine the effectiveness of the conservation actions proposed here.

Underlying most of the challenges is a lack of university-trained technicians working for governmental agencies in themes related to environmental criminology. GB is considered a biodiversity hotspot, but currently there is only one person active in DGFF in addressing illegal wildlife/environmental crime. There are no veterinarians specialized on wildlife working within country, and IBAP is the sole institution actively supporting the confiscation of captive wildlife from the pet trade. There is a critical need to attract and retain skilled professionals specialized in wildlife to improve the conservation of the country's biodiversity.

6 | Conclusions

The ITLC in GB is probably more widespread than current data indicate, and there are significant challenges in effectively curbing this practice. A national strategy to combat illegal wildlife trade is urgently needed, but such a strategy is currently lacking. GB is home to an important chimpanzee population, and greater attention and resources should be allocated to its conservation.

Given the high extinction risk faced by this subspecies, addressing the ITLC in GB is an urgent priority.

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Data Availability Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Endnotes

¹For instance, a network of traffickers arrested in Ivory Coast was connected to over 80 countries and was operating as a family business in Guinea, Cote d'Ivoire, Liberia, DR Congo, Togo, and Mali (PASA 2020).

²In these fake permits, (i) the source or purpose code was missing, (ii) the country listed was other than where the species occurred, or (iii) it declared that the animals were captive bred (the “C-scam”).

³We follow the definitions of sanctuary, rescue center and rehabilitation center by the Global Federation of Animal Sanctuaries (GFAS; <https://sanctuaryfederation.org/accreditation/definitions/>). GFAS defines a sanctuary as “an establishment that provides lifetime care for animals that have been abused, injured, abandoned, or are otherwise in need. The animals may come from sources including, but not limited to, private owners, research laboratories, government authorities, the entertainment industry, and zoo.”

⁴For instance, the Guinean CITES focal person issuing fraudulent permits was convicted to a sentence of 18 months and the payment of a symbolic penalty of 1 Guinean franc and a fine of US\$ 17, Clough and Channing (2018).

⁵Direção Geral das Florestas e Fauna (DGFF), Instituto da Biodiversidade e das Áreas Protegidas (IBAP), Direcção Geral de Pecuária (DGP) and Brigada de Protecção Natureza e Ambiente (BPNA).

⁶Note that the five chimpanzees found correspond to individuals detected by Maria Joana Ferreira da Silva and listed in Table SI.

⁷Maria Joana Ferreira da Silva also encountered other primates as pets (e.g., baboons, *Papio papio*, patas monkeys, *Erythrocebus patas*, and green monkeys *Chlorocebus sabaues*), and other non-primate species, such as gazelles, crocodiles, and gray parrots living in private premises, suggesting that the live wildlife trade at the national scale is largely unregulated.

⁸We intentionally do not reveal the price of chimpanzees to avoid incentivizing the traffic.

⁹The monetary sanctions to be applied to perpetrators of the hunting regulation (Decree No. 21/1980) range between 1,000 and 10,000 *Peso Guineense*. *Peso Guineense* has been replaced by the West African CFA Franc (XOF), the currency of Communauté Financière Africaine (BCEAO). A method to convert the values of monetary sanctions determined by Decree No. 21/1980 to XOF is lacking.

¹⁰Decree number No. 3/2017 approves the regulation of the international convention on the trade of threatened flora and fauna species in Guinea-Bissau (CITES regulation).

¹¹According to the decree, live specimens should be sent to their country of origin, transferred to a rehabilitation center, sold if listed in Appendix II or III or euthanized (Decree No. 3/2017, chapter VI, art. 24°). However, there is no sanctuary or rehabilitation center in the country.

¹²On September 18, 2024, according to www.xe.com, 3,000,000 XOF corresponded to US\$ 5,092.99 and 4,000,000 XOF corresponded to US\$ 6,789.50.

¹³For the chimpanzee named Bo, the reintroduction to the original chimpanzee's community was attempted but failed, and the individual was sent to the headquarters of Cufada Lagoons Natural Park, where it was living inside a vertical cage (Figure S5). This event reached international news and the chimpanzee became famous nationally.

¹⁴See documentary produced by the journalist Alexandra Batista from RTP at <https://www.youtube.com/watch?v=GxXMk2UPvUM>

¹⁵https://human-primate-interactions.org/wp-content/uploads/2023/06/monekys_v2.pdf.

¹⁶<https://www.illumina.com/company/news-center/feature-articles/genomics-support-gorilla-conservation.html>.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.