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Assessing trophy hunting in South Africa by comparing hunting and exporting databases

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ABSTRACT

Trophy hunting constitutes a major part of the global wildlife tourism industry and is connected through the export of kills to international wildlife trade. Inconsistencies between kills and exports can contribute to identifying illegal trophy hunting that constitutes a major threat to biodiversity conservation. This paper quantitatively analyses to what extent the data of trophy hunting kills and of trophy exports are consistent using the example of South Africa. Data was extracted from two different sources for the year 2018. These sources were trade data reported under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and its Trade Database on the export of trophy items from South Africa, which is compared with the South African Professional Hunting statistics (SAPHs) containing trophy kills information for each species and the country of origin of the hunter. The data of trophy hunting kills and data of trophy hunting export was found to differ to varying degrees across the countries contributing to trophy hunting and CITES-listed trophy-hunted species. We found that both databases report hunting of the same 28 threatened taxa. On the other hand, the same data reports that hunters of 64 nationalities participated in a total of 4,726 trophy kills, while only 3,131 hunting trophy items were exported from South Africa, to 37 countries as final destinations. Among the possible reasons for the discrepancies found, we suggest that the time required to taxidermize trophy specimens may delay the items being addressed to their final destination, in addition to the dual citizenship of some hunters that should also have some influence on our results, as well as the important commercial destination of Brussels Airport. The USA show the highest absolute number of trophy hunters, followed by Spain, but Denmark is the highest driver per capita. Therefore, greater participation of these countries in conservation policies for endangered species is necessary. Additionally, a more detailed differentiation of the term "trophy" to more specific terms such as claws, skins, skulls, etc. may improve reporting systems to easier identify illegal activities related to hunting.

1. Introduction

Wildlife tourism can be defined as tourism based on encounters with non-domesticated animals. The encounters can occur in either the animals' natural environment (e.g., national park) or captivity (e.g., a zoo), in both non-consumptive (e.g., game viewing, hiking and walking safaris) and consumptive activities (e.g., hunting and fishing)(Higginbottom, 2004). Wildlife tourism includes trophy hunting, and is defined as "the killing of animals for recreation with the purpose of collecting trophies such as horns, antlers, skulls, skins, tusks, or teeth for display" (Sheikh, 2019, p. 1), and trophy export is globally interconnected and particularly related to Africa (Hodgetts et al., 2018; Lindsey et al., 2007; MacDonald, 2005), such as South African wildlife tourism (Mkono, 2018; Tsas-Rolfes, 2017).

Within the South African trophy hunting industry, the executing companies are usually run by hunting operators who offer hunts to clients and employ qualified staff (e.g., professional hunting guides, professional hunters, drivers, trackers, and taxidermists) (Lindsey et al., 2006). The difference between South Africa and other countries where trophy hunting takes place lies in the legislation that was implemented in the 1960s and 1970s and according to which animals are classified as the property of the landowner (Cirelli & Morgera, 2010). This Provincial legislation encouraged the transformation of many livestock farms into hunting farms with significant progress at that time towards the protection of wild animals.

For instance, trophy hunting programmes have contributed to the

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recovery of African White and Black Rhinos (Roe & Cremona, 2016). However, there is a lack of information on the economic significance and ecological impact of the hunting industry, and on corruption leading to inequitable distribution of revenues (Lindsey et al., 2007). According to the South African government, if the population of a species is stable, protected and well-managed, hunting is allowed. It is the Department of Forestry, Fisheries and the Environment who allows the hunting of vulnerable, endangered, and critically endangered species (Humane Society International/Africa, 2021). Private game farms and game ranches, which represent stakeholders in wildlife tourism, are an important source of revenue and a significant contributor to the national economy.

In economic terms, thousands of hunters participate in hunting activities annually in South Africa (Saayman et al., 2018) and pay higher daily-rates compared to ordinary tourists (Lindsey et al., 2006). The hunting packages consist mainly of daily rates and trophy fees, and the prices differ considerably among species. Generally speaking, the more days they have clients for and the more trophies the clients shoot, the more money they make. Therefore, incomes can be generated from lower volumes of clients (Lindsey et al., 2006). In social terms, several studies provide information on the benefits of trophy hunting for local communities such as income generation and the contribution it makes to the national economy (Booth, 2010; SCI, 2015). These studies are mainly focused on the economic consequences of the hunting industry in South Africa.

Trophy hunting had been at the centre of controversies for at least two decades. Although most contentions have been around ecological and management issues, the controversies also have roots in ethical considerations (for discourse examples see Batavia et al., 2019; Bauer & Herr, 2004; Dickman et al., 2019; Ghasemi, 2021). Another form of trophy hunting is 'canned hunting' in which usually lions are bred in captivity to be later shot by hunters. It involves unfairly preventing the target animal escaping the hunter, either by using physical constraints such as fences, or by mental constraints such as having the animals habituated with humans. Thus, it is eliminating the 'fair chase' and guaranteeing the hunter a trophy (Norris et al., 2002).

The international wildlife trade is closely connected with the hunting of wild species in South Africa. South Africa trades thousands of dead animal trophies and products made therefrom across international borders, and the legal trade in wildlife is usually overshadowed by illegal trade and wildlife crime (TRAFFIC, 2020). The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and its implementing bodies regulate and monitor the import and export of 35,000 species threatened by trade. CITES has 183 member countries ('Parties'), that must submit annual reports on their international trade in CITES-listed species (CITES, 2020). Therefore, the CITES Trade Database is considered to be the most effective and unique global tool ever implemented to regulate trade in endangered species, and it is source of information on the recorded international trade of fauna and flora (Foley et al., 2011). Each Party of the Convention is obligated to designate its Management Authority in charge of granting permits and certificates under the terms of the Convention and Scientific Authority to advise on the effects of trade on the status of a species (CITES, 2020).

Several studies have looked at the export of commodities from certain species out of South Africa using the CITES trade database. For instance, Lindsey et al. (2012) assessed the South African captive-bred lion hunting industry, while Brennan & Kalsi (2015) examined ivory trafficking problems in Sub-Saharan Africa generally, but not South Africa specifically. Hence, the available literature provides some results on how many commodities made from certain CITES-listed species are exported out of Sub-Saharan Africa or South Africa, but a more comprehensive overview is missing. In particular, no study on trophy hunting in South Africa could be identified that has made a comparative analysis of species killed for trophies in South Africa with species exported as trophies out of South Africa in order to assess the consistency of that data. Thus, the research evidence on the number of trophy-killed animals belonging to endangered species especially in South Africa and exported from there, remains scant and we see a need for a better understanding of this contentious sector. The comparison of CITES and South African Game Hunting Statistics (SAPHs) databases which is published every year by the Department Environment, Forestry and Fisheries, is an opportunity to better understand the current scenario of trophy hunting in South Africa.

The focus of this research is comparing the number of exported trophies out of South Africa and number of animals shot by hunters with a foreign nationality recorded between the CITES Trade database and the SAPHs, checking if the number of imported trophies is consistent to the hunting records numbers and to the country of origin of those international hunters. Therefore, we also assess the extent of trophy hunting and its export, the distribution of the nationality of trophy hunters and the consistency of the ratio of trophy exports related to a certain species with the hunted numbers by those hunters. Furthermore, due to a variety of ethically questionable practices that do serious damage to the prospects of trophy hunting being accepted as a legitimate conservation tool, such as above mentioned 'canned hunting', we sought to verify the origins of the slaughtered animals, whether born in captivity (born or otherwise produced in a controlled environment) or in the wild.

2. Methods

2.1. Data collection

This study compared data from two databases from South Africa. One database concerns the reported trophy kills and the other the reported exports for 2018. The South African Professional Hunting Statistics (SAPHs) data was contrasted with the records from the comparative tabulations reported into the CITES trade database (CITES).

2.2. The CITES trade database (CITES)

CITES offers a tool to analyse the trade in species of conservation concern. The export trade data for 2018 were intentionally accessed on 1st April 2020 with a relative time lag due to a deadline established by Resolution Conf. 11.17 (Rev. CoP16) for the submission of annual reports on 31 October of the year following the year to which they relate (UNEP, 2013). However, the fact that data for 2018 has been submitted by all countries assessed does not guarantee a consistent quality of the data. It has already been pointed out that not all Parties submit their annual reports in a complete manner (UNEP, 2013). The CITES trade database was approached by means of the CITES Trade Database Guide (UNEP, 2013) and the following parameters and related variables were selected to gain the data:

– the year range (from 2018 – 2018);

– the exporting (South Africa) and (all) importing countries;

– the source of species or specimens traded (animals bred in captivity, animals bred in captivity for commercial purposes, animals born in captivity, wild sourced and ranched specimens);

– the trade term (trophies, skins, skulls, skeletons, bodies, rug, skin pieces, horns); and.

– the taxon (all species traded out of South Africa) of interest;

– the purpose of the trade (hunting trophy and personal purposes).

The term "personal purposes" was included in the quantitative analysis because the CITES trade database sometimes classifies terms such as trophy, skulls and skins for personal purposes and sometimes as "hunting trophy".

In the next step, the database produces a type of report file containing this data that can be downloaded. This file is a detailed comparative tabulation that can be opened in Microsoft Excel, wherein the further working steps have been executed. These are the allocation of species, the allocation of countries and the final comparison in a table,

which are all briefly described in the following.

This way the number of trophies exported across national borders out of South Africa reported to the CITES was determined.

2.3. South African Professional hunting statistics data (SAPHs)

The hunting statistical data was received upon inquiry from the Custodians of Professional Hunting & Conservation – South Africa for 2018. Data is listed therein for each province and in the way it was reported to the SAPHs Register. This document contains information such as permit-client holders, countries of origin of the clients, species hunted, and number of species hunted. For the quantitative analysis, all the none-CITES-listed species were excluded since this study is only focusing on the CITES-listed endangered species threatened by trade and the limited availability of data on trade in none CITES-listed species does not allow them to be included in the quantitative analysis.

2.4. Allocation of species

Both datasets needed to be interrogated for which species they relate to. Following this, harmonising the different names for the same species was required to create a workable comparison table. The SAPHs data distinguishes its species killed by using English terms while the CITES trade database uses Latin terms for the species traded. These English and Latin names we matched for the work with the final comparison table for the quantitative analysis continued (Table 1). Roman numerals represent the classification status of the species according to the CITES appendices to which they belong: (I.) species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances, (II.) species not necessarily threatened with extinction, but in which trade must be controlled to avoid utilization incompatible with their survival, (III.) species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade (CITES, 2020).

According to the SAPHs data derived, “Lechwe – Black“, ”Lechwe Kafue“ and ”Lechwe Red“ species were killed in 2018. The data derived from the CITES database instead calls them “*Kobus leche smithemani*”, ”*Kobus leche kafuensis*“ and ”*Kobus leche*“ respectively and indicates them as subspecies. Therefore, we grouped the antelope species ”lechwe“, because SAPHs data contains subspecies like species while CITES separates them.

Additionally, the CITES Convention include some whole groups, such as primates. However, in some cases, only a subspecies or geographically separate population of a species (for example, the population of just one country) is listed. In our case, the CITES trade database does not identify one species as a particular species but by the abbreviation “spp.”. That indicates here “several species” and as it cannot be secured to which species they belong, they were left out. It concerns two trophy items of “Papio ssp.” exported to the US., which were therefore excluded from the quantitative analysis (Table 1).

2.5. Allocation of countries

The allocation of nationalities of the hunters to the destinations of the trophies is also a precondition for connecting both databases.

SAPHs (2018) has provided the total number of international hunters that came to South Africa in 2018 and from that information, the number of hunters that successfully hunted CITES listed species was extracted. This data was further used, and some county naming needed to be re-assessed as several permit holders (hunters) did not correctly indicate their country of origin. Some country names were wrongly written e.g., “Maxico” instead of “Mexico”. In several cases, multiple terms were used for one and the same country of origin of a successful hunter (e.g., “Spain” or “Expanya”). The term “Iberia” was found in the data which can refer to Spain, Portugal or Andorra. Therefore, all countries and their short names, official names and standard country codes were cross-checked with the classification of the International Organization for Standardization (ISO, 2020). If the allocation of a

Table 1
Species/taxa found in both CITES and SAPHs databases and their respective classification by CITES appendix.

Species name (CITES)	English term (SAPH)	Class	Order	Family	Appendix
Addax nasomaculatus	Addax	Mammalia	Artiodactyla	Bovidae	I
Ammotragus lervia	Aoudad / Barbary Sheep	Mammalia	Artiodactyla	Bovidae	II
Antilope cervicapra	Indian Blackbuck	Mammalia	Artiodactyla	Bovidae	III
Axis porcinus	Deer - Hog	Mammalia	Artiodactyla	Cervidae	III
Caracal caracal	Caracal	Mammalia	Carnivora	Felidae	II
Ceratotherium simum	White Rhinoceros	Mammalia	Perissodactyla	Rhinocerotidae	II
Cercopithecus albogularis	Monkey - Samango Monkey	Mammalia	Primates	Cercopithecidae	II
Chlorocebus pygerythrus	Monkey - Vervet Monkey	Mammalia	Primates	Cercopithecidae	II
Civettictis civetta	Civet - African Civet	Mammalia	Carnivora	Viverridae	III
Crocodylus niloticus	Crocodile - Nile	Reptilia	Crocodylia	Crocodylidae	II
Damaliscus pygargus	Bontebok	Mammalia	Artiodactyla	Bovidae	II
Diceros bicornis	Black Rhinoceros	Mammalia	Perissodactyla	Rhinocerotidae	I
Equus zebra hartmannae	Hartmanns Zebra	Mammalia	Perissodactyla	Equidae	II
Equus zebra zebra	Cape Mountain Zebra	Mammalia	Perissodactyla	Equidae	II
Felis lybica	Cat - African Wild Cat	Mammalia	Carnivora	Felidae	II
Felis silvestris	Cat - African Wild Cat	Mammalia	Carnivora	Felidae	II
Giraffa camelopardalis giraffa	Giraffe	Mammalia	Artiodactyla	Giraffidae	II
Hippopotamus amphibius	Hippopothamus	Mammalia	Artiodactyla	Hippopotamidae	II
Hippotragus niger	Sable Anthelope	Mammalia	Cetartiodactyla	Bovidae	I
Hippotragus niger variani	Sable Giant	Mammalia	Artiodactyla	Bovidae	I
Kobus leche	Lechwe - Red,Black,Kafue	Mammalia	Artiodactyla	Bovidae	II
Leptailurus serval	Serval	Mammalia	Carnivora	Felidae	II
Loxodonta africana	Elephant African	Mammalia	Proboscidea	Elephantidae	II
Mellivora capensis	Honey Badger	Mammalia	Carnivora	Mustelidae	III
Oryx dammah	Oryx - Scimitar Horned	Mammalia	Artiodactyla	Bovidae	I
Oryx leucoryx	Oryx - Arabian	Mammalia	Artiodactyla	Bovidae	I
Panthera leo	Lion	Mammalia	Carnivora	Felidae	II
Panthera pardus	Leopard	Mammalia	Carnivora	Felidae	I
Papio ursinus	Baboon - Chacma Baboon	Mammalia	Primates	Cercopithecidae	II
Philantomba monticola	Duiker - Blue Duiker	Mammalia	Artiodactyla	Bovidae	II
Proteles cristata	Aardwolf / Maanhaarjakkals	Mammalia	Carnivora	Hyaenidae	III
Sarkidiornis melanotos	Duck - Knob Billed	Aves	Anseriformes	Anatidae	II

person to one country could be not secured, the data was left out.

Moreover, when hunter's origin country was not provided (n = 3), instead the abbreviation not applicable ("N/A") is given, and we did not include the data in the quantitative analysis.

2.6. African lion (Panthera leo)

We obtained information on how many imported trophies of African lions were wild sourced, ranched animals, bred in captivity or born in captivity. The term 'bred in captivity' refers only to specimens, as defined in Article I, paragraph (b), of the Convention, born or otherwise produced in a controlled environment. It shall apply only if the parents mated or gametes were otherwise transferred in a controlled environment or if production is sexual, or the parents were in a controlled environment when development of offspring began or if reproduction is asexual and in the breeding stock, to the satisfaction of competent government authorities of the exporting country. The term 'born in captivity' refers to 'first offspring generation' or subsequent generations that do not fulfil the definition of 'bred in captivity', as well as parts and derivates thereof (CITES, 2020). Information was extracted on how many individuals of the African lion were hunted and the CITES trade database provided data of the source of species or specimens traded.

2.7. The final comparison Table

The construction of the final comparative table of the two databases consists of several consecutive phases (Fig. 1).

The animals are sorted first according to the class they belong to, e.g. (Mammalia, Aves, Reptile). The list of animal species is organized by Latin names as well as English names and their order e.g. (Carnivora, Primates) and family e.g. (Hyaenidae, Cercopithecidae). These appendices are also noted in the final comparison table for all species. Each specimen name is followed by two columns: one containing the number of trophy (hunted) individuals and one containing the number of (exported) trophy items exported out of South Africa. The number of trophy exports is further sorted according to the countries of trophy import, and all trophy hunted species were additionally sorted by the country of origin of the hunter who killed them.

3. Results

3.1. Number of species hunted for trophy

According to SAPHs (2018), from 1 January to 31 December 2018, international hunters hunted 28 out of 37 hunting game species listed in CITES, which the South African trophy hunting industry offers to be hunted. Inconsistencies were found between the overall number of animals killed (n = 4726) and the export of trophies (n = 3131) as well as within the numbers of most of the species assessed (Fig. 2).

Fig. 2 further reveals that the numbers for none of the 32 species that were either killed for trophies or exported as trophies were identical, 19 species were more exported as trophies than killed for trophies and 13 species were more trophy killed than exported. Several species were 2018 exported from South Africa as trophy items, but not all exported species were recorded to have been hunted that year within South Africa, for example North African wild cat (*Felis lybica*), addax (*Addax nasomaculatus*), Indian blackbuck *(Antilope cervicapra)* and knob billed duck *(Sarkidiornis melanotos)*. Contrarily, some species, e.g., giraffe (*Giraffa camelopardalis giraffa)*, samango monkey *(Cercopithecus albogularis),* sable antelope *(Hippotragus niger),* and sable giant antelope *(Hippotragus niger variani)* showed zero trophy exports yet have been hunted by foreign hunters.

Fig. 2 additionally reveals that sable antelope *(Hippotragus niger)* was the most killed species for trophies in 2018 by foreign hunters in South Africa (32% of all kills). It also shows that this species is listed in CITES Appendix I, and despite being hunted the most, it has zero reported exports of trophy items. Another inconsistency between trophy kills and trophy exports has been found in case of African lion (*Panthera leo*) as

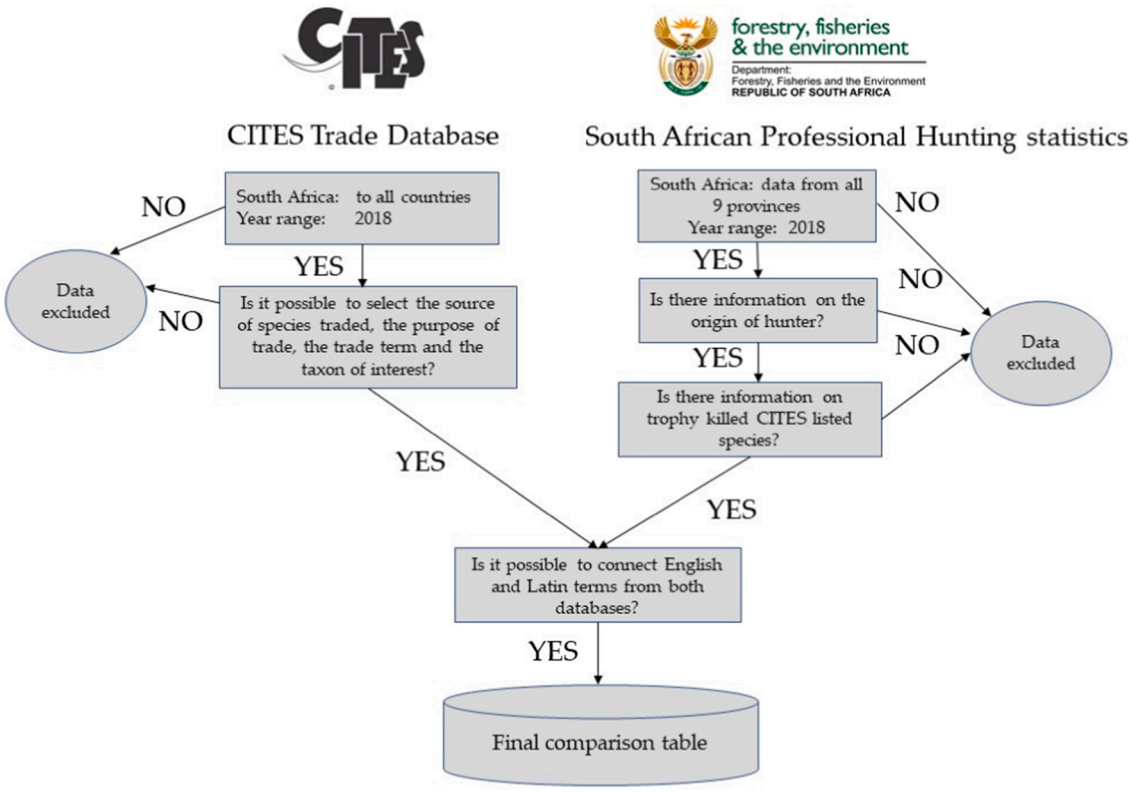

Fig. 1. Decision making flowchart of phases of construction of the final comparison table.

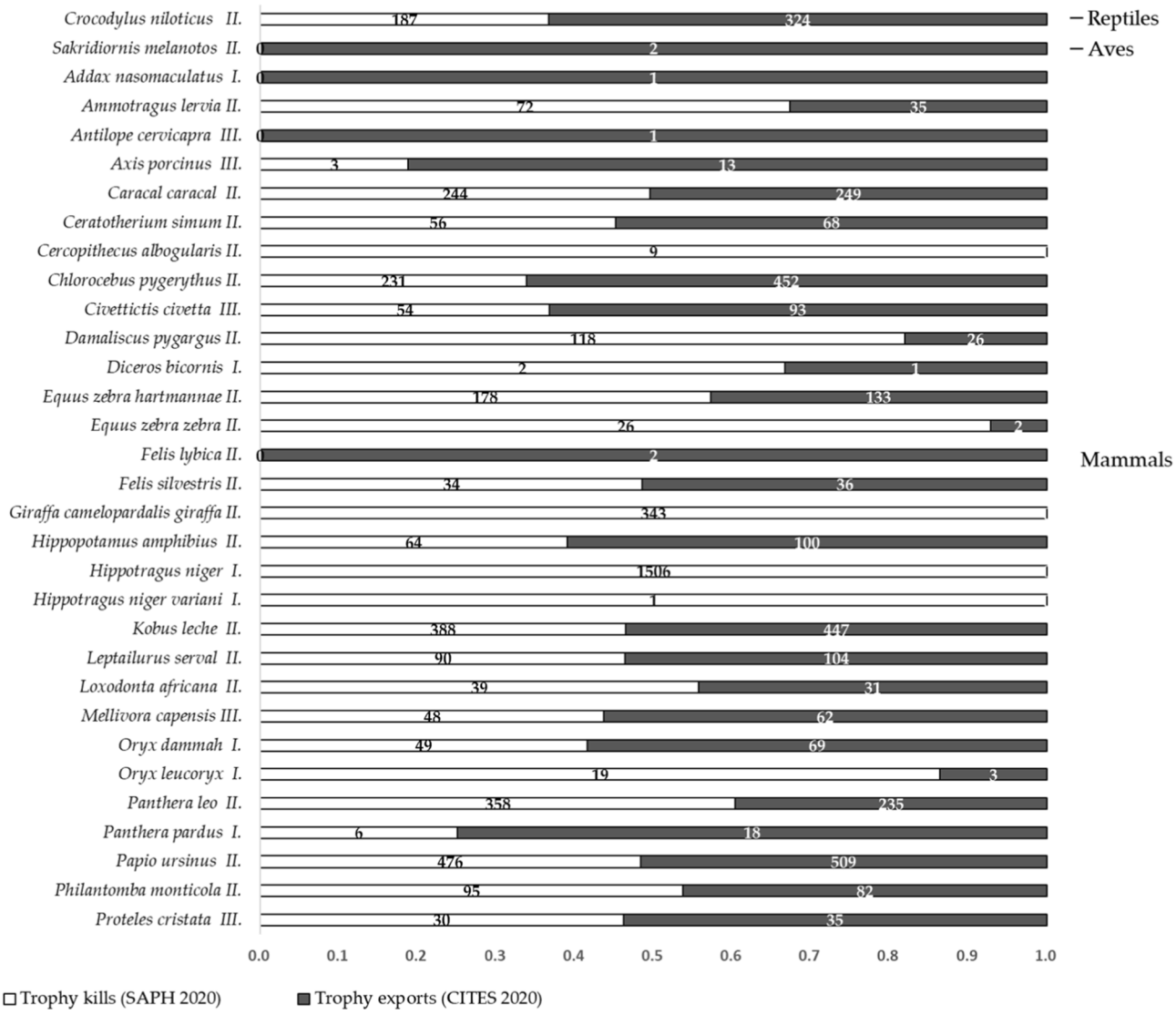

Fig. 2. Comprises 32 endangered species that were either hunted or the trophies of those species have been exported out of the South Africa in the year 2018. Numbers are based on the CITES Trade Database and SAPH database. Roman numeral symbols represent the classification of species according to the CITES appendices to wich they belong (I.) species threatened with extiction, (II.) species not necessarily threatened with extinction, (III.) species that are protected in at least one country.

well as of the Nile crocodile (*Crocodylus niloticus*) (for details see Fig. 2). The analysis of giraffes shows that not a single trophy item from a giraffe *(Giraffa camelopardis)* was exported while a total of 343 individuals were hunted.

The species included in Appendix II proved to be the most numerous in terms of trophies exported from South Africa (Fig. 2 and Table 2). During 2018, out of the 32 endangered species included in the quantitative analysis, 30 species were mammals (93,75%), 1 specimen was reptilian (3,13%) and 1 avian (3,13%). These hunted species, protected by CITES against over-exploitation through international trade, are included in one of three appendices with different degrees of protection.

Table 2
Number of Trophy Hunted Species Protected under CITES according to Appendices.

Appendix	I.	II.	III.
Mammals	7	18	5
Birds	0	1	0
Reptiles	0	1	0
TOTAL	7	20	5

(Table 2).

3.2. Hunting of Panthera leo in detail numbers

In the following, the data for the African lion (*Panthera leo*) is analysed in more detail to determine the number of lions that are bred in captivity for trophy hunting. The reported hunts of African lions are distributed quite differently among South Africa's provinces (Fig. 3).

According to the data supplied by each province individually and collected in the SAPHs, it is evident that the dominant destination of African lion trophy hunting is the Northwest province, where most of the lions (42,4%) were killed in 2018. This is followed by Eastern Cape province (23,6%), Limpopo (16,5%) and the remaining 6 provinces constitute 16,5%. Additionally, according to the CITES trade database the majority (82%) of all trophies of African lion exported out of the South Africa are sourced as "Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5, of the Convention". Thus, it can be assumed that a great majority of the captive-bred lion hunting facilities in South Africa are in the Northwest

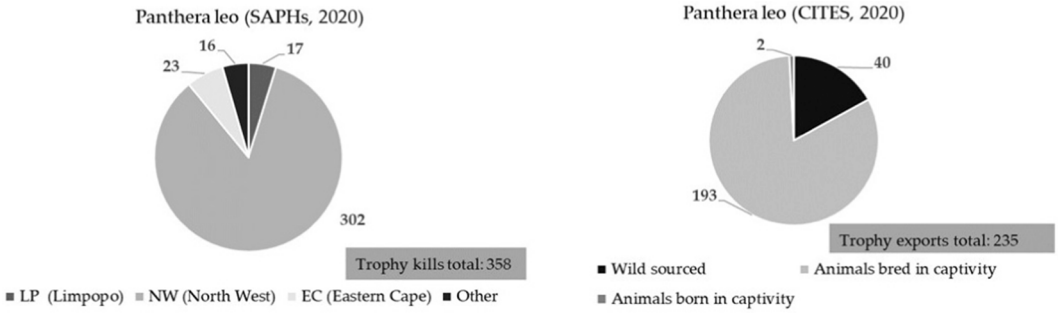

Fig. 3. *Panthera leo* in detail numbers.

province. Only a minority (17%) of trophies of the African lion were taken from the wild or were born in captivity (1%). Spain is the main importing country for lion trophies (47), followed by Hungary (30) and then the USA (27).

3.3. Number of countries and their involvement in trophy hunting and trophy exports

Out of the 68 countries, a total of 4 countries participated in the trade of CITES-listed species but did not participate in killing them. These countries are Thailand, Singapore, Namibia and Malta. Hunters from 9 countries did not participate in the hunting of endangered species listed in the CITES as well as they did not participate in the trophy trade. The countries are Bosnia and Hercegovina, Ethiopia, Greece, Jordan, Ireland, Macedonia, Mauritius, New Caledonia and Zimbabwe.

If the numbers of killed animals and exported animals seems consistent for one country, this does not indicate that the numbers of kills and number of exports are consistent for each species.

The USA is the major client of the South African wildlife industry and at the same time the biggest importer of trophy items from South Africa. The resulting values differ widely and even the number of kills and the number of export trophies in certain countries are not consistent (Table 3). A country may have relatively consistent trophy kills and trophy exports in one species but not in other species.

When it comes to the contribution of Europe to trophy hunting of endangered species, South Africa's major client countries are Spain, Denmark, and Germany in absolute numbers (Tables 4a and 4b).

A comparison of Tables 4a and 4b reveals that the countries ranked according to their contribution to the trophy hunting kills differ widely to when the countries are ranked according to their reported number of trophy exports. Across all taxa, the USA, Spain, Belgium, Denmark, Poland and Germany, respectively, are the main countries with the highest reported exports out of South Africa of trophy items. Poland followed by the Czechia and Belgium have lower reported numbers of trophy kills than of exports.

A relative comparison reveals that the number of killed individual animals with the number of exported trophies per capita provides a different view (Fig. 3). From this relative per capita view, three smaller EU Member States countries, with Denmark outnumbering the USA in both killed animal individuals and trophies exported, and Belgium outnumbering the USA solely in the number of exported trophies can be seen (Fig. 4). Canada and Mexico, despite featuring in the list of the top-10 countries when it comes to kills (Table 4a), could not be included in the display for Fig. 3 as they both showed zero trophies exported.

4. Discussion

4.1. CITES-listed species killed for trophies

We compared hunting and export databases to quantify the number of animals hunted and trophies exported in 2018, and to verify the main countries that operate in this market. In general, the number of animals hunted exceeds the number of trophies exported, but it is not the same in relation to hunted species, where most trophies are exported.

According to Berec et al., 2018, incomplete submitted data in the CITES trade database is more the rule than the exception, and only a small number of published papers have admitted discrepancies when using the CITES trade database. For instance, several studies which used the recorded data from the CITES trade database did not specify how they distinguished the traded volume (Bennett, 2015).

Baboon – Chacma Baboon *(Papio ursinus)* and Monkey – Vervet Monkey (*Chlorocebus pygerythrus)* are the most hunted of all South African trophy primates. However, these primates would not be the most exported commodity if different trade terms were selected in the CITES trade database. For example, if ivory, hairs, leather products etc. would be included, the largest number of exported trophies would be species such as lion, elephant and the Nile crocodile. The reason why these trade terms were not selected for the analysis is that it is not possible to determine from how many individuals of endangered animal species the number of exported - e.g., leather - products come from. Therefore, selecting different variables in the CITES trade database would affect the results.

The use of the term "trophy" in the CITES database is ambiguous and it could have several meanings. Berec et al., 2018 also noted that large differences among the exporter and importer country recorded data can occur when including into the reporting system individual trade reports. For instance, unspecified units are automatically assigned to be a specimen (UNEP, 2013). Each Party of the Convention may allocate authority to various institutions (e.g., what the Czech Environmental Inspectorate does in Czechia is done by the police in Germany and the Customs Service in Poland). Therefore, the authority structure varies considerably between and within countries. Thus, some Parties of the Convention that have a provincial structure designate authority in each province separately, such as in South Africa while the Department of Environmental Affairs has been designated as the CITES management authority for the whole of South Africa with the responsibility for communication between the CITES Secretariat, other parties, and the provincial management authorities.

In such an environment, international cooperation takes place. The trade is cross-border and therefore Parties must effectively communicate and cooperate. It can be problematic if there is no communication with the same designated authority on the other side. Also, the country-related results differ depending on how accurate the data from SAPHs are if hunting operators from all 9 provinces of South Africa enter the records to the database individually. The methods section has already mentioned that a specific country has been referred to by multiple terms, and several terms were not possible to allocate.

Hunting trophies traded in total, including domestic hunts and domestic hunts traded from South Africa within 2018 are not provided because the South African Professional statistics only reflect international trade and not domestic hunting. Therefore, the numbers stated in this paper are incomplete estimations of the total wild and captive bred

Table 3
List of the Countries Participated in Trophy Hunting and Trophy Trade in South Africa (2018).

COUNTRY	Number of killed animals	Number of exported trophies		COUNTRY	Number of killed animals	Number of exported trophies
South America						
Argentina	46	0		Poland	73	100
Brazil	4	8		Portugal	4	0
Chile	2	0		Romania	13	4
Ecuador	1	0		Spain	188	186
Peru	6	0		Sweden	70	38
Central America				Switzerland	17	16
Costa Rica	5	0		Turkey	3	1
North America				Ukraine	10	0
Canada	180	0		**Africa**		
Dominican Republic	1	0		Uruguay	1	0
Mexico	99	0		Côte d'Ivoire	1	0
Samoa	1	0		Morocco	7	5
USA	2881	1999		Mozambique	1	0
Europe				South Africa	55	0
Austria	51	31		Tasmania	1	0
Belgium	20	180		**Asia**		
Bulgaria	10	24		Bahrain	1	0
Croatia	6	1		China	6	21
Czechia	35	55		India	2	0
Denmark	158	128		Indonesia	2	0
Estonia	3	3		Japan	1	0
Finland	30	12		Kuwait	6	1
France	77	18		Lebanon	2	0
Germany	124	92		Mongolia	7	0
Great Britain	59	16		Namibia	0	1
Hungary	85	66		Oman	1	0
Iceland	1	0		Pakistan	10	0
Italy	21	7		Philippines	2	1
Lichtenstein	2	0		Qatar	1	0
Lithuania	18	6		Russia	130	13
Luxembourg	7	0		Saudi Arabia	9	0
Malta	0	9		Singapore	0	1
Netherlands	14	0		Thailand	0	3
Norway	34	30		United Arab Emirates	4	0
Serbia	9	6		**Australia**		
Slovakia	51	38		New Zealand	5	10
Slovenia	4	1		Australia	48	0
				TOTAL (SAPHs and CITES)	**4726**	**3131**

Table 4
a and 4b: 4a (left).: Top-10 countries ranked by number of kills; 4b (right): Top-ten countries ranked by number of exported trophies. Colour shaded are changes in ranks.

COUNTRY	Number of Kills (SAPHs)	Number of Exported Trophies (CITES trade database)	COUNTRY	Number of Kills (SAPHs)	Number of Exported Trophies (CITES trade database)
USA	2881	1998	USA	2881	1998
Spain	188	186	Spain	188	186
Canada	180	0	Belgium	20	180
Denmark	158	128	Denmark	158	128
Russia	130	13	Poland	73	100
Germany	124	92	Germany	124	92
Mexico	99	0	Hungary	85	66
Hungary	85	66	Czechia	35	55
France	77	18	Sweden	70	38
Poland	73	100	Slovakia	51	38
Other	731	525	Other	1041	245
TOTAL	**4726**	**3126**	**TOTAL**	**4726**	**3126**

animals hunted for trophies.

The trophy hunting kills and trophy hunting exports within 2018 proved to be inconsistent across trophy-hunted species and countries of origin to varying degrees. While several species, such as Aardwolf (*Proteles cristata),* Caracal *(Caracal caracal)* and Cat – African Wild Cat (*Felis silvestris)* have been revealed to be relevantly consistent, species such as Sable Antelope (*Hippotragus niger)*, Crocodile – Nile (*Crocodylus niloticus)* and Lechwe (*Kobus leche)* with higher trophy exports or trophy kills call for an answer (for more details see Fig. 2).

Furthermore, this data analysis was limited to CITES-listed species only, because while the scale of trade in CITES-listed species is relatively well recorded, trade in none-CITES-listed species is usually only collected in market surveys. In addition, a record is subject to the willingness of individual countries to provide or record data (Janssen & Shepherd, 2018). Thus, the reason why there are no recorded trophy exports for *Giraffa camelopardalis* is that the species at the time of data processing (1st April 2020) was CITES-listed, though it was a none-CITES-listed species in 2018. Therefore, without any international trade rules that would protect the species, this means that trophies and body parts could be exported and also imported without any quotas or records, despite the fact they are vulnerable according to the Red List and their population is decreasing (IUCN, 2020).

In August 2019, a resolution was passed at the Conference of Parties to CITES (CoP, 2019), that agreed to protect giraffes with the degree of protection on CITES Appendix II, which regulates the international trade with giraffe commodities. On 13 March 2015, The Australian Government introduced a stricter domestic measure to regulate the import and export of African lion items, as though they are listed in Appendix I of the CITES Convention. This measure limits Australian trade in African lion items, including preventing imports and exports of African lion hunting trophies. Such action was introduced in response to Australian public concerns about 'canned hunting' of African lions (Australian Government, 2021). In general, it is almost impossible to identify whether a particular African lion trophy item has come from a lion that has been killed in a canned hunting or in a wild one.

For better understanding the role and contribution of the South Africa wildlife sector to the conservation, the High-Level Panel report (South African Government, 2021) on the management, breeding, hunting, trade and handling of lions was released. This report confirms that the captive lion industry has not contributed to protection and that it damaged South Africa's reputation for conservation and tourism. Thus, South Africa's Department of Forestry, Fisheries and the Environment (2021) indicated that it would adopt the majority of the report's recommendations. Captive-bred lions have no conservation value whatsoever, as those lions are inbred and genetically tarnished. The reintroduction of these South African populations into the wild would be a disaster. The question arises as to what consequences the ban on canned hunting would actually have on wild lion populations. For instance, Lindsey et al., 2012 claim that captive-bred lions take pressure off the wild lion, while on the contrary, Tsas-Rolfes, 2017 concluded that the captive hunting industry in South Africa has not done anything to stem lion declines in the wild across the continent.

Nowadays, many problems with commercial hunting are emphasized. Commercial hunters generally operate within organized groups that target commercially valuable species (e.g., elephants, rhinoceroses

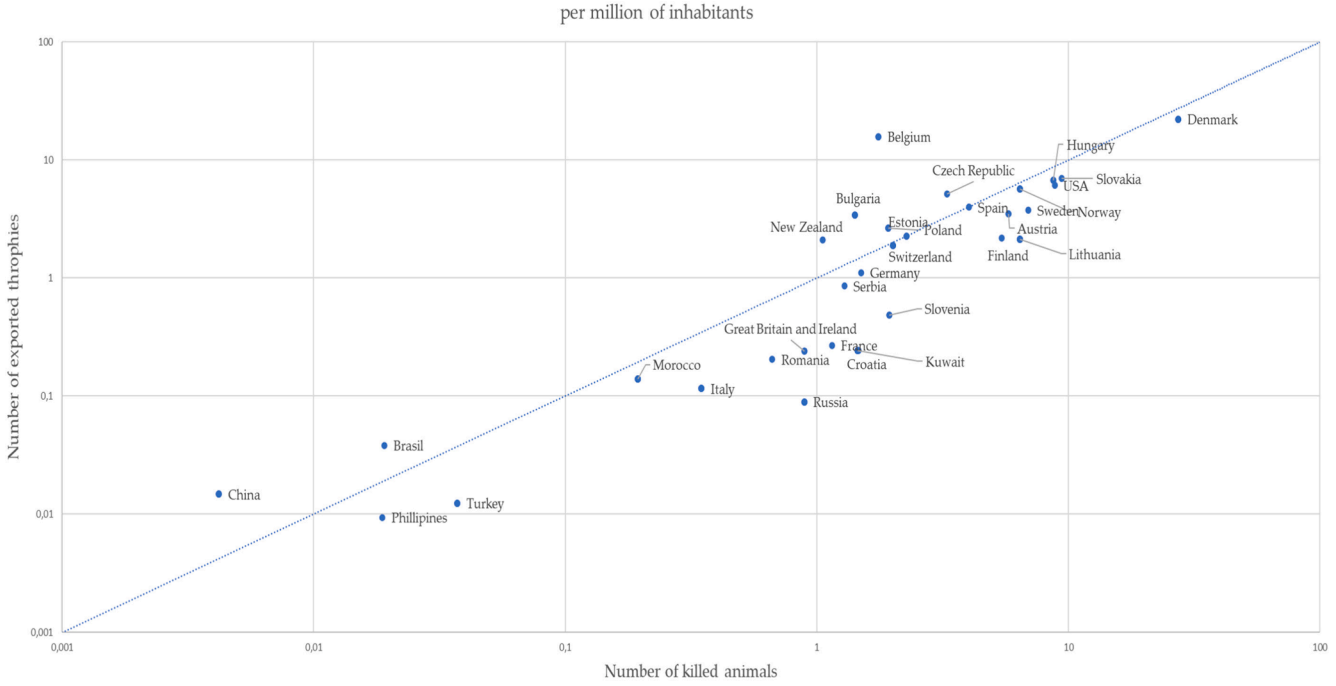

Fig. 4. Logarithmic distribution of hunter's origin countries per million inhabitants in relation to individual animals killed and trophies exported.

and lions), and use modern technologies, including firearms and geographic positioning systems (Duffy, 2014; Ellis, 1994). Trophy hunting can lead to the decline of rare and endangered species, and the way funds are transferred from trophy hunting to nature conservation can be linked to corruption (Lindsey et al., 2016; Sheikh, 2019). On the other hand, trophy hunting is considered to also be beneficial for the protection of wild animal populations in certain circumstances (di Minin et al., 2016; Palazy et al., 2011).

CITES only regulates international trade, not the hunt itself. If an animal is on private land, it can be killed in South Africa with the owner's permission. This includes lions, rhinos, and other endangered species. Therefore, it is possible to hunt all the species of the three appendices on certain territory of South Africa Animal species included in the CITES Appendix 1 are threatened with extinction; leopard (*Panthera pardus*), black rhinoceros (*Diceros bicornis*), sable antelope (*Hippotragus niger*), addax (*Addax nasomaculatus*), oryx – arabian (*Oryx leucoryx*), oryx - scimitar horned (*Oryx dammah*) and sable giant (*Hippotragus niger variani*).

4.2. Countries involvement in trophy hunting

According to Saayman et al., (2018), the USA is the major contributing country to the South African wildlife industry. This paper confirms and quantitatively specifies this assumption. The USA has the largest number (2,881) of trophy kills of trophy-hunted endangered animals and at the same time is South African's largest exporting country (1,999) of trophy items. However, if the size of USA's population is taken into account, the statement of Saayman et al., 2018 can be relativised due to the higher values per capita in Hungary, Slovakia and especially Denmark found in this study.

In Europe, Spain, Belgium and Poland are the largest client countries of South Africa when it comes the absolute numbers of trophy exports from endangered species killed by trophy hunters with origins in those countries relatively. The numbers of trophy exports and trophy killed animals for Spain are rather consistent. However, this cannot be claimed for Belgium. The latest TRAFFIC and WWF report (Musing et al., 2018) proposes a possible reason for this inconsistency and provides information about Brussels Airport as an important trading destination for CITES-listed species, particularly from Africa. The airport can create opportunities for both legal and illegal wildlife trade to occur. Antwerp is the second largest port city in the EU in terms of tonnes of shipments into the EU's seaports (Musing et al., 2018). Therefore, there is a degree of probability that most trophy items hunted by international hunters from a country other than Belgium may eventually be exported out of South Africa to Belgium. However, it is important to note that these findings are estimated from the legal trade of trophy items and that it is difficult to accurately assess the scale of the global illegal trade with trophies.

Another factor which may affect the results is taxidermy and its duration. The length of time it takes to get a trophy back from a taxidermy studio is usually between 7 and 10 months after confirmation of the hunter's order. Orders that need specialized mounts and pachyderms may take even longer. Therefore, trophy kills included in the SAPHs data from 2018 might not have been exported until 2019, and therefore would not listed in the CITES database for 2018. Similarly, kills of specimen could have happened prior to 2018 but end up being listed in the CITES database as exported trophies for 2018. The distribution of kills and exports for a longer period, e.g., from 2017 to 2019, could not be undertaken, which would have smoothened this time-overlapping impact because data sets holding the information about permit holder and trophy kills for 2017 and 2019 were not provided by Custodians of Professional Hunting & Conservation – South Africa. However, this impact is assumed to affect the data of each year when doing such a comparison. For 2017 and for 2019, this effect can also not be excluded. Species killed in 2016 are not included in data related to trophy kills in 2017 but in the 2017 export data, and species killed in 2018 are not included in export data of 2018 but in 2019. Thus, the effect can be expected to be relatively even in all years while still not necessarily being negligible.

A dual citizenship of hunters can also be one of the factors related to incongruence between the databases. Although to a lesser extent, this could play a small role when interpreting these results. The daily rates and trophy fees are considered rather expensive and only a small group of people can afford trophy hunting. These wealthy hunters could often travel and have property outside of their country of origin where the trophy is sent to after taxidermy.

Another aspect to consider with species of the Cervidae family is that every year the antlers (used as trophies) are shed and every year the new antlers grow. In our analysis, it was only one species of Hog deer (*Axis porcinus)* of Cervidae family, where antlers are grown by males and are shed annually (Bubenik, 1983). Due to this factor, it is possible that some exports were not actually hunted trophies but were found as fallen antlers. Species that have horns belong to the Bovidae family and their horns are never branched, never shed, and in many species, horns never stop growing throughout an animal's life. After all, according to SAPHs database (2018), certain species are financially more affordable than other, and the hunter may already have a larger number of trophies of this species in his/her home country and thus decides not to export the trophy.

5. Conclusions

Data of trophy hunting kills and data of trophy hunting exports from South Africa differ widely and to varying degrees across the countries which contribute to trophy hunting of CITES-listed trophy-hunted species.

The assessment, using data recorded in the South African Professional Hunting statistics (SAPHs) compared with CITES trade database provides particular descriptive findings from statistical data on trophy hunting kills and trophy hunting exports, and provides findings about the level of inconsistency for 32 species threatened by trophy hunting or trophy trade.

The top-10 analyses of the number of trophy kills and exported trophies out of SA in 2018 and related origin countries of hunters show the dominance of one nation. More than half of the number of kills and exported trophies relate to the USA (Table 4a and 4b). The European countries that have contributed the most to trophy hunting in South Africa are Spain, with relatively consistent trophy kills and trophy exports, followed by Belgium, with high trophy exports and significantly low trophy kills, and Denmark, with similar number of trophy kills and trophy exports. However, from a per capita perspective, Denmark far outnumbers the USA in both killed animal individuals and trophies exported. Therefore, Denmark is the major contributing country to the South African wildlife industry per capita during 2018.

Out of the nine South African provinces, the Northwest province was the dominant destination of African lion trophy hunting, where most of the lions (42,4%) were killed and the majority (82%) of all trophies of African lion exported out of the South Africa are sourced as "Animals bred in captivity".

Several factors which may affect the results are discussed such a main role of certain airports and ports in Belgium for imports of trophies into the EU, the taxidermy and its duration and potential dual citizenship of hunters.

This analysis revealed that data from the CITES trade database are valuable but must be used carefully and after consideration. One of the recommendations for research is to explore more in detail the possible reasons discussed for the difference found, and in particular their causality. Another recommendations for improving the CITES reporting system could possibly be a more detailed differentiation of the term "trophy" with more specific terms such are antlers, claws, skins, skulls etc. Of course, some of these terms are in the CITES trade database used and were also selected for this quantitative data analysis, however the

term "trophy" could have several meanings.

Based on the findings, we suggest that South Africa should take more measures for better managing their wildlife trade, such as: to develop methods for identifying captive-bred and wild animals and monitoring population dynamics of CITES Appendix listed species; to strengthen CITES law enforcement collaboration with other countries; and to encourage more researchers to contribute their experience and knowledge in wildlife trade management and influence policy through this targeted research and dialogue. The comparison done revealed inconsistences within and among both data bases and emphasis should be placed on improving the documentation of both SAPH (without errors in wrongly written countries) and the CITES reporting system (with more detailed differentiation of the term "trophy") as contribution for easier identifying illegal activities related to hunting. Additional contributions to conservation programmes, especially by the USA from the perspective of absolute trophy numbers and Denmark as the biggest importers of trophy hunting trophies per capita, are recommended and would require dialogue among state wildlife officials, conservation organizations and hunting organizations as well as the willingness of these countries to make such contributions.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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