

Non-detriment finding for *Ceratotherium simum simum* (southern white Rhinoceros)

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Summary of findings

The South African population of *Ceratotherium simum simum* (southern white rhinoceros) 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 the horn, are deemed to be specimens of species included in Appendix I, meaning that the export of specimens for commercial purposes is prohibited (provisions of Article III apply). However, specimens bred in captivity for commercial purposes are deemed to be specimens of species included in Appendix II of CITES (Article VII on Exemptions and Other Special Provisions Relating to Trade) and therefore may be traded in accordance with the provisions of Article IV. Article IV of the Convention stipulates that 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.

This NDF for *Ceratotherium simum simum* (white rhinoceros) was compiled through deliberations held at an expert workshop that was convened by the South African National Biodiversity Institute (SANBI) on 1 February 2018 (see list of workshop participants at the end of this document) and amended through various further consultations with experts. A comprehensive review of the relevant scientific literature and reports (see reference list) ensured all available information on the species was considered and captured in this document, current as of October 2024.

The white rhinoceros is a long-lived species with both sexes living between 30 and 40 years. The species has a low reproductive rate, with females in wild populations giving birth to their first calf at between 5 and 6 years of age on average. Inter-calving intervals average 2.9 years, with a gestation period of approximately 16 months. Males are reproductively mature at a similar age range to females, but due to social constraints tend to only mate successfully after the age of 10 – 12 years. A relatively adaptable species, being able to survive in a variety of grassland and savannah habitats, the white rhinoceros favours short grasses on grazing lawns but can switch to taller, relatively fibrous bunch grasses when short grass is unavailable. They are thus able to persist and reproduce in nutrient poor areas, as evidenced by their current distribution. Individuals disperse rapidly into new areas and can move over very large distances in unfenced areas. The species is conservation dependent, occurring solely in protected areas and on game farms and game reserves, but is tolerant of human activity and can be ranched under semi-intensive management.

More than 81% of the global population of southern white rhinoceros occurs in South Africa. As most populations exist in fenced protected areas or on private/community owned game farms and reserves, its distribution in the country is fragmented. The southern white rhinoceros is considered to be a common and widespread species in South Africa, occurring in approximately 200 state, private and communal game farms and reserves across all nine provinces. The total area occupied by white rhinoceros nationally exceeds 49,000 km², of which approximately 18,000 km² is private or communal land. According to data gathered from a survey of rhinoceros on private and state land by the IUCN African Rhinoceros Specialist Group (AfRSG), the total white rhinoceros population comprises approximately 13,991 individuals (as at the end of 2023) of which 5,406 (39%) and 8,585 (61%) occur on state-owned and private land respectively, the latter including approximately 1,986 white rhinoceros residing in South Africa's largest captive breeding facility under semi-intensive management. The largest populations of southern white rhinoceros in South Africa occur in the greater Kruger National Park (KNP) (which incorporates

adjacent private and state reserves) and Hluhluwe-iMfolozi Park (HiP), estimated at the end of 2023 at 1,812 (1,680-1,943) and 2,117 individuals respectively.

Analyses undertaken by AfRSG indicate that the national average growth rate of the southern white rhinoceros population in South Africa was just over 7% from 1991 to 2012. Several key developments are thought to have contributed to the increase in the national population since the late 1800s when no more than 50 white rhinoceros survived in the iMfolozi Game Reserve in what was then Natal, such as the advent of chemical capture drugs, mass translocations, and policy changes both locally and internationally that allowed for private ownership, live sales auctions and limited trophy hunting. These factors served to create sufficient economic incentives for private ownership, thereby facilitating the expansion of rhinoceros range and numbers. Since 2017, rhinoceros numbers in KNP have declined, with this population having suffered the brunt of rhinoceros poaching since 2007. Significant numbers of white rhinoceros have been translocated from wild populations to smaller secure areas where the animals are subjected to semi-intensive/intensive management.

There are detailed recent quantitative data on white rhinoceros numbers, poaching rates and population performances for most populations over the past 30 years due to a process of confidential annual white rhinoceros status reporting to the Southern African Development Community (SADC) Rhinoceros Management Group (RMG), as well as regular reporting to IUCN/SSC AfRSG. Even though there are some concerns regarding adequate budgets to conduct regular counts and implement intensive monitoring on the ground, robust population estimates exist, and in most cases, direct population estimates from individual registration techniques are used to monitor the effects of harvest. The monitoring method employed in KNP is primarily one of conducting block counts, while formal distance sampling using line and point transects is employed in the HiP in KwaZulu-Natal. Monitoring of the remainder of the national herd is variable, but with many private landowners monitoring their rhinoceros closely. The quality of monitoring in some populations has recently declined as field staff are having to increasingly focus on anti-poaching, with less time available for other conservation activities such as monitoring.

Ceratotherium simum simum is listed as Near Threatened (A4ad) on the International Union for Conservation of Nature's (IUCN) Regional Red List of Threatened Species (Emslie & Adcock, 2016). The loss of rhinoceros to poaching for their horn is the major threat to South Africa's white rhinoceros population. This is mainly due to a demand for rhinoceros horn in Asia and the lack of a regulated legal trade. Since 2007, there has been an upsurge in black market prices for rhinoceros horn and apparent new uses and demand emerging in south-east Asia and especially Vietnam, which has caused an increase in rhinoceros poaching in some range States including South Africa. Compounding this is the threat posed by organised crime which has emerged in response to the international trade prohibition. Poaching of white rhinoceros has been increasing each year from 2007 (when 13 were poached), reaching a peak in 2014 when 1,151 were poached in the country (an estimated 6.5% of the wild population). Poaching has since declined, with an estimated 1,009 white rhinoceros (approximately 6% of the national population) poached in 2016 and 463 poached in 2023 (approximately 3.3% of the national population).

There seems to be a positive response to the anti-poaching interventions employed nationally and specifically in KNP, although a link to prices of rhinoceros horn in Asian markets requires further investigation. The number of incursions into KNP have also decreased and should do so further, partly due to broadscale dehorning of rhinoceros. The main purpose of dehorning at present is to reduce the incentive to poach rhinoceros. In small populations where dehorning is cost effective, all rhinoceros have been dehorned. Dehorning is less common in larger populations. If the current efforts to curb poaching are withdrawn, poaching of white rhinoceros in KNP is likely to increase dramatically, especially considering the increasingly sophisticated methods employed by poachers. There is evidence that poaching has increased in other hotspots, particularly in northern KwaZulu-Natal, with criminals likely targeting these areas in response to the dehorning in KNP. Though the poaching threat is currently considered substantial and reversible (poaching has not yet exceeded the intrinsic rate of increase of the species nationally), the severity of the threat will increase substantially should the current funding and resources be withdrawn. Significant financial input from external sources is crucial to maintain anti-poaching measures. Even so, it should be acknowledged that the response to rhinoceros poaching has been disproportionately high, and much needed funding has been redirected from other species and conservation activities.

Since 2010, the South African government has launched a variety of initiatives in collaboration with various stakeholders to address the poaching threat and ensure the long-term conservation of the species. In 2014 Cabinet

adopted an integrated four-pronged approach to curb rhinoceros poaching. Prior to this, a national white rhinoceros strategy was approved in 2000 and in December 2015 a national Biodiversity Management Plan (BMP) for white Rhinoceros was gazetted for implementation in terms of section 43 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA). This plan formed the basis for greater coordination between existing and future plans and was informed by the National Strategy for the Safety and Security of Rhinoceros Populations in South Africa as well as the Rhinoceros Issues Management Report. This BMP is currently undergoing a revision in accordance with outcomes of the Committee of Inquiry (CoI), the Rhinoceros Lab, the ministerial High Level Panel, the White Paper on the Conservation and Sustainable Use of Biodiversity in South Africa and the Policy Position on the Conservation and Sustainable Use of Elephant, Lion, Leopard and Rhinoceros. A draft BMP was recently published for public comment. Although the White Paper does not have direct implications for rhinoceros management, it broadly requires the incorporation of ethical practices and standards into the management and use of wildlife in South Africa, and further requires that threats to biodiversity, such as over-exploitation, be avoided or minimised, and mitigated.

The Policy Position on the Conservation and Sustainable Use of Elephant, Lion, Leopard and Rhinoceros, an outcome of the recommendations emanating from the High-Level Panel of experts for the review of policies, legislation and practices on matters of elephant, lion, leopard and rhinoceros management, breeding, hunting, trade and handling, was published for implementation on 24 April 2024. The Policy Position contains three objectives pertinent to rhinoceros, largely white rhinoceros, including 1) phasing out the intensive management and captive breeding operations of rhinoceros for commercial purposes and enhance wild populations, 2) promoting live export of specimens of the five species (including rhinoceros) to range states or any appropriate and acceptable destinations with suitable habitats on the African continent and 3) South Africa working with range states and potential destination countries to support a proposal for international commercial trade in rhinoceros horn from protected wild rhinoceros, for conservation purposes, when conditions become favourable. Conditions to be met were established by the COI and are indicators of the five pillars; namely security (law enforcement); community empowerment; biological management; responsive legislative provisions and effective implementation, and demand management.

Less than half of the white rhinoceros population is generally well-managed within protected areas, with offtakes (primarily translocations of animals) managed in terms of ecological management plans. The white rhinoceros population in KNP (representing 13% of the national population) is managed in accordance with an adaptive management plan, while on private land, management of white rhinoceros is undertaken for different purposes and is thus more variable. In KwaZulu-Natal, HiP (hosting 15% of the national white rhinoceros population) and other reserves follow a management strategy and a status reporting framework based on fixed stocking rates, the outcome of which is constant harvest management for some of the populations in the province.

Ceratotherium simum simum is listed as protected in terms of section 56 of NEMBA, while various provincial ordinances and acts provide further legislative protection. Permits are therefore required to undertake a variety of activities, e.g. hunting, keeping, selling and other forms of direct use. The white rhinoceros population in South Africa is generally subjected to two forms of legal offtake, namely management removals of animals and trophy hunting, with both offtakes based on strict biological criteria. An estimated 1.4% of the national herd is translocated from protected areas annually. The removal of live animals for translocation purposes is not considered to be a form of harvest since these animals are not permanently removed from the national population. There are however some international exports of live animals. Between 2010 and 2022, a total of 1,034 live white rhinoceros were exported from South Africa, constituting approximately 34% of the total exports of this species from South Africa during this time period. Live animals were exported primarily for re-introduction purposes (54%), to zoos (29% of exports) and breeding facilities (8% of exports). The main destination countries were Namibia (44% of exports), China (21% of exports), and Botswana (10% of exports), with Namibia and Botswana importing live white rhinoceros mainly for re-introduction purposes, and China mainly for zoos and breeding facilities. African Parks have taken over management of the Platinum Rhinoceros captive breeding facility (representing 14% of the national population) and plan to reintroduce these rhinoceros into free-ranging conditions across South Africa as well as other areas on the continent.

Legal hunting of white rhinoceros, typically on private land, is mostly economically motivated. Prior to 2005, the number of white rhinoceros hunted was generally a function of market forces, with the market supporting the legal

hunting of an average of 36 – 70 animals annually. After 2005, the number of rhinoceros hunted increased, and by 2011 an average of 116 animals (0.6% of the national population) were hunted, with many of these hunts being undertaken by non-traditional hunters (“pseudo hunters”), most likely in an attempt to source the horn. Through stricter regulatory measures introduced in 2012, the occurrence of “pseudo hunts” has reduced considerably and since then an average of only 68 white rhinoceros (0.5% of the national population) have been legally hunted annually. This clamp down on “pseudo hunting” was however followed by an escalation in the poaching rate. White rhinoceros hunting trophies exported from South Africa between 2010 and 2022 were primarily imported by the United States of America (34%), Russian Federation (12%), China (6%), Vietnam (5%), and Poland (5%). Setting a hunting quota has been unnecessary to date as the legal offtake has been well within sustainable levels. Trophy hunting removes surplus adult males, whilst generating important conservation revenue (while poaching targets animals of all ages and sexes).

A domestic moratorium on the sale of rhinoceros horn or rhinoceros horn products was implemented on 13 February 2009 (Government Gazette No. 31899, Notice No. 148). The moratorium was a temporary measure to afford the Department of Environmental Affairs (DEA) (now DFFE) an opportunity to develop and implement permanent measures aimed at eliminating the illegal international trade in rhinoceros horns. However, the moratorium was set aside by the High Court of South Africa in November 2015, thereby rendering the domestic trade in rhinoceros horn within the borders of the country legal once again. To effectively manage the legal domestic trade in rhinoceros horn, the DEA published Norms and Standards for the Marking of Rhinoceros and Rhinoceros Horn, and for the Hunting of Rhinoceros for Trophy Hunting Purposes for implementation in September 2018 (Gazette No. 41913). The Minister also prohibited the carrying out of certain restricted activities involving rhinoceros horn, or part, product or derivative of such horn, belonging to the species black rhinoceros (*Diceros bicornis bicornis*, *Diceros bicornis minor*, *Diceros bicornis michaeli*) and white rhinoceros (*Ceratotherium simum simum*) through a notice for implementation on 3 June 2020 (Gazette No. 43386) and which was set to commence on 3 February 2023. The commencement notice was however withdrawn on 31 March 2023; thus, these regulatory measures have been published for implementation but have not yet commenced.

The amended Norms and Standards for the Marking of Rhinoceros and Rhinoceros Horn and for the Hunting of Rhinoceros for Trophy Hunting Purposes require that all rhinoceros hunts and dehornings are attended by state conservation officials. Provincial conservation agencies indicate that these legal requirements are being complied with in full. The Norms and Standards require the collection of a DNA sample at the time of dehorning for genetic profiling purposes. DNA samples are also required from live animals, including both horns, when rhinoceros are sold and translocated. A possession permit as well as a DNA certificate is issued to the owner of the rhinoceros horn and all DNA samples are stored on the RhODIS (Rhino DNA Indexing System) database to ensure traceability. The system is well managed, and rhinoceros horn stock piles are regularly audited. Reporting of rhinoceros horn stockpiles within the private sector continues to improve in part due to improved declaration and reporting. It has been reliably established that stockpiles of rhino horn in South Africa (predominantly from the white rhino) amount to around 65 tons (with 25 tons in private ownership). There is a high level of confidence in the monitoring of both illegal and legal harvests of white rhinoceros in state protected areas, which constitute close to half of the national herd. Rhinoceros are individually known in smaller properties where there is also a high confidence in carcass detection rates.

The ability of the state and the private sector to gain financially from owning, selling, translocating, viewing (via ecotourism) and hunting white rhinoceros has contributed significantly to the conservation of this species in South Africa. The white rhinoceros population is now 10 times larger since trophy hunting was introduced in 1968. Due to the significant economic benefits of white rhinoceros trophy hunts to game farmers (worth approximately US\$18 million over the period 2017 – 2022), together with live sales and ecotourism, the private sector has increasingly stocked these animals. Sixty-one percent of the national population is now privately owned. This has contributed to the expansion of the species’ range and a rapidly growing national white rhinoceros population, while a further 18,000 km² has been added to the conservation estate in South Africa. The private sector in South Africa now conserves more rhinoceros than there are black and white rhinoceros in the whole of the rest of Africa. Live sales of surplus animals to the private sector have also been highly beneficial to conservation agencies, generating vital conservation revenue and preventing overstocking in established populations.

Due to the high levels of poaching, the cost of rhinoceros security has increased substantially in recent years, while financial returns from owning rhinoceros have decreased. Demand for trophy hunting has been declining and the commercial international sale of legal rhinoceros horn remains prohibited under CITES. These factors have contributed to a negative shift in the cost benefit ratio of owning white rhinoceros, leading to a reduction in the live sale price and reduced incentives to buy and conserve white rhinoceros. As a consequence, many private rhinoceros owners are now showing an increasing tendency to disinvest in the species, especially in the provinces of Limpopo, Mpumalanga and KwaZulu-Natal. Given that more than half of the national herd is kept on 18,000 km² of privately-owned land, the loss of private sector interest in keeping white rhinoceros is a significant concern for the conservation of the species and its habitat. The reduced introduction of rhinoceros to new areas is expected to result in a decline in the national population growth rate, thereby constraining the total population size and reducing revenue to the conservation agencies that rely upon funds generated from rhinoceros sales to conserve and protect the species. Income of the three largest rhinoceros sellers (SANParks, Ezemvelo KZN Wildlife and Vleissentraal auctioneers) earned from the sale of white rhinoceros has reduced from a total of ~R100 million in 2009 when 370 rhinoceros were sold to R20 million in 2014, when only 60 were sold. Furthermore, between 2009 and 2023 there was a reduction in the average price of white rhinoceros, from R365 000 per animal in 2009 to R150 000 in 2023. Total loss of revenue is estimated at R373 million. Interestingly in 2012, suggestions that South Africa would submit a proposal to the 17th Conference of the Parties to CITES to trade in rhinoceros horn saw a temporary recovery in the average price for a white rhinoceros.

In March 2018, the Private Rhino Owners Association (PROA) launched Rhino Horn Trade Africa (RHTA), an initiative to facilitate the legal trade of rhinoceros horn via an online trade desk, and aiming to provide a managed, efficient platform from which genuine buyers and sellers can trade in legal, humanely acquired rhinoceros horn. An online auction, however, was met with little interest. A recent private initiative, Rhinomics (<https://Rhinomics.com/>), aims to develop a legal rhinoceros horn trade that is regulated and traceable, and to create a self-sustaining finance mechanism for the long-term survival of rhinoceros, people and nature. A vault and software management system for all of South Africa's rhinoceros horn, as well as a national network for logistics and storage have already been established under this private initiative.

Close to half of the national herd that is kept in state controlled protected areas is strictly protected, with legal hunting negligible (<10 per year). However, the high poaching rate is indicative of the limited effectiveness of these protected areas, and several key populations are showing signs of decline despite the significant resources that have been deployed towards gaining control over illegal activities. Poaching has occurred in most protected areas with some, notably the KNP, struggling to combat these illegal activities. The international ban on the commercial trade in rhinoceros horn, in place now for more than 40 years, has also failed to effectively provide strict protection to the species, despite the numerous anti-poaching measures implemented in South Africa. These measures importantly fail to address the critical drivers of poaching (long histories of trade, speculative demand, poverty and economic inequality, price inelasticity, involvement of criminal syndicates, inadequate law enforcement at various levels, human-wildlife conflict disincentives and unclear ownership or user rights). Socio-economic research suggests that the demand for rarity weakens the impact of anti-poaching measures, and scarcity in the market (a result of the trade prohibition) in fact increases demand. International trade prohibitions are ironically one of the primary drivers of speculation in Asian markets.

It is unlikely that the current investment in the protection of rhinoceros from current sources (government and donors) can be sustained in the long term. It is estimated that between R0.87 billion and R1.29 billion per annum is required to secure rhinoceros in the state-owned protected area system, while private game farms and reserves have spent collectively approximately R2 billion on the management and specifically the protection of rhinoceros between 2009 and 2017. Furthermore, a large portion of the rhinoceros security and enforcement budgets in several of provinces are funded by international donors and are therefore at risk of donor fatigue. It is thus important that alternative sources of revenue be explored to protect rhinoceros. There is a certain economic value that could be derived from rhinoceros horn that could be allocated to the protection of the species. At present, most private reserves must fund their own security measures, but income derived from the sale of rhinoceros horn would assist both government and the private sector to continue funding rhinoceros protection measures. As a result of the continued illegal trade in rhinoceros horn and the apparent failure of the CITES trade ban, there have been calls from some segments of the conservation community to reconsider current policies, especially the 40-year ban on the international trade in rhinoceros products, and to establish a legal, well-regulated international market for

trading rhinoceros horn. A plethora of recently published peer-reviewed papers argue for a legal trade. Recent research has concluded that behaviour change will be difficult to achieve, and behavioural change interventions may have unintended and undesirable consequences. While demand reduction campaigns have seen some success in raising awareness, their influence on consumer behaviour is limited by cultural beliefs, distrust in campaign promoters, and the ineffective targeting of key social groups. Consumers show a preference for legal rhino horn, and there is no strong empirical or theoretical evidence that stigmatising demand would be at a sufficient scale that it can compensate for the lack of legal competition.

In conclusion, the non-detriment finding undertaken for the white rhinoceros, as summarised in the analyses of the key considerations above, demonstrates that legal international trade in live animals to appropriate and acceptable destinations and the export of hunting trophies poses a low risk to the survival of this species in South Africa and is not detrimental (Fig.1 & Fig. 2). Trophy hunting of white rhinoceros incentivizes the conservation and protection of the species in South Africa. In recent years, the national herd of rhinoceros has shown an overall population growth, with illegal offtakes (poaching) having been reduced over the last five years to around 3% of the population. It is, however, unlikely that current investment in the protection of this species by government, external donors, and especially private rhinoceros owners can be sustained indefinitely due to the high costs of securing populations and limited economic returns.

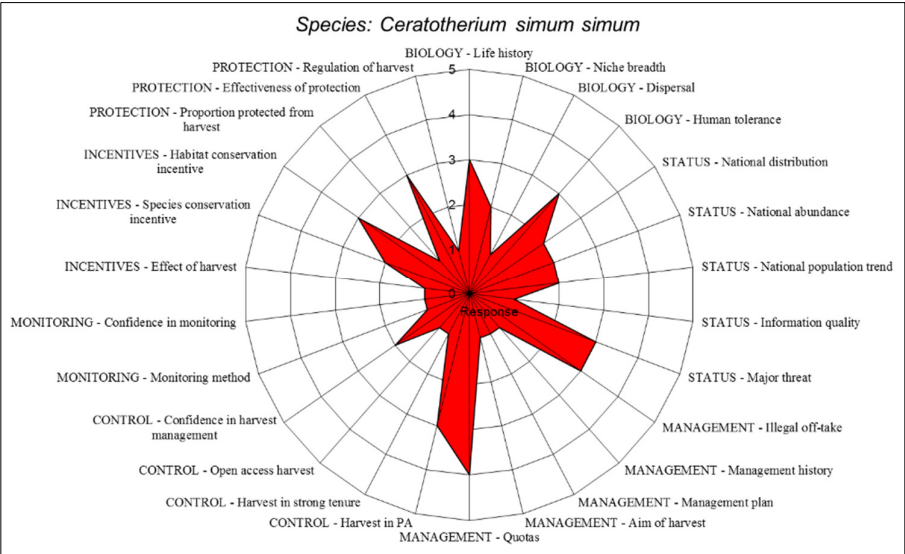


Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Ceratotherium simum simum* (southern white rhinoceros) in South Africa in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks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

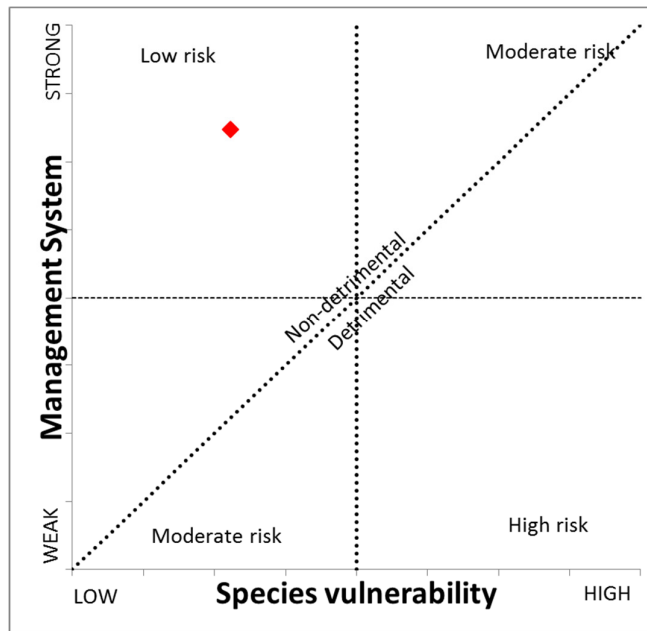


Figure 2: The risk of trading in *Ceratotherium simum simum* (southern white rhinoceros) by South Africa, as represented by the relationship between species vulnerability (biology and status) and the strength of the management system to which the species is subjected (management, control, monitoring, 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 *Ceratotherium simum simum* (southern white rhinoceros) in 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
The white rhinoceros is long-lived with both sexes living to approximately 30 – 40 years in the wild. White rhinoceros are sedentary and semi-social. Cohesive groups consist mostly of mother-offspring associations, or small groups of sub-adults (Owen-Smith, 1988). Adult bulls are generally solitary. Females give birth to their first calf on average between 5 and 6 years in wild populations (range 4.1 to 13.5 years) (Skinner & Chimimba, 2005). Inter-calving intervals average 2.9 years (1.7 - 5 years), with a gestation period of approximately 16 months. Males are capable of mating at a similar age range to females, but due to social constraints tend to only mate successfully after 10 - 12 years old (Shrader & Owen-Smith, 2002). Youngsters can become independent of their mother around the time of the birth of the next offspring, when aged between 2.2 and 3.3 years (Owen-Smith, 1988). White rhinoceros 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
The white rhinoceros is a relatively adaptable species, able to survive in a variety of habitats from grassland to savannah, and inhabiting areas with mean annual rainfall ranging from 350 mm per year to 1,500 mm per year. Juvenile mortality rates during the winter months on the Highveld are however high which is thought to be due to a combination of low temperatures and poor grazing quality. White rhinoceros favour short grasses on grazing lawns with short leafy <i>Themeda triandra</i> and broad leaved <i>Panicum maximum</i> and <i>P. deustum</i> growing under trees (Emslie, pers. comm.), but can switch to taller relatively fibrous bunch grasses when short grass is unavailable. Grasslands growing on nutrient-poor soils tend to be avoided (Owen-Smith, 1988), and grazing in such areas predominates in nutrient hotspots such as around termitaria or along wetlands or drainage lines. They are thus able to persist and reproduce in nutrient poor areas, as evidenced by their current distribution. Favoured short grass species include <i>Panicum coloratum</i>, <i>Urochloa mosambicensis</i>, <i>Cynodon dactylon</i>, <i>Digitaria spp.</i> and <i>Sporobolus spp.</i> (Owen-Smith, 1988). About 35 other grass species are eaten to a lesser extent (Skinner & Chimimba, 2005), but species such as <i>Cymbopogon plurinodis</i>, <i>Bothriochloa insculpta</i> and <i>Aristida spp.</i> are avoided. They do not appear to compensate for seasonal declines in food quality by switching to other species or increasing the number of species eaten and may instead draw on fat reserves during the dry season (Shrader <i>et al.</i>, 2006), or if possible, feed higher-up in the catena where they can graze on taller <i>Themeda triandra</i> (Emslie, pers. comm.).		
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
Individual dispersal is a process that takes place at the juvenile stage. White rhinoceros calves generally leave their mothers from 2.5 – 3.5 years of age to form groupings with other adult females and/or other sub-adults, subsequently dispersing into new areas. Individuals have been known to move over distances of 40 – 50 km during drought conditions. White rhinoceros of all ages are known to disperse. Biological barriers however may inhibit their dispersal (Cromsigt & te Beest, 2014). Shrader and Owen-Smith (2002) suggest that the “buddy system” exemplified by shifting temporary associations among sub-adults, and between sub-adults and some adult females, could be important in ameliorating potential costs of dispersal into unfamiliar habitat. Males have non-overlapping territories which are known to range from 0.75 km² to 14 km² in typical savannahs. The boundaries of their home ranges are commonly aligned with topographic features such as rivers, watersheds or roads (Skinner & Chimimba, 2005).		

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
The species is conservation dependent, occurring solely in protected areas and on game farms and reserves, but it is tolerant to local human activity and can be ranched under semi-intensive conditions. Under these conditions, where the density of animals is higher and regular anaesthetic procedures for management purposes and/or translocation are likely to increase stress levels, there is no detectable difference in cow fertility (Ververs <i>et al.</i>, 2017). In addition, Badenhorst <i>et al.</i>, (2016) found that faecal glucocorticoid metabolite (fGCM) levels do not differ between ranched and free-ranging adult individuals, though routine dehorning procedures do result in short-term stress responses that dissipate after 72 hours (Badenhorst <i>et al.</i>, 2016). Nhleko <i>et al.</i>, (2022b) found that female rhinoceros decreased their visitations to rhinoceros middens by 70% in response to human vocalisations, while visitations by males remained unchanged. Both sexes exhibited more vigilance (watchful) behaviour (i.e. head up) in response to human vocalisations (males 69.5%, females 96%) compared to control sites (Nhleko <i>et al.</i>, 2022b).		
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
The total area occupied by white rhinoceros within South Africa exceeds 49,000 km², of which approximately 18,000 km² is private or communal land. There are likely less than 200 sub-populations of white rhinoceros in South Africa across all nine provinces of which approximately 21 properties are state-owned and the remainder either private or community owned. The largest subpopulations occur in the greater Kruger National Park (KNP) (which incorporates adjacent private and state reserves) and Hluhluwe-iMfolozi Park (HiP). Although the white rhinoceros population in South Africa is fragmented (as all sub-populations exist in fenced protected areas and are thus functionally genetically isolated), ongoing gene flow, through translocations among reserves, does occur, though in an unstructured manner.		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	4
	Uncertain	5
Of all the African rhinoceros, the southern white rhinoceros is the most abundant (IUCN, TRAFFIC, 2022), with total numbers far exceeding that of a minimum viable population (Reed <i>et al.</i>, 2003). At the end of 2021 there were approximately 15,940 white rhinoceros on the continent (IUCN/TRAFFIC, 2022 CITES E-CoP19-75) of which approximately 80% occurred in South Africa (IUCN/TRAFFIC, 2022 CITES E-CoP19-75). More recently, the African Rhinoceros Specialist Group (AfRSG) reported 17,464 southern white Rhinoceros on the continent, with 13,991 in South Africa at the end of 2023 (Ferreira <i>et al.</i>, 2024). According to data gathered from a survey of Rhinoceros on private and state land by the SADC Rhinoceros Management Group (RMG) and data from the IUCN SSC's African Rhinoceros Specialist Group (AfRSG), the South African white rhinoceros population as of the end of 2023 was estimated at 13,991 individuals (Fig. 3), with 5,406 (39%) and 8,585 (61%) occurring on state-owned and private land respectively (Table 2). As of the end of 2023 the Kruger National Park (KNP) subpopulation was estimated 1,812 (1,680-1,943) (SANParks, Unpublished data). According to the KZN Biodiversity Status Assessment Report 2023, the KwaZulu-Natal (KZN) white rhinoceros population at the end of 2023, comprising eight subpopulations in state protected areas and 26 subpopulations on private and communal land, was estimated to be 3,158, with 2,375 animals in protected areas and 783 animals on private and communal land..		

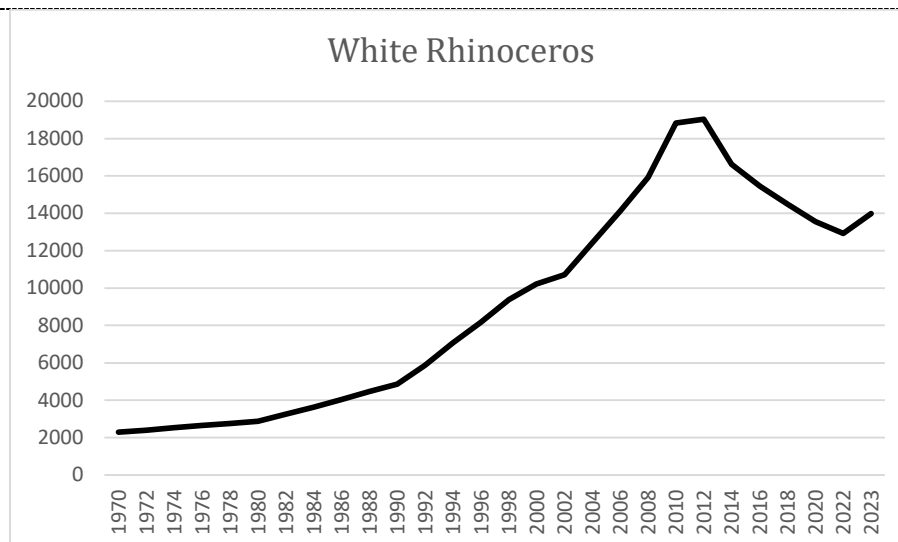


Figure 3: Trends in the number of white rhinoceros (including white rhinoceros in captive breeding operations (CBOs)) in South Africa from 1970 to 2023 (Source: SADC RMG).

Table 2: White rhinoceros disaggregated per province (with SANParks numbers presented separately) and ownership in South Africa as of 31 December 2023 (SADC RMG) including white rhinoceros within captive breeding operations (CBOs).

Entity	White rhino		Total per Province
	State owned	Privately owned	
Eastern Cape	0	308	308
Free State	77	300	377
Gauteng	14	26	40
KZN	2,328	747	3,075
Limpopo	0	2,092	2,092
Mpumalanga	88	724	812
Northern Cape	0	1,298	1,298
North West	654	2,918	3,572
Western Cape	0	172	172
SANParks	2,245	0	2,245
TOTAL	5,406	8,585	
NATIONAL TOTAL			13,991

There are at present four registered white rhinoceros captive breeding facilities across three provinces. All four properties met the compliance criteria for the registration of operations that breed Appendix I animal species in captivity for commercial purposes as set out in Res. Conf. 12.10 (Rev. CoP15). However none of the properties have formally applied to register with the CITES Secretariat. The largest captive breeding operation for white rhinoceros has a population of more than 1,986 (as of December 2023) animals on an area of approximately 8,200 ha. The population is rated by the IUCN African Rhinoceros Specialist Group as a continentally **Key1** (> 100 animals -stable or increasing over the last 5 years) white rhinoceros population. The rating holds because the animals are genetically the same as wild populations and are maintained in circumstances which allow mate choice, largely normal social behaviours and interactions, and reasonable exposure to natural food and various environmental and disease challenges. This population has been breeding well, achieving an average annual population growth rate of approximately 9% since 2008 (Adcock *et al.*, 2018; Furstenburg *et al.*, 2022). This white rhinoceros population has recently been bought by African Parks with the intention of rewilding these rhinoceros over the next 10 years (Somerville, 2023).

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
The white rhinoceros is the most numerous of the African rhinoceros species and ranged from Morocco to South Africa during the Pleistocene (Skinner & Chimimba, 2005). The northern white rhinoceros is now effectively extinct, and South Africa is the main stronghold for the southern white rhinoceros, which has grown from a single remnant population of probably less than 50 animals at the turn of the 20th century in what is now Hluhluwe-iMfolozi Park (HiP), to over 19,030 individuals in the country in 2012. White rhinoceros numbers in Africa increased rapidly from 1992 to 2010 (averaging 7.1% growth per year) followed by a levelling off that coincided with escalating poaching levels (Emslie <i>et al.</i>, 2016). From 2012 to 2015, white rhinoceros numbers on the continent seemed to decline at a non-significant rate of 0.4% per year (Emslie & Adcock, 2016). However, between 2017 and 2021 white rhinoceros were decreasing at 3.1% per annum. This is associated with white rhinoceros declines in South Africa linked to trends in Kruger National Park (KNP) (CoP19 Doc. 75 (Rev. 1). In South Africa, white rhinoceros numbers increased threefold from over 5,000 individuals in 1992 to an estimated 19,030 animals in 2012 (Fig. 3). According to analyses undertaken by the AfrSG, the national average annual growth rate of the white rhinoceros population from 1991 to 2012 was 7.1%. A number of key developments are thought to have contributed to the increase in the national population of white rhinoceros since the late 1800s. These include (1) the improved ability to capture and translocate white rhinoceros following the first successful translocation of white rhinoceros from iMfolozi Game Reserve in 1961 ('t Sas-Rolfes <i>et al.</i>, 2022); (2) the improvements in the use of anaesthetic and other drugs to calm rhinoceros during capture; (3) the attribution of (financial) value to white rhinoceros associated with the first sport hunting of the species in 1968 ('t Sas-Rolfes <i>et al.</i>, 2022); (4) the mass translocation of over 500 white rhinoceros from Hluhluwe and iMfolozi Game Reserves to the KNP in the early 1980s to avoid drought related mortalities; (5) implementation of a policy by the then Natal Parks Board allowing white rhinoceros to be auctioned off and thus establishing a market related value for the species which resulted in an increasing number of white rhinoceros being afforded protection on private land from the late 1980s onwards ('t Sas-Rolfes <i>et al.</i>, 2022); and (6) a CITES annotated Appendix II listing in 1995 that allowed for the international trade in live animals in addition to the exports of hunting trophies. The total South African white rhinoceros population was estimated at 13,911 individuals at the end of 2023 (including the rhinoceros in captive breeding operations, approx. 2640 white rhinoceros), indicating a slight increase in the national population after the rapid decline observed between 2012 (19,030) and 2022 (12,923) (Fig. 3). The decline in the national population between 2012 and 2022 was largely due to a decline in the estimated numbers of rhinoceros in KNP, South Africa's largest population (Fig. 4). From 2012 to 2017 white rhinoceros numbers declined by an estimated 51% in KNP and 26% in other state-run parks and game reserves in South Africa. In 2017 there were 10 fewer state-run white rhinoceros populations than there were in 2012 (a 21% decline); these populations were either lost due to poaching or their last remaining animals were translocated to more secure areas. The three small National Park subpopulations of white rhinoceros, Mokala, Marakele and Mapungubwe, increased from 2011 to 2015 (Ferreira <i>et al.</i>, 2017). Between 2010 and 2020, the white rhinoceros population in the KNP showed an approximate 76% decline (SANParks, 2021) with a further 14.7% decline estimated for 2021 (SANParks, 2022). Between the 2013 and 2014 surveys, the number of southern white rhinoceros that were born and survived the first year (854 – 992 animals) in KNP exceeded the number that were poached (745 animals) (Ferreira <i>et al.</i>, 2017). However, between the 2014 and 2015 surveys, the number of white rhinoceros born and surviving the first year (725 – 810 individuals) were similar to the number poached (818 individuals). Population declines in KNP were largely driven by poaching and included a dependency effect (Nhleko <i>et al.</i>, 2022a). The decline occurred despite a 40% recorded reduction in the number of white rhinoceros poached. Poaching resulted in a reduction in the lifetime reproductive output per cow from approximately 6 to 0.7 calves: a loss of 5.3 future offspring (Nhleko <i>et al.</i>, 2022a). Reduced rainfall exacerbated poaching losses. The marked decline coincides with the severe drought that affected southern Africa in 2015-2016, when KNP rainfall was 49% below the long-term average following a 26% below long-term average rainfall the year before, which negatively impacted both mortality and calving rates (Ferreira <i>et al.</i>, 2019). White rhinoceros, however, showed high resilience to droughts with birth and survival recovered two years after the drought (le Roex & Ferreira, 2021). Three hundred white rhinoceros were also translocated out of KNP between 2015 and 2017. The KNP white rhinoceros population has increased slightly since 2022 (1,849 (95% CI: 1,711-1,988) white rhinoceros and 1,812 (95% CI: 1,680-1,943) in 2022 and 2023 respectively), the first time in a decade with no detectable decline. In addition, recruitment rate (rhinoceros born and that survived the first year after birth as a fraction of the population) matched the total loss rate (poaching, natural deaths and deaths of dependent calves) (SANParks, Unpublished data). As of the end of 2021 the KNP subpopulation was estimated at 2,237 (Ferreira <i>et al.</i>, 2024). By 2023 the estimated subpopulation was 1,812 (1,680-1,943) (SANParks, Unpublished data).		

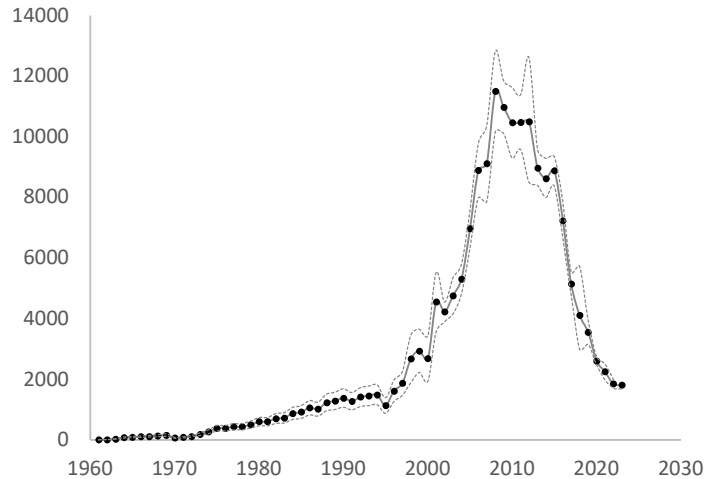


Figure 4: Population trend for white rhinoceroses in KNP up to 2023 (SANParks, Unpublished data).

While the rhinoceros populations declined in KNP and other State-run parks and game reserves, numbers of white rhinoceroses on private land have continued to increase. The percentage of white rhinoceroses under private and communal ownership has increased from 25% in 2010 (Clements *et al.*, 2023) to 61% (8,585) in 2023 (Fig. 5). However, there are fewer white rhinoceroses on communal land in South Africa (an estimated 1% of the national populations) (Ferreira *et al.*, 2022). Private and communal white rhinoceros owners are thus important players in white rhinoceros conservation and incentives are required to encourage conservation friendly management and to limit management activities that diminish the conservation status of the national herd (Clements *et al.*, 2023). Increased costs of security (estimated to be fivefold between 2012 and 2018) and limited capacity to recoup the costs by owners (commonly attributed to an inability of private owners to sell harvested rhinoceros horn to international markets) has resulted in many private rhinoceros owners disinvesting in rhinoceros and the total number of properties with rhinoceros on them declining by approximately 50% (from approx. 300 (prior to 2014) to approx. 150) (Clements *et al.*, 2020). Supplementary feeding of rhinoceros during the recent drought, which reduced mortalities and improved birth rates, added to the costs incurred by private rhinoceros owners (Emslie *et al.*, 2019; Clements *et al.*, 2023). According to a national survey conducted by Clements *et al.*, (2020) in 2015 and again in 2018, 28% percent of rhinoceros owners are disinvesting in rhinoceros, 57% are pursuing business-as-usual (largely ecotourism), and 15% are investing in more rhinoceros. The 28% of owners in the sample, who collectively owned roughly a third of both the rhinoceros (black and white rhinoceros) and the land, were actively disinvesting in rhinoceros mainly due to the cost of poaching to private- rhinoceros owners (Emslie *et al.*, 2019; Ferreira *et al.*, 2014). By contrast, 15% of owners were purchasing land and rhinoceros in response to the poaching crisis. These owners, who owned 45% of all rhinoceros, had increased their rhinoceros-security costs considerably and were buying rhinoceros and land despite experiencing the most poaching incidents. Investors thus appear better-equipped financially than disinvestors to cope with the growing costs of owning rhinoceros (Clements *et al.*, 2020). Although these owners show resilience to poaching thus far, possibly benefitting from the reduced rhinoceros prices and the supply from disinvestors, whether this strategy will result in resilient rhinoceros conservation in the long term remains unknown (Clements *et al.*, 2020). In addition, all owners in this category would participate in legal-horn trade (Clements *et al.*, 2020).

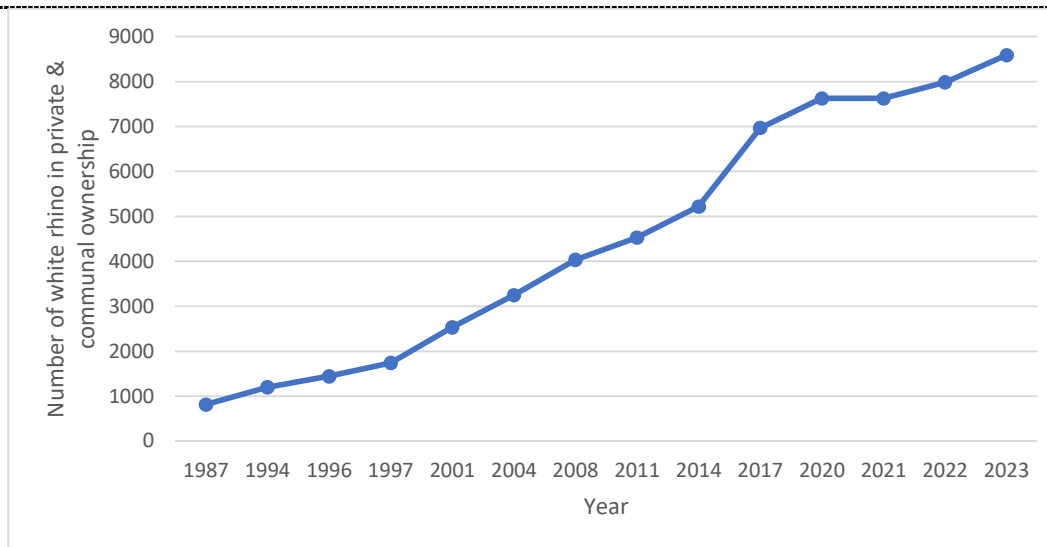


Figure 5: Numbers of white rhinoceros on private land and, to a lesser extent on community land, from 1987 to 2023 (Source IUCN SSC AfRSG; & SADC RMG).

In KwaZulu-Natal (KZN), the provincial subpopulation grew at an average rate of 3.9% per annum from 2004 and reached its peak in 2012 (3,543). From 2012 to 2016, the KZN subpopulation declined at 5.4% per annum to 2,845 (Goodman, *et al.*, 2017), but since 2016 has shown a gradual increase to 3,191 and a small decline to 3,158 at the end of 2023 (Fig. 6) (KZN Biodiversity Status Assessment Report 2023).

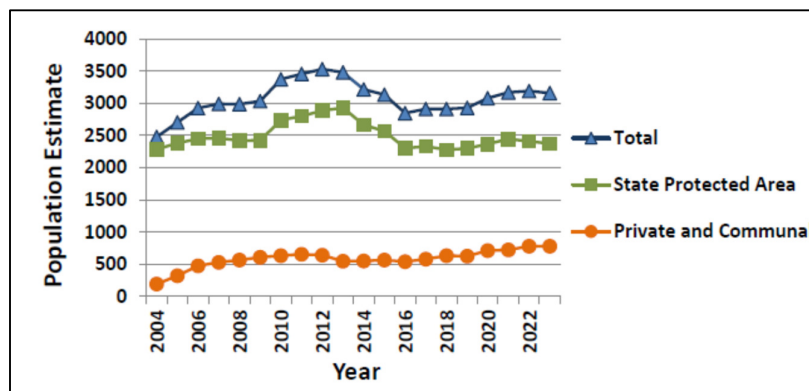


Figure 6: Trend in the population of white rhinoceros in protected areas and on private and communal land in KZN, 2004-2023 (KZN Biodiversity Status Assessment Report 2023).

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

Detailed data exist on white rhinoceros numbers, poaching and population performances for most subpopulations over the past 30 years due to a process of confidential annual white rhinoceros status reporting to the Southern African Development Community (SADC) Rhinoceros Management Group (RMG), as well as regular reporting to IUCN/SSC AfRSG. The sizes of many white rhinoceros subpopulations, which are monitored using individual identification methods, are known exactly or to within a few individuals. In Kruger National Park (KNP), where individual based monitoring over the whole area is not feasible, white rhinoceros numbers are monitored using intensive helicopter block counts which have wider confidence levels (Ferreira *et al.*, 2017). In Hluhluwe iMfolozi Park (HiP), white rhinoceros numbers are estimated statistically using distance-based line and point transects (Emslie & Adcock, 2016). Although the quality of the reporting has varied over time and between the provinces and the private sector, there has been an overall improvement in reporting from both sectors in the past years.

Recently the quality of monitoring in some populations has declined as field staff are having to increasingly focus on anti-poaching with less time available for other conservation activities such as monitoring.

There are currently two processes underway that could further assist with the collation and accessibility of data. The South African National Biodiversity Institute (SANBI) is currently in the process of developing a national online species population database. The South African Wildlife Population System (SAWPS) will allow reserve managers to submit all population and offtake data into the online system that can be used on a provincial and national basis to monitor and report on population trends. Wildlife Ranching South Africa (WRSA) has also initiated the development of a similar online system for their members.

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

The current major threat to South Africa's white rhinoceros population is the continuing loss of individuals to poaching for their horn (Knight, 2017). This is mainly due to a persistent demand for rhinoceros horn in Asia in the absence of a regulated and sustainable legal trade. Rhino horn has been used in traditional Chinese and Vietnamese medicines for centuries (Bending, 2018; Cheung *et al.*, 2018; Nowell, 2012). Since 2007, there has been an upsurge in black market prices for horn and apparent new uses and demand from south-east Asia and especially Vietnam, which has caused an increase in rhinoceros poaching in some range states including South Africa (Thomas, 2010; MacMillan *et al.*, 2017). Compounding this is the threat posed by organised crime which has emerged in response to the international trade prohibition.

The rate of rhinoceros poaching in South Africa increased rapidly since 2007 and then started to decline after reaching a peak in 2014. The rate of poaching was recorded at 0.04 rhinoceros per day in 2007, increasing to 0.21 per day in 2008, 0.31 in 2009, 0.88 in 2010, 1.13 in 2011, 1.76 in 2012, 2.64 in 2013, and to a peak of 3.15 rhinoceros per day in 2014 before declining to 3.01 in 2015 and 2.76 per day in 2016. The number of white rhinoceros poached per annum dropped below 1000 animals per year to 963 and 722 in 2017 and 2018 respectively (Fig. 6). In 2021, approximately 423 white rhinoceros (approximately 3.3% of the national population) were lost to poaching with close to half of these in KNP alone. Analyses of field carcass detection data in KNP indicate that around 20% of rhinoceros carcasses may go undetected (Ferreira *et al.*, 2018) and therefore actual white rhinoceros poaching levels in KNP from 2014-2017 may have averaged in the region of 10-12% of the population per annum, which exceeds the long-term estimated maximum population growth rate for white rhinoceros of approximately 9%. In 2022 and 2023, the intensity of poaching shifted to KZN where 244 and 325 rhinoceros were poached respectively. In 2023, 463 white rhinoceros were poached nationally (Fig. 7). Poaching of white rhinoceros on private game farms and reserves has increased by more than 45% from approximately 160 animals in 2016 to 232 animals in 2017.

There seems to be a positive response to the anti-poaching interventions employed nationally and specifically in KNP, although a link to prices of rhinoceros horn in Asian markets requires further investigation. The number of incursions into KNP have also decreased and should do so further, partly due to broadscale dehorning of rhinoceros. The main purpose of dehorning at present is to reduce the incentive to poach rhinoceros. In small subpopulations dehorning is cost effective, and all rhinoceros have therefore been dehorned in many of the smaller subpopulations. Dehorning is less common in larger subpopulations. If the current efforts to curb poaching are withdrawn, poaching of white rhinoceros in KNP is likely to increase dramatically, especially considering the increasingly sophisticated methods employed by poachers. Though the poaching threat is currently considered substantial and reversible (poaching has not yet exceeded the intrinsic rate of increase of the species nationally), the severity of the threat will increase substantially should the current funding and resources be withdrawn. Huge financial input from external sources is crucial to maintain anti-poaching measures. It is important to acknowledge though that the response to this threat has been disproportionately high, and much needed funding has been redirected from other species and conservation activities.

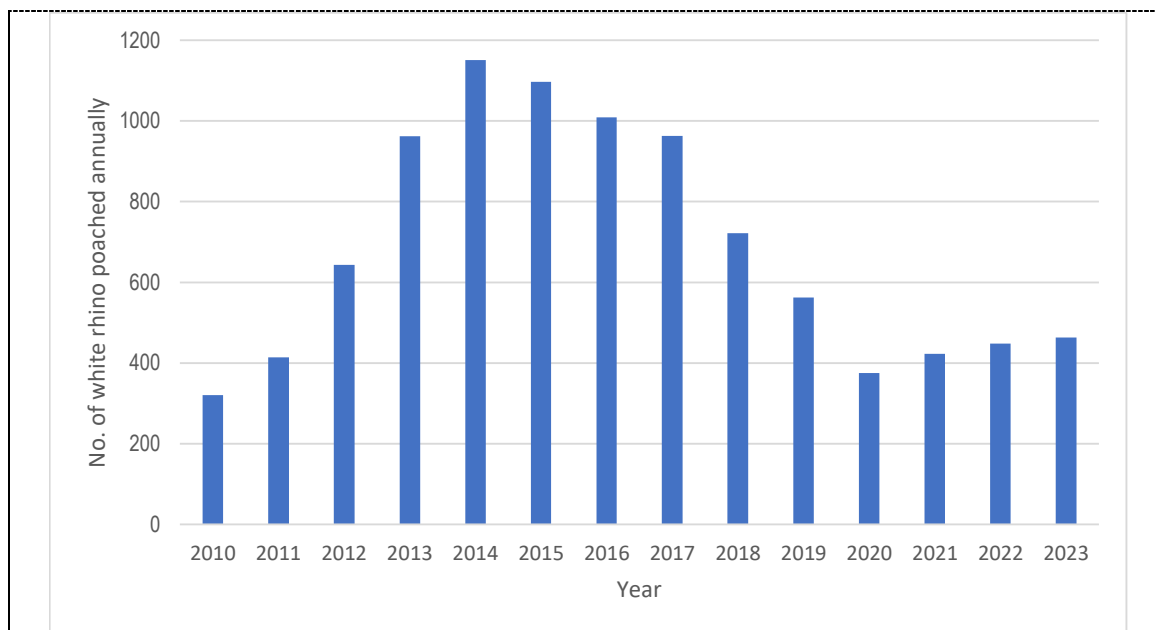


Figure 7: Number of white rhinoceros poached annually within South Africa between 2010 and 2023. *The poaching figure for 2022 includes both white and black rhinoceros poached within the year, and thus a slight overestimate for white rhinoceros.

The key driver leading to the illegal killing of rhinoceros is the demand for a high value resource (rhinoceros horn) in Asia and the lack of a legal supply (Zhu, 2020). The rate of patent filing for rhinoceros products spiked in 2013 just prior to the years in which poaching levels increased rapidly, suggesting a surge in demand, particularly for medicinal purposes (Hinsley *et al.*, 2024). The current consumer demand seems to stem from investors who are purchasing rhinoceros horn not because of its cultural value but rather because of their prospects for appreciation (UNODC, 2016; Zhu, 2020; Di Minin *et al.*, 2021). Because of this speculative demand for rhinoceros horn, trade restrictions intended to protect rhinoceros often have the opposite effect (Zhu, 2020). International trade prohibitions are ironically one of the primary drivers of speculation in Asian markets (Zhu, 2020). By artificially inflating the scarcity of the resource, trade prohibitions drive price spikes.

Due to rising security costs, private rhinoceros owners are showing an increasing tendency to disinvest in the species, and as a result limited new suitable habitat is becoming available for the establishment of new rhinoceros subpopulations (Rubino & Pienaar, 2017; Clements *et al.*, 2020). According to a national survey conducted by Clements *et al.*, (2020), twenty-eight percent of rhinoceros owners are disinvesting in rhinoceros, 57% are pursuing business-as-usual (largely ecotourism), and 15% are investing in more rhinoceros. The total number of properties with rhinoceros on them have declined by approximately 50%, from approximately 300 to approximately 150 in 2023. Many current subpopulations are near or exceed ecological carrying capacity and thus have very low growth rates (Balfour *et al.*, 2015), thereby impacting opportunities for population growth and range expansion. Auctioning patterns indicate that there may be a decline in interest in keeping rhinoceros on private land, particularly in the provinces of Limpopo and Mpumalanga. A once thriving domestic trade in rhinoceros has substantially diminished, with values of white rhinoceros dropping from approx. R350,000 in 2011 to approx. R150,000 in 2023. In KwaZulu-Natal, both the number of protected areas with white rhinoceros and the number of private and communal game farms and reserves with rhinoceros declined from a peak of 36 in 2012 to 29 in 2017 but has subsequently risen to 34 in 2023 (KZN Biodiversity Status Assessment Report 2023). Considering that more than half (61%) of the national herd (8,585 animals) is kept on approximately 18,000 km² of privately owned land, the loss of private sector interest in keeping white rhinoceros is a significant concern for the conservation of the species. In some cases, reserve owners have moved their white rhinoceros to smaller enclosures for security purposes.

Income earned of the three largest white rhinoceros sellers (SANParks, Ezemvelo KZN Wildlife and Vleissentraal auctioneers) from the sale of white rhinoceros has reduced from a total of approximately R100 million in 2009 when 370 rhinoceros were sold, to R20 million in 2014 when only 60 were sold. Between 2009 and 2012 there was a 43% year on year reduction in rhinoceros sales from these sources, with a reduction in the average price from R365 000 per white rhinoceros in 2009 to R258 000 in 2012. This equated to a direct loss to these institutions during this period of approximately R100 million. With the total number of rhinoceros being sold declining from the peak of 370 in 2009 to 60 in 2014, a further loss of revenue of about R273 million is estimated, bringing the total loss to R373 million. Turnover from the 1,750 white rhinoceros sold by SANParks, Ezemvelo KZN Wildlife and Vleissentraal auctioneers over the 2008 – 2014 period totalled R500 million, averaging R63 million per year. Interestingly, in 2012 suggestions that South Africa would consider submitting a proposal to the 17th Conference of

the Parties (CoP) to CITES to trade in rhinoceros horn saw the average price for a white rhinoceros increase temporarily back to R305 000 per animal. For security reasons an increasing proportion of rhinoceros are not being sold publicly on auctions.

The loss of revenue and value of rhinoceros to both state and private sector owners generated from the sale of rhinoceros translates into reduced funds for new conservation land and anti-poaching measures. Active involvement of the private sector in the acquisition of rhinoceros since 2005 was estimated to generate R290 million for conservation authorities. A further consequence of the decline in the sale and subsequent introduction of rhinoceros to new areas is the expected decline in the meta-population growth rate. Increased poaching also means there will be fewer surplus rhinoceros that could be sold to maintain productive densities.

Poaching of rhinoceros thus hampers several conservation objectives (Ferreira, Botha & Emmett, 2012). Population restoration opportunities as well revenue generating opportunities to enhance protected areas are lost when animals are poached. Importantly, rhinoceros horn profits are currently reaped largely by poachers and criminal traders on the black market, rather than by local communities or the public administrators or private owners of land hosting rhinoceros who currently bear the prohibitive financial and security costs of protecting and conserving the species (Rubino & Pienaar, 2017).

Habitat loss is not a threat to the white rhinoceros and the species' range has in fact expanded since the 1960s.

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

Poaching on a continental level in 2015 represented 5.0% of African rhinoceros numbers (5.3% for white rhinoceros), close to the continental average annual growth rates (7.2%) that white rhinoceros achieved between 1995 and 2007. While poaching levels have declined since 2015, poaching remains at high levels with around 3.1 rhinoceros (black and white rhinoceros combined) poached per day on the African in 2017. In South Africa, an estimated 3.3% of the national population was lost to poaching in 2023 (Table 3). As a result, the white rhinoceros was listed as Near Threatened (A4ad) on the IUCN regional (South Africa, Swaziland and Lesotho) Red List of Threatened Species (Emslie & Adcock, 2016). The AfRSG reported a threshold of 3.5% poaching rate beyond which populations will decline (Ferreira *et al.*, 2022). Since 2020, the poaching rate of all rhinoceros inclusive of white and black rhinoceros were below this threshold.

Table 3: Estimated number of white rhinoceros poached in South Africa between 2010 and 2023.

Year	Wild population estimate	No. of wild rhinoceros poached	Poaching as % of wild population
2010	18462	321	1.7
2011		414	
2012	18358	643	3.5
2013		962	
2014		1151	
2015	17208	1097	6.4
2016		1009	5.9
2017	15625	963	6.2
2018	14175	722	5.1
2019		562	
2020	12358	375	3.0
2021	12923	423	3.3
2022	13483	448*	3.3
2023	13991	463	3.3
Total		9553	

*The poaching figure for 2022 includes both white and black rhinoceros poached within the year, and thus a slight overestimate for white rhinoceros.

Over the past half decade, poaching losses have been lower on private land (0.5% of private white rhinoceros poached in 2019) than in Kruger National Park (KNP) (6.1%) and provincial parks (3.1%) (Ferreira & Dziba, 2021). A total of 1,009 white rhinoceros were poached in 2016, compared to 1,097 in 2015 and 1,151 in 2014, representing declines in poaching rates of 4.7% and 8.0% respectively. The number of white rhinoceros poached per annum dropped below 1000 animals per year for the first time in 2017 (Fig. 7) (Table 3). In 2023, 463 white rhinoceros were poached nationally (Fig. 7) (Table 3). This reduction in poaching after a period of significant increases in poaching indicate a positive response to the anti-poaching interventions employed nationally and specifically in KNP, though market dynamics as a major driver cannot be discounted. The situation on the ground is however more complex because while the number of rhinoceros poached in KNP has decreased, there is evidence that poaching has increased in other hotspots, particularly in northern KwaZulu-Natal (Fig. 8). Overall, removal rates from the KwaZulu-Natal white rhinoceros population through poaching, sport hunting and live exports from the province increased from 2% per annum between 2005 and 2009, to 4% per annum between 2010 and 2012 and to between 5.1% and 7.6% between 2012 and 2016. In 2017, 10% of the white rhinoceros population in KwaZulu-Natal was removed (Fig. 8). From 2016 onwards, most removals were primarily due to poaching, this now being the primary pressure on, and future threat to the KwaZulu-Natal white rhinoceros population. Poaching was generally low prior to 2008, but this situation has changed radically with an exponential increase in poaching mortality observed. In 2017, the poaching rate was the highest on record amounting to 7.07% of the population (KZN Biodiversity Status Assessment Report, 2023). This was well above 2013 and 2014 levels (Fig. 8) and more than three times the maximum acceptable rate of 2% per annum. According to the Ezemvelo White rhinoceros Management Strategy, when poaching exceeds 2% of the population, it is likely to impact on the growth of the white rhinoceros population and thus additional protection measures need to be implemented to ensure continued growth in the population. Between 2018 and 2021, the average poaching rate declined to approximately 3.8% per annum (KZN Biodiversity Status Assessment Report, 2023). In 2020, all removals from the population in KwaZulu-Natal were attributed to poaching. In 2022 and 2023, there has been a major increase in poaching losses to 7.26% and 9.95% respectively (KZN Biodiversity Status Assessment Report, 2023).

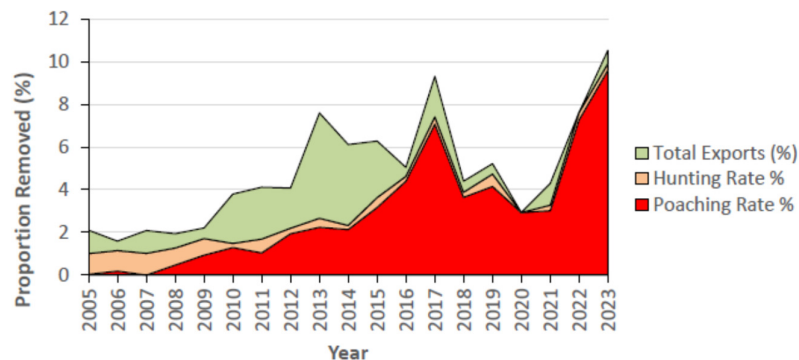


Figure 8: Removal rate (percentage) of white rhinoceroses for harvesting activities such as live removals, hunting and poaching respectively in KwaZulu-Natal between 2005 and 2023 (KZN Biodiversity Status Assessment Report 2023).

The legal hunting of trophies for the purpose of obtaining rhinoceros horn ("pseudo" hunts) was a regular occurrence in South Africa from approximately 2010 to 2012 when it was substantially reduced through legislative intervention. Stricter scrutiny under the new policy resulted in the refusal of at least 17 hunting applications from the Czech Republic, Ukraine, Vietnam, China, Bulgaria, Canada and Slovakia, and at least 24 other hunts were cancelled (Emslie *et al.*, 2016). This is likely to have led to increased poaching as rhinoceros horn could no longer be obtained through legal means (Table 3; Fig. 7; Fig. 10), though it is clear that the demand was not being met through these "pseudo" hunts. While "pseudo" hunting removed surplus male rhinoceros, poaching is non-selective and individuals of all sexes and ages are targeted, thereby impacting the breeding potential of the population. Some private sector rhinoceros owners have also reportedly sold horns illegally (Hübschle, 2015).

The key driver leading to the illegal killing of rhinoceros is the demand for a high value resource (rhinoceros horn) in Asia in the absence of a legal manner for obtaining the horn (Zhu, 2020). In addition, some of the current consumer demand seems to stem from investors that are purchasing these products not because of their cultural value, but rather because of their prospects for appreciation (UNODC, 2016; Zhu, 2020; Di Minin *et al.*, 2021). Because of this speculative demand, trade restrictions intended to protect the species tend to have the opposite effect (Zhu, 2020). International trade prohibitions are ironically one of the primary drivers of market speculation (Zhu, 2020). By artificially inflating the scarcity of the resource, trade prohibitions drive subsequent price spikes.

Due to highly effective anti-poaching measures within the Buffalo Dream Ranch captive breeding operation (CBO), the operation has lost less than 0.02% of its rhinoceros to poaching in the 10 years since its inception, which is significantly less than the national average.

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

Approximately 39% of the white rhinoceros population is generally well managed within state protected areas, with offtakes managed in terms of ecological management plans. The white rhinoceros subpopulation in the KNP (13% of the national population) is managed in accordance with an adaptive management plan. Management of white rhinoceros on private land is more variable, though they are mostly well managed based on the same conservation principles and objectives as for the state protected areas. In KwaZulu-Natal, a management strategy and a status reporting framework currently supports fixed stocking rate management and therefore constant harvest management for some of the subpopulations in the province (Fig. 8). The regulatory framework in place 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. All hunts by international clients must be recorded in the Professional Hunter's Register (PH 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) collates the provincial registers into a national register on an annual basis, which facilitates oversight and adaptive management.

Legal hunting, which occurs mostly on private land where it is generally economically motivated, is regulated through a system of permits. Legal hunting of white rhinoceros commenced in South Africa in 1968 when the size of the national population was approximately 1,800. Prior to 2005, the number of white rhinoceros hunted annually was generally a function of market forces, with 36 – 70 hunts being permitted. After 2005, the number of rhinoceros hunted annually increased, with more hunts increasingly undertaken by non-traditional hunters ("pseudo hunters"). Legal hunts of white rhinoceros peaked at 173 in 2011 (Fig. 11). However, following the introduction of several measures in early 2012 to reduce pseudo hunting, the number of white rhinoceros hunted dropped to previous levels, and 64 were hunted in 2015. Increased regulation of the hunting process resulted in a rapid decline in the number of applications by hunters from non-traditional hunting countries. Trophy hunting offtakes increased to 115 and 110 in 2022 and 2023 respectively but is still within sustainable levels. Majority of trophy hunting are taking place on private properties where little or no poaching occurs. The increase in number of white rhinoceros hunted in 2022 and 2023 is likely due to successful hunting shows in the USA as well as markets recovering after the COVID pandemic. Despite the translocation of significant numbers of white rhinoceros out of the country to stock protected areas in other African countries, and zoos and safari parks worldwide, the white rhinoceros population in South Africa is approximately 10 times larger since trophy hunting was introduced in 1968; a clear demonstration that this approach is sustainable and provides a positive contribution to conservation (Emslie *et al.*, 2016; Cooney *et al.*, 2017) (Fig. 9).

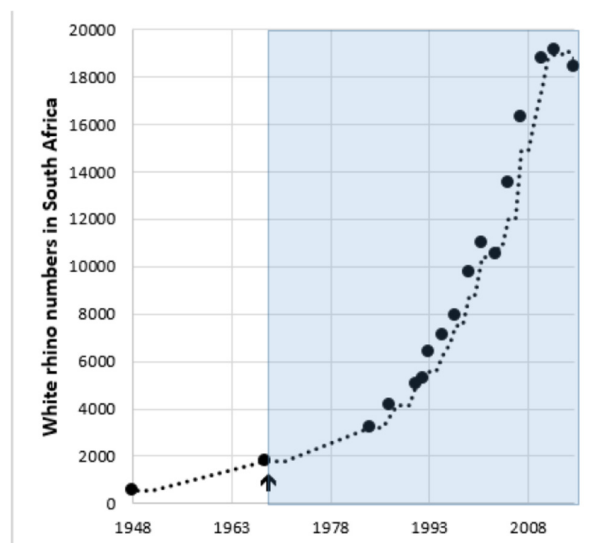


Figure 9: Growth of the white rhinoceros population in South Africa before and after trophy hunting started (↑) in 1968 (Emslie *et al.*, 2016).

In 1976, the CITES Conference of the Parties (CoP) included the entire *Rhinocerotidae* family in Appendix I. In 1994, the CoP transferred South Africa's population of southern white rhinoceros (*Ceratotherium simum simum*) to Appendix II with an annotation to restrict exports to live animals to appropriate and acceptable destinations and to hunting trophies, with all other parts and derivatives remaining in Appendix I. There has thus been an international ban on the commercial trade in rhinoceros horn since 1976.

A domestic moratorium on the sale of rhinoceros horn or rhinoceros horn products was implemented on 13 February 2009 (Government Gazette No. 31899, Notice No. 148). The moratorium was a temporary measure to afford the Department of Environmental Affairs (DEA) (now Department of Forestry, Fisheries and the Environment (DFFE)) an opportunity to develop and implement permanent measures aimed at eliminating the illegal international trade in rhinoceros horns. The domestic moratorium was set aside by the High Court of South Africa (Gauteng Division) on 29 November 2015 on the basis that an appropriate public consultation process, as required in terms of section 100 of the National Environmental Management: Biodiversity Act (NEMBA) No. 10 of 2004, had not been followed. The High Court judgment was upheld when the Supreme Court of Appeal and the Constitutional Court did not grant leave for appeal, effectively rendering the domestic trade in rhinoceros horn legal once again. To effectively manage the legal domestic trade in rhinoceros horn, the Department of Environmental Affairs published Norms and Standards for the Marking of Rhinoceros and Rhinoceros Horn, and for the Hunting of Rhinoceros for Trophy Hunting Purposes for implementation in September 2018 (Gazette No. 41913). The Minister also prohibited the carrying out of certain restricted activities involving rhinoceros horn, or part, product or derivative of such horn, belonging to the species black rhinoceros (*Diceros bicornis bicornis*, *Diceros bicornis minor*, *Diceros bicornis michaeli*) and white rhinoceros (*Ceratotherium simum simum*) through a notice for implementation on 3 June 2020 (Gazette No. 43386) and which was set to commence on 3 February 2023. The commencement notice was however withdrawn on 31 March 2023; thus, these regulatory measures have been published for implementation but have not yet commenced. The following activities were prohibited 1) powdering of rhinoceros horn, 2) form or create slivers, chips of drill bits or any similar derivative from rhinoceros horn and 3) remove parts or layers from a rhinoceros horn.

The Norms and Standards for the Marking of Rhinoceros and Rhinoceros Horn and for the Hunting of Rhinoceros for Trophy Hunting Purposes require collection of a DNA sample at the time of dehorning for genetic profiling purposes (the main purpose of dehorning at present is to reduce the incentive to poach rhinoceros), as well as from live animals, including both horns, when rhinoceros are sold and translocated. A possession permit as well as a DNA certificate is issued to the owner of the rhinoceros horn and all DNA samples are stored on the RhODIS database to ensure traceability. Rhinoceros horns from all sources including organs of state and private owners must be registered and secured on rhinoceros horn databases with DNA samples submitted to the RhODIS lab. The RhODIS DNA database is operational, and profiling is undertaken for all rhinoceros management/poaching horn/animal samples.

In 2017, the CITES Scientific Authority of South Africa, considering CITES Resolution Conf. 11.2 (Rev CoP) on the definition of appropriate and acceptable destinations, made the following recommendations with regards to the export of white rhinoceros from South Africa (SA 2017-03):

1. A maximum of five rhinoceros (either one male and between two and four females, or five males) may be exported for zoological purposes as the education and awareness associated with zoos and exhibition facilities can promote *in situ* conservation, and the sale of rhinoceros to zoos further generates funds essential for habitat management and for securing rhinoceros populations against poaching.
2. Unless as part of a formal *ex-situ* programme that (a) is supported by the authorities in both the import and export State and that (b) forms part of a conservation strategy or BMP (Biodiversity Management Plan), export of any number of rhinoceros for breeding purposes to outside the species' natural distribution range should not be allowed as these exports cannot be deemed to promote the *in-situ* conservation of the species.

As an indication of government's commitment to combat poaching at the highest level, South Africa's Cabinet adopted an integrated four-pronged approach to stop poaching (Department of Environmental Affairs 2014). The four elements of this approach are: (1) compulsory interventions to protect rhinoceros by implementing widespread and intensive anti-poaching programmes as well as creating particular zones of management using technology and intelligence, (2) game-changing interventions, targeted simultaneously at disrupting organised crime and creating opportunities for more equitable benefit-sharing of ecosystem services with all South Africans, (3) long-term sustainability interventions to explore the development of a legal and sustainable rhinoceros trade system and (4) biological management interventions that focus on strategic removals from areas of high poaching risk to create rhinoceros strongholds elsewhere (Ferreira *et al.*, 2017).

Since 2010, the South African government has launched a variety of initiatives in collaboration with various stakeholders to address the poaching threat to rhinoceros and ensure the long-term conservation of the species (Fig.10). In 2014, in response to the ongoing increase in rhinoceros poaching, and in preparation for the 17th Conference of the Parties to CITES, the Minister of Environmental Affairs appointed a Committee of Inquiry (COI) to advise on the southern white rhinoceros and

African elephant CITES trade proposals at the time. The scope of the advice sought included consideration of the implications of potential international trade in rhinoceros horn as assessed through different trade models. Through a process of stakeholder consultation, scenario planning, case study analysis, decision-tree and a SWOT analysis processes, the COI identified five key areas that require interventions that not only address poaching of rhinoceros in their natural habitat, but also are needed to address wildlife crime in general and to realise benefits associated with successful conservation. The COI identified four possible options based on different solutions to challenges of managing the demand for rhinoceros horn. Cabinet adopted Option 3 namely application of current policy, with no immediate intention to trade in rhinoceros horn, but maintaining the option to re-consider regulated legal international trade in rhinoceros horn when requirements are met, which recognises that commercial international trade in rhinoceros horn is not allowed under the CITES provisions at the time and that submitting a trade proposal to CITES should only be reconsidered once certain minimum requirements are met.

The Rhinoceros Conservation Lab in 2016 identified challenges and developed detailed action plans and budgets to implement the COI recommendations. The total budget required to implement the Lab's initiatives was estimated at approximately R473 million per year (R379 million for the South African Police initiatives and R94 million for all others). In 2017, a process to develop a rhinoceros research strategy was initiated. The Rhinoceros Research Strategy (DEA, 2019) identifies five key areas that require research interventions aligned with all the areas recognised through previous rhinoceros processes, such as the Integrated Strategic Approach for the Management of Rhinoceros in South Africa and the Rhino Conservation Lab. These focal areas include Enforcement; Community Empowerment; Demand Management; Responsive Legislation; and Biological Management/Management of Rhinoceros population. Additionally, three cross-cutting areas were identified: enabling mechanisms; unexpected or unintended risks associated with Protected Areas; and values and economics. Specific research themes were developed under each of these eight areas.

Since its approval, the Rhino Research Advisory Committee (Advisory Committee) was established by DFFE with a primary role of providing an interim evaluation of the achievement of the Rhinoceros Research Strategy at three (3) year intervals, including the establishment of a research fund, implementation of the Research Strategy and evaluating research outcomes. The Advisory Committee met only once and the decision was taken that they should consider the outcomes of the High-Level Panel (HLP) processes. The BMP requires that the effective implementation of the Rhinoceros Research Strategy should be considered. In 2023 a process to revise the BMPs for black and white rhino was initiated, and a draft BMP for black and white rhino combined (for implementation over the 2024-2034 period) was published for public comment in early 2024.

In March 2018, the Private Rhino Owners Association (PROA) launched Rhino Horn Trade Africa (RHTA), an initiative that aimed to facilitate the legal trade of rhinoceros horn via an online trade desk, and designed to provide a managed, efficient platform from which genuine buyers and sellers could trade in legal, humanely acquired rhinoceros horn. An online auction, however, was met with little interest. A recent private initiative, Rhinomics (<https://Rhinomics.com/>), aims to develop a legal rhinoceros horn trade that is regulated, and traceable, and creates a self-sustaining finance mechanism for the long-term survival of rhinoceros, people and nature. A vault and software management system for all of South Africa's rhino horn, as well as a national network for logistics and storage have already been established under this private initiative.

The White Paper on the Conservation and the Sustainable Use of South Africa's Biodiversity was approved by Cabinet on 29 March 2023, and published in the Government Gazette (No. 48785) for implementation on 14 June 2023. The White Paper provides a foundation for conservation and sustainable use in South Africa in terms of 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 sets 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 a 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 value from nature." Existing legislation, including the National Environmental Management Biodiversity Act (NEM: BA), National Environmental Protected Areas Act (NEM: PAA), and the Threatened or Protected Species Regulations (ToPS), amongst others, will be reviewed for alignment with the White Paper; as will biodiversity policies, strategies, plans, and guidelines. The White Paper places a duty of care on people to ensure that activities, methods and actions aimed at conservation and sustainable use of biodiversity are humane and ensure quality of life within the environment. Although the White Paper does not have direct implications for rhinoceros management, it broadly requires the incorporation of ethical practices and standards into the management and use of wildlife in South Africa, and further requires that threats to biodiversity, such as over-exploitation, be avoided or minimised, and mitigated.

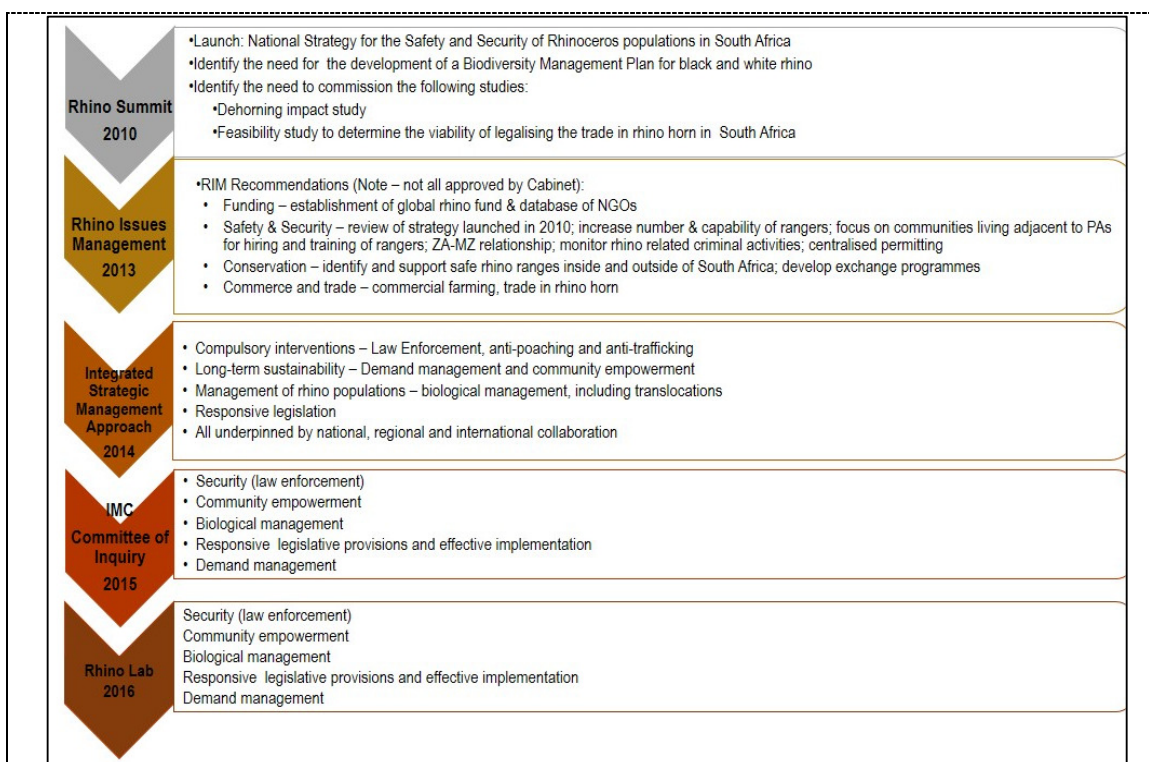


Figure 10: A flow diagram illustrating the timelines and main outcomes of initiatives taken by the South African government in collaboration with various stakeholders to address the poaching threat to Rhinoceros and ensure the long-term conservation of the species (Source: presentation by T. Carroll (DEA), October 2017).

The Policy Position on the Conservation and Sustainable Use of Elephant, Lion, Leopard and Rhinoceros, an outcome of the recommendations emanating from the High-Level Panel of experts for the review of policies, legislation and practices on matters of elephant, lion, leopard and rhinoceros management, breeding, hunting, trade and handling, was published for implementation on 24 April 2024. The Policy Position draws from the rhinoceros COI findings and the White Paper. The Policy Position contains three objectives pertinent to rhinoceros, largely white rhinoceros, including 1) phasing out the intensive management and captive breeding operations of rhinoceros for commercial purposes and enhance wild populations, 2) promoting live export of specimens of the five species (including rhinoceros) to range states or any appropriate and acceptable destinations with suitable habitats on the African continent and 3) South Africa working with range states and potential destination countries to support a proposal for international commercial trade in rhinoceros horn from protected wild rhinoceros, for conservation purposes, when conditions become favourable. Conditions to be met were established by the COI and are indicators of the five pillars; namely security (law enforcement); community empowerment; biological management; responsive legislative provisions and effective implementation, and demand management.

With the development of captive breeding operations for white rhinoceros, criteria for the captive breeding of white rhinoceros (*Ceratotherium simum simum*) have been developed (SANBI, 2018) and approved by South Africa's CITES Scientific Authority for implementation in South Africa. Recent policy changes, specifically the Policy Position on the Conservation and Sustainable Use of Elephant, Lion, Leopard and Rhinoceros has highlighted the need to phase out the intensive management and captive breeding operations of rhinoceros for commercial purposes and enhance wild populations.

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

A national white rhinoceros strategy was approved in 2000 and in December 2015 a national Biodiversity Management Plan (BMP) for white rhinoceros was gazetted for implementation (Government Gazette No. 39469) in terms of section 43 of the NEMBA. This plan, which was developed by the SADC RMG, is informed by the National Strategy for the Safety and Security of Rhinoceros Populations in South Africa (DEA 2011) as well as the Rhinoceros Issues Management Report (DEA 2013)

(Fig. 10) and will form the basis for greater coordination between existing and future plans. The primary objective of the plan is a national white rhinoceros net average population growth rate of 2% per annum, with at least 20,400 southern white rhinoceros in South Africa by the end of 2020, which in the end was not achieved (Fig. 3). The BMP advocates the use of set percentage harvesting to retain populations at productive densities. A revised BMP for both black and white rhinoceros in South Africa, to be implemented over 2024-2034, aims to build on the outcomes of the previous version. The revised BMP will seek to progressively advance previous initiatives, particularly those of the COI which was operationalised through the Rhinoceros Lab. Whilst the number of rhinoceros poached has declined, new hotspots of poaching are developing, and this poses a risk to the viability of rhinoceros populations and fragmentation in management practices. Furthermore, many of the citizens in South Africa have been and continue to be excluded from participating in rhinoceros conservation and sustainable use and the revised BMP will seek to address this and thereby contribute to the transformation of the biodiversity sector.

SANParks has an institutional plan for white rhinoceros and Ezemvelo KZN-Wildlife implements a provincial level management strategy for white rhinoceros on state, private and communal land.

A Regional Rhinoceros Conservation Strategy for both black and white rhinoceros was adopted by SADC in 2005. The strategy sets out a long-term goal of maintaining "Southern African rhinoceros ... as flagship species for biodiversity conservation and wildlife-based economic development, within viable and well distributed populations" (Janssens & Trouwborst 2018). In addition to this the African Rhinoceros Conservation Plan (2016) was formulated and endorsed by most African rhinoceros range states, including South Africa (https://www.dffe.gov.za/sites/default/files/docs/african_rhinoconservation_plan.pdf).

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

The white rhinoceros population in South Africa is subjected to several types of legal offtake, including management removals for ecological or biodiversity reasons, offtakes of live animals for revenue generation on sales, and trophy hunting. Most of these offtakes (excluding international exports of live animals and trophy hunts) do not result in the permanent removal of animals from the national population. Offtakes enhance conservation through enabling effective ecological management, ensuring rapid growth in numbers and expansion of the species' range, and generating conservation revenue. Since 1986, more than 3,000 white rhinoceros have been sold by the state to the private sector. More recently, white rhinoceros have been translocated from the KNP into safer more secure habitats. However, this intervention has been curtailed by a veterinary moratorium due to concerns that white rhinoceros may be carriers of tuberculosis.

A total of 1,034 live white rhinoceros (source codes W, R, and F) were exported from South Africa between 2010 and 2022, constituting approximately 34% of the total exports of this species from South Africa during this time period (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). Live animals were exported primarily for re-introduction purposes (54%), to zoos (29% of exports) and breeding facilities (8% of exports). The main destination countries were Namibia (44% of exports), China (21% of exports), and Botswana (10% of exports), with Namibia and Botswana importing live white rhinoceros mainly for re-introduction purposes, and China mainly for zoos and breeding facilities (Fig. 11).

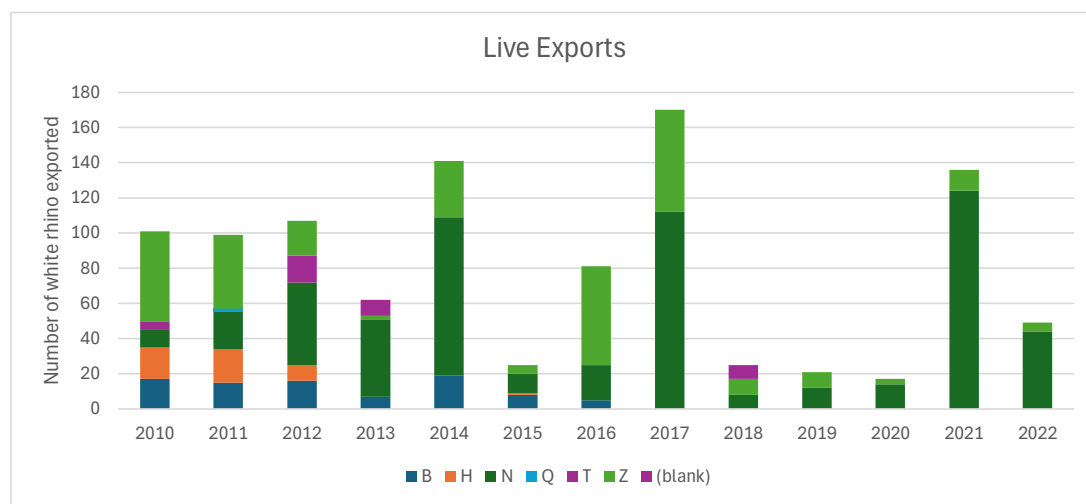


Figure 11: Number of live white rhinoceros exported from South Africa between 2010 and 2022 according to the CITES trade database (UNEP World Conservation Monitoring Centre, Cambridge, UK).

Trophy hunting removed on average 0.58% of the national population during the period 2005 – 2015 per annum and around 0.47% per annum since 2012 to end of 2023 when measures to prevent pseudo hunting were implemented. Legal hunting of white rhinoceros is predominantly economically motivated, although it does provide significant additional conservation benefits (demographic, genetic and security (income generated through trophy hunting contribute to security measures to protect rhinoceros)). Sustainable hunting generates a conservation benefit through incentivizing the private sector to keep rhinoceros and to purchase land to stock rhinoceros. The tenfold increase in the national population since trophy hunting was introduced in 1968 (Emslie *et al.*, 2016) is clear evidence of the success of this conservation model. Trophy hunting removes surplus adult males, whilst generating important revenue for private and state conservation. Poaching in contrast removes a wider range of ages and sexes and is therefore likely to have a greater impact on rhinoceros population growth rates. It has been demonstrated that trophy hunting can be sustainably managed in South Africa (see Figs 9 & 12) (Cooney *et al.*, 2017; Emslie *et al.*, 2016). Forty-six percent of the total exports of white rhinoceros specimens between 2010 and 2022 were hunting trophies (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK); 1,376 trophies in total. This figure is likely to be an overestimate due to the intricacies of data capture off CITES export permits, and indeed, according to the DFFE Professional Hunter's Register, 1,053 white rhinoceros were trophy hunted in South Africa over this time period. Since South Africa clamped down on "pseudo" hunting in 2012, on average only 68 white rhinoceros were legally hunted annually (on average less than 0.5% of the annual population estimates) (Fig. 12). In 2022 and 2023, the number of white rhinoceros trophy hunted increased to 115 (0.85% of population) and 110 (0.79% of population) respectively but are still considered sustainable (<1% of population). In addition, trophy hunting takes place on private properties where little or no poaching has occurred. The main destination countries for trophy hunting between 2010 and 2022 included the United States of America (34%), Russian Federation (12%), China (6%), Vietnam (5%), and Poland (5%). Even in the year of peak "pseudo" hunting (2011), only 0.94% of the population was hunted for trophy purposes (Fig. 12) (Emslie *et al.*, 2016).

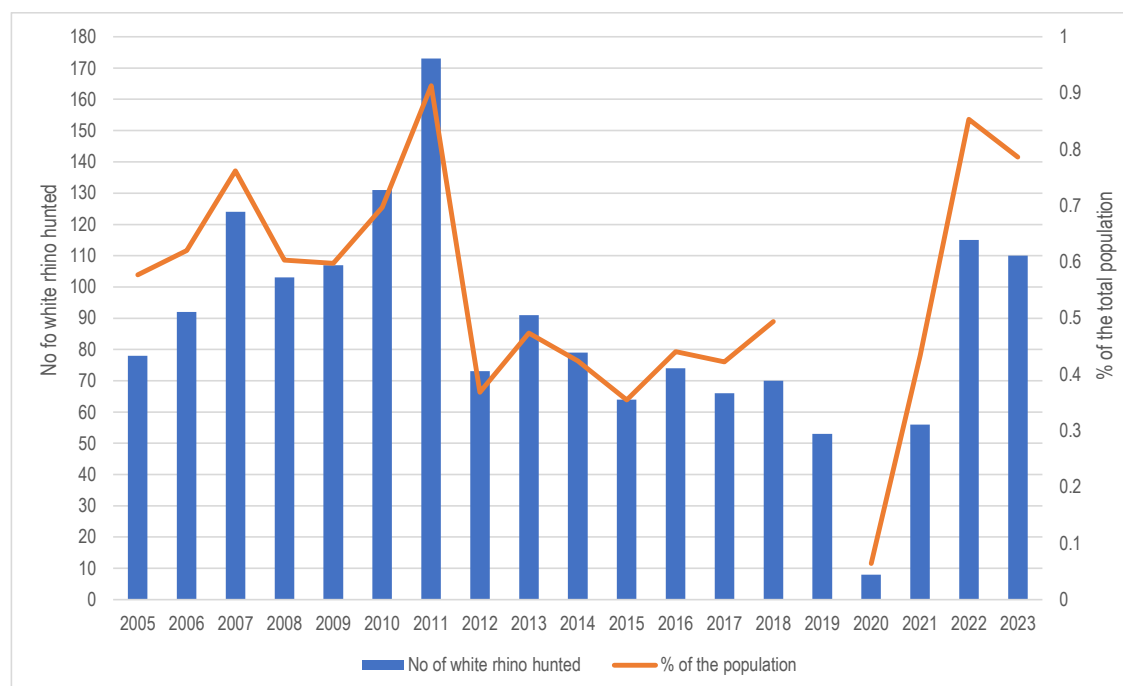


Figure 12: Number of white rhinoceros hunted, and the percentage of the estimated population hunted between 2005 and 2023.

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

The number of white rhinoceros legally hunted annually is market driven but well below a level that would threaten the long-term viability of the national herd (Fig. 11). For this reason, setting a quota has been unnecessary to date as trophy hunting has not yet increased to above 1% of the national population. Since 2012, on average 72 white rhinoceros are legally hunted annually (on average < 0.50% of the national population). However, the number of white rhinoceros hunted in 2022 and 2023 increased to 115 and 110 respectively but still below 1% of the total population. There is currently no quota for the export of rhinoceros horn for non-commercial purposes (allowable under the Appendix I listing) and no national quota for the export of live white rhinoceros.		
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
Less than 2% of the national herd is translocated out of state protected areas annually. The removal of live animals for local translocation purposes is not considered to be a form of harvest as these animals are not permanently removed from the national population. Individuals that are translocated from established subpopulations that are approaching or exceed ecological carrying capacity are routinely being introduced into new areas with suitable habitat and protection, where populations can grow rapidly. Biological management has played a significant role in the expansion of range and numbers of white rhinoceros. Since 2012, less than 10 white rhinoceros have been hunted from state controlled protected areas.		
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
On average about 68 white rhinoceros are legally hunted annually. Most of these animals are hunted on private land, where there is strong local control over resource use.		
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 <i>de facto</i> or actual open access?	None	1
	Low	2
	Medium	3
	High	4
	Uncertain	5
White rhinoceros occur solely in protected areas and on game farms and reserves. None occur in areas with open access.		
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
A suite of decision-making mechanisms and a robust permitting system are currently in place to manage and monitor harvest of white Rhinoceros and horn. In accordance with the amended Norms and Standards for the Marking of Rhinoceros and Rhinoceros Horn and for the Hunting of Rhinoceros for Trophy Hunting Purposes (Government Gazette 41913, 21 September 2018), trophy hunts are attended by conservation officials. Through better regulation, the occurrence of "pseudo" hunts has ceased. All dehorning activities are also attended by conservation officials and rhinoceros horn stockpiles are regularly audited. While previously problems with reporting and monitoring were experienced, policing, record keeping, and the implementation of regulations have much improved.		
Monitoring of harvest		
19. Methods used to monitor the harvest: What is the principal method	Direct population estimates	1
	Quantitative indices	2
	Qualitative indices	3

used to monitor the effects of the harvest?	National monitoring of exports	4
	No monitoring or uncertain	5
In most cases direct population estimates are used to monitor the effects of harvest. Block counts are conducted in the Kruger National Park (KNP). Distance sampling using line and point transects is employed in the Hluhluwe iMfolozi Park (HiP) in KwaZulu-Natal. The quality of monitoring of the remainder of the national herd is variable, with rhinoceros closely monitored at many sites. Many larger subpopulations are monitored through aerial counts, while smaller subpopulations are monitored using ranger sightings of ear notched individuals. The amended Norms and Standards for the Marking of Rhinoceros and Rhinoceros Horn and for the Hunting of Rhinoceros for Trophy Hunting Purposes (Government Gazette No. 41913, on 21 September 2018) require that all hunts are monitored by conservation officials. In addition, all dehorning activities are monitored by conservation officials and rhinoceros horn stockpiles are regularly audited. A 2014 survey of white rhinoceros owners in South Africa found that privately-held horn stockpiles totalled 1,697 pieces (6,256 kg) (Balfour <i>et al.</i>, 2015), accounting for approximately 80 – 85% of the potential estimated weight of stocks expected from natural mortalities (i.e. 7,690 kg). Fear of reporting stockpiles to authorities in some provinces where such information could be leaked to criminals is a factor in under-reporting (Emslie <i>et al.</i>, 2016). At the end of 2023 there were 16,056 rhinoceros (black and white) in South Africa. Through natural mortality, translocations, and dehorning (often implemented for security purposes), there is a steady growth in the number of rhinoceros horns in stockpiles nationally. This has been the case even through the period in which rhinoceros numbers declined through poaching and will be the case over the next decade. It will be important to ensure that all rhinoceros horn stockpiles are secure, audited, databased and that there is a policy developed that guides their management.		
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 the rates of harvest (both illegal and legal) of white rhinoceros in state protected areas, which constitute approximately 39% of the national herd. Kruger National Park (KNP) has achieved an approximate 80% detection rate for white rhinoceros carcasses. There is a 10% confidence limit around the population estimate in KwaZulu-Natal and a 100% confidence in the monitoring of legal offtake in the province. Rhinoceros are individually known on smaller properties where there is also a high confidence in carcass detection rates. Even though there are some concerns with regards to adequate budgets to conduct regular counts and implement intensive monitoring on the ground, and though there has been a decline in the quality of monitoring information captured in recent years in some reserves due to the redeployment of rangers to anti-poaching activities, very good population estimates exist. Due to security concerns, there is however mistrust among parties and access to information is a challenge. The amended Norms and Standards for the Marking of Rhinoceros and Rhinoceros Horn and for the Hunting of Rhinoceros for Trophy Hunting Purposes require that all rhinoceros hunts and dehorning are attended by conservation officials. Provincial conservation agencies indicate that these legal requirements are being complied with in full. Reporting of rhinoceros horn stockpiles within the private sector continues to increase in part due to improved declaration and reporting.		
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
According to Clements <i>et al.</i> (2020), one quarter of private owners offer rhinoceros trophy hunting, 45% trade in live rhinoceros and 62% undertake wildlife-based tourism. Legal hunting of white rhinoceros has been beneficial to the conservation of the species, even in recent years during the poaching crisis. Due to the significant economic benefits of white rhinoceros trophy hunts to game farmers (worth approximately \$18 million over the period 2017 – 2022) (DFFE PH Register), together with live sales and ecotourism, the private sector has increasingly stocked these animals, contributing now to 61% of the national population. This has contributed to the expansion of the species' range and has maintained a rapid population growth of the		

national population (Fig. 9). However, private rhinoceros owners regard the current prohibition on the commercial international trade in rhinoceros horn as a missed opportunity to benefit further from owning and protecting rhinoceros, especially in the face of the high costs of securing rhinoceros with limited economic returns.

Live sales of surplus animals to the private sector have been highly beneficial to conservation agencies, generating vital conservation revenue (e.g. sales by SANParks, and Ezemvelo KZN Wildlife as well as Vleissentraal from 2007 to end 2014 totalled R507 million) and preventing overstocking in established subpopulations. However, the increased poaching rate has limited this positive impact as private sector interest in buying and keeping rhinoceros has declined due to the rising costs of security. A once thriving domestic trade in rhinoceros has substantially diminished with prices per white rhinoceros dropping from approx. R350,000 in 2011 to approx. R150,000 in 2023. Due to the increased poaching losses, there were no live off-takes of white rhinoceros from Hluhluwe iMfolozi Park (HiP) in 2018, which would otherwise have been sold on auction – this foregone revenue source is a loss to conservation.

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

The ability of the state and the private sector to gain financially from owning, selling, translocating, viewing (via ecotourism) and hunting white rhinoceros has contributed significantly to the conservation of this species in South Africa through expansion of its range and the maintenance of a rapid population growth ('t Sas-Rolfes *et al.*, 2022). The continued poaching of rhinoceros has, however, undermined the incentives for owning and conserving the species. Research suggests that the photographic tourism revenues generated by Kruger National Park's (KNP) rhinoceros population between 2011 and 2013 ranged from 5.9 to 14.9 million US\$ per year (Saayman & Saayman, 2017) and, in this light, the severe reduction of the KNP population (Fig. 4) should be a major concern.

Privately-owned game farms and reserves have contributed significantly to white rhinoceros conservation (Fig. 5), with 61% of the national herd (approximately 8,585 animals) kept on approximately 18,000 km² of privately-owned land at present. The private sector in South Africa now conserves more rhinoceros than there are black and white rhinoceros in the whole of the rest of Africa (Emslie & Adcock, 2016). However, increased poaching, increased security costs, increasing numbers of incidents deemed threatening to human life, and perceived reduced incentives for their conservation, have resulted in reduced white rhinoceros live sale prices (to a low of R150 000 per animal in 2023) and an increasing number of owners seeking to get rid of their rhinoceros (Clements *et al.*, 2020). (Interestingly, speculation that South Africa could submit a proposal to the 17th CoP to CITES to trade in rhinoceros horn saw the average price paid for white rhinoceros increase temporarily from R369,341 in 2014 to R638,962 in 2015.) Increased costs of security (estimated to be fivefold between 2012 and 2018) and limited capacity to recoup the costs by owners (commonly attributed to an inability of private owners to trade their horn internationally) has resulted in many private rhinoceros owners disinvesting in rhinoceros and the total number of properties with rhinoceros declined by approximately 50% (from approx. 300 prior to 2014) to approx. 150) (Clements *et al.*, 2020). According to a national survey conducted by Clements *et al.*, (2020) in 2015 and again in 2018, 28% percent of rhinoceros owners are disinvesting in rhinoceros, 57% are pursuing business-as-usual (largely ecotourism), and 15% are investing in more rhinoceros. The 28% of owners in the sample, who collectively owned roughly a third of both the rhinoceros (black and white rhinoceros) and the land, that were actively disinvesting in rhinoceros, mainly due to the cost of poaching to private-rhinoceros owners (Emslie *et al.*, 2019; Ferreira *et al.*, 2014). By contrast, 15% of owners were purchasing land and rhinoceros in response to the poaching crisis. These owners, who owned 45% of all rhinoceros, had increased their rhinoceros-security costs considerably and were buying rhinoceros and land despite experiencing the most poaching incidents. Investors thus appear better-equipped financially than disinvestors to cope with the growing costs of owning rhinoceros (Clements *et al.*, 2020). Although these owners show resilience to poaching thus far, possibly benefitting from the reduced rhinoceros prices and the supply from disinvestors, whether this strategy will result in resilient rhinoceros conservation in the long term remains unknown (Clements *et al.*, 2020). In addition, all owners in this category would participate in legal-horn trade (Clements *et al.*, 2020). In KwaZulu-Natal (KZN), both the number of protected areas with white rhinoceros and the number of private and communal game farms and reserves with rhinoceros declined from a peak of 36 in 2012 to 29 in 2017 but has subsequently risen to 34 in 2023 (KZN Biodiversity Status Assessment Report 2023). Since 2011, approximately 12 reserves within KZN removed all their rhinoceros, though many of these reserves had only a few animals. This worrying trend threatens to reverse the expansion of range and has the potential to significantly reduce conservation budgets (due to declining live sales), and possibly negatively affect meta-population growth rates in future. Where there is a diverse conservation income (inclusive of ecotourism), there is still some benefit of keeping rhinoceros, but the cost benefit of keeping rhinoceros is vulnerable (benefits are becoming marginal) (Clements *et al.*, 2023).

It has been suggested that a legal trade in rhinoceros horn would attract buyers away from the illegal market and provide much needed additional income to bolster security by investing a percentage of the revenue obtained from trade back into conservation (Biggs *et al.*, 2013; Di Minin *et al.*, 2015 and 2022). This would be especially pertinent for private owners of white rhinoceros, who would be able to recuperate some of their anti-poaching costs through the sale of horn. At present, some private owners are selling their rhinoceros due to the prohibitive financial and security pressures resulting from the poaching, while others are moving their animals to neighbouring countries (Emslie *et al.*, 2016; Knight, 2016; Rubino & Pienaar, 2017; Clements *et al.*, 2020). The majority of South African rhinoceros owners support rhinoceros-horn trade (Clements *et al.* 2020; Rubino & Pienaar 2020). A 2015 survey of 171 private rhinoceros owners conducted under the auspices of the SADC RMG and funded by the DEA (now DFFE), showed that 85% of the private rhinoceros owners supported legal international trade in horn, while 10% were undecided and only 5% were against a legal trade in rhinoceros horn (Clements *et al.*, 2020). The survey also showed that 80% of private rhinoceros owners would sell horn if it was legal to do so, while 44% would conduct intensive husbandry of rhinoceros to trade horn (Knight, 2016; Clements *et al.*, 2020).

Based on recent white rhinoceros population estimates and feedback from private rhinoceros owners, Taylor *et al.*, (2017) estimated the annual potential supply of horn that could be obtained within South Africa from four sources: natural mortalities, dehorning, trophy hunting and stockpiled horn. Using different scenarios of horn production, they showed that the mass of horn that could be supplied would range from 5,319 to 13,356 kg per year (Taylor *et al.*, 2017), which exceeds the mass of horn currently lost to poaching per year – approximately 5,718 kg (3,781-5,933 kg for the period 2012-2016, assuming an average horn mass of 5.88kg per horn set) (Taylor *et al.*, 2017).

Several initiatives to find new funding streams for rhinoceros conservation and to increase incentives for the keeping and management of rhinoceros have been developed. However, none of these have had broad positive impacts on rhinoceros conservation to date. In March 2018, the Private Rhino Owners Association (PROA) launched Rhino Horn Trade Africa (RHTA), an initiative that aimed to facilitate the legal trade of rhinoceros horn via an online trade desk, and designed to provide a managed, efficient platform from which genuine buyers and sellers could trade in legal, humanely acquired rhinoceros horn. An online auction, however, was met with little interest. A recent private initiative, Rhinomics (<https://Rhinomics.com/>), aims to develop a legal rhinoceros horn trade that is regulated and traceable, and creates a self-sustaining finance mechanism for the long-term survival of rhinoceros, people and nature. A vault and software management system for all of South Africa's rhino horn, as well as a national network for logistics and storage have already been established under this private initiative. Section 37C (1) of the Income Tax Act No. 58 of 1962 (ITA) also provides for tax incentives through biodiversity management agreements that aim to unlock much needed sustainable finance for the conservation management of important species subject to BMPs such as rhinoceros and lions. This tax incentive has recently been developed and currently tested on several reserves that volunteered to be part of the process. The Wildlife Conservation Bond, also known as the Rhino Bond, includes a conservation success payment made by Global Environment Facility (GEF) to stakeholders, dependent on verified increases in rhinoceros numbers. It is the world's first financial instrument dedicated to protecting a species (<https://www.greenfinanceinstitute.com/gfihive/case-studies/the-wildlife-conservation-bond-the-Rhinoceros-bond/>) but is currently benefitting only two black rhinoceros populations in South Africa.

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

Private game farms and reserves contribute significantly to the conservation estate in South Africa. It is estimated that private game farms and reserves with white rhinoceros have added a further 18,000 km² to the conservation footprint. However, due to the prohibitive financial and security pressures resulting from poaching, private landowners are disinvesting in the species and new suitable habitat is no longer becoming available to establish new rhinoceros populations. This does not only impact on range expansion, but also on current subpopulations that are near carrying capacity by reducing their population growth rates. The ecotourism incentive is still high, but incentives for the harvesting of white rhinoceros have likely decreased. At present benefits and revenue gained from harvesting are mostly financing the protection of rhinoceros rather than habitat management and range expansion. Other factors reducing the benefit to habitat conservation include the veterinary moratorium on the translocation of rhinoceros from Kruger National Park (KNP), the cessation of live sales from Hluhluwe iMfolozi Park (HiP), a decline in the number of rhinoceros sport hunted and higher security costs. There is however a potential for rhinoceros horn sales to increase incentives for the keeping of white rhinoceros and thus contribute to habitat conservation.

Protection from harvest

24. Proportion strictly protected: What percentage of the species' natural	>15%	1
	5-15%	2
	<5%	3

range or population is legally excluded from harvest?	None	4
	Uncertain	5
For the purposes of this NDF, strict protection is considered to be provided by state-owned protected areas managed by provincial or national conservation agencies where legal hunting is negligible (<10 per year). Thirty-nine percent of the national population is conserved within state protected areas (5,406 individuals). National parks, which are under the management of South African National Parks (SANParks), are custodian to approximately 16% of South Africa's white rhinoceros. No trophy hunting of white rhinoceros are currently allowed in any national parks. The CITES prohibition on the international trade in rhinoceros horn for commercial purposes, in existence since 1977, is widely considered by the Parties to CITES, as well as conservation and animal protection NGOs and the general public at large to be a mechanism affording strict protection to the species.		
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
There is a low confidence in the long-term effectiveness of the state protected area system to protect the white rhinoceros. Poaching has occurred in most state-owned protected areas, and some protected areas are struggling to combat these illegal activities. For the Kruger National Park (KNP), this is primarily due to the long permeable border with Mozambique, and that country's inadequate legal and wildlife protection systems. However, Mozambique's legislation was amended in May 2017 to criminalize wildlife poaching and trafficking thereby facilitating cross border cooperation. More recently, removals of white rhinoceros from KNP to safer areas are prevented by a veterinary moratorium due to concerns that white rhinoceros may be carriers of tuberculosis. Budgets and resources are also constrained and the strong emphasis on rhinoceros protection detracts from other important conservation issues as funding and resources are redeployed to rhinoceros protection and management. The international ban on the commercial trade in rhinoceros horn, in place now for more than 40 years (Emslie, 2012), has apparently also failed to effectively provide adequate protection to the species over the last decade, despite the numerous anti-poaching measures implemented in South Africa (Emslie, 2013; Emslie <i>et al.</i>, 2013; Knight, 2016; Rademeyer, 2016; Di Minin <i>et al.</i>, 2022) and demand reduction campaigns by NGOs. It does appear from the latest poaching figures that the number of rhinoceros poached per annum is on the decline, though while the number of rhinoceros poached in KNP has decreased, there is evidence that poaching has increased in other hotspots, particularly in northern KwaZulu-Natal. Poaching in KwaZulu-Natal increased from approximately 102 rhinoceros in 2021 to 325 in 2023 (this includes both black and white rhinoceros). From a national perspective poaching has resulted in a significant population decline of white rhinoceros from approximately 18,953 animals in 2011 to 12,358 animals in 2020 despite the significant resources that have been deployed towards gaining control over illegal activities. Since 2021 there has been a slight improvement with the national population increasing to 13,991 in 2023. Current measures importantly fail to address the cause of the escalating poaching levels (high demand and high prices, i.e. the low supply to demand ratio, coupled with poverty and unemployment in rural communities). Since trade restrictions and demand reduction campaigns inhibit the potential for local people who bear the cost of living alongside biodiversity, to benefit directly from nature conservation (Cooney <i>et al.</i>, 2017), the CITES prohibition on rhino horn trade is inappropriate for a developing country with impoverished rural communities such as South Africa. Furthermore, Chen (2016) suggests that demand for rarity weakens the impact of anti-poaching policies. The reduction in the amount of poaching that can be achieved using supply-side anti-poaching policies may not be large when people are willing to pay more for rare wildlife goods (Chen, 2016), and rarity in fact increases demand (Hausmann <i>et al.</i>, 2023). Socioeconomic drivers of illegal wildlife trade influential at the local scale are rarely accounted for in multinational agreements aimed at curtailing international trade in threatened species (Liew <i>et al.</i>, 2021). Poverty, and especially economic inequality in source countries such as South Africa, are central drivers of rhinoceros poaching. Local South African and Mozambican men are contracted by crime syndicates to poach rhinoceros (Lunstrum, 2021). These poachers usually receive 1000 to 9000 US\$ per kg of horn (significant for people who are struggling economically), while end users pay an estimated 65 000 US\$ per kg (Hübschle, 2016). Ground-level poachers are generally poor, and they rarely have access to job opportunities that provide comparable earnings (Lunstrum, 2014); understandably there are always local people willing to poach (Rubino & Pienaar, 2017). Poverty is a multifaceted problem encompassing more than just a lack of alternative economic opportunities, such as lack of power, prestige, voice and an inability to shape one's future (Duffy <i>et al.</i>, 2014; Lunstrum, 2021). As such, poaching rhinoceros might not only be driven by the need for an income, but could also be a means of seeking and affirming identity, status, lifeways, custom, and local prestige (Duffy <i>et al.</i>, 2016). Haas and Ferreira (2016) therefore suggest that a transnational policing effort aimed at dismantling criminal networks involved in rhinoceros horn trafficking, coupled with increases in legal economic opportunities for people living adjacent to protected areas, is required. Providing legal job opportunities for especially		

young men in rural communities would further improve the protection of rhinoceros and reduce the poaching risk (Jewkes *et al.*, 2012; Haas & Ferreira, 2017).

There is a concern that the current protection measures are financially unsustainable. Based on a recommended one ranger per 10 km² (at a cost of approximately R50,218 per km² (2015 costs)) for protected areas <100,000 ha, and a recommended one ranger per 15 – 30 km² (at a cost of approximately R16 739 – R33 479 per km² (2015 costs)) for protected areas >100,000 ha (Conway, Ezemvelo KZN Wildlife, pers. comm.), between R0.87 billion and R1.29 billion per annum would have been required in 2015 to secure rhinoceros in the state owned protected area system (due to inflation, this estimate would be higher today). To fulfil their stated objective of “Sustainable rhinoceros populations monitored and increased”, SANParks spent R25.6 million (US\$1.7 million) or R8,600 per rhinoceros (US\$520 per rhinoceros) in 2020 (SANParks 2021). This is markedly less than the average spent by private properties on rhinoceros security of R28,600 per rhinoceros (US\$2,200 per rhinoceros) in 2017 (Clements *et al.*, 2020), highlighting the funding challenges for state-owned protected areas (Lindsey *et al.*, 2021) and possibly a reason for the lower poaching rates on private land. It is also possible that the large size of KNP (20,000 km²) and its rhinoceros population (2607 white rhinoceros) makes rhinoceros security more challenging than in much smaller areas (averaging ~100 km² and 34 white rhinoceros) (Clements *et al.*, 2020; Ferreira & Dziba, 2021). Between 2009 and 2017, private game farms and reserves have spent collectively approximately R2 billion on the management and specifically the protection of rhinoceros. In addition, the annual costs of rhinoceros security increased from approximately R1.5 million (US\$116,000) per property on average in 2017 to R2.2 million (US\$152,000) per property in 2021 (Jones, pers. comm. as quoted by Clements *et al.*, 2023).

A large portion of the rhinoceros security and enforcement budgets in provincial state-owned reserves are funded by international donors, and are thus at risk of donor fatigue, while the majority of private reserves have to fund their own security measures (Rubino & Pienaar, 2017). It is unlikely that the current investment in the protection of rhinoceros from current sources (government and donors) can be sustained in the long term and it is important that alternative sources of revenue be explored. Income derived from the sale of rhinoceros horn could assist both government and the private sector to continue funding the current investment in rhinoceros protection. Di Minin *et al.*, (2015) argue that there is a certain economic value that could be derived from rhinoceros horn that could be allocated to the protection of the species.

Behaviour change is difficult to achieve, and interventions may have unintended and undesirable consequences because of unaddressed systemic, cultural and environmental drivers, and limited resourcing (Thomas-Walters *et al.*, 2020). Several studies have highlighted the complexity of consumer preferences and behaviour regarding rhino horn in Vietnam and China (Truong *et al.*, 2015; Margulies, Wong & Duffy, 2019; Dang Vu *et al.*, 2022, Dang Vu & Nielsen, 2022). While demand reduction campaigns have seen some success in raising awareness, their influence on consumer behaviour is limited by cultural beliefs, distrust in campaign promoters, and the ineffective targeting of key social groups (Dang Vu *et al.*, 2020; Dang Vu & Nielsen, 2021; Vu 2023).

Despite high exposure (Smith, 2018), demand reduction campaigns fail to significantly change consumer behaviour (Dang Vu *et al.*, 2020). Many campaigns focus on scientific evidence debunking rhinoceros horn's medicinal properties, and have had little impact. Consumers distrust these campaigns, especially when framed in a paternalistic or oversimplified way, viewing them as profit-driven and scientifically lacking (Dang Vu *et al.*, 2020; Dang Vu & Nielsen, 2021; Dang Vu *et al.*, 2022; Vu, 2023). Simplistic messages, like comparing rhinoceros horn to fingernails, often backfire and only succeed in angering traditional medicine users and practitioners. Campaigns that oversimplify the science behind rhinoceros horn's inefficacy or fail to provide nuanced and reliable evidence struggle to change the deeply entrenched cultural beliefs of consumers. Traditional deliverers like celebrities, doctors, and government officials exert little influence compared to peers. This suggests that campaigns need to be more culturally sensitive and nuanced to effectively change behaviour (Vu, 2023).

As a result of the continuing illegal trade in rhinoceros horn, there have been calls from some segments of the conservation community to reconsider current policies, including the 40-year ban on the international trade in rhinoceros products, and to establish a legal, well-regulated international market for trading rhinoceros horn (Conrad, 2012; Biggs *et al.*, 2013; Ferreira, Pfab & Knight, 2014; Di Minin *et al.*, 2015; Di Minin *et al.*, 2021). Ayling (2013) further argues that “where the knowledge base is poor and existing strategies seemingly ineffectual, one can certainly argue under a precautionary approach that any action that could reduce poaching and quash the illegal trade ought to be tried.” Janssens and Trouwborst (2018) agree and recommend that the CITES CoP seriously explore the merits of alternative regimes for rhinoceros horn trade, which involve more scope for legal trade than allowed under the presently applicable regime. Current consumer demand seems to stem from investors that are purchasing these products not because of their cultural value but rather because of their prospects for appreciation that stem from their cultural values (Mason *et al.*, 2012; UNODC, 2016; Zhu, 2020). Because of this speculative demand for rhinoceros horn, legislative restrictions intended to counter the trade often have the opposite effect (Zhu, 2020). International trade prohibitions are ironically one of the primary drivers of market speculation (Zhu, 2020). By artificially inflating the scarcity of the resource, trade prohibitions drive subsequent price spikes. Market speculators may even face incentives to subsidise poaching until wild populations are extinct or nearly extinct to gain monopoly power (Mason *et al.*, 2012). In addition,

attempts to discourage product purchase through legislative and coercive means (i.e., bans) will only succeed to the extent that such restrictions have social legitimacy, create product stigma, and cause increases in black-market prices that buyers are unwilling or unable to afford (t Sas-Rolfes *et al.*, 2019). However, if consumers do not accept bans as legitimate, are largely unwilling to switch to substitute products, and are therefore insensitive to price increases (i.e., demand is price inelastic), the efficacy of bans is severely undermined — they can in fact raise total market value and the profitability of illegal supply rather than reduce it (t Sas-Rolfes, 2012).

There are several concerns relating to the potential effects of legalisation (Fischer, 2004):

- (1) The potential to 'destigmatise' the perceived immorality among consumers of using rhinoceros horn. Moyle (2018) however argues that there is no strong empirical or theoretical evidence that stigmatising demand would be at a sufficient scale that it can compensate for the lack of legal competition. MacMillan *et al.*, (2017), after interviewing 1,000 traditional medicine users in Vietnam, concluded that there is no evidence of social 'stigma' associated with rhinoceros horn consumption in Vietnam, and that the introduction of a legal supply of rhinoceros horn has the potential to 'crowd out' illegally sourced rhinoceros horns for two reasons, namely, consumers' strong preference for non-lethal harvesting, and an anticipated overall fall in price due to the loss of prestige and exclusivity of a rare product. The study also found that there is likely to be a small increase in the number of people who might consume rhinoceros horn after legalisation, and thus recommended that sufficient supplies of legal stock be available to meet demand. (At 65 tons, South Africa's current stockpiles are more than sufficient.) This is in line with the findings of Cheung *et al.*, (2021) which found that only 10% of Traditional Chinese Medicine (TCM) practitioners in the Chinese province of Guangdong are likely to increase their prescription of rhinoceros horn if trade is legalised. This is probably because clinical cases in which rhinoceros horn is medically appropriate are uncommon.
- (2) Illegally obtained rhinoceros horn will be laundered into a legal trade. But Moyle (2018) argues that where sales are occurring largely outside the legal market (i.e. illegally), trade bans have limited effect. He further argues that trade bans only achieve the objective of reducing laundering to zero at the cost of giving up all competition with illegal sellers and possibly increasing illegal sales to above acceptable levels. The ideal size of the legal market thus involves a trade-off between laundering and competition.
- (3) Two further concerns around the potential effects of legalisation relate to whether legalised trade competes with existing illegal markets or simply creates new parallel ones, and whether legalised trade leads to reduced enforcement against illegal traders.

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 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, e.g. hunting, keeping, selling and other forms of direct use. Provinces have indicated that the amended Norms and Standards for the Marking of Rhinoceros and Rhinoceros Horn and for the Hunting of Rhinoceros for Trophy Hunting Purposes (Government Gazette No. 35248; April 2012) are being implemented effectively. Trophy hunting of white rhinoceros is well-managed, it only affects a very small proportion (<0.50%) of the national population and is unlikely to have a deleterious effect on the population as a whole.

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