Non-detriment finding for *Loxodonta africana* (African savanna elephant)

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Summary of findings

The South African population of *Loxodonta africana* (African savanna elephant) is included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), for the exclusive purpose of allowing international trade in live animals to appropriate and acceptable destinations and the export of hunting trophies. All other specimens, including ivory, are deemed to be specimens of species included in Appendix I, meaning that the export of specimens for commercial purposes is prohibited (Article III). In terms of Article IV of the Convention, an export permit shall only be granted for an Appendix II species when a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species. Elephant is also currently listed as protected in terms of section 56 of the National Environmental Management: Biodiversity Act (NEMBA) No. 10 of 2004 and as Least Concern on the International Union for Conservation of Nature (IUCN) Regional Red List of Threatened Species (Selier *et al*., 2016). A non-detriment finding (NDF) for this species is therefore required. This NDF for *Loxodonta africana* (African savanna elephant) was compiled through a review of the relevant literature and deliberations held at a NDF workshop convened by the South African National Biodiversity Institute on 23 February 2022 (workshop participants and references included at the end of this document), and amended through various further consultations. The information presented is current as of February 2024.

Elephants are long-lived, with both sexes living longer than 50 years, and are considered to have a low reproductive rate. Female elephants have a long gestation period of about 22 months. Considerable variation in age at first calving (range 8.4 – 15.8 years) and the calving interval (range 1.8 – 13 years) has been observed in elephant populations throughout the continent. In South Africa the mean age of elephant cows at first calving tends to be younger than cows in other parts of Africa, with cows having their first calves at an average age of 11.3 years and producing a single calf on average every 4.2 years. The species is considered to be a generalist as it can use a variety of habitats and food resources, but is dependent on water and river systems. Due to biological, social and anthropogenic constraints, the dispersal ability of both sexes is considered good rather than very good; with bulls dispersing further than breeding herds. The species is sensitive to the presence of humans and their activities, as well as to management actions. The survival of the African elephant in South Africa is conservation-dependent, the species occurring in state protected areas and on numerous privately-owned and communal properties in the country.

While the African elephant may be uncommon across a number of provinces within South Africa, given the total population size as well as the densities within the areas in which elephant occur, the species is considered to be a common species in South Africa with a fragmented and restricted distribution. Land area currently available to elephant accounts for less than 2.8% of the total land area of South Africa, and is estimated at 38 753 km^2 (end of 2023). By the 1890s almost all of South Africa's elephants had been hunted out, with only three or possibly four relict subpopulations remaining. Since then, elephants in South Africa have undergone a period of sustained growth due to the proclamation and fencing of national parks and reserves. Between 1979 and 2001 over 800 elephants were translocated to approximately 58 properties in South Africa. These newly introduced elephant populations have been characterized by high growth rates.

The total national wild population is estimated at approximately 43 681 elephants of which 33 972 occur on state-owned land, and 9 709 on privately or communal owned land. Elephant numbers increased by approximately 26.8% between 2002 (14 071 elephants) and 2006 (17 847 elephants). Since 2006 there has been an approximate

increase of 41% in South Africa's elephant population. The Kruger National Park (KNP) population of approximately 27 992 (60% of national population, end of 2021) increased at 3.5% per annum between 2006 and 2013 and appear to be stable at present. There however seem to be net movements of elephants into KNP (drought and safety related) which may mask demographic responses to density and environmental variability. The remainder of the national population occurs in 17 state-owned and 74 privately or communal owned properties where elephants have been re-introduced and are managed to varying degrees. At present the national elephant population grow at approximately 5.5% per annum (1991-2020; doubling every 13 years). As a number of private and state properties have, or are in the process of, implementing immuno-contraception and other measures to reduce reproduction (e.g. vasectomy), this increase is likely to stabilize in future. Information on elephant abundance and trends is based on recent quantitative data as most properties conduct regular surveys of their elephant populations.

The current major threat to the elephant population of South Africa is the number of small fragmented subpopulations that are mostly managed in isolation. Currently, approximately 73% of all elephant populations in South Africa have less than 100 elephants and 21% of populations have less than 10 elephants. These small and medium-sized subpopulations in South Africa have management challenges that, if not addressed, will become threats to their survival. These anticipated threats include i) the potential long-term effects of contraception and other restricting measures on elephant social structure and behaviour; ii) a decline in genetic diversity due to the lack of a national meta-population management plan within the network of small and medium-sized properties, and iii) the negative effects of elephants on the vegetation leading to habitat degradation. This threat is considered reversible with the implementation of a meta-population management strategy for the species. At present illegal offtake of elephants in South Africa is considered low and amounts to <0.01% of the national elephant population. There is thus a low risk that poaching will impact on the dynamics of elephants at present or in the near future.

In South Africa elephants are utilised for hunting, photographic tourism and recreation (e.g. captive populations) and protein in accordance with the sustainable use policy environment prescribed by the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA). The elephant population of South Africa is well-managed and all activities related to elephant are regulated through the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA), specifically the Threatened or Protected Species Regulations (TOPS Regulations), the National Norms and Standards for the Management of Elephants in South Africa (Government Gazette no. 47984) and respective provincial conservation legislation. In accordance with the National Norms and Standards for the Management of Elephant in South Africa, both state-owned and private properties with elephant are required to submit an elephant management plan to the relevant provincial Management Authority for approval.

Regular elephant counts are conducted on the majority of national, provincial and private reserves. These counts are well replicated, yielding results with good confidence intervals around the estimates. At present harvesting offtakes are monitored through a permit system and exports are monitored through CITES export permits. Permit applications are evaluated based on a sound knowledge of known elephant populations. Budgetary constraints within all provinces however hamper the effective implementation of elephant management plans, the enforcement of permit conditions and the monitoring and evaluation of offtakes including trophy hunting. Demographic-related concerns have further been raised about the high offtake of large-tusked males and the impact that this may have on tusk size in future. However, within the Associated Private Nature Reserves (APNR; Klaserie, Timbavati, Umbabat and Balule private reserves to the west of KNP), where the majority of elephant in South Africa are hunted, the hunting of females and collared elephants is prohibited and specific age and tusk weight restrictions have been implemented for the hunting of elephant bulls to ensure the preservation of large tusked genetics in the elephant population. In addition, all elephant hunts are accompanied by a qualified and trained reserve representative to ensure correct decision-making, and that responsible hunting ethics are adhered to. Confidence in monitoring the impacts of legal elephant off-take (trophy hunting and damage-causing animal (DCA) control) outside of National Parks is thus medium.

Photographic tourism is the main form of utilisation of elephants on both state-owned and private land within South Africa. Trophy hunting of elephant in South Africa is limited and mainly offered on private land, but also within some provincial protected areas. Trophy hunting of elephants is not allowed in any of the National Parks administered by South African National Parks (SANParks). Under CITES, South Africa is currently allowed to export 150 elephants (equating to 300 tusks) annually as hunting trophies. The quota is determined on a provincial level from known population sizes on respective properties. The overall aim of trophy hunting is mostly economic gain, but

the revenue gained is used to further conservation efforts. Harvesting in the form of translocation is mostly for population management/control and the growth of the national meta-population. The killing of DCAs is low because almost all elephant subpopulations in South Africa are fully fenced. There are some DCA related harvests in certain areas adjacent to protected areas in Mpumalanga (i.e. near Manyeleti) and Limpopo, but these are related to peripheral incursions from source populations (i.e. KNP, Manyeleti Game Reserve, Transboundary elephant) which pose a threat to human life or livelihoods.

The Kruger National Park supports approximately 70% of the national elephant population. The subpopulation is well protected and no harvesting in the form of trophy hunting is allowed within the park. Trophy hunting of bulls is however allowed in the agglomeration of reserves adjoining the KNP on its western and eastern border as well as in areas north of the Limpopo River. Bulls, including large-tusked and potentially large-tusked individuals, frequently move between the KNP and these areas and are thus not strictly protected. (A potentially-large tusked elephant is any elephant younger than 35 years of age, with at least one tusk weighing 60lbs (~27kg) and consequently with the potential, given normal wear and tear, to weigh a minimum of 80-100lbs when 50-60 years old.) There is a high confidence in the effectiveness of these strict protection measures as the number of elephants hunted for trophies in South Africa each year is highly regulated and a permit to remove a putative DCA is required.

Harvesting of elephants in South Africa has incentivized the conservation of elephants and to a lesser degree their habitat since part of the revenue generated from trophy hunts and translocations is used to aid conservation efforts on both state and private land. High densities of elephants on small and medium-sized reserves may however lead to habitat degradation. The growing elephant population with limited options for management is a concern and novel ideas on how to create mega-landscapes and greater tolerance to live with elephants is urgently needed.

In conclusion, the NDF assessment undertaken for the African elephant (*Loxodonta africana*) demonstrates that international trade in live animals to appropriate and acceptable destinations and the export of hunting trophies poses a low and non-detrimental risk for the species in South Africa (Fig. 1 and Fig. 2). Though populations are overabundant and increasing in many reserves, the species is generally well managed, and the Scientific Authority does not have any current concerns relating to the export of elephants in accordance with Article IV of CITES. Despite the increased poaching of elephant and the illegal trade in ivory in other parts of Africa, levels of poaching in South Africa are negligible at present.

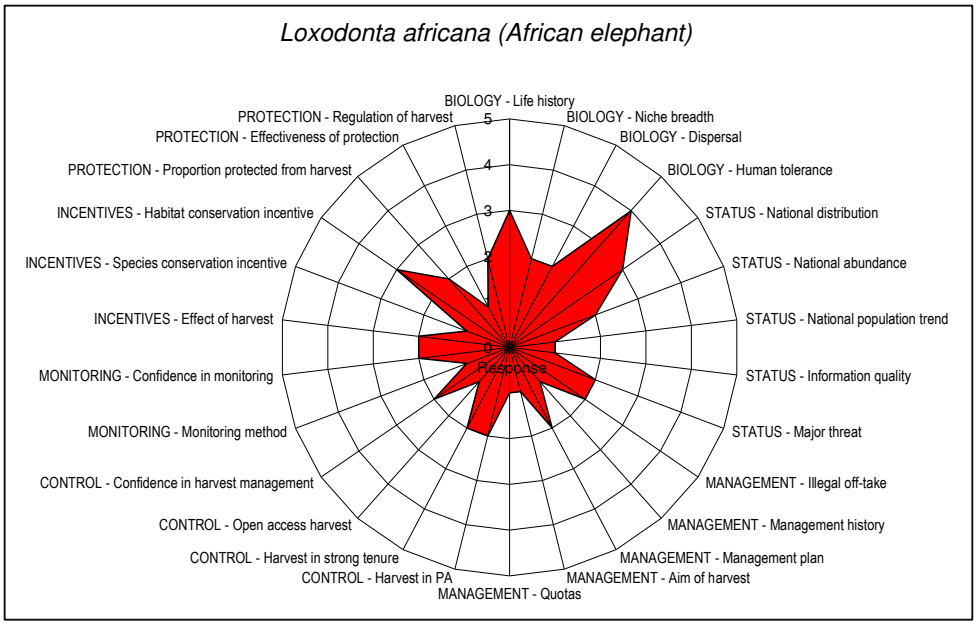

Figure 1: Radar chart summarizing the non-detriment finding (NDF) assessment undertaken for ***Loxodonta africana* (African savanna elephant)** in South Africa accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The limited shaded area in the radar chart demonstrates an overall low risk to the species.

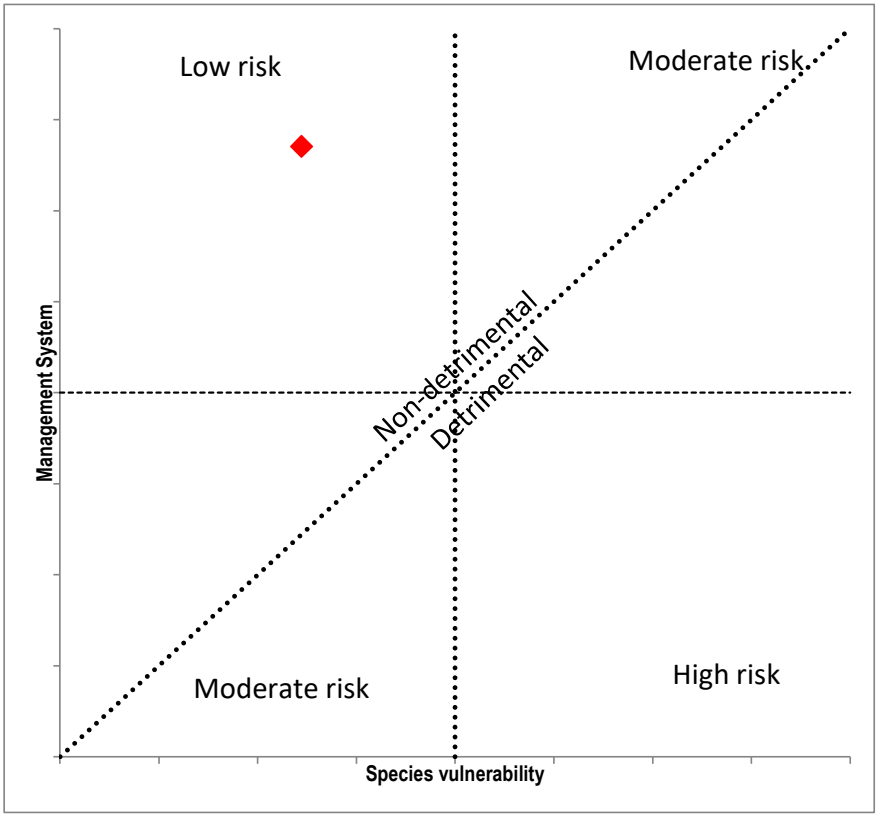

Figure 2: The risk of trading in ***Loxodonta africana*** **(African savanna elephant)** by South Africa, as represented by the relationship between species vulnerability (biology and status) and the strength of the management system to which the species is subjected (management, control, monitoring, incentives and protection). The figure demonstrates that the species is assessed as at a low risk, and that trade is not detrimental.

Table 1: Detailed non-detriment finding (NDF) assessment for ***Loxodonta africana*** **(African savanna elephant)** by South Africa, undertaken in accordance with the CITES NDF checklist. Scores assigned to each question are indicated (bold text and shaded blocks) along with detailed explanations/justifications where relevant. Higher scores are indicative of higher risks to the species.

Biological characteristics		
1. Life history: What is the species' life history?	High reproductive rate, long-lived	1
	High reproductive rate, short-lived	2
	Low reproductive rate, long-lived	**3**
	Low reproductive rate, short-lived	4
	Uncertain	5
African elephants are long-lived with both sexes living to approximately 50-60 years in the wild (Owen-Smith 1988). Both sexes can reproduce on average to an age of 48 – 56 years (van Aarde *et al*., 2008). The number of calves a female will give birth to in her lifetime depends on the age at first calving (range 8.4 – 15.8 years) and the number of years between calves (range 1.8 – 13.5 years) (van Aarde *et al*., 2008). The 1.8 years noted for an elephant in Amboseli (Moss 2001) is exceptionally short and may be due to the early death of the previous calf. The mean age at first calving tends to be younger for South African populations, with cows having their first calves at an average age of 11.3 years (median = 11.9, SD = 1.8; n = 8) (van Aarde *et al*., 2008). Outside of South Africa cows have their first calves at an average age of 14.1 years (median = 13.5, SD = 3.0; n = 16) (van Aarde *et al*., 2008). The calving intervals of elephant cows across Africa range from 1.8 – 13.5 years (van Aarde *et al*., 2008), but within South Africa elephant cows calf on average every 4.2 years (median = 3.8, SD = 1.8; n = 22) (van Aarde *et al*., 2008) after a gestation period of approximately 22 months. Bulls become sexually mature at 15-18 years under natural conditions, but due to social constraints the majority of matings will be performed by bulls over the age of 35 years (Hollister-Smith *et al*., 2007; Poole 1989). African elephants thus have a low reproductive rate.		
2. Ecological adaptability: To what extent is the species adaptable (habitat, diet, environmental tolerance etc.)?	Extreme generalist	1
	Generalist	**2**
	Specialist	3
	Extreme specialist	4
	Uncertain	5
Elephants are mega-herbivores (herbivores exceeding 1 000 kg body mass - Owen-Smith 1988). They are generalists that utilise a variety of food resources including grass, leaves and fruits (van Aarde *et al*., 2008). Within South Africa elephants occur in most habitat types such as the bushveld regions of the Lowveld and Zululand (KwaZulu-Natal), as well as Eastern Cape thicket habitats. Elephants are very adaptable and occur in every biome except for deserts but are even capable of spending short periods of time in desert environments, as can be seen in Namibia and the presence of elephant in Kgalagadi Transfrontier Park. Major river systems have been shown to be important for elephant distribution (Gaylard *et al*., 2003; Smit *et al*., 2007; Smit and Ferreira 2010) and thus there is some dependence on these linear habitats. Elephants have been translocated across several provinces within South Africa, and now also occur in marginal habitat types that may not have formed part of their natural distribution range in the past (Ebedes, Vernon and Grundling 1995; Scholes and Mennell 2008; Landman & Kerley 2018). At present elephants occur in nearly all habitat types within South Africa, but historically elephants were not found year-round in certain habitats, such as populations within the Karoo and the Kalahari. Considering their relatively wide dietary requirements, and wide distribution across most mesic, and even some semi-arid landscapes, they can be considered a generalist.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism at key life stages?	Very good	1
	Good	**2**
	Medium	3
	Poor	4
	Uncertain	5
Elephants have a complex social structure with males and females having equally complex, but separate social structures. Bulls leave their maternal herds at approximately 15 years of age and disperse into bull areas, which in large systems are separate from areas utilised by breeding herds (Poole 1989). Bulls seem to disperse more readily into unknown areas, with younger bulls having the largest exploratory home ranges, while breeding herds tend to take a long time to explore unknown areas (Druce, Pretorius and Slotow, 2008, Henley, 2014a; Selier *et al*., 2014). In South Africa, apart from two transfrontier conservation areas (TFCAs), namely the Greater Limpopo Transfrontier Conservation Area (GLTFCA) and the Greater Mapungubwe Transfrontier Conservation Area (GMTFCA), and Ithala Game Reserve, Isimangaliso Wetland Park in KwaZulu-Natal and the Garden Route National Park (Knysna forest) in the Western Cape, all properties with elephants are fully fenced		

thereby preventing the migration and dispersal of elephants (Slotow *et al*., 2005; Landman & Kerley, 2018). Tracking data show the movement of elephant from the southern part of Kruger National Park (KNP), Limpopo Province to the fence of Tembe Elephant National Park, KwaZulu-Natal and areas around Maputo Elephant Special Reserve, Mozambique. There have been more than 30 annual incidents of elephant movements between the southern part of KNP and southern Mozambique to Tembe Elephant National Park and into South Africa over the past three years. These are however mainly bulls and a small number of breeding herds. Adequate fencing is a legislative requirement for the keeping of elephants in South Africa. Fencing reduces the level of human elephant conflict but at the same time confines elephants to specific areas preventing natural dispersal and linkages between populations. However, fences don't affect the biological or ecological ability of elephants to disperse.

The way elephants use space is likely to depend on a combination of biological, behavioural, and ecological processes that may work at various scales (Douglas-Hamilton *et al*., 2005; Jachowski *et al*., 2013). The distribution of resources such as food and water are key ecological drivers determining the distribution of elephants in the landscape (van Aarde *et al*., 2008; Chamaille-Jammes *et al*., 2008; Shannon *et al*., 2010). Elephant have also been found to use space in a manner that reduces contact with humans, for example, by altering their drinking behaviour (Jackson *et al*., 2008), avoiding areas close to human settlements (Graham *et al*., 2009), adopting different daytime and night-time behaviour (Douglas-Hamilton *et al*., 2005; Graham *et al*., 2009), increasing their rate of movement (Douglas-Hamilton *et al*., 2005), and leaving areas entirely when human densities reach a certain threshold (Hoare & Du Toit, 1999) or where activities such as hunting creates a landscape of fear (Selier *et al*., 2015). Given the constraints in the South African situation, the species have good dispersal capabilities.

4. Interaction with humans: Is the species tolerant to human activity other than harvest?	No interaction	1
	Pest / Commensal	2
	Tolerant	3
	Sensitive	**4**
	Uncertain	5

Most present-day interactions between elephants and people in South Africa occur within conservation areas, and are predominantly positive (Twine & Magome, 2008). However, several studies implicated elephants as the cause of landscape-level tree mortalities in Zimbabwe (Ndoro *et al*., 2016), Botswana (Teren *et al*., 2018) and South Africa (Mograbi *et al*., 2017), with such outcomes attributed to high elephant numbers (Balfour *et al*., 2007). There is, however, limited evidence that consistently links ecological change with elephant densities (Guldemond *et al*., 2017). An alternative is that ecological change relates to how intensively elephants use landscapes (Henley & Cook, 2019; Owen-Smith *et al*., 2006; van Aarde *et al*., 2006).

Across Africa, human–elephant interactions have received increasing attention in the scientific literature in the last two decades, because of a perceived rise in levels of conflict between the two. Human elephant conflict refers to those interactions between people and elephants which threaten human lives and livelihoods (Dublin & Hoare, 2004; Perera, 2009; Thirgood *et al*., 2005). Such conflicts emerge where human and elephant ranges coincide, either in unprotected landscapes or in land-use mosaics of protected areas and human settlement (Hoare, 2000). Elephants are sensitive to the presence of humans, and human activities and management actions. In areas where human activities and elephant range overlap, spatial factors such as human density, land transformation, agriculture, roads and proximity to protected areas tend to influence the distribution of elephants (Hoare and Du Toit, 1999; Parker and Osborn, 2001; Sitati *et al*., 2003; van Aarde and Jackson, 2007). Human activities such as fences (Boone & Hobbs, 2004; Vanak *et al*., 2010) and hunting (Burke *et al*., 2008; Henley, 2014b; Selier *et al*., 2014; Selier *et al*., 2015) can further influence the distribution of elephants, while the provision of artificial water sources can influence their movement patterns and behaviour (Leggett, 2006; Loarie *et al*., 2009).There is a threshold human density beyond which elephants cannot survive (Hoare and Du Toit, 1999) suggesting the species is conservation dependent (Twine & Magome, 2008). The species can thus be considered sensitive as far as interactions with humans are concerned.

National status		
5. National distribution: How is the species distributed nationally?	Widespread, contiguous in country	1
	Widespread, fragmented in country	2
	Restricted and fragmented	**3**
	Localized	4
	Uncertain	5

At present, elephants occur in all the provinces of South Africa except for the Northern Cape and the Free State, in a total of altogether 92 subpopulations across 104 separate properties of which 18 subpopulations are on state-owned land and 74 subpopulations on either private or communal owned land (SANBI elephant database) (Fig. 3). Land area currently available to elephant accounts for less than 2.8% of the total land area of South Africa and is estimated at 38 753 km^2 (end of 2023). Subpopulations on private properties however tend to be small and can range from as few as two to several hundred elephants (SANBI elephant database). Due to the presence of fences and other spatial constraints in the landscape, no migratory

subpopulations of elephant exist in South Africa. Three transfrontier subpopulations however still exist on the borders of South Africa, namely those in the GMTFCA (with elephants moving between Botswana, South Africa and Zimbabwe), the GLTFCA (with elephants moving between South Africa, Mozambique, Zimbabwe and Eswatini) and the Lebombo TFCA (Fig. 3). Ithala Game Reserve in KwaZulu-Natal remains unfenced along the section of its boundary that is defined by the Pongola River, while the rest of the protected area is fenced. The KNP elephant population is, connected to several private reserves in South Africa and a matrix of protected and rural areas in Mozambique and Zimbabwe (Chikadel *et al*., 2020). Elephants move freely across this GLTFCA (Cook *et al*., 2015). Elephants moving out of the KNP have been found to link the GLTFCA with the Lebombo TFCA, linking Tembe National Park to the KNP and other reserves within Eswatini.

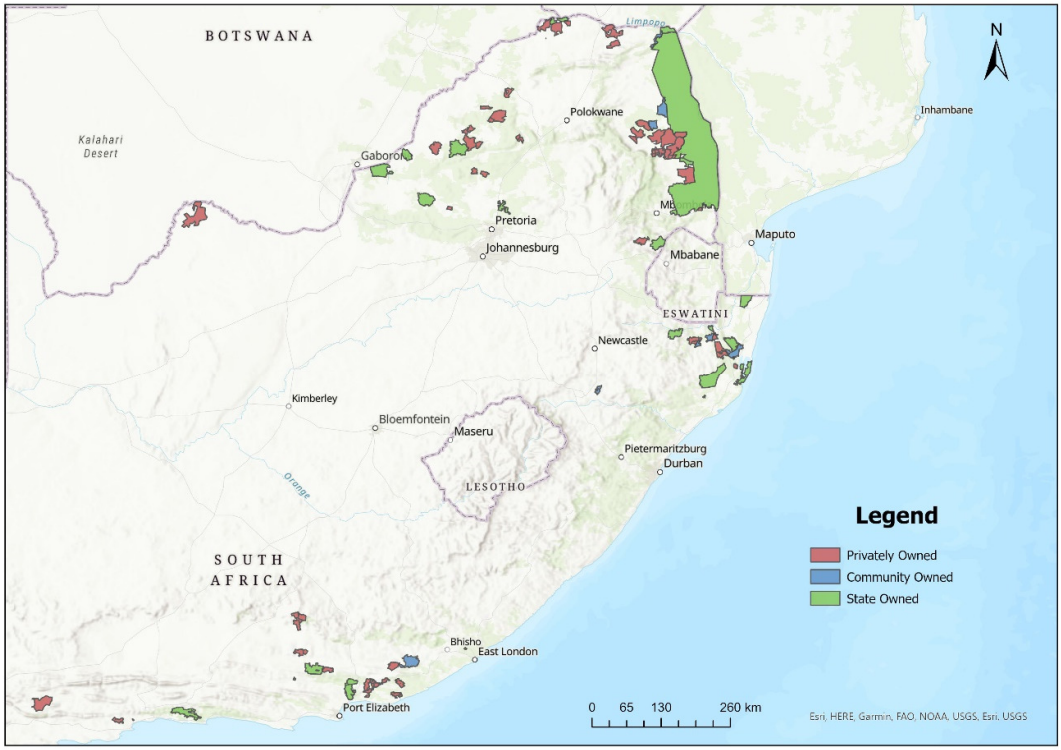

Figure 3: The distribution of elephants on state-owned and private land within South Africa (Mole *et al*., (In prep)).

6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	**2**
	Uncommon	3
	Rare	4
	Uncertain	5

The total national wild population is estimated at approximately 43 681 elephants of which 33 972 occur on state-owned land, and 9 709 on privately or communal owned land (SANBI database). Property sizes vary greatly from approximately 1 500 ha to 1 962 362 ha (including Kruger National Park (KNP)) and subpopulation size varies from 1 to 31 527 (95% CI: 31 085 - 31 976) (KNP) (SANBI elephant database; Louw *et al*., 2021). KNP recently developed new approaches to surveying elephants in the national park, because the traditional approach ignores biases (availability, observer and detectability) and sample error. The new technique, which only accounts for sample error, predicts an undercount of 15% (95% CI: 9% – 22%) by the historic counts just accounting for sampling error. Using this approach, the KNP elephant population is estimated at 31 527 (95% CI: 31 085 - 31 976) individuals in 2020 (Louw *et al*. 2021). In addition, there seem to be net movements of elephants into KNP (drought and safety related) which may mask demographic responses to density and environmental variability (Smit *et al*., 2020). The KNP forms part of the GLTFCA where elephants move freely across borders, leading to population fluctuations (e.g. 27 992, 95% CI: 26 401 – 29 584 in KNP during 2021). The elephant population within the GLTFCA is estimated between 45 000 and 50 000 individuals, with the majority occurring within the Greater Kruger Area, followed by Gonarezhou National Park. While elephants may be considered common in certain areas, i.e. KNP, nationally elephants are considered uncommon given the restricted range and overall population estimate.

Currently, approximately 73% of all elephant populations in South Africa have less than 100 elephants and 21% of populations have less than 10 elephants (SANBI elephant database) (Fig. 4 & 5). There are four subpopulations with over 1 000 individuals,

namely Madikwe Game Reserve (North West) (1 629), the collective elephant population of the KNP, the Associated Private Nature Reserves (APNR), Great Letaba Ranch, Makuya, Manyeleti and Sabi Sands adjoining KNP to the west (7 225) and the GMTFCA elephant population (approx. 1 970 individuals, as of end of 2017)(Fig. 5). Addo Elephant National Park in the Eastern Cape and Hluhluwe-imfolozi Park (HiP) in KwaZulu-Natal each have large subpopulations of 804 and 864 elephants respectively (as of end of 2023). The majority of the subpopulations in small and medium-sized properties are intensively managed due to concerns about habitat degradation (Slotow *et al.*, 2005), and several subpopulations are currently on contraception programs to maintain or reduce population growth (Bertschinger *et al.*, 2008; Scholes & Mennell, 2008; Garai *et al.*, 2018). Off the 74 populations surveyed by Olivier et al., (2022), 95.9% of properties managed elephants and their effects, 13.5% of these properties made use of indirect techniques, 31.1% direct techniques and 51.4% used a combination of direct and indirect techniques. A small captive industry that serves primarily the ecotourism sector (i.e. Elephant Back Safaris, Elephant interactions and conservation education) exists.

While the African elephant may be uncommon across a number of provinces within South Africa, given the total population size, the densities within the areas in which elephant occur and the fact that the majority of the subpopulations in small and medium-sized properties are intensively managed due to concerns about habitat degradation, the species is considered to be a common species in South Africa with a fragmented and restricted distribution.

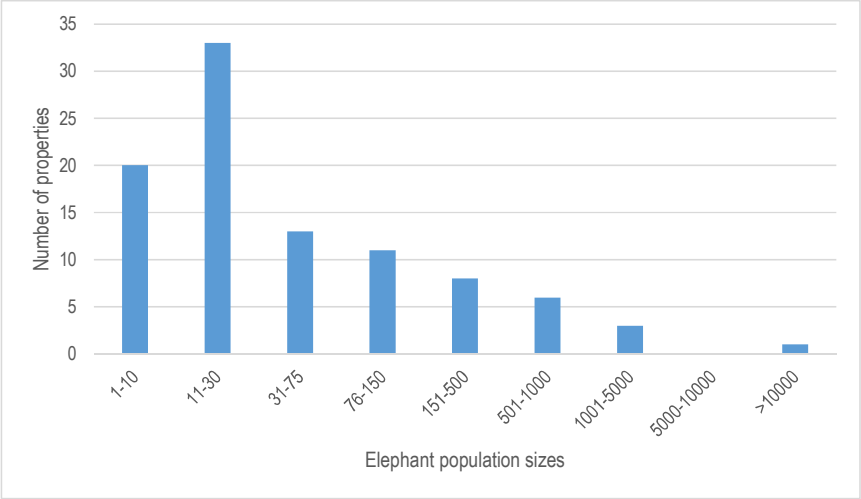

Figure 4: Number of elephant populations in South Africa within each of the population size classes (SANBI elephant database).

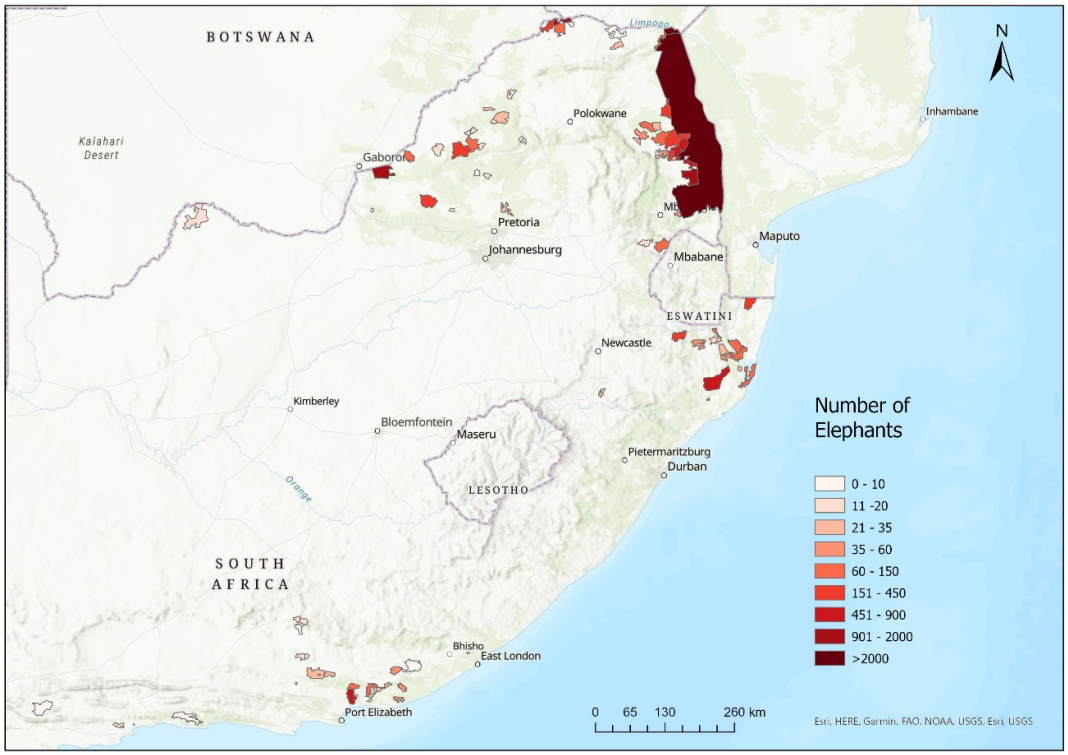

Figure 5: Population sizes and distribution of elephant subpopulations across South Africa (Mole et al., (In prep)).

7. National population trend: What is the recent national population trend?	**Increasing**	**1**
	Stable	2
	Reduced, but stable	3
	Reduced and still decreasing	4
	Uncertain	5

Between 1991 and 2021, the national elephant population trend was strongly driven by the population trend of KNP. With KNP included, the national elephant population grew 5.5% per annum (1991-2020; doubling every 13 years)(Kuiper *et al*., In prep). While the growth rate may vary been elephant populations, by far the majority of elephant populations in South Africa is increasing. A recent study indicated that out of the 39 elephant properties assessed in South Africa none of the properties harboured a decreasing elephant population. Populations were either increasing or no significant trend could be detected. Twenty-five out of the 39 populations (64%) increased significantly. Most populations increased linearly. The linear model provided the best fit for 17 out of 39 (44%) populations and indicate that these elephant populations are increasing consistently every year. The logistic model provided the best fit for six populations (15%) which suggest that these populations may be stabilising with their growth rates decreasing (although the overall trend is still increasing). In the South African context this is likely because a management intervention such as contraception or translocation has been implemented. Two populations increased exponentially. Thus overall, the national elephant population of South Africa has been consistently increasing over the past 20 years.

The estimated annual population growth rate, particularly for small populations in South Africa, exceeds the maximum theoretical growth rate of 7% (Calef, 1988; van Aarde *et al*., 2008). Annual growth rates for South African subpopulations range from -0.6 to 25.5% per year (van Aarde *et al*., 2008). Of the 29 estimates of annual population growth rates in South Africa, only two were negative and 16 were higher than 7% per annum (van Aarde *et al*., 2008). There were a number of factors that have contributed to the high growth rate in introduced populations: 1) a female bias in translocated adults resulted in female biased adult sex ratios, and thus high growth potential; 2) the simultaneous maturation of the orphan animals (they were all approximately the same age when moved) resulted in spurts of growth as they all matured; 3) the abundant food in reserves from which elephants had been absent for extended periods; 4) in combination with (3) above, there had not been an intense drought in South Africa between 1992 and 2005, meaning that all populations have been experiencing favourable and unlimited environmental conditions; 5) management intervened to treat animals that were sick, snared or injured; 5) mortality of adults has been low as there are no individuals dying of old age and few fights to the death among adult males; 7) age at first reproduction and inter-calving intervals appear to be low in a number of reserves (van Aarde *et al*., 2008).

Elephant numbers in South Africa increased by approximately 26.8% between 2002 (14 071 elephants) and 2006 (17 847 elephants). Pretorius *et al*., (2018) estimated a population increase of nearly 89% from 15 744 elephants in 2001 to 28 168 elephants in 2015 (Fig. 6). In addition, the proportion of privately owned elephants increased from 17.5% (2 755) in 2001 to 22.8% (6 430) in 2015, with the actual number of privately-owned elephants more than doubling (Pretorius *et al*., 2018) (Fig. 6). The average annual growth rate for the South African elephant population is estimated at 6.90% for the period 2001 to 2013 (ESAG database 2014) despite the KNP annual growth rate having dropped to 3.5% between 2006 and 2012. At the time when culling stopped in the mid-1990s the annual growth rate for KNP was estimated at 6.1% (Ferreira *et al*., 2012). The elephant subpopulation of GMTFCA is increasing at <2% per annum (Selier *et al*., 2014).

Elephant subpopulations on private land have been increasing at 7.2% per annum. As most private properties have, or are in the process of, implementing immuno-contraception and other measures to reduce reproduction (e.g. vasectomy), this increase is likely to stabilize in future.

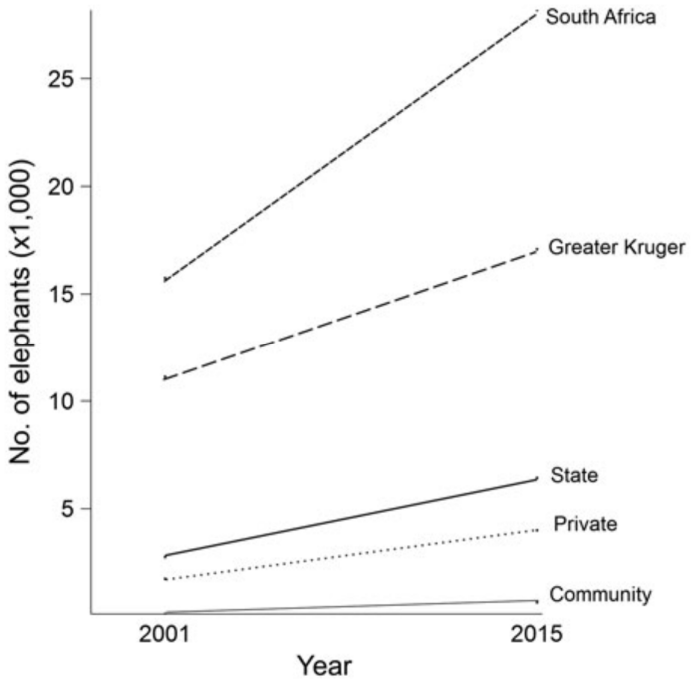

Figure 6: Increases in elephant *Loxodonta africana* numbers in the Greater Kruger area and on additional communal, state, and privately owned land across South Africa between 2001 and 2015 (Graph taken from Pretorius *et al*. 2018).

8. Quality of information: What type of information is available to describe abundance and trend in the national population?	**Quantitative data, recent**	**1**
	Good local knowledge	2
	Quantitative data, outdated	3
	Anecdotal information	4
	None	5

A comprehensive survey of elephants on private land was recently conducted by the DFFE (2019). SANBI collates data from provincial conservation authorities on an annual basis and maintains a database of all elephant populations within South Africa. Annual strip-transect aerial surveys of the elephant population are conducted in the KNP where approximately 70% of South Africa's elephant population occurs, while biennial counts are conducted within the GMTFCA, with the most recent count in 2017. Annual elephant counts are conducted on the majority of provincial reserves. All private reserves adjoining the KNP conduct annual helicopter counts of their elephant populations. These counts are well replicated, yielding results with good confidence intervals around the estimates. Private landowners in general also conduct regular counts and the majority of elephant populations on private land are small and thus consist of known individuals. Good annual estimates for elephants on private land in all provinces exist. However, the lack of provincial funding and the recent COVID pandemic has impacted negatively on private and State reserves ability to fund the regular counting of elephant populations. Comparative to every other country with a similar elephant population size, South Africa counts a significantly higher proportion of the elephant population than any other country.

There are currently two processes underway to improve on the collation and accessibility of data. SANBI is currently in the process of developing a national online species population database. Wildlife Ranching South Africa has also started with the development of an online system for their members to submit species population data.

9. Major threats: What major threat is the species facing (underline following: overuse/ habitat loss and alteration/ invasive species/ other: Small fragmented populations) and how severe is it?	None	1
	Limited/Reversible	**2**
	Substantial	3
	Severe/Irreversible	4
	Uncertain	5

At present the major threat to the elephant population of South Africa is the number of small fragmented populations that are mostly managed in isolation. Approximately 73% of all elephant populations in South Africa have less than 100 elephants and 21% of populations have less than 10 elephants. In addition, adequate fencing is a legislative requirement for the keeping of elephants in South Africa. Fencing reduces the level of human elephant conflict but at the same time confines elephants to specific areas preventing natural dispersal and linkages between populations. The fragmented landscape within which elephant populations exist as well as the number of small populations is likely to lead to inbreeding and reduced genetic diversity within these populations over time (Whitehouse & Harley, 2001). Traill, Bradshaw and Brook (2007) suggest that for most mammal species the mean viable population size is likely 4 169 individuals (95% CI = 3 577-5 129). Fortunately, elephants are long-living species, with genetic differentiation of populations taking a long time to occur (Lobora *et al*., 2018). This suggests that the effects of isolation on elephant populations will take time to manifest, allowing for the creation of elephant corridors, or to use other management approaches, to restore or mimic ecological processes.

A possible future threat linked to small populations, is the age bottleneck created by continued and prolonged contraception of females on small properties. In some cases elephants on small properties are intensively managed (e.g. through contraception) to control population sizes. While there currently seem to be no long term effects on the behaviour and spatial range use of contracepted elephant populations (Delsink *et al*., 2013; Druce *et al*., 2013) the long-term effects of radical changes in social structure, for example the complete absence of calves in some herds for long periods, have not yet been evaluated. While contraception can control population growth, one of the tools to reduce population sizes, namely translocation, is currently limited due to a lack of suitable new areas or reserves to which elephants can be introduced. Habitat degradation in small fenced properties in conjunction with severe droughts may affect these small fenced populations if elephants cannot be relocated in time. Within South Africa, only two subpopulations of elephant can move naturally as fences restrict movements elsewhere.

Meta-population management is not currently implemented among small and medium-sized properties, but is important for retaining the genetic diversity within the national population. A national coordinated approach for the translocation of elephants from areas with excess elephants is also required. However, current policy instruments such as the National Norms and Standards for the Management of Elephants, limit the available management tools to effectively manage elephants and does not allow for the implementation of a metapopulation management framework, as according to the Elephant Norms and Standards no elephant may be translocated more than once.

Harvest management

10. Illegal off-take or trade: How significant is the national problem of illegal or unmanaged off-take or trade?	None	1
	Small	**2**
	Medium	3
	Large	4
	Uncertain	5

At present illegal offtake of elephants is considered low in South Africa and amounts to <0.01% of South Africa's total elephant population. Between 2000 and 2013 only 4 elephants were poached within South Africa. However, since 2015 a sudden increase in poaching has been observed reaching a peak in 2018 with 72 elephants poached in that year (DFFE) (Fig. 7). Since 2019 the number of elephants poached have however declined significantly to only 15 elephants poached in 2020 (DFFE), but increased again to 52 in 2023 (Fig. 7). Majority of poaching incidents occurred within KNP (Fig. 8). Four elephants have been poached in the Pongola River outside Ithala Game Reserve (2 in 2018, 1 in 2019 and 1 in 2021). In addition, approximately 10 elephants were poached in Pongola Nature Reserve in 2023. At present there is a low risk that poaching will impact on the dynamics of the national elephant population. There is no evidence that trophy hunting of elephants in South Africa facilitates poaching or illegal trade due to the low volumes of tusks acquired through hunting. Illegal ivory can for instance not be laundered through the legal hunting system.

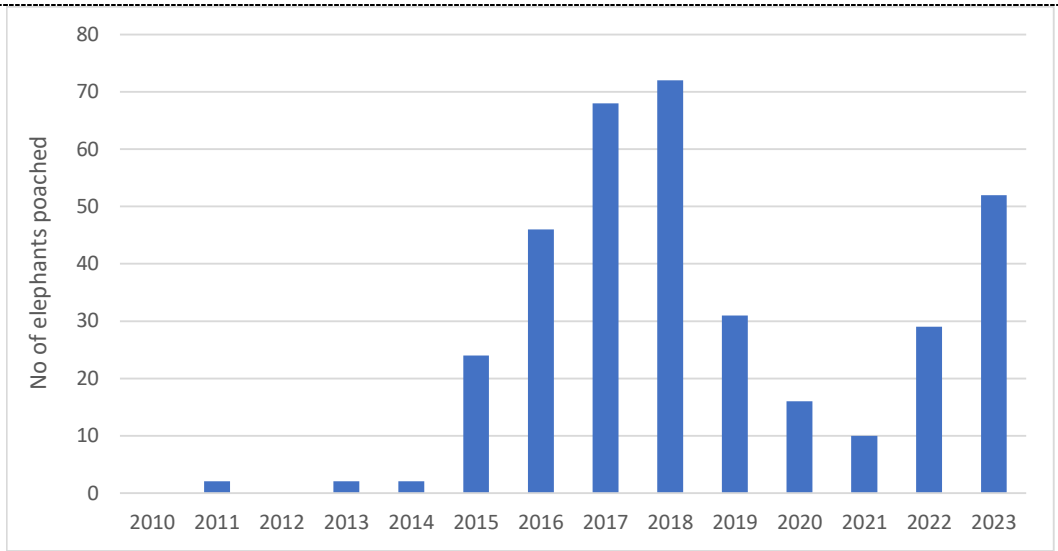

Figure 7: Number of elephants poached within South Africa between 2010 and 2023 (DFFE).

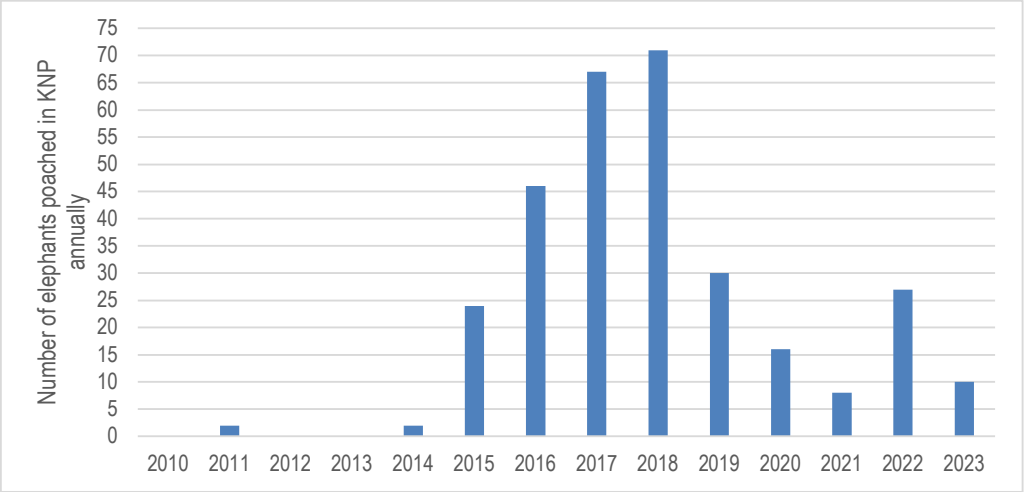

Figure 8: Number of elephants poached within Kruger National Park between 2010 and 2023 (Pers. Comms. SANParks).

11. Management history: What is the history of harvest?	**Managed harvest: ongoing with adaptive framework**	**1**
	Managed harvest: ongoing but informal	2
	Managed harvest: new	3
	Unmanaged harvest: ongoing or new	4
	Uncertain	5

By the 1890s almost all of South Africa's elephants had been hunted, with only three or possibly four relict subpopulations remaining within the country (Carruthers *et al*., 2008). Since then, elephants in South Africa have undergone a period of sustained growth due to the proclamation and fencing of national parks and reserves. Between 1979 and 2001 over 800 elephants were translocated to approximately 58 reserves in South Africa (Garai *et al*. 2004). These newly introduced elephant populations have been characterized by high growth rates (Carruthers *et al*. 2008, van Aarde *et al*. 2008).

In South Africa elephants are utilised legally for hunting, photographic tourism, recreation (e.g. captive populations) and as a protein source, in accordance with the sustainable use policy environment prescribed by the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA). Since 2008 elephants have been managed in accordance with the National Norms and Standards for the Management of Elephants in South Africa (Government Gazette No. 30833, 29 February 2008). These norms and standards have recently been revised but not yet gazetted for implementation. The species is listed as protected in terms of section 56 of NEMBA and various provincial ordinances and acts provide further legislative protection. Permits are therefore required to undertake a variety of activities in relation to elephants, e.g. hunting and other

forms of direct use. Since the implementation of the National Norms and Standards for the Management of Elephants in South Africa, no wild elephants have been exported to captive facilities abroad. In addition, at present no province permits the hunting of elephant cows.

The White Paper on the Conservation of the Sustainable Use of South Africa's Biodiversity was approved by Cabinet on 29 March 2023, and published under Government Notice No. 3537 in the Government Gazette, No. 48785, for implementation on 14 June 2023. The White Paper provides a foundation for conservation and sustainable use in terms of its four goals, namely: 1) Enhanced Biodiversity Conservation (All biological diversity and its components conserved); 2) Sustainable Use (The sustainable use of biodiversity enhances thriving living land- and seascapes and ecosystems, livelihoods, and human well-being, while a duty of care avoids, minimises, or remedies adverse impacts on biodiversity); 3) Equitable Access and Benefit Sharing (Benefits are derived and shared from the use and development of South Africa's genetic and biological resources, without compromising the national interests); and 4) Transformed Biodiversity Conservation and Sustainable Use (Effect is given to the environmental right as contained in Section 24 of the Constitution which facilitates redress, and promotes transformation). The White Paper, therefore, set out the vision: "An inclusive, transformed society living in harmony with nature, where biodiversity conservation and sustainable use ensure healthy ecosystems, with improved benefits that are fairly and equitably shared for present and future generations", with the Mission: "To conserve and manage South Africa's biodiversity, and ensure healthy ecosystems, ecological integrity and connectivity, with transformative socio-economic benefits to society for current and future generations through ecologically sustainable, and socially equitable use of what people values from nature."

As part of the implementation of the White Paper, legislation, including NEM: BA, NEM: PAA, ToPS, and the Elephant Norms and Standards, amongst others, will be reviewed for alignment; as will other mechanisms and tools such as Biodiversity policies, strategies, plans, and guidelines.

In April 2024 the Policy position on the conservation and sustainable use of elephant, lion, leopard and rhinoceros" was published for implementation (Government Gazette no. 50541). This policy position has been developed to clarify policy intent in respect of conservation and sustainable use of white and black rhinoceros, lions, elephants and leopards. The policy position have two objectives relevant to elephant, namely 1) to promote live export of the five species only to range states of any other appropriate and acceptable destinations with suitable habitat on the African continent and 2) consider international commercial elephant ivory trade only when conditions become favourable.

The regulatory framework in place thus allows for sustainable offtakes. On a property level managers and/or landowners have an interest in ensuring the stability of their populations and manage their populations and offtakes accordingly. The harvest of elephant is thus dually managed by both private landowners and government within an adaptive framework. In addition, all hunts by international clients must be recorded in the Professional Hunter's Register. The professional hunter accompanying the international client is responsible for completing and submitting the register to the provincial conservation authority. The Department of Forestry, Fisheries and the Environment (DFFE) collate the provincial registers into a national register on an annual basis.

Photographic tourism remains the predominant form of utilisation of elephants within South Africa. Hunting of elephants is limited, and it is unlikely to have a deleterious effect on the population as a whole.). Between 2010 – 2022, according to the CITES trade database (UNEP World Conservation Monitoring Centre, Cambridge, UK) approximately 965 hunting trophies, an average of 74 hunting trophies (less than 0.2% of the total population) per year, have been exported from South Africa. Between 2010 and 2020, according to provincial records (based on permits issued) approximately 541 elephants were hunted by international clients (Fig. 8). This is higher than what has been recorded in the PH register for the same time period (366 elephants) and is likely due to a number of permits not being executed. Between 2010 and 2022, approximately 132 elephants have been exported from South Africa, mainly for reintroduction purposes. In 2018, 30 elephants from uMkhuze and 24 elephants from Ithala Game Reserve where translocated to Zinave National Park in Mozambique for reintroduction purposes.

Local trade involves mainly exchanges between properties through translocations, but is limited. Between 2010 and 2020 approximately 171 elephants have been translocated between properties within South Africa (Fig. 9). Human elephant conflict incidences in general are low across the elephant range in South Africa, mainly because the majority of properties keeping elephants are fenced. Human elephant conflict incidents are however reported along the northern and eastern borders of South Africa where the two transboundary subpopulations occur, as well as along the KwaZulu-Natal boundary with Mozambique where elephants regularly enter South Africa into Tembe Elephant Park. Between 2010 and 2020 approximately 452 elephants were killed as damage-causing animals (DCAs) across all provinces, averaging approximately 45 elephants per annum (Fig. 9). These offtakes occur mainly along the Limpopo River and within the GLTFCA. Across all provinces and SANParks clear processes are in place to determine, manage and monitor offtakes of elephant (including DCAs).

Within Limpopo, the elephant population is divided into three categories namely 1) free-roaming elephant crossing the border from Botswana and Zimbabwe (around the GMTFCA), 2) elephant in the Greater Kruger System including the APNR (Reserves on the western boundary of KNP) and two State Managed Reserve (Makuya and Letaba Ranch) and 3) elephants in fenced reserves where movement is confined to a specific property or reserve by fencing. A conservative hunting quota of 3.7 % of the total population is calculated for each of the mentioned categories. For the free-roaming elephant population of the GMTFCA, because there is no cooperative agreements in terms of establishing an off-take quota between South Africa, Botswana and Zimbabwe, and because the area of interest lies across these three countries, the calculated off-take quota is divided by three, irrespective of what Botswana and Zimbabwe take off. In addition, only 0.7% may be bulls over the age of 35 years. The offtake quota also takes into account elephants killed as DCAs.

Within KZN there is strong oversight from the provincial authority on the number of bulls that may be hunted on a specific property. The number is based on the size and structure of the population and captured within the approved management plan for the property. There is thus little scope for deviation from the management plan in the number of elephant hunted per annum per property.

Mpumalanga province conducts DCA control actions through permitted hunting where revenues generated are utilised to support conservation actions within these reserves. Within both Limpopo and KwaZulu-Natal provinces damage causing elephants can either be hunted by a local hunter or are destroyed by a provincial officer. DCA offtakes in both these provinces are included within the sustainable offtake quota calculated for the year. Elephant DCA reports within the Eastern Cape and Gauteng are very low (1-2 DCA removals over a 10 year period in Gauteng, one DCA in Eastern Cape in 2018).

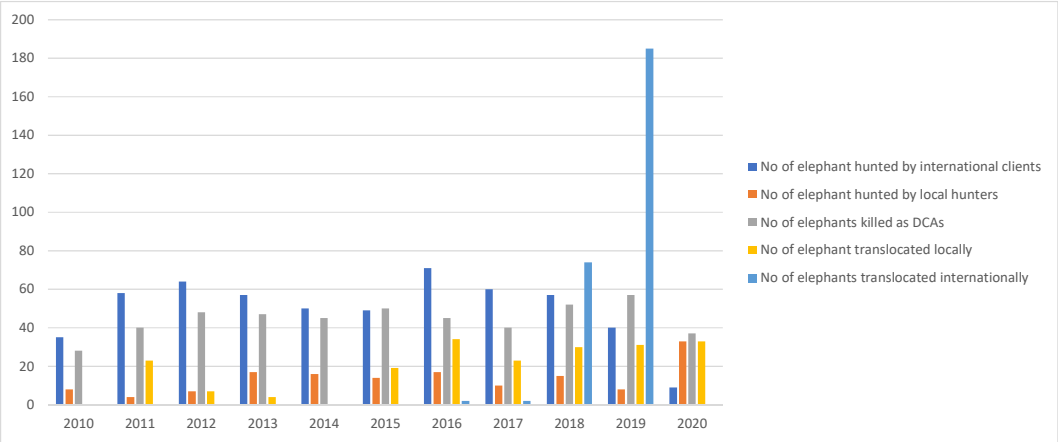

Figure 9: The number of elephants hunted by international clients and locally, killed as damage-causing animals and translocated between reserves within South Africa and internationally for reintroduction purposes between 2010 and 2020 (Information provided by provincial authorities).

12. Management plan or equivalent: Is there a management plan related to the harvest of the species?	Approved and co-ordinated local and national management plans	1
	Approved national/state/provincial management plan(s)	**2**
	Approved local management plan	3
	No approved plan: informal unplanned management	4
	Uncertain	5

There is no national management plan for elephants in South Africa, but approved local and provincial plans for elephant exist. SANParks' management of elephants is driven by (i) ensuring the ecological role of elephants by protection from illegal activities such as poaching and (ii) managing the social-economic-ecological impact of elephants. The latter focuses on restoring ecological processes such as re-naturalising water distribution, fire regimes and diverse spatial gradients in Kruger National Park. In smaller parks, SANParks mimics processes and outcomes by reducing birth rates through contraception while creating gradients of water, food, comfort and safety resources to induce variable intensities of landscape use (South African National Parks Annual Report 2019/2020). In addition, a framework for the management of elephant within the Greater Limpopo TFCA has been developed with the objective to collectively conserve and manage elephants for the benefit of the people of Mozambique, South Africa and Zimbabwe as a component of a complex landscape that is ecologically and socio-economically resilient.

In accordance with the National Norms and Standards for the Management of Elephants in South Africa, all properties with elephants are required to submit an elephant management plan to the relevant Provincial Management Authority for approval.

Private areas are however still not fully compliant and are only now starting to submit the required elephant management plans. Delays in reviewing elephant management plans in some provinces have hampered elephant management in these conservation areas. At present population management plans are written in isolation and focused on the specific population with little coordination between plans as well as consideration of the broader overall population. In 2019, a process has been initiated to address the above through the development of a National Elephant Heritage Strategy, which is anticipated to be completed by 2024. The strategy will provide a high-level vision and strategic objectives for the management and long-term conservation of elephants in South Africa, while contributing to the well-being of people. The strategy will also assist in the further revision of the current Elephant Norms and Standards. The establishment of a national elephant management forum has been recommended to allow for a more cohesive national management approach.

The policy/regulatory framework in place nationally and across all provinces for elephant can thus be considered an approved and coordinated management plan. The regulatory framework is aimed at the long term sustainable use of the species. The species is managed in accordance with the National Norms and Standards for the Management of Elephants in South Africa, is listed as protected in terms of section 56 of NEMBA and various provincial ordinances and acts provide further legislative protection, which means that all provinces acknowledge the need that the species requires special measures. In addition, all policies / regulations are approved and subject to a public participation process.

13. Aim of harvest regime in management planning: What is harvest aiming to achieve?	**Generate conservation benefit**	**1**
	Population management/control	2
	Maximize economic yield	3
	Opportunistic, unselective harvest, or none	4
	Uncertain	5

Even though the hunting of elephants is mainly practised to maximize economic returns, in South Africa, though, limited, the hunting of elephants does generate a conservation benefit. In addition, hunting creates financial incentives for the keeping and tolerance of elephant. Revenue gained from hunts is often used to further conservation actions within the properties and in some provinces is utilised directly by the state. Within the APNR (one of the major elephant hunting areas in the country), revenue gained through trophy hunts is utilised within the reserve to further conservation actions and to effectively manage the reserve. According to Chidakel, Eb & Child, (2020) hunting fees fund the management cost of the four private conservancies adjoining Kruger National Park within the APNR, that allow hunting and were estimated from management surveys at around R50 m (all trophy hunting fees). In addition, within these private reserves consumptive tourism provided 60% of management income and dependency on trophy hunting was as high as 80% in the four reserves that permit hunting (Chidakel, Eb & Child, 2020). Approximately 129 elephants were hunted in the APNR between 2015 and 2019 (on average 26 elephants/year) generating more than R50 million for the area. All revenue generated through hunting is spent on wildlife management (≈30%), anti-poaching (≈60%) and community outreach (10%). Hunting is one of a diverse set of funding streams that contribute to the budgetary needs to maintain a reserve with the conservation, experiences and revenue that a reserve generate as outcomes. In fact, diverse funding streams provide adaptive capacity and resilience to perturbations (Clements *et al*., 2022), e.g. local hunting revenue was a key contributor to reserves persisting during the COVID Pandemic, when tourist revenue dried up. Harvesting in the form of translocation is mostly for population management/control and the growth of the national meta-population.

While DCA offtakes are reactive, a number of processes are in place to determine, manage and monitor DCA offtakes and are reflected on annually. Considering that all offtakes are included in the overall quota on a provincial level, the informal harvest (DCAs) influences the formal part of the quota and is thus adaptive even though some decision-making is reactive (i.e. DCA offtakes). In addition, managing DCAs aligns with dealing with unintended conservation risks and enhancing conservation legitimacy. It is thus focused on maintaining good stakeholder relationships. Most parks will have a considerable risk of persisting where communities neighbouring these parks have high levels of dissatisfaction and believe that elephants have more rights than they do. Conservation benefits is much wider than just considering economic benefits. Responses to DCAs may thus not necessarily be paying for damages, but softer conservation outcomes such as re-establishing and maintaining amicable relationships with neighbouring communities.

Benefits or income derived from harvesting must always be balanced with cost of management of an area. It is important to note that some landowners will have invested into a property for many years before actually deriving an income from for instance trophy hunting.

14. Quotas: Is the harvest based on a system of quotas?	**Ongoing national quota: based on biologically derived local quotas**	**1**
	Ongoing quotas: "cautious" national or local	2

	Untried quota: recent and based on biologically derived local quotas	3
	Market-driven quota(s), arbitrary quota(s), or no quotas	4
	Uncertain	5

Under CITES, South Africa determined an export quota of 150 elephants (equating to 300 tusks) annually as hunting trophies. The quota is determined on a provincial level from known population sizes on the respective properties. Trophy hunting of elephant within South Africa is however limited and the entire annual quota is often not utilised (Fig. 9). For the period 2010 – 2022 an average of 74 hunting trophies (less than 0.2% of the total population) have been exported from South Africa annually according to the CITES trade database (UNEP World Conservation Monitoring Centre, Cambridge, UK) (Fig. 10). Within the APNR hunting quotas are strictly regulated though the implementation of the Greater Kruger Hunting Protocol for reserves where hunting takes place. The protocol prohibits the hunting of females and collared elephants and specific age and tusk weight restrictions have been implemented for the hunting of elephant bulls to ensure the preservation of large tusked genetics in the elephant population (Sowry, 2020). It therefore does not alter natural selection in any meaningful way. For the period 2015 – 2019 an average of 26 trophy bulls were hunted, amounting to approx. 1% of the population. In addition, all elephant hunts within the APNR are accompanied by a qualified and trained reserve representative to ensure correct decision-making, and that responsible hunting ethics are adhered to (Sowry, 2020).

Within Limpopo, the elephant population is divided into three categories namely 1) free-roaming elephant crossing the border from Botswana and Zimbabwe (around the GMTFCA), 2) elephant in the Greater Kruger System including the APNR (Reserves on the western boundary of KNP) and two State Managed Reserve (Makuya and Letaba Ranch) and 3) elephants in fenced reserves where movement is confined to a specific property or reserve by fencing. A conservative hunting quota of 3.7 % of the total population is calculated for each of the mentioned categories. For the free-roaming elephant population of the GMTFCA, because there is no cooperative agreements in terms of establishing an off-take quota between South Africa, Botswana and Zimbabwe, and because the study area is cross bordering in these three countries, the calculated off-take quota is divided by three, irrespective of what Botswana and Zimbabwe take off. In addition, only 0.7% may be bulls over the age of 35 years. The offtake quota also takes into account elephants killed as DCAs. Within KZN there is strong oversight from the provincial authority on the number of bulls that may be hunted on a specific property. The number is based on the size and structure of the population and captured within the approved management plan for the property. There is thus little scope for deviation from the management plan in the number of elephant hunted per annum per property.

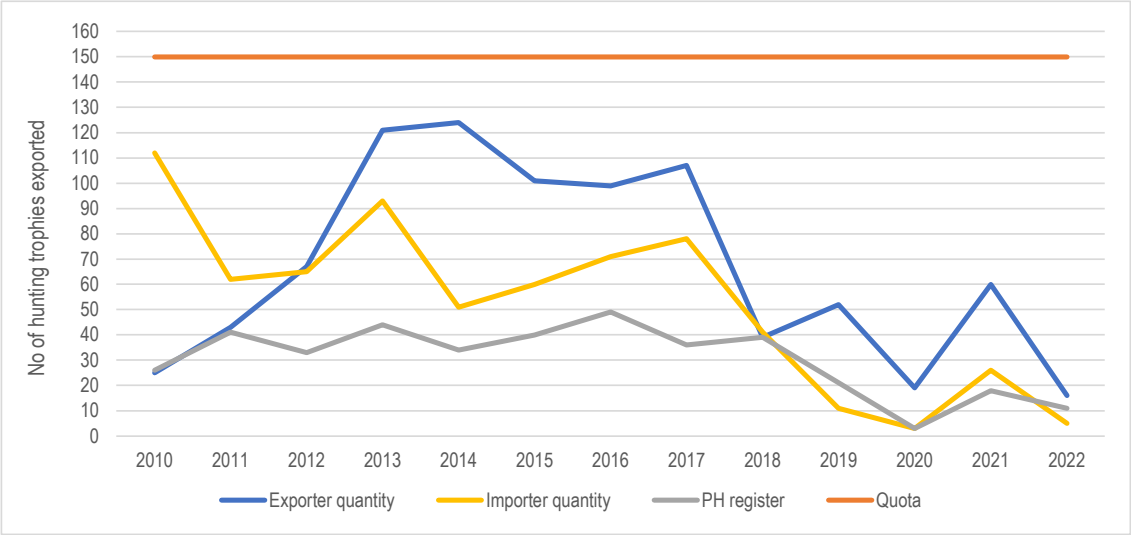

Figure 10: Number of elephants hunted according to the CITES trade database (UNEP World Conservation Monitoring Centre, Cambridge, UK) using quantities reported by South Africa as well as the importing country and number of elephants hunted as reported on the Professional Hunter's Register between 2010 and 2022.

Control of harvest		
15. Harvesting in Protected Areas: What percentage of the legal national harvest occurs in State-controlled Protected Areas?	High	1
	Medium	**2**
	Low	3
	None	4
	Uncertain	5

Trophy hunting of elephants is not allowed in any of the National Parks administered by South African National Parks (SANParks). There is limited trophy hunting on some of the provincial reserves. The culling of elephants is allowed on any property if a culling management plan, as part of a reserve elephant management plan (as per National Norms and Standards for the Management of Elephants in South Africa), is approved by the respective Management Authority. No culling operations however have taken place since the implementation of the National Norms and Standards for the Management of Elephants in South Africa in 2008.

DCA offtakes generally occur outside of protected areas on private and communal land, but likely originated from within protected areas, and pose a risk to humans or their livelihoods. Human elephant conflict incidences are reported along the northern and eastern borders of South Africa where the two transboundary subpopulations occur (mainly along the Limpopo River and within the GLTFCA), as well as along the KwaZulu-Natal boundary with Mozambique where elephants regularly enter South Africa into Tembe Elephant Park. Between 2010 and 2020 approximately 452 elephants were killed as damage-causing animals (DCAs) across all provinces, averaging approximately 45 elephants per annum (Fig. 9).

Even though live export of elephants for reintroduction purposes is allowed from state reserves, the number of elephants exported from these reserves are low. In 2018, 30 elephants from uMkhuze and 24 elephants from Ithala Game Reserve where translocated to Zinave National Park in Mozambique for reintroduction purposes.

16. Harvesting in areas with strong resource tenure or ownership: What percentage of the legal national harvest occurs outside Protected Areas, in areas with strong local control over resource use?	High	1
	Medium	**2**
	Low	3
	None	4
	Uncertain	5

Trophy hunting of elephants mainly occurs on private land. Photographic tourism remains the main form of utilisation of elephants within South Africa on both state and private land. Translocation of elephant herds mainly occur within South Africa between properties across various provinces. However, approximately 263 elephants have been translocated internationally for reintroduction purposes from Limpopo (207), KZN (54) and Gauteng (2) since 2016. The majority of these elephants originated from private reserves.

Within South Africa almost all elephant subpopulations are fully fenced. Ithala Game Reserve and iSimangoliso Wetland Park are not fully fenced and elephants occasionally undertake excursions out of these reserves, but no legal harvesting occurs in these areas. There are some DCA related harvests adjacent to reserves in Mpumalanga (i.e. near Manyeleti), but these are related to peripheral incursions from source populations (i.e. KNP, Manyeleti Game Reserve) and are considered to pose a threat to human life. Between 2010 and 2020, approximately 268 elephants were killed as DCAs within the province. Approximately 141 and 29 elephants were killed in Limpopo and KZN as DCAs respectively over the same time period. Most of the DCAs in Limpopo originate along the Limpopo River and within the GLTFCA.

While ownership of elephant may in some cases be contentious, the control over resource use remains strong regardless of land ownership. In all cases, trophy hunting, culling or DCA control permits from the responsible conservation management authority are required and no action may be taken without the necessary permits.

DCA control and trophy hunting within South Africa was highlighted as a possible concern for the GMTFCA population, by reducing bull numbers which in future could impact on the social structure of the bull population and lead to population declines (Selier *et al*., 2014). Within Botswana and Zimbabwe the GMTFCA population is free-roaming but movements within South Africa are restricted by fences. Even though the largest part of this population remains within Botswana, elephants often move between the three countries. In recent years the range of the GMTFCA population has been expanding east and west along the Limpopo River. This expansion of the elephant's range into areas outside formally protected areas such as Mapungubwe National Park, have brought elephant into conflict with commercial farmers and game ranchers on the South African side (Selier *et al*., 2014). Consequently out of a population of about 1 300 elephants, 17 bulls were hunted as DCAs in 2012 and another 10 bulls in 2013. Within Zimbabwe an extra 10 bulls per annum are hunted as trophies (Selier *et al*., 2014). The recommended sustainable offtake of trophy bulls per annum from this population is 10 (Selier *et al*., 2014).This suggests that the current offtake of bulls from this population is unsustainable and that the offtake in South Africa on this shared resource should be reduced. In order to reduce offtakes from South Africa, the Limpopo Department of Economic Development, Environment and Tourism (LEDET) restrict the offtake quota from South Africa. For the free-roaming elephant population of the GMTFCA, because there is no cooperative agreements in terms of establishing an off-take quota between South Africa, Botswana and Zimbabwe, and because the study area is cross bordering in these three countries, the calculated off-take quota is divided by three, irrespective of what Botswana and Zimbabwe take off. In addition, only 0.7% may be bulls over the age of 35 years. The offtake quota also takes into account elephants killed as damage-causing animals.

17. Harvesting in areas with open access: What percentage of the legal national harvest occurs in areas where there is no strong local control, giving *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5

There are no open access areas for elephant in South Africa. All harvest of elephant are strictly regulated, whether on state, private or communal land.

18. Confidence in harvest management: Do budgetary and other factors allow effective implementation of management plan(s) and harvest controls?	High confidence	1
	Medium confidence	**2**
	Low confidence	3
	No confidence	4
	Uncertain	5

Since the publication of the National Norms and Standards for the Management of Elephants in South Africa in 2008, the translocation and use of elephants has been strictly regulated. All activities with regards to elephants require permits. Elephants are well managed in accordance with the National Norms and Standards for the Management of Elephants in South Africa and the National Environmental Management: Biodiversity Act 10 of 2004 – Threatened or Protected Species Regulations (TOPS Regulations) on national and provincial levels. At the provincial level additional legislation exists to manage and regulate activities relating to elephants. Budgetary constraints within all provinces hampers the effective implementation of elephant management plans, the enforcement of permit conditions and the monitoring and evaluation of trophy hunting. EKZN Wildlife had to seek outside funding for immuno-contraception of all elephant populations managed by EKZNW as well the ISimangoliso elephant population. Implementing elephant contraception programmes requires regular monitoring (with salaries, vehicles, collars, etc.) and in a number of provinces including Limpopo, North West and KZN there are insufficient funds for this. Regardless, there is a medium confidence in harvest management of elephant across provinces, as all elephant populations are monitored and all offtakes of elephant are regulated and reported annually.

Confidence in harvest management also comes with constraints. The management and monitoring of elephant populations are very expensive. COVID-19 has had financial implications for the majority of reserves that keep elephant, specifically those dependent on international tourists. These constraints are likely to negatively affect budgets going forward. In addition, current policy instruments such as the National Norms and Standards for the Management of Elephants, limit the available management tools to effectively manage elephants and does not allow for the implementation of a metapopulation management framework, as according to the Elephant Norms and Standards no elephant may be translocated more than once.

Monitoring of harvest

19. Methods used to monitor the harvest: What is the principal method used to monitor the effects of the harvest?	**Direct population estimates**	**1**
	Quantitative indices	2
	Qualitative indices	3
	National monitoring of exports	4
	No monitoring or uncertain	5

Elephant populations in South Africa are mainly monitored through observation of known individuals (mainly in small properties), aerial surveys, involving annual strip-transect aerial surveys in KNP and helicopter aerial surveys in the majority of the provincial reserves and National Parks. All private reserves adjoining the KNP conduct annual helicopter counts of their elephant populations. These counts are well replicated, yielding estimates with good confidence intervals. Private landowners in general also conduct regular counts and the majority of elephant populations on private land are small and thus consist of known individuals. There is thus recent quantitative data of individual populations at the local level and data are easily obtained. Trend data is quantitative and there is a high confidence in the population trends of the national population.

In addition, the policy and regulatory mechanisms require direct population estimates for any restricted activity. Through the permitting system, monitoring data on the annual offtakes of species per property are generated. Thus off-takes are managed on a local scale by the provincial Management Authorities through a permit system on a case-by-case basis, based on direct population estimates. In KZN the estimated number of elephants to be hunted per annum must be included in the property elephant management plan. Properties submit an annual status report against their elephant management plan in which progress against the management objectives are assessed. Within Limpopo, the elephant population is divided into three categories namely 1) free-roaming elephant crossing the border from Botswana and Zimbabwe (around the GMTFCA), 2) elephant in the Greater Kruger System including the APNR (Reserves on the western boundary of KNP) and two State

Managed Reserve (Makuya and Letaba Ranch) and 3) elephants in fenced reserves where movement is confined to a specific property or reserve by fencing. A conservative hunting quota of 3.7% of the total population is calculated for each of the mentioned categories. For the free-roaming elephant population of the GMTFCA, because there is no cooperative agreements in terms of establishing an off-take quota between South Africa, Botswana and Zimbabwe, and because the study area is cross bordering in these three countries, the calculated off-take quota is divided by three, irrespective of what Botswana and Zimbabwe take off. In addition, only 0.7% may be bulls over the age of 35 years. The offtake quota also takes into account elephants killed as DCAs. The effects of harvesting are thus monitored in some provinces but not equally well in all provinces.

Harvesting is further monitored through:

1. The CITES permitting system. South Africa's elephant population was down listed to Appendix II in 2000, which means that according to Article IV elephants and derivatives of elephant can be exported if the CITES Scientific Authority of South Africa deems it non-detrimental to the long term survival of the species.
2. Elephant is listed as protected in terms of section 56 of NEMBA, due to the international trade in the species and its high conservation value. All activities relating to the direct use of elephant (e.g. translocation, hunting, selling etc.) cannot be undertaken without a permit issued by the relevant Provincial Management Authority. Harvesting (including DCAs) is thus being monitored through a permit system and CITES exports (hunting and export of live specimens only). Professional hunters are required to complete a hunting register within 14 days of the completion of a hunt. The information is collated on a provincial level. On an annual basis the Department of Environmental Affairs (DFFE) consolidates the information received from the provinces to determine the number of specimens hunted and to calculate the economic contribution of the sector. A copy of the hunting register is required as proof of legal acquisition when applying for an export permit for a hunting trophy.
3. Illegal offtakes (poaching and illegal ivory exports) are monitored on a national level as well as reported on internationally on an annual basis through the MIKE and ETIS systems.

20. Confidence in harvest monitoring: Do budgetary and other factors allow effective harvest monitoring?	High confidence	1
	Medium confidence	**2**
	Low confidence	3
	No confidence	4
	Uncertain	5

There is a high confidence in the monitoring of exports as sufficient budget is provided and regular analyses of CITES trade records are conducted. Monitoring of harvest is aided through the permitting systems, but in some provinces reporting may be problematic. However, all trophy hunts by international clients must be recorded in the Professional Hunter's Register. The professional hunter accompanying the client (a legal requirement) is responsible for completing and submitting the register to the provincial conservation authority. The Department of Environment, Forestry and Fisheries collate the provincial registers into a national register on an annual basis. Demographic-related concerns have further been raised about the high offtake of large-tusked males and the impact that this may have on tusk size in future. This concern has been addressed within the APNR, where the majority of elephant in South Africa is hunted, where specific age and tusk weight restrictions have been implemented for the hunting of elephant bulls to prevent the overutilization of large-tusked bulls (Sowry, 2020). Confidence in monitoring the impacts of legal elephant off-take (trophy hunting and DCA control) outside of National Parks is thus medium due to the variability between provinces. While DCA offtakes are reactive, a number of processes are in place to determine, manage and monitor DCA offtakes and are reflected on annually. Considering that all offtakes are included in the overall quota on a provincial level, the informal harvest (DCAs) influences the formal part of the quota and is thus adaptive even though some decision-making is reactive (i.e. DCA offtakes).

Incentives and benefits from harvesting		
21. Utilization compared to other threats: What is the effect of the harvest when taken together with the major threat that has been identified for this species?	Beneficial	1
	Neutral	**2**
	Harmful	3
	Highly negative	4
	Uncertain	5

At present the major threat to the elephant population of South Africa is the number of small fragmented populations that are mostly managed in isolation. Trophy hunting and DCA control is limited and thus has no harmful effect on the national population as both offtakes combined amounts to less than 3% of the national population. Burke *et al*., (2008) showed that the hunting of male elephants is ethically acceptable when considering the effects on the remaining elephant population, when these bulls are hunted when alone. In addition, hunting is feasible in relatively small enclosed reserves without major risk of attack, damage, or breakout (Burke *et al*., 2008). Within South Africa, trophy hunting generates conservation benefits and could be used to incentivise the establishment of larger elephant areas or corridors linking reserves, thus mitigating the current major threat to elephants in South Africa. However, this has not yet materialised broadly. There is some evidence from the

Eastern Cape of larger conservancies being established through the dropping of fences and joining of reserves. At present the effect of harvest taken with the major threat is considered neutral. With the implementation of a metapopulation management framework it is envisioned that the effect of harvest would be beneficial when taken together with the major threat to the species.

Mpumalanga province conducts DCA control actions through permitted trophy hunting where revenues generated are utilised to support conservation actions within these reserves. In addition, managing DCAs is often focused on maintain good stakeholder relationships. Most parks will have a considerable risk of persisting when communities neighbouring parks are angry and believe that elephants have more rights than they do. Conservation benefits are much wider than just considering economic benefits. Management responses to DCAs may not necessarily be paying for damages, but softer conservation outcomes such as re-establishing and maintaining amicable relationships with neighbouring communities. In cases where elephants are controlled through DCA permits, meat distribution to local residents provides benefits and builds positive relationships between protected areas and their neighbours.

Between 2016 and 2020, approximately 263 elephants have been translocated internationally for reintroduction purposes from Limpopo (207), KZN (54) and Gauteng (2). However, according to the CITES trade database only 132 elephants have been exported from South Africa for reintroduction purposes between 2010 and 2022. The majority of elephants originated from private reserves. Translocation of elephant for reintroduction purposes is beneficial on a local and international scale. On a local scale the removal of elephant from a property reduces real or perceived impact on habitat, while at an international level it increases the range and population size of the southern African elephant population.

22. Incentives for species conservation: At the national level, how much conservation benefit to this species accrues from harvesting?	**High**	**1**
	Medium	2
	Low	3
	None	4
	Uncertain	5

While photographic tourism remains the main form of utilisation of elephants within South Africa on both state-owned and private land, the option to hunt is an incentive for some private landowners to keep elephant on their properties, pays for the management costs on reserves and could incentivizes the expansion of properties to allow for the re-introduction of elephants. It thus contributes to the financial resilience of reserves keeping elephants. In addition, revenue gained through trophy hunts is often used to further conservation actions on these properties. Within the APNR (one of the major trophy hunting areas), revenue gained through trophy hunts is utilised within the reserve to further conservation actions and to effectively manage the reserve. According to Chidakel, Eb, & Child, (2020) hunting fees fund the management cost of the four private conservancies adjoining Kruger National Park within the APNR, that allow hunting and were estimated from management surveys at around R50 m. In addition, within these private reserves consumptive tourism provided 60% of management income and dependency on trophy hunting was as high as 80% in the four reserves that permit hunting (Chidakel, Eb & Child, 2020). Approximately 129 elephants were trophy hunted in the APNR between 2015 and 2019 (on average 26 elephants/year) generating more than R50 million for the area (Sowry, R., pers. comms. 2021). All revenue generated through trophy hunting is spent on wildlife management (≈30%), anti-poaching (≈60%) and community outreach (10%) (Sowry, R., pers. comms. 2021). During 2019 alone, 41 elephants (less than 2% of the estimated population) were hunted within the APNR generating US$901 655. The revenue generated in 2019 through the elephant trophy hunts were spent on wildlife management (26%), anti-poaching (59%) and community outreach (15%) (Sowry, R., pers. comms. 2021).

While most of the hunted animals (e.g., 96% in South Africa in 2012) (Cloete *et al*., 2015) are often from more common and less valuable species, most of the trophy hunting revenue is generated from a few species carrying valuable trophies, particularly the charismatic 'Big Five' (lion; leopard; elephant; buffalo; and black or white rhinoceros) (Di Minin *et al*., 2013). Out of the US$ 68 million of gross revenue generated from trophy hunting in South Africa in 2012, over US$ 28 million (at least 41%) was generated from the Big Five alone (Cloete *et al*., 2015). Thus, if trophy hunting, particularly of the charismatic mammal species such as elephant, were to be reduced or stopped, it is likely that the area under wildlife could be diminished, and with that South Africa's conservation estate would be substantially compromised.

The removal of DCA elephants is done in cases where the elephants pose risk to people and their property. This is primarily done in the context of environmental justice, where people have a right to a safe and secure environment that does not damage their health. In many cases, the majority of people living in close proximity to protected areas in South Africa do not accrue direct benefits from the protected area, yet incur the majority of negative impacts (costs) associated with living there, such as those associated with DCAs. These costs are not only financial through the loss of croplands, but include costs to human wellbeing such as feeling unsafe and insecure as a result of sharing a landscape with elephants that pose risks to themselves and their families. By managing DCA elephants responsibly, conservation areas are able to provide access to meat for many communities, re-establishing and maintaining positive relationships with neighbouring committees, while also addressing their

concerns with regards to negative impacts of dangerous animals accessing their land. This provides a large positive incentive for accepting the existence of elephants in these human-dominated landscapes. For example, meat from one elephant bull, processed in accordance with required meat safety regulations, can amount to in the region of 1-3 tonnes. The KNP supports various community groups with protein (schools, old age facilities, traditional authorities) in the interests of sharing benefits and relationships building, by donating elephant meat harvested from DCA individuals, with the meat from one bull reaching between 5 000 and 15 000 people. Most parks face risks of being seen as irrelevant by local residents, when they are unable to deliver of expectations, while also being perceived as giving more rights to animals than to people, and sharing a diversity of benefits from elephant conservation, enables parks to reach out to broader society, with people and nature benefits. Conservation benefits are much wider than economic benefits. Responses to DCAs may not necessarily be paying for damages, but softer conservation outcomes such as addressing local needs, engaging on issues of mutual interest and re-establishing and maintaining amicable relationships with neighbouring communities provides benefits to human wellbeing as well as conservation. Mpumalanga province conducts DCA control actions through permitted trophy hunting where revenues generated are utilised to support conservation actions within these reserves.

International translocations of elephants from South Africa to other African savanna elephant range states benefits the continental populations by facilitating gene flow, reintroducing elephants into areas where previously extirpated and growing the continental population.

Recent attempts to ban trophy hunting of elephants and other threatened species and increased restrictions on trophy imports to some countries is likely to hamper South Africa's conservation efforts. There is already a perception that elephants have limited value to a large number of South Africans, as a result of a lack of access to elephant-related benefits. Increased restrictions are likely to further reduce the value of elephants for stakeholders.

A number of experts (Di Minin, Leader-Williams & Bradshaw, 2016; Dickman *et al*., 2019; Parker *et al*., 2020) have warned that blanket trophy hunting bans could exacerbate biodiversity loss due to the disinvestment of private landowners and communities in wildlife-based land uses, and at the same time risk disempowering and impoverishing rural communities. At present not all available hunting markets such as the UK and Belgium allow for the import of hunting trophies of certain threatened species such as elephant, black rhinoceros (*Diceros bicornis*), bontebok and Cape mountain zebra (*Equus zebra zebra*). The USA, an important hunting trophy market for South Africa, requires an enhancement finding for each trophy import of these species (since they are listed as Endangered on the Endangered Species Act) and has recently proposed even stricter measures for the import of elephant trophies. These international restrictions unfortunately hamper the conservation efforts for these species in South Africa. The Global Risks Report 2024 (World Economic Forum), identified misinformation and disinformation as the top short term threat and 2nd ranked overall global threat. Synthetic content will manipulate individuals, damage economies and fracture societies in numerous ways over the next two years. Falsified information could be deployed in pursuit of diverse goals, from climate activism to conflict scalation.

23. Incentives for habitat conservation: At the national level, how much habitat conservation benefit is derived from harvesting?	High	1
	Medium	2
	Low	**3**
	None	4
	Uncertain	5

Over the past 20 – 30 years the area available to elephants in South Africa has been increasing as a result of translocations of elephants to state-owned and private properties as well as the expansion of some existing state protected areas and private properties (Slotow *et al*., 2005; Druce, Pretorius and Slotow, 2008). Elephant numbers have increased by approximately 26.8% between 2002 (14 071 elephants) and 2006 (17 847 elephants). Since 2006 there has been an approximate increase of 41% in South Africa's elephant population. Habitat available to elephants is estimated to have increased from approximately 30 455 km^2 in 2007 (African Elephant Database) to approximately 33 840 km^2 in 2013 and to 38 753 km^2 by the end of 2023. In addition, between 2001 and 2015, 26 reserves introduced elephants for the first time. International translocations to other African savanna elephant range states have further led to direct habitat conservation on a continental scale and facilitating gene flow.

The benefit to habitat conservation however remains low as the majority of the properties with elephants are small to medium-sized (73% of all properties have less than 100 elephants) and elephants may cause habitat degradation where they occur in high densities or where they did not naturally occur. The manipulation of natural resources, such as the provision of an artificial water supply all year round together with fencing, are concerns in larger subpopulations as these affect the movements of elephants and the intensity of resource use by elephants, potentially leading to habitat degradation.

Protection from harvest		
	>15%	1

24. Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from harvest?	**5-15%**	**2**
	<5%	3
	None	4
	Uncertain	5

Approximately 70% of the national elephant population occurs within the KNP, and is therefore well protected. Harvesting in the form of trophy hunting is currently not allowed within the KNP. Culling has not been implemented as a management tool in any of the State protected areas within the recent past. Trophy hunting of bulls is however allowed in the agglomeration of reserves adjoining the KNP on its western- and eastern border as well as in areas north of the Limpopo River. Bulls, including large-tusked and potentially large-tusked individuals, frequently move between KNP and these areas and are thus not strictly protected. (A potentially-large tusked elephant is any elephant younger than 35 years of age, with at least one tusk weighing 60lbs (~27kg) and consequently with the potential, given normal wear and tear, to weigh a minimum of 80-100lbs when 50-60 years old. A large-tusked elephant is an elephant with at least one tusk weighing a minimum of 100lbs (45kg) and more than 1.5m in length). However, within the APNR specific age and tusk weight restrictions have been implemented for the hunting of elephant bulls and decisions on the number of elephant to be hunted annually is done in consultation with the respective provinces, landowners and SANParks (Sowry, 2020). Approximately 30% of KNP are considered a wilderness areas, where no management actions are implemented. Thus at least 30% of KNP can be considered strictly protected.

DCA offtakes generally occur outside of protected areas on private and communal land, but likely originated from within protected areas, and pose a risk to humans or their livelihoods. Human elephant conflict incidences are reported along the northern and eastern borders of South Africa where the two transboundary subpopulations occur (mainly along the boundaries of the GLTFCA and the Limpopo River), as well as along the KwaZulu-Natal boundary with Mozambique where elephants regularly enter South Africa into Tembe Elephant Park due to continued harassment on the Mozambique side of the border.

Both the management and specifically the harvest of the species is subject to strong regulation on a national and provincial level. In addition, only management actions listed within approved management plans may be implemented. Trophy hunting is listed as an approved activity for only a few properties and none of the State protected areas. Thus, at a minimum, between 5-15% of the national elephant population is legally excluded from harvest.

25. Effectiveness of strict protection measures: Do budgetary and other factors give confidence in the effectiveness of measures taken to afford strict protection?	**High confidence**	**1**
	Medium confidence	2
	Low confidence	3
	No confidence	4
	Uncertain	5

The national and provincial permitting systems are effective. There is a high confidence in the effectiveness of the protection measures taken as the illegal offtake of elephant from within protected areas amount to less than 0.01% of the national population. There is a high confidence in the effectiveness of the strict protection measures afforded by the KNP. Elephants are furthermore well protected within national and provincial legislation and all activities are strictly regulated through the TOPS Regulations, and the National Norms and Standards for the Management of Elephants in South Africa. There are no special measures taken to prevent poaching of elephant on national and provincial reserves, but the introduction of anti-poaching measures in the face of increased rhino poaching benefits elephants where the two species co-occur. In addition, majority of elephant populations are either increasing or stable.

26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size, season or equipment) for preventing overuse?	Very effective	1
	Effective	**2**
	Ineffective	3
	None	4
	Uncertain	5

The number of elephants hunted for trophies in South Africa each year is highly regulated and a permit to remove a putative DCA is required. While the Norms and Standards for the Management of Elephants in South Africa allows for the hunting of females when written into the reserve management plan, all provinces only allow for the trophy hunting of solitary males and damage-causing animals. The hunting of females and bulls in the vicinity of breeding herds are thus not permitted. Outside of the Associated Private Nature Reserves (APNR), there are no additional restrictions on the age, or size of elephants that can be hunted. However, within the APNR, in the Klaserie, Timbavati, Umbabat and Balule private reserves to the west of KNP, a Greater Kruger Hunting Protocol for reserves where hunting takes place has been developed and implemented. The protocol prohibits the hunting of females and collared elephants and specific age and tusk weight restrictions have been implemented for the hunting of elephant bulls to ensure the preservation of large tusked genetics in the elephant population (Sowry, 2020). All elephant hunts are accompanied by a qualified and trained reserve representative to ensure correct decision-making, and that responsible hunting ethics are adhered to (Sowry, 2020). For the free-roaming elephant population of the GMTFCA, only

0.7% may be bulls over the age of 35 years. In addition, strict protocols exist across provinces for the removal and monitoring of DCAs. Regulatory mechanisms in place are thus effective as there are currently no evidence of overuse or harvest in elephants.

The hunting of females has behavioural consequences, not only for the individual's offspring but for the entire family unit. The hunting of large females within herds can lead to the calf of the hunted female being orphaned, a change in leadership or lack thereof when the matriarch is shot from a herd consisting of only young females, possible depletion of the knowledge base within the herd, and increased stress levels that have far reaching consequences including increased aggressiveness. The southern African range states have become the last stronghold for iconic large-tusked individuals due to over exploitation elsewhere in Africa. Hence the market for trophy hunting of large-tusked bulls is growing and needs to be regulated to preserve the genes and safeguard the few remaining large-tusked elephants in South Africa. Trophy hunting is highly selective of animals of specific age and sex groups with outstanding physical features (Joubert, 1996). Genetically, there is concern that long-term selective off takes of larger tusked bulls will ultimately depress the quality of trophies (Stalmans *et al*., 2003), erode fine-scaled genetic structure (Archie *et al*., 2008) and lead to increased reproductive skewing in the population, which altogether may increase the rate at which genetic diversity is lost (Archie *et al*., 2012). Over exploitation of older bulls may also socially disrupt elephant populations. Older bulls are preferred as mates to females, are known to have higher paternity success, suppress musth in younger bulls, promote group cohesion and function as 'mentors' within bachelor groups (Poole 1997; Slotow *et al*., 2001; Hollister-Smith 2005; Rasmussen 2005; Evans and Harris, 2008; Chiyo *et al*., 2011; Archie and Chiyo, 2012). Burke *et al*., (2008) however showed that the hunting of male elephants is ethically acceptable when considering the effects on the remaining elephant population, when these bulls are hunted when alone. In addition, hunting is feasible in relatively small enclosed reserves without major risk of attack, damage, or breakout (Burke *et al*., 2008).

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