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GOVERNMENT NOTICES • GOEWERMENTSKENNISGEWINGS

DEPARTMENT OF ENVIRONMENTAL AFFAIRS

NO. 1104

22 AUGUST 2019

NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004
(ACT NO. 10 OF 2004)

NON-DETRIMENT FINDINGS

CONSULTATION IN TERMS OF SECTION 62(3) OF THE NATIONAL ENVIRONMENTAL MANAGEMENT:
BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)

I, Barbara Dallas Creecy, Minister of Environment, Forestry and Fisheries, hereby, under section 62(3) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), give notice of my intention to publish non-detriment findings for *Diceros bicornis* (black rhinoceros) made by the Scientific Authority in the Schedule hereto.

Members of the public are invited to submit to the Scientific Authority, within 30 days from the date of the publication of the notice in the *Gazette*, written scientific information relating to the non-detriment findings to the following addresses:

By post to: Chair: Scientific Authority
South African National Biodiversity Institute
Attention: Ms M Pfab
Private Bag X101
PRETORIA
0001

By hand at: 2 Cussonia Avenue, Brummeria, Pretoria, 0001
By email: m.pfab@sanbi.org.za
By fax: 086 555 9863

Comments received after the closing date may not be considered.



MS B D CREECY, MP
MINISTER OF ENVIRONMENT, FORESTRY AND FISHERIES

SCHEDULE

Non-detriment finding assessment for *Diceros bicornis* (black rhinoceros)

Reference Number: Dic_bic_Jul2018

Date: 12 July 2018

Issued by the Scientific Authority of South Africa

Summary of findings

The South African population of *Diceros bicornis* (black rhinoceros) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the export of wild-sourced specimens for commercial purposes is therefore prohibited. In terms of Article III of the Convention, an export permit shall only be granted for a specimen of an Appendix I species (e.g. in the case of a hunting trophy) when a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species. In accordance with Resolution Conf. 13.5 (Rev. CoP14), South Africa is allowed an annual export quota of five hunting trophies of adult male black rhinoceroses. This document details the undertaking of a non-detriment finding (NDF) for *Diceros bicornis*, and is based on the best available information, current as of March 2018.

The black 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 only reaching sexual maturity at approximately 7 years. Inter-calving intervals average 2.7 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 the age of 7 years. The black rhinoceros is a relatively adaptable, generalist browser and naturally occurs in a wide variety of habitats from deserts to wetter forested montane areas. In general, black rhinoceros populations are slow to disperse from their established range to colonise new range, although there are many cases of individual rhinoceroses wandering great distances from time to time, in many different habitat types. In South Africa, the species is conservation dependent, occurring solely in protected areas, game reserves and on game farms. Black rhinoceroses are somewhat sensitive to general human presence and activity, but do become habituated to regular human presence and activity when no overt threats arise therefrom.

As all subpopulations exist in fenced protected areas or on private/community game farms or reserves, the distribution of the black rhinoceros in South Africa is fragmented. The total area occupied by black rhinoceros is estimated at close to 33,000 km² or less than 3% of the total land surface of the country. The species is widespread, occurring in more than 69 state, private and communal reserves and game farms across seven out of the nine provinces. However, due to the low numbers, it is regarded as a rare species in South Africa. According to data gathered from a survey of rhinoceroses on private and state land by the IUCN/SSC African Rhinoceros Specialist Group (AfRSG), the total South African black rhinoceros population comprises approximately 1,893 individuals (as at the end of 2015), of which 1,382 (73%) and 511 (27%) occur on state-owned and private land respectively.

While black rhinoceros populations in most other African range states have declined over the last three generations (43.5 years), numbers of black rhinoceros within South Africa have been increasing from a low of approximately 110 animals in 1930. Numbers of both the eastern black rhinoceros (*D. b. michaeli*) and the southwestern black rhinoceros (*D. b. bicornis*) have been increasing in the country, with long-term average population growth rates of around 7%. Neither of these subspecies had suffered any poaching up to the end of 2016. In contrast, the more numerous southern-central black rhinoceros (*D. b. minor*) meta-population has performed less well. At present, when including Kruger National Park (KNP) data, it appears that the subspecies may be declining at 1.35% per annum, however, excluding the KNP subpopulation, the remaining meta-population is growing at 3.17% per annum. This subspecies has borne the brunt of the poaching, with the KNP *D. b. minor* population

being especially impacted, probably as by-catch of the continued poaching of the white rhinoceros, the preferred target species of poachers.

Detailed recent quantitative data exist on black rhinoceros numbers, poaching rates and population performances for most subpopulations over the past 30 years due to a process of confidential annual black rhinoceros status reporting to the Southern African Development Community (SADC) Rhinoceros Management Group (RMG), as well as regular reporting to IUCN/SSC AfRSG. The size of many black rhinoceros subpopulations, which are monitored using individual identification methods, is also known exactly or to within a few animals. Even though there are some concerns with regards to adequate budgets to conduct regular counts and implement intensive monitoring on the ground, very good population estimates exist and in most cases direct population estimates are used to monitor the effects of harvest. The quality of monitoring in some subpopulations has declined as field staff are having to increasingly focus on anti-poaching with less time available for other conservation activities such as monitoring.

Ongoing loss of rhinoceroses to poaching for their horn is currently the most immediate threat to South Africa's black rhinoceros population. Poaching of wild black rhinoceroses has been increasing each year from 2010 (when 12 animals were poached), and reached a peak in 2015 when 62 were poached in the country (an estimated 3.3% of the wild population). Poaching has since declined slightly with an estimated 45 wild black rhinoceroses (approximately 2.4% of the wild population) poached in 2016. On average 2.4% of the black rhinoceros population is currently poached annually (c. 45 individuals), effectively representing 40% of the potential annual population increment. The "offtake" from poaching is thus still at levels that are sustainable (total births still exceed total deaths) and is not yet causing a population decline at the national scale, with the exception of the *D. b. minor* population in KNP where a decline has recently been observed. The recent decline in poaching is likely to indicate a positive response to the anti-poaching interventions employed nationally and specifically in KNP. However, the number of incursions into KNP continues to increase, so should the current measures to curb poaching be removed, poaching of both white and black rhinoceroses in KNP would increase dramatically and the severity of the national threat will increase substantially. In order for the current efforts to continue, significant financial inputs from external sources are required.

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, and in 2014 Cabinet adopted an integrated four-pronged approach to curb rhinoceros poaching. In January 2013 a Biodiversity Management Plan (BMP) for the Black Rhinoceros (*Diceros bicornis*) was gazetted for implementation in terms of section 43 of the National Environmental Management Biodiversity Act 2004 (No. 10 of 2004) (NEMBA). This plan will form the basis for greater coordination between existing and future plans.

A high percentage (73%) of the black rhinoceros population is generally well managed within protected areas, with offtakes managed in terms of species-specific or ecological management plans. The black rhinoceros population in the KNP (just over 20% of the national population) is managed in accordance with an adaptive management plan. In KwaZulu-Natal (KZN), black rhinoceroses on state and private land are managed strictly according to the KZN Black Rhino Management Strategy. Management of black rhinoceroses on private land is variable. From 2003, the WWF Black Rhinoceros Range Expansion Project (BRREP), working in partnership with Ezemvelo KwaZulu-Natal (EKZN) Wildlife and more recently the Eastern Cape Parks and Tourism Agency (ECPTA), has helped create eleven new large areas for the conservation of black rhinoceros, totalling 214 black rhinoceroses on over 1,800 km² of private and communal land in South Africa. These management translocations are making a significant contribution to the recovery of the species.

Diceros bicornis is listed as endangered 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. The black rhinoceros population in South Africa is generally subjected to two forms of legal offtake, namely management removals of animals and trophy hunting, and are based on strict biological criteria. An estimated 2.7% of the national herd across state and private protected areas is translocated annually. Between 2003 and 2015, approximately 2,320 km² of habitat have been added nationally

and 178 individual rhinoceros founders have been translocated to new reserves. Although 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 some international exports of live animals. A total of 45 live black rhinoceroses were exported from South Africa between 2005 and 2015, this constituting approximately 50% of the total exports of the species from South Africa during this time period. Live animals were exported primarily for re-introduction purposes (44 out of the 45 live exports). To date, South Africa has donated founder black rhinoceroses to Botswana, Malawi, Swaziland, Tanzania, Zambia and Zimbabwe (Emslie & Adcock, 2016). There is currently no quota for the export of live animals. Exports of live rhinoceros is driven by the conservation expansion program as part of the SADC Regional Rhinoceros Conservation Strategy and the African Rhinoceros Conservation Plan.

Legal hunting of black rhinoceroses, mostly on private land, is predominantly economically motivated. With an average of 3 – 4 trophy bulls hunted per year, only a very small proportion of the population is exposed to trophy hunting. Given the strict approval criteria and approval process, there is a high confidence in the measures applied to prevent overuse. Under CITES, South Africa is allowed an annual export quota of five hunting trophies of adult male black rhinoceroses (Res. Conf. 13.5 (Rev. CoP14)). For the period 2005 – 2015, a total of 40 hunting trophies (0.2% per annum of the current national population) have been exported from South Africa. The main destination countries included the Russian Federation (16%), Germany (14%), France (12%), Spain (12%), Malaysia (9%) and Poland (9%). Legal hunting, combined with the impact of poaching, has not yet reached a level where it has caused a cessation in population growth.

A moratorium to prohibit any sale of rhinoceros horn or rhinoceros horn products within the country was implemented in February 2009 to afford the Department of Environmental Affairs 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. In order to effectively manage the legal domestic trade in rhinoceros horn, draft regulatory measures were published for public comment in February 2017, but the regulations are yet to be finalized. In March 2018, the Private Rhino Owners Association (PROA) launched Rhino Horn Trade Africa (RHTA), an initiative that will facilitate the legal trade of rhinoceros horn via an online trade desk, which aims to provide a managed, efficient platform from which genuine buyers and sellers can trade in legal, humanely acquired rhinoceros horn.

The amended Norms and Standards for the marking of rhinoceros and rhinoceros horn and for the hunting of rhinoceros for trophy hunting purposes (published in April 2012) require that all rhinoceros hunts are attended by conservation officials. Provinces indicate that this legal requirement is being complied with. In addition, the norms and standards require that an official must attend all dehorning activities and that a DNA sample must be collected from each animal, as well as from both horns. 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. The system is well managed and rhinoceros horn stock piles are regularly audited. There is a high level of confidence in the monitoring of both illegal and legal harvests of black rhinoceroses in most state protected areas. On smaller properties, rhinoceroses are individually known and there is also a high confidence in carcass detection rates.

It is estimated that the private game industry manages about 23% of the national black rhinoceros herd, and the private sector in South Africa now conserves more rhinoceroses than there are black and white rhinoceroses in the whole of the rest of Africa. The current overall species conservation benefit associated with trophy hunting of black rhinoceros is low, though conservation revenues could be improved by allowing the hunting of additional surplus trophy bulls. There is also currently no benefit derived for habitat conservation through trophy hunting. The sale of live black rhinoceroses is currently limited and excess animals are donated towards range expansion. The export of live specimens for reintroduction purposes does however benefit the regional and global conservation of the species. Since 1990, in order to promote high population growth rates, national and provincial conservation agencies have harvested and sold black rhinoceroses to private landowners. This has served to generate revenue for state conservation agencies, and at the same time has increased rhinoceros numbers in

the donor populations by stimulating growth rates while expanding black rhinoceros range within South Africa through the establishment of new subpopulations. Adequately managed and secure habitat suitable for black rhinoceros is however limited. The biodiversity management plan for black rhinoceros relies on the translocation of animals to establish new subpopulations in order to maintain high growth rates, and thereby mitigate poaching offtakes. The scarcity of available and suitably secure habitat limits the effectiveness of this approach in countering poaching offtakes.

Over two thirds of the national population of black rhinoceros (73%) is conserved within state protected areas (1,382 individuals). South African National Parks (SANParks) is custodian to 31% of the country's black rhinoceroses. However, ongoing poaching is indicative of the limited effectiveness of these protected areas, despite the significant resources that have been deployed towards gaining control over illegal activities. Poaching has occurred in most protected areas with some protected areas, notably the KNP, struggling to combat these illegal activities. This primarily arises from the long permeable border with Mozambique and that country's inadequate legal and wildlife protection systems. Improved protection measures (enhanced intelligence gathering and effective prosecution with deterrent sentences), as well as active regional cooperation (especially from Mozambique), are required to combat poaching. 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 cause of the escalating poaching levels (high demand for black market horn at high prices, i.e. the low supply to demand ratio, coupled with poverty and unemployment in rural communities).

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 rhinoceroses 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 rhinoceroses between 2009 and 2017. Furthermore, a large portion of the rhinoceros security and enforcement budgets in a number of provinces are funded by international donors and are therefore at risk of donor fatigue. It is thus important that alternative sources 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 rhinoceros. At present, the majority of private reserves have to fund their own security measures but income derived from the sale of rhinoceros horn will assist both government and the private sector to continue funding the current investment in the strict protection measures. As a result of the continued increase in the 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, including the 40-year ban on the international commercial trade in rhinoceros products, and to establish a legal, well-regulated international market for trading rhinoceros horn. A plethora of peer-reviewed papers recently published in the scientific literature argue for a legal trade in rhinoceros horn.

In conclusion, the non-detriment finding undertaken for the black rhinoceros, as summarized in the analyses of the key considerations above, demonstrates that current exports of live animals and hunting trophies pose a low risk to the survival of this species in South Africa (Fig. 1 and 2) and should be allowed to continue. Currently legal and illegal harvests combined are still within sustainable levels. Periodic international exports of live animals for the purposes of establishing new populations generate a conservation benefit through ensuring rapid growth in numbers and expansion of the species' range, while at the same time generating conservation revenue and preventing overstocking in established populations. Legal hunting of black rhinoceros is beneficial to the conservation and protection of the species in South Africa, though the current low levels of trophy offtakes do not sufficiently incentivize the conservation of the species or its habitat. As there are surplus males that could be hunted, over and above the 3 – 4 trophy bulls hunted per year, the CITES export quota of five hunting trophies from adult males could be increased. Due to the Endangered status of the species in South Africa and the difficulties of regularly dehorning black rhinoceros, the export of black rhinoceros horn for primarily non-commercial purposes is not recommended at this stage.

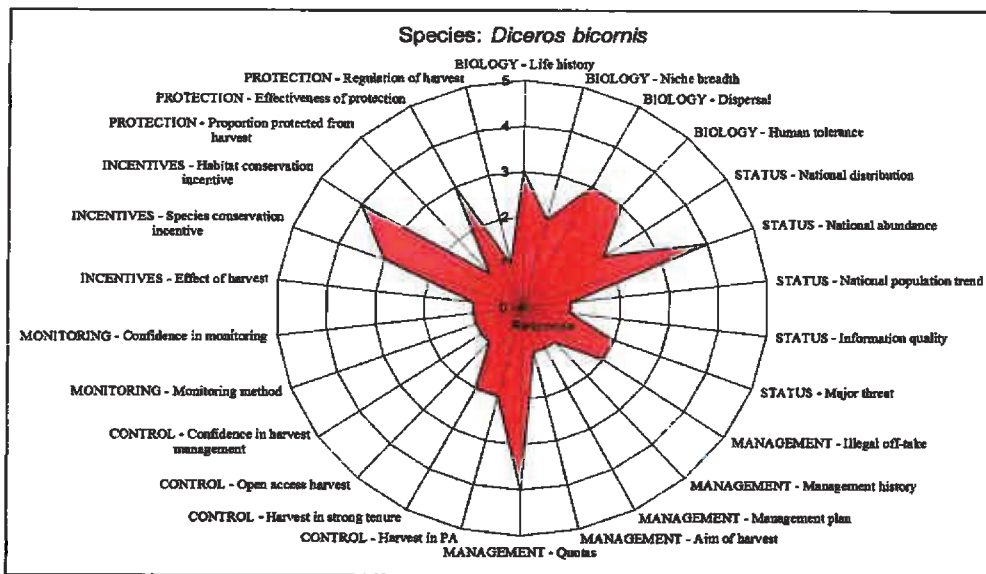


Figure 1: Radar chart summarizing the non-detriment finding assessment for *Dicerus bicornis* (black rhinoceros) in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The limited area shaded in the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

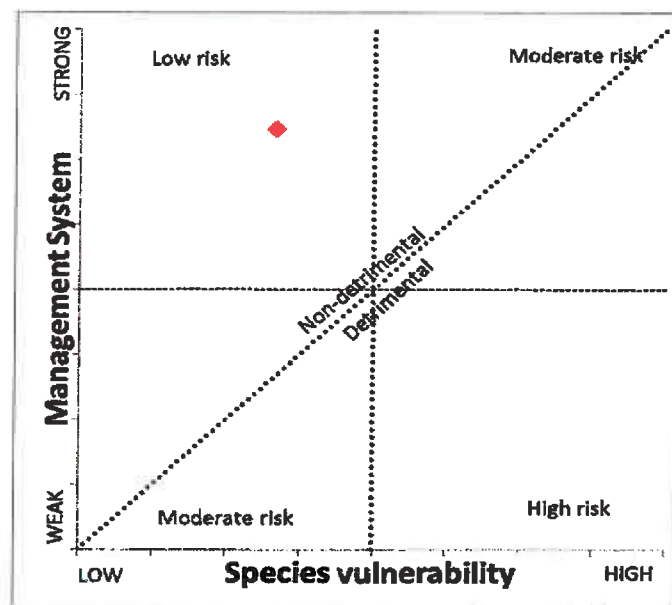


Figure 2: The risk of trading in *Dicerus bicornis* (black rhinoceros), as represented by the relationship between species vulnerability (biology and status) and the management system to which the species is subjected (management, control, monitoring, incentives and protection). The figure demonstrates that the species is at a low risk, and that trade is not detrimental.

Table 1. Detailed NDF assessment for *Diceros bicornis* (black rhinoceros) 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
<p>The black rhinoceros is long-lived with both sexes living to approximately 30 – 40 years in the wild. Black rhinoceros are generally solitary. Cohesive groups consist mostly of mother-offspring associations (Owen-Smith, 1988). Females produce their first calf at 7 years on average (median 6.8, range 4 – 14), while males mate effectively only at 7 to 12 years of age depending on social dominance of other males. The intercalving interval on average is 2.7 (range 1.7 – 4) years after a gestation period of approximately 15 – 16 months (Adcock, <i>et al.</i>, 2010). Black rhinoceros thus have a low reproductive rate.</p>		
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
<p>Black rhinoceroses are generalist browsers and can occur in a wide variety of habitats from deserts to wetter forested montane areas. Their achievable population density is correlated with the interacting factors of actual standing browse availability and suitability in the 0 – 2 m black rhinoceros feeding height range, soil nutrient status, average annual rainfall, and the densities of competing herbivores. Highest densities are found at 350 – 700 mm rainfall sites with rainfall well spread throughout the seasons, where low thicket, scrublands, or understorey forbs predominate, and on more nutrient-rich soils (Emslie & Adcock, 2016; Adcock, 2014). Diet studies across Africa show that black rhinoceros feed on a wide range of plant genera. Important diet types include most African <i>Acacias</i> (now called the <i>Vachellia</i> and <i>Senegalia</i> genera), <i>Grewia</i>, certain <i>Gymnosporia</i> and <i>Combretum</i> species, and many Euphorbiaceae (including <i>Spirostachys africana</i>), forbs and dwarf shrubs such as <i>Justicia</i>, <i>Indigofera</i>, <i>Tephrosia</i>, <i>Monechma</i>, <i>Lycium</i>, <i>Rhigozum</i>, and <i>Zygophyllum</i>. Generally smaller plants less than 1 m in size are most preferred with most browsing occurring under 2 m. Browse in long grass areas tends to be avoided. Grass is usually only eaten incidentally with browse, or where browse availability is limited (grass stalks may comprise over 30% of faecal mass) but is poorly digested (Clause, <i>et al.</i>, 2006) and is thus often over-represented in the dung (Malan, 2011). Black rhinoceros require a permanent water source, except in areas with high palatable succulent plant availability. Intraspecific conflict between rhinoceros individuals may increase in areas where densities are too high (Hitchins & Anderson, 1983). High levels of secondary plant chemicals in some browse species and other indigestible components in many evergreen species, means that much of the available browse in an area can be unsuitable for black rhinoceros.</p>		
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
<p>Home range size varies with the quality of the habitat, averaging well over 100 km² in desert sites, 15 – 60 km² in many woody savannahs and below 10 km² in nutrient rich thicket (SADC RMG status report data). Dispersal is a process that most often takes place at the sub-adult stage. Youngsters become independent of their mothers at 2.5 – 5 years old, mainly triggered by the birth of the next offspring, or</p>		

the process of sexual maturation. In general, black rhinoceros populations are slow to spread out from their established areas to colonise new sites, although there are many cases of individual rhinoceroses wandering great distances from time to time in many different habitat types. Within the Great Fish River population an 80% overlap in the ranges of adult females and their adult offspring has been observed (D. Peinke, pers. comm.).

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

Black rhinoceroses are conservation dependent, occurring solely in protected areas and on game farms and game reserves. They are considered somewhat sensitive to general human activity (e.g. Beytell, 2010; Buk & Knight, 2012), but do become habituated to regular human activity when no overt threats arise therefrom.

National status

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

At a species level black rhinoceros in South Africa is considered widespread and fragmented. The total area occupied by black rhinoceros in South Africa is estimated at close to 33,000 km² (Table 2) which is less than 3% of the total land surface of the country. Black rhinoceros occur in more than 69 state, private and communal reserves and game farms across seven out of the nine provinces. The black rhinoceros population is severely fragmented, as all subpopulations exist in fenced protected areas or private/community game reserves. However, in accordance with a conservation plan for the species, periodic translocations among reserves ensure genetic interchange between many subpopulations in the meta-population. Furthermore, additional individuals that become available through population growth are reintroduced to new available land on an ongoing basis.

By 2011, South Africa conserved three of Africa's seven IUCN SSC African Rhino Specialist Group (AfRSG) rated Key 1 black rhinoceros populations of continental significance and 42% of the other rated Key (3/10) and Important (12/26) populations (Knight, Balfour & Emslie, 2012). South Africa's black rhinoceros conservation effort is therefore of continental importance and South Africa is recognised as a world leader in conserving both the black and white rhinoceros (Knight, Balfour & Emslie, 2012).

There are currently three remaining ecotypes/subspecies of black rhinoceros in East and southern African countries (Emslie & Brooks, 1999), all of which occur in South Africa. Though a recent study by Moodley, *et al.* (2016), suggests six genetic populations with the Zambezi-Cunene a major divide where southern African genotypes mainly occur to the south and the East African genotype to the north, Harper *et al.*, (2018) support the three recognised ecotypes.

By 1973 there were no south-western black rhinoceroses (*D. b. bicornis*) remaining in South Africa, but the subspecies was reintroduced in 1985. According to data gathered by the IUCN SSC AfRSG, the area of occupancy of *D. b. bicornis* is estimated at 4,075 km², on 11 breeding sites in western and south-eastern South Africa (Adcock, 2016) (Table 2).

Southern-central black rhinoceroses (*D. b. minor*) are believed to have occurred from southern Tanzania through Zambia, Zimbabwe, and Mozambique to the northern, north-western and north-eastern parts of South Africa (north of the Mtamvuna River). Today, its stronghold is South Africa and, to a lesser extent

Zimbabwe. Specifically, it occurs within the eastern Lowveld in Limpopo and Mpumalanga and KwaZulu-Natal Lowveld habitats. In the province of Limpopo, its range extends westwards to the North West Province. Its putative distribution is partially predicted by rainfall isohyets but also the potential barrier to movement to the south of KwaZulu-Natal posed by the "Transkei gap". There are 57 breeding locations within the region and the estimated area of occupancy is 28,469 km² (Adcock, 2016) (Table 2).

The eastern black rhinoceros (*D. b. michaeli*) was introduced to South Africa in 1962 and currently exists in a single population on private land which is estimated at 349 km² (Adcock, 2016) (Table 2).

Table 2: The area of occupancy (km²) for black rhinoceros in South Africa as at the end of 2014.

Type of land	<i>D. b. bicornis</i>	<i>D. b. minor</i>	<i>D. b. michaeli</i>	Total
State land	2045.93	15664.25		17710.18
Provincial land	200.00	5124.37		5324.37
Private custodian land	245.00			245.00
Private land	1584.18	5838.64	349.09	7771.91
BRREP land		1841.41		1841.41
	4075.11	28468.67	349.09	32892.87

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

Currently there are approximately 5,250 black rhinoceroses on the continent (Emslie *et al.* 2016). According to data gathered from a survey of rhinoceros on private and state land by the AfRSG, the total South African black rhinoceros population consists of approximately 1,893 individuals (as at the end of 2015) (Fig. 3) of which 1,382 (1,319 – 1,444) and 511 (488 – 534) occur on state-owned and private land respectively. The estimated number of south-western black rhinoceroses (*D. b. bicornis*) in South Africa at the end of 2015 was 254. By the end of 2015 the southern-central black rhinoceros (*D. b. minor*) was estimated at 2,164 individuals throughout Africa with 1,560 in South Africa (Fig. 3), and 20 in Swaziland. The single *D. b. michaeli* population in South Africa numbered 79 at the end of 2015. South Africa conserves approximately 36% of the continental black rhinoceros population (Fig. 4).

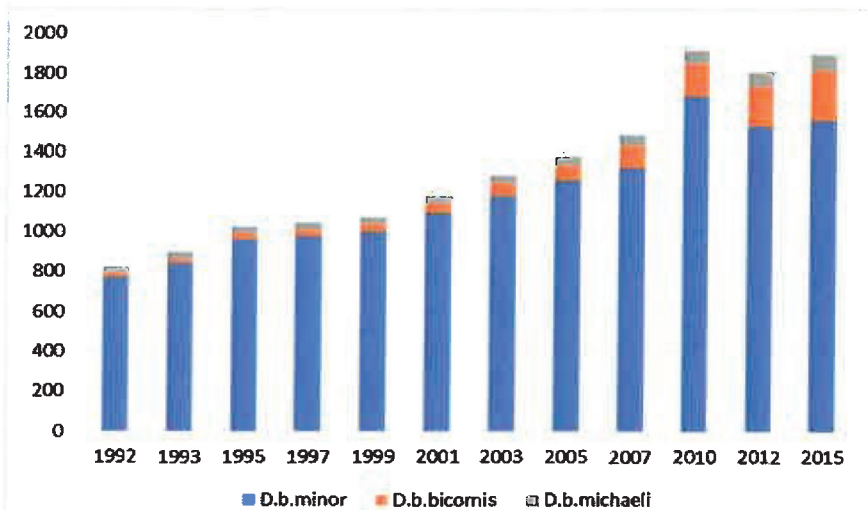


Figure 3: The estimated numbers of black rhinoceros in South Africa from 1992 to 2015 (Source: IUCN SSC AfRSG).

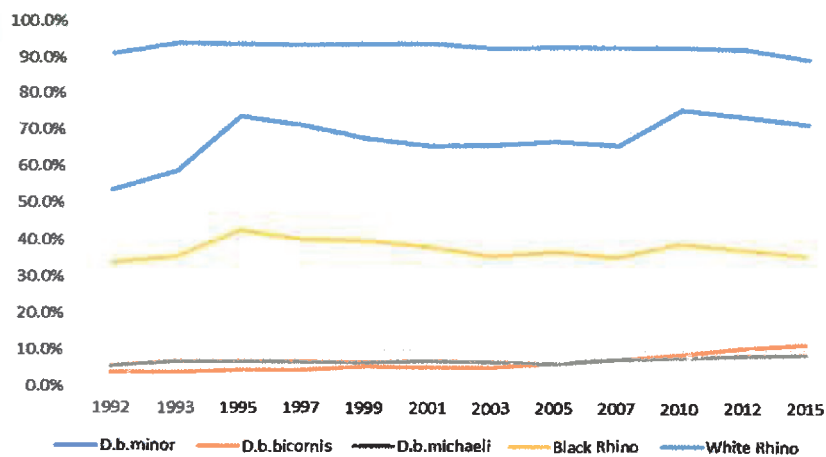


Figure 4: The estimated proportion of Africa's wild rhinoceros (both species) conserved by South Africa between 1992 and 2015 (Source: IUCN SSC AfRSG).

The KwaZulu-Natal (KZN) black rhinoceros population at the end of 2016, comprising nine subpopulations in protected areas and nine subpopulations on private land, is estimated to be 501 individuals.

Very few captive breeding operations for the breeding of black rhinoceros exist. The largest captive breeding operation for rhinoceros has, in addition to a white rhinoceros population of 1,517 (as of November 2017), 15 black rhinoceroses on area of approximately 8,200 ha.

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

In 1970 there were an estimated 65,000 black rhinoceroses in Africa. Currently there are approximately 5,250 black rhinoceroses on the continent (Emslie *et al.* 2016), which means that at a continental level, current black rhinoceros numbers are still 90% lower than three generations (43.5 years) ago (Emslie & Adcock, 2016).

While black rhinoceros populations in most range states have declined over the last three generations, the numbers of black rhinoceroses within the South Africa have been increasing for many years. From only 110 black rhinoceroses in 1930, by the end of 2015 there were an estimated 1,893 black rhinoceroses in South Africa. Both the eastern black rhinoceros (*D. b. michaeli*) and the south-western black rhinoceros (*D. b. bicornis*) numbers are showing an increase with long-term average population growth rates of around or over 7% (Emslie & Adcock, 2016). Neither of these subspecies had experienced loss from poaching up to the end of 2014. In contrast, the more numerous southern-central black rhinoceros (*D. b. minor*) meta-population has performed less well. At present it appears when including Kruger National Park (KNP) data that the subspecies may be declining at 1.35% per annum (Emslie & Adcock, 2016). However, when KNP data for this subspecies are excluded the meta-population is growing at 3.17% per annum (2012 – 2014). This subspecies has borne the brunt of the poaching, with the KNP *D. b. minor* population being especially impacted.

Black rhinoceros subpopulations within the Eastern Cape and North West provinces are stable to increasing. In KZN, the black rhinoceros subpopulation increased to approximately 500 individuals in

2013 and has remained stable since then. The poaching rate in KZN, which was on average below 1% of the population annually between 2003 and 2012, has increased to above 1%. The current poaching rate in the province is 2.4% of the population annually.

South-western black rhinoceros (*D. b. bicornis*) within Addo Elephant, Karoo, Mountain Zebra, and Mokala National Parks increased significantly over the past 5 years (2011-2015) (Ferreira *et al.* 2017). The overall high growth rates can be explained by a population skewed in favour of females due to the initial introductions and a high female calving rate in the initial years after introduction (Ferreira *et al.* 2017). Southern-central black rhinoceros (*D. b. minor*) in Marakele National Park increased significantly between 2011 and 2015 (Ferreira *et al.* 2017).

Since 1990, in order to promote high population growth rates, national and provincial conservation agencies have harvested and sold black rhinoceroses to private landowners. This has served to generate revenue for state conservation agencies, and at the same time has increased rhinoceros numbers in the donor populations by stimulating growth rates while expanding black rhinoceros range within South Africa through the establishment of new subpopulations. From 2003, the World Wildlife Fund (WWF) Black Rhinoceros Range Expansion Project (BRREP), in partnership with Ezemvelo KwaZulu-Natal (EKZN) Wildlife and more recently the Eastern Cape Parks and Tourism Agency (ECPTA), has helped create 11 new large areas for black rhinoceros totalling more than 1,800 km² of private and communal land in South Africa. These populations have grown to 214 individuals. Founder groups of rhinoceros from KZN and Eastern Cape provincial reserves are introduced and managed on a custodianship basis, but progeny are shared between the provincial donor and the site owners. These management translocations are making a significant contribution to the recovery of the species.

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 black rhinoceros numbers, poaching and population performances for most subpopulations over time. This is thanks to a process of confidential annual black rhinoceros status reporting to the Southern African Development Community (SADC) Rhinoceros Management Group (RMG) that has been ongoing since 1989, and regular reporting to IUCN/SSC AfRSG. The size of many black rhinoceros subpopulations, which are monitored using individual identification methods, is also known exactly or to within a few individuals. In KNP, where individual based monitoring over the whole area is not feasible, black rhinoceros numbers are monitored using intensive helicopter block counts, which have wider confidence levels (Ferreira, *et al.*, 2017), though individual identification methods are beginning to form part of the overall black rhinoceros monitoring in the park. 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.

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 black rhinoceros population is the continuing loss of individuals to poaching for their horn (Knight, 2017). In recent years there has been an upsurge in black market prices for rhinoceros horn, which has caused an increase in poaching in some range states including South Africa (Thomas, 2010). In 2016 approximately 45 black rhinoceroses (around 2.4% of the national population) were lost to poaching (Table 3). Before the onset of mass poaching in 2008, black rhinoceroses were performing well in KNP (Ferreira, *et al.*, 2011), but are now most likely declining,

although this is difficult to demonstrate due to sampling error (Ferreira, *et al.*, 2017). Poaching not only reduces the abundance of a species (Emslie & Brooks, 1999), but is also likely to disrupt breeding and calf recruitment rates since it is biased towards adults (Ferreira, Botha & Emmett, 2012). In KZN, approximately 2.4% of the black rhinoceros population is currently poached annually, effectively representing 50% of the potential annual population increment.

Poaching of wild black rhinoceroses increased each year from 2010 (12 poached) reaching a peak in 2015 when 62 wild black rhinoceroses were poached in the country (an estimated 3.3% of the wild population). Poaching has since declined slightly in 2016 (Table 3). The recent decline in poaching is likely to indicate a positive response to the anti-poaching interventions employed nationally and specifically in KNP. Poaching of black rhinoceroses may in fact be a by-catch of white rhinoceros poaching; white rhinoceroses are preferentially poached since they are easier to find (on account of their preference for more open habitats), their greater average horn weights, and their more frequent occurrence in larger groups.

Table 3: The number of black rhinoceroses per subspecies poached annually from 2010 to 2016 (Source: IUCN SSC AfRSG).

	2010	2011	2012	2013	2014	2015	2016	Total
<i>D. b. minor</i>	12	34	25	38	54	62	45	270
<i>D. b. bicornis</i>	0	0	0	0	0	0	0	0
<i>D. b. michaeli</i>	0	0	0	0	0	0	0	0
Black rhinoceros total	12	34	25	38	54	62	45	270

Due to the prohibitive financial and security pressures associated with the current levels of poaching, some private landowners are disinvesting in rhinoceros and limited new suitable habitat is becoming available for the establishment of new rhinoceros populations. This does not only impact on range expansion, but also on current populations that are near carrying capacity by reducing the rates at which these populations can grow. The loss of revenue to both state and private sector owners generated from the sale of rhinoceroses has translated into reduced funds for new conservation land and anti-poaching measures. A further consequence of the decline in the sale and subsequent introduction of rhinoceroses to new areas is the expected decline in the meta-population growth rate. Increased poaching also means there will be fewer surplus rhinoceroses that could be sold to maintain productive densities.

Availability of well managed and secure land for black rhinoceros is limited. The translocation of animals to maintain high underlying population growth rates underpins the meta-population management plan for black rhinoceros, which aims to maintain genetic transfer to future rhinoceros generations, while mitigating poaching losses. The scarcity of available and suitably secure land limits the effectiveness of the meta-population approach in countering poaching offtakes. A further constraint for the conservation of the species is the current veterinary moratorium on the translocation of rhinoceros from KNP for the establishment of new subpopulations on the basis that rhinoceroses are potential carriers of tuberculosis.

Nevertheless, the loss from poaching is still at levels that are sustainable (total births still exceed total deaths) and are not yet causing a population decline at the national scale, although the southern-central black rhinoceros (*D. b. minor*) population in KNP may have started to decline. The poaching threat is thus currently considered limited and reversible. There is some room for concern however and Emslie and Adcock (2016), using a modelling approach, predicted that the average estimated number of black rhinoceros after 5 years will decline by 5.9% from current levels over the next 5 years.

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
<p>High levels of poaching were primarily responsible for the crash in black rhinoceros numbers from a continental population of approximately 65,000 in 1960 (Cumming <i>et al.</i>, 1990) to a low of 2,410 in 1995. Since then, and with concerted conservation action, continental numbers have increased, reaching 5,250 by the end of 2015 (Emslie <i>et al.</i>, 2016). The species remains listed on the IUCN's Global Red List as Critically Endangered, but is listed regionally as Endangered C2a(i) (Emslie & Adcock, 2016).</p>		
<p>Total poaching losses in Africa in 2015 represented 5.0% of African rhinoceroses (3.8% for black rhinoceros). These levels are now approaching the average continental growth rates (4.7%) that black rhinoceros achieved from 1995 through to 2007. Poaching of black rhinoceros has more than doubled from 2013 through to 2015 due to increased losses in Namibia, Zimbabwe and South Africa (Emslie <i>et al.</i>, 2016).</p>		
<p>In South Africa, approximately 2.4% of the black rhinoceros population is currently poached annually (averaging 45 individuals), effectively representing 40% of the potential annual population increment (2.4% poached vs the c.6% annual underlying biological growth of 2012 – 2014). Up to the end of 2014 no south-western black rhinoceros or eastern black rhinoceros had been poached in South Africa (Emslie & Adcock, 2016). The southern-central (<i>D. b. bicornis</i>) black rhinoceros has borne the brunt of the poaching (Table 4), with KNP's <i>D. b. bicornis</i> population being especially impacted. In other provinces the poaching rate for black rhinoceros has been relatively low compared to KNP. In KZN the poaching rate for 2016 was 2.4%. Between 2003 and 2011 the poaching rate was relatively low (<1% of the population) but has risen rapidly from 2012 onwards with the mean annual poaching rate for the last five years at 2.68%, which exceeds the 1% per annum acceptable threshold set by the KZN Black Rhino Management Strategy (Conway & Goodman, 2013). However, the poaching rate does appear to have declined over the last two years. Within the ECPTA parks, the poaching rate of black rhinoceroses for 2016 was 3%.</p>		
<p>Mortalities related to illegal activities (poaching, snaring and calves of poached mothers lost) comprise over half (53.8%) of the southern-central black rhinoceros total reported mortalities, equating to a 2.85% average annual loss to southern-central black rhinoceros over 2012 – 2014 compared to 1.1% average annual poaching-related loss rate for the previous three year period, 2009 – 2011. Between 2013 and 2014, the number of southern-central black rhinoceroses born that survived the first year in KNP (18 – 26 individuals) was similar to the number of rhinoceros poached (17 individuals). However, between 2014 and 2015 more southern-central black rhinoceroses were poached (52 individuals) than were born and survived the first year (29 – 42 individuals) (Ferreira <i>et al.</i>, 2017).</p>		
<p>At the current poaching rate, there thus appears to already be a detectable negative population growth rate in KNP. A similar national trend is anticipated and Emslie and Adcock (2016) have predicted that the average estimated number of black rhinoceroses will decline nationally by 5.9% from current levels over the next 5 years. This prediction used a modelling approach based on the best estimate of longer-term underlying annual population growth rate (4.7%), and observed average annual poaching levels up to April 2016. In 2014, the year on year percentage increase in poaching levels of both species of rhinoceros had declined to 21% from the previous average of 35%. The 2015 and 2016 poaching statistics actually indicated a decline in the number of rhinoceroses poached annually, both for the country as a whole and for KNP. A total of 45 black rhinoceroses were poached in 2016, compared to 62 in 2015, representing a decline of 38%. This is likely to indicate a positive response to the anti-poaching interventions employed nationally and specifically in KNP. Use of such reduced poaching levels in the models of Emslie and Adcock (2016) would likely result in very different outputs from poaching scenario models.</p>		
<p>Poaching of black rhinoceroses may in fact be a by-catch of white rhinoceros poaching; white rhinoceroses are preferentially poached since they are easier to find (on account of their preference for more open habitats), their greater average horn weights, and their more frequent occurrence in larger</p>		

groups. Over the period 2010 – 2014, available data show that only 4.4% of rhinoceroses poached were black (Emslie & Adcock, 2016). An out-of-province reserve managed by ECPTA, lost 10 white rhinoceros and no black rhinoceroses in 2016, while in 2017 the same reserve lost 14 white rhinoceros and three black rhinoceros.

Table 4: South African black rhinoceros mortalities and estimated mortality rates for the period 2012 – 2014 (Source: IUCN SSC AfRSG).

SA Black Rhino Mortalities and estimated Mortality Rates, 2012-2014	G. & A. Province	G. & C. Western	G. & M. Free	All of South Africa
Natural Mortalities	14	3	126 (126*)	143
Wegal Mortalities	0	0	141	141
Trophy Hunts	2	1	7	10
Other Human-Related Mortalities	0	0	16	16
Total Mortalities	16	4	160 (290*)	219
Overall Mortality Rate/Yr (Avg.)	2.58%	1.71%	5.88%	3.41%
Natural Mortality Rate/Yr (Avg.)	1.00%	1.30%	2.54%	2.67%
Wegal Mortality Rate/Yr (Avg.)	0.00%	0.00%	2.85%	2.28%
Trophy Hunting Rate/Yr (Avg.)	0.29%	0.43%	0.14%	0.17%
Other Human-Related Mortality Rate/Yr (Avg.)	1.54%	0.43%	0.40%	0.82%

* (Adjustment made for Kruger NP natural mortality rate which was estimated at 2% per year making 26 for the period - although just 4 were officially reported).

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

A high percentage (73%) of the black rhinoceros population is generally well-managed within protected areas, with off-takes managed in terms of species specific or ecological management plans. The black rhinoceros population in the KNP (just over 20% of the national population) is managed in accordance with an adaptive management plan. Black rhinoceros populations on private land are mostly well managed on the basis of the same conservation principles and objectives as for the state protected areas.

Since the 1990s, national and provincial conservation agencies have sold black rhinoceroses to private landowners. These sales generate revenue for state conservation agencies and also increase rhinoceros numbers through the establishment of new populations, thereby expanding black rhinoceros range within South Africa. From 2004, the Black Rhinoceros Range Expansion Project (BRREP) – Managed by WWF in partnership with EKZN Wildlife and more recently the ECPTA – has helped create several new large areas for black rhinoceros on private and communal land in South Africa. Founder groups of rhinoceroses from KZN and Eastern Cape provincial reserves are introduced and managed on a custodianship basis, but progeny are shared between the provincial donor and the site owners. These management relocations are making a significant contribution to the recovery of the species.

In 1976 the CITES Conference of the Parties (CoP) listed 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 allow for the international trade in live animals to appropriate and acceptable destinations and the export of hunting trophies. The South African black rhinoceros population remained on Appendix I. There has thus been an international ban on the commercial trade in rhinoceros horn since 1976.

In addition a moratorium to prohibit any sale of rhinoceros horn or rhinoceros horn products within the country 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 an opportunity to develop and implement permanent measures aimed at eliminating the illegal international trade in rhinoceros horns. The 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. The implication of the judgment is that the domestic trade in rhinoceros horn within the borders of the country is once again legal, and government is now obliged to consider any permit application received in this regard. To effectively manage the legal domestic trade in rhinoceros horn, the Department of Environmental Affairs published draft regulatory measures for the domestic trade in rhinoceros horn, or a part, product or derivative of rhinoceros horn for public comment, in February 2017 (Gazette No. 40601). These measures will be implemented only once the regulations are finalised.

In addition to the Biodiversity Management Plan (BMP) for the Black Rhinoceros (*Diceros bicornis*) (Government Gazette No. 36096), South Africa's Cabinet adopted an integrated four-pronged approach to curb rhinoceros poaching (Department of Environmental Affairs 2014), including (1) compulsory interventions to protect rhinoceroses 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 product (horn) 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. 5). The Rhinoceros Conservation Lab in 2016 identified challenges and developed detailed action plans and budgets to implement the Committee of Inquiry (Fig. 5) recommendations. The total budget required to implement the Lab's initiatives is approximately R473 million per year (R379 million for the South African Police Services initiatives and R94 million for all others). In 2017 a process to develop a rhinoceros research strategy was initiated.

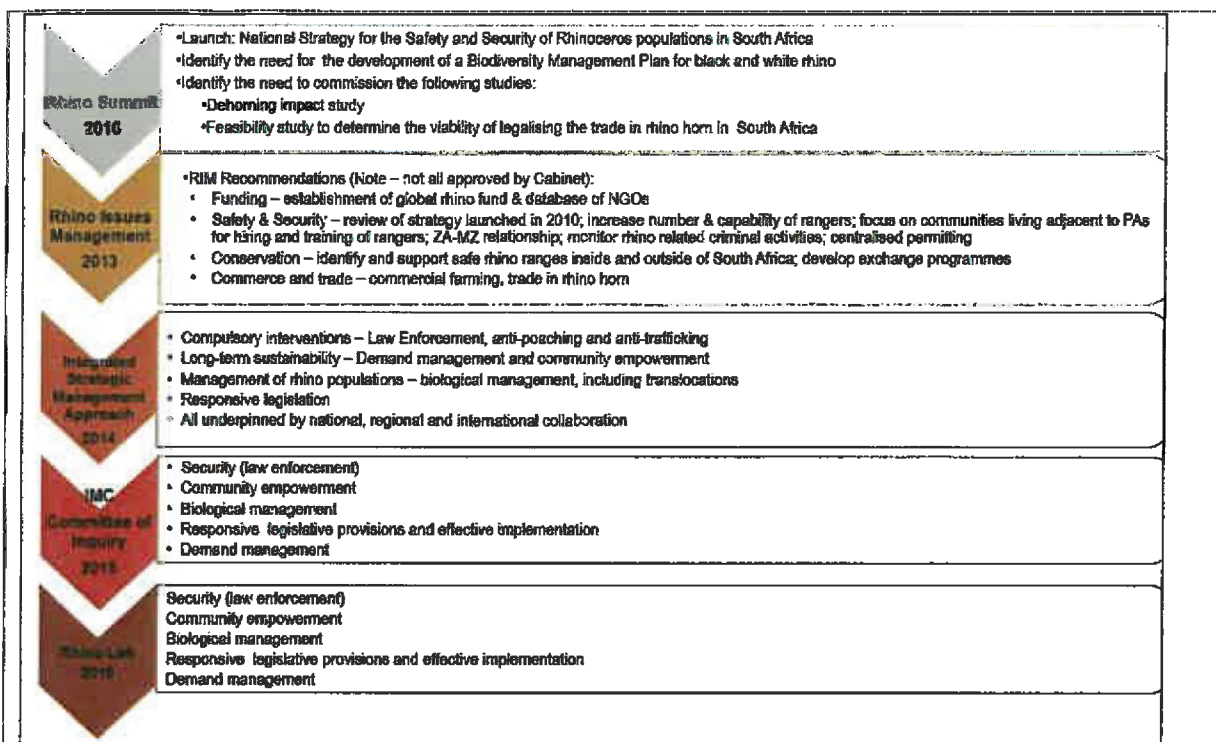


Figure 5: A flow diagram illustrating the timelines and main outcomes of initiatives taken by the South African government in collaboration with various stakeholders to address the poaching threat to rhinoceros and ensure the long term conservation of the species (Source: presentation by T. Carroll (DEA), October 2017).

In March 2018, the Private Rhino Owners Association (PROA) launched Rhino Horn Trade Africa (RHTA), an initiative that will facilitate the legal trade of rhinoceros horn via an online trade desk, which aims to provide a managed, efficient platform from which genuine buyers and sellers can trade in legal, humanely acquired rhinoceros horn.

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

In January 2013 a Biodiversity Management Plan (BMP) for the Black Rhinoceros (*Diceros bicornis*) was gazetted for implementation (Government Gazette vol. 571 no. 36096) in terms of section 43 of NEMBA. This plan, which was developed by the SADC Rhino Management Group, is informed by the National Strategy for the Safety and Security of Rhino Populations in South Africa (DEA 2011) as well as the Rhinoceros Issues Management Report (DEA 2013) and will form the basis for greater coordination between existing and future plans. The plan aims for a South African black rhinoceros population growth rate of at least 5% per annum, with 2,800 south-central and 260 south-western black rhinoceros by the end of 2020. In addition, the BMP recommends an annual minimum harvesting of 5% for established populations that are showing a zero growth population density. Harvesting is considered to be beneficial to the species, because it maintains or enhances population vigour in the harvested population whilst also promoting overall meta-population growth through the establishment of new populations. The management of black rhinoceros populations, notably smaller ones, may result in the demographic skewing of the population sex ratio in favour of males. This can have a negative impact on the population's breeding performance and genetic status. The BMP suggests that these surplus males should either be translocated to establish male-only groups or be hunted. An RMG working group has

also developed a set of assessment criteria to ensure that only hunts of benefit to population demographics and/or genetics be approved (see Knight *et al.*, 2012).

In KZN, black rhinoceroses on state and private land are managed strictly according to the KZN Black Rhino Management Strategy, and a status reporting framework currently supports live harvest management for the species. Private properties in KZN and the Eastern Cape that form part of the BRREP have individual site specific management plans, while in most provinces, all private properties with black rhinoceroses have management plans.

A SADC Regional Rhinoceros Conservation Strategy for both species was adopted 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 was formulated and endorsed by most African rhinoceros range states, including South Africa.

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 black rhinoceros subpopulations in South Africa are potentially subjected to a number of types of legal offtake. These include management removals of animals for ecological or biodiversity reasons as well as offtakes for trophy hunting and revenue generation on live sales. The majority 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. These offtakes generate a conservation benefit through enabling effective conservation management (including rapid growth in numbers and expansion of the species' range), while at the same time generating conservation revenue. In some instances there may be a financial transaction involved and there are periodic international exports to other African Range States of live animals for the purposes of establishing new populations.

A total of 45 live black rhinoceros were exported from South Africa between 2005 and 2015, this constituting 50% of the total exports of the 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 (44 out of the 45 live exports). To date, South Africa has donated and sold founder black rhinoceroses to Botswana, Malawi, Swaziland, Tanzania, Zambia, Rwanda and Zimbabwe (Emslie & Adcock, 2016) with plans for Chad ongoing.

Permanent removal of black rhinoceros from the national population through trophy hunting is predominantly economically motivated, although it does provide additional conservation benefit. Hunting removed about 0.2% per annum of the national population during the period 2002 to 2015. It is a national policy that sustainable hunting aims to generate a conservation benefit through incentivizing the private sector to keep rhinoceroses and to purchase land in order to stock rhinoceroses. Trophy hunting removes surplus adult males, whilst generating important revenue for private and state conservation, this in contrast to poaching which removes a wider range of ages and sexes. Thus poaching is 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 6 & 7) (Cooney *et al.*, 2017; Emslie, *et al.*, 2016). Forty-seven percent of the total exports of black rhinoceros specimens between 2005 and 2015 were hunting trophies (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK); 40 trophies in total (although this figure is likely to be an overestimate due to the intricacies of data capture). The main destination countries included the Russian Federation (16%), Germany (14%), France (12%), Spain (12%), Malaysia (9%) and Poland (9%).

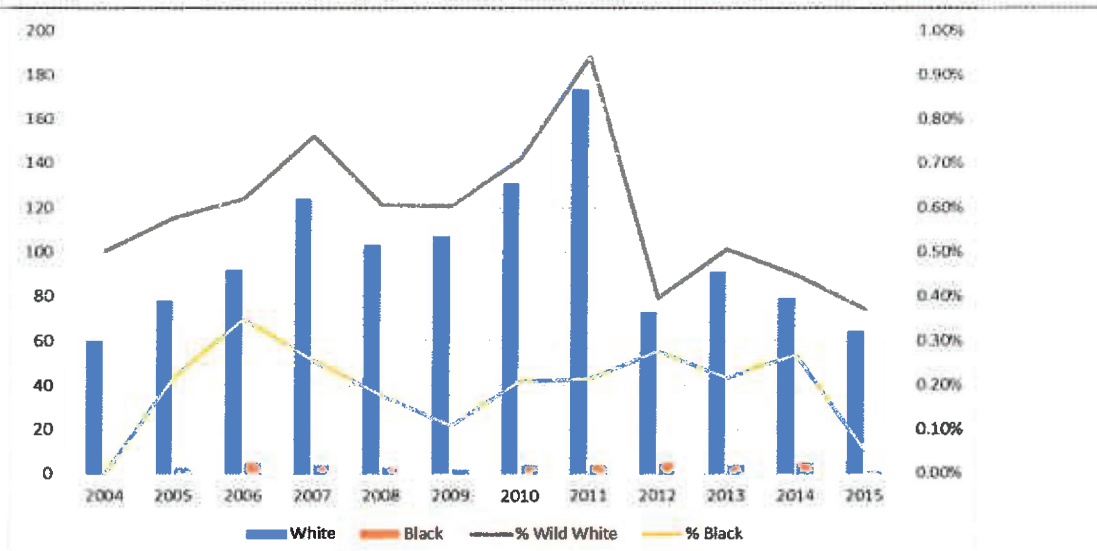


Figure 6: Number of white and black rhinoceroses hunted and the percentage of the estimated wild rhinoceros population hunted (Source: IUCN SSC AfRSG).

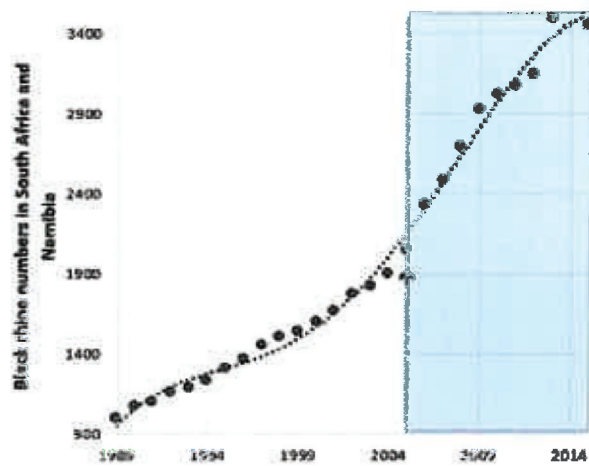


Figure 7: Growth of black rhinoceros population in South Africa and Namibia including over the period (shaded) during which trophy hunting has been undertaken (Emslie, *et al.*, 2016).

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
<p>Under CITES South Africa is allowed an annual export quota of five hunting trophies of adult male black rhinoceros (Res. Conf. 13.5 (Rev. CoP14)), and according to the CITES trade database (UNEP World Conservation Monitoring Centre, Cambridge, UK), a total of 40 hunting trophies were exported from South Africa over the period 2005 – 2015. Hunting of black rhinoceros is sustainable in South Africa (Cooney <i>et al.</i>, 2017). A set of strict criteria have been established in order to ensure that only specific males are hunted, those whose hunting can enhance demographic or genetic conservation (see Knight <i>et al.</i>, 2012). There is currently no quota for the export of live animals. Exports of live rhinoceros are driven by conservation objectives in line with the longer term vision encapsulated in South Africa's black rhino BMP (facilitating range expansion and managing black rhinoceroses both within South Africa and regionally, as part of an expanding meta-population). The international live export of black rhinoceros to help found or boost wild populations in other African rhinoceros countries is also in line with the African Rhino Range States' African Rhino Conservation Plan. This calls for countries "to cooperatively manage and expand rhinoceros populations across the African landscape". There is currently no quota for the export of rhinoceros horn for non-commercial purposes.</p>		
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
<p>From January 2012 to December 2014, annual translocations of black rhinoceroses averaged 2.7% of the national herd across state and private protected areas, with about 58% of those removals originating from national or provincial protected areas (Adcock, 2016). These animals are not permanently removed from the national population. Individuals that are removed (translocated) from established subpopulations that are approaching or exceed carrying capacity are routinely being invested in 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 black rhinoceros. Over the past five years, SANParks moved three south-western black rhinoceroses between four National Parks, placed five under custodianship and introduced an additional seven individuals from privately-owned populations into National Parks (Ferreira <i>et al.</i> 2017).</p>		
<p>On average between three and four black rhinoceroses are legally hunted annually (0.2% per annum of the current national population) (Fig. 6). Of these almost all were hunted on private properties, thus providing an incentive to the private sector to conserve black rhinoceros.</p>		

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
Forty-two percent of live removals and over 90% of trophy hunts take place on private / communal land where there is strong local control over resource use. On average between three and four black rhinoceroses have been hunted annually over the past 11 years, which is 0.2% per annum of the current national population.		
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
Black rhinoceroses occur solely in protected areas and on private and communal game farms and reserves.		
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 black rhinoceros. Since the introduction of 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), all rhinoceros hunts are attended by conservation officials, a legal requirement of the norms and standards. In addition, animals are carefully selected for hunting based upon a set of strict criteria (see Knight <i>et al.</i> , 2012). Within the Eastern Cape, the BRREP program has been instrumental in allowing the provincial parks authority to effectively implement the black rhinoceros BMP. At present North West Parks and Tourism Board do not have sufficient resources and budget to implement the black rhinoceros BMP. Offtakes of rhinoceros in this province are however negligible.		
Monitoring of harvest		
19. Methods used to monitor the harvest: What is the principal method used to monitor the effects of the harvest?	Direct population estimates	1
	Quantitative indices	2
	Qualitative indices	3
	National monitoring of exports	4
	No monitoring or uncertain	5
The size of many black rhinoceros subpopulations, which are monitored using individual identification methods, is known exactly or to within a few individuals. In KNP, where individual based monitoring over the whole area is not feasible, black rhinoceros numbers are monitored using intensive helicopter block counts (which have wider confidence levels), though individual identification methods are beginning to form part of the overall black rhinoceros monitoring in the park.		
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) require that all hunts are monitored by conservation officials. In addition, all dehorning activities are monitored by conservation officials. 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. However, dehorning is less common in larger subpopulations. The norms and standards require that a DNA sample be collected at the time of dehorning for genetic profiling purposes, as well as from each live animal and from both horns of the live animal in cases where the animals are sold and translocated. DNA samples of all detached horns must also be collected. 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. The system is well managed and rhinoceros horn stock piles are regularly audited.

Reporting of rhinoceros horn stocks within the private sector continue to increase in part due to improved declaration and reporting. A 2014 survey of white rhinoceros owners in South Africa found that privately-held stocks totalled 1,697 pieces (6,256 kg) (Balfour, *et al.*, 2016), 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 can be leaked to criminals is a factor in under-reporting (Emslie, *et al.*, 2016).

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

Monitoring of harvest (illegal and legal) of black rhinoceros in state protected areas, which constitute 73% of the national herd, is conducted with a high degree of confidence, where detection rates of carcasses are well over 90%. KNP has an approximate 80% detection rate of rhinoceros carcasses. The sizes of many black rhinoceros subpopulations, which are monitored using individual identification methods, are also known exactly or to within a few individuals. For both Ezemvelo KZN-Wildlife and Eastern Cape Parks and Tourism Agency, there is a less than 5% error around rhinoceros population estimates and a 100% confidence in the monitoring of legal harvest. Rhinoceroses are individually known in smaller properties where there is also a high degree of 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 and in most cases direct population estimates are used to monitor the effects of harvest.

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 are attended by conservation officials. Provincial conservation agencies indicate that these legal requirements are being complied with in full.

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
<p>Legal hunting of black rhinoceros has been beneficial as it provides necessary funding for expensive conservation related activities. In addition, the removal of animals benefits the remaining population by reducing browse pressure on the habitat, and thereby helping to maintain the ecological integrity of the landscape.</p> <p>Since the 1990s, in order to maintain high breeding rates, national and provincial conservation agencies have sold excess black rhinoceros to private landowners, which not only generates revenue for state conservation agencies, but also increases rhinoceros numbers through the establishment of new populations while expanding black rhinoceros range within South Africa. From 2004, The Black Rhinoceros Range Expansion Project (BRREP) – Managed by WWF in partnership with EKZN Wildlife and more recently the ECPTA – has helped create several new large areas for black rhinoceros on private and communal land in South Africa. Founder groups of rhinoceroses from KZN and Eastern Cape provincial reserves are introduced and managed on a custodianship basis, but progeny are shared between the provincial donor and the site owners. These management translocations are making a significant contribution to the recovery of the species. Because of the BRREP, EKZN Wildlife are no longer selling black rhinoceroses, but contribute all excess individuals to this range expansion program. Thus there is no longer an economic benefit for the provincial conservation agency. The ECPTA continues to sell black rhinoceroses to private reserves but also contributes excess black rhinoceroses to the BRREP. In 2017, ECPTA sold six black rhinoceroses to private reserves. This is an important source of income for the ECPTA. There is currently no benefit derived from the sale of rhinoceros horn.</p> <p>Due to the significant economic benefits of hunting to game farmers, together with live sales and ecotourism, the private sector has increasingly stocked these animals. This has contributed to the expansion of the species' range and has maintained a rapid meta-population growth of the national population. Live sales of surplus animals to the private sector have been highly beneficial to conservation agencies, generating vital conservation revenue and preventing overstocking in established populations. However, the increase in poaching is starting to limit this positive impact as private sector interest in buying and keeping rhinoceroses continues to decline due to the rising costs of security. In addition, the current prohibition on the commercial international trade in rhinoceros horn can be viewed as a missed opportunity for beneficiation associated with owning and protecting rhinoceroses.</p>		
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
<p>Black rhinoceros is not considered a highly viewable tourism animal. The sale of live black rhinoceros is currently limited and excess animals are donated towards range expansion. The export of live specimens for reintroduction purposes does benefit the regional and global conservation of the species. A SADC RMG survey indicated that the private sector does not keep black rhinoceros for purely financial purposes.</p> <p>Since the 1990s, national and provincial conservation agencies have sold excess black rhinoceros to private landowners in order to maintain high breeding rates, thereby generating conservation revenue and increasing rhinoceros numbers through the establishment of new populations and the expansion of black rhinoceros range within South Africa. From 2004, the Black Rhinoceros Range Expansion Project</p>		

(BRREP) – managed by WWF in partnership with EKZN Wildlife and more recently the ECPTA – has helped create several new large areas for black rhinoceros on private and communal land in South Africa. Founder groups of rhinoceroses from KZN and Eastern Cape provincial reserves are introduced and managed on a custodianship basis, but progeny are shared between the provincial donor and the site owners. These management translocations are making a significant contribution to the recovery of the species. EKZN Wildlife no longer sells black rhinoceroses, but contributes all excess individuals to BRREP. The ECPTA continues to sell black rhinoceroses to private reserves but also contributes excess animals to the BRREP. In 2017, ECPTA sold six black rhinoceroses to private reserves, an important source of income for this conservation agency.

Due to a limited annual export quota of only five hunting trophies, the current overall species conservation benefit associated with trophy hunting is low. Conservation revenues could be improved however if additional surplus trophy bulls could be hunted. The extremely limited trophy hunting that has taken place has nevertheless positively impacted on the population through incentivizing landowners to stock the species.

Poaching 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 rhinoceroses who currently bear the prohibitive financial and security costs of protecting and conserving rhinoceros (Rubino & Pienaar, 2017).

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). 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). A 2015 survey of 171 private rhinoceros owners conducted under the auspices of the SADC RMG and funded by the DEA, showed that 85% of the private rhinoceros owners supported legal international trade in horn, 10% were undecided and only 5% were against a legal trade in rhinoceros horn. 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 in order to trade horn (Knight, 2016). However, horn from black rhinoceros would contribute a small amount to the total mass of horn produced per year due to the smaller size of the horn as well as the difficulties of regularly dehorning black rhinoceros. The mass of black rhinoceros horn currently lost to poachers per year is approximately 120 kg (67-166 kg for the period 2012-2016, assuming an average horn mass of 2.68kg per horn set) (Taylor, *et al.*, 2017).

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 the private game industry manages about 23% of the national black rhinoceros herd. Between 2003 and 2015, approximately 2,320 km² of habitat have been added nationally and 178 individual rhinoceros founders have been translocated to new reserves (Balfour, pers. comm.). However, due to the very low number of black rhinoceros hunted per annum, there is currently no benefit derived for habitat conservation through trophy hunting.

The current model used for black rhinoceros conservation is prescriptive and not a market-driven system, as there are very strict criteria (relating to fencing, security and habitat conditions) for the keeping of

black rhinoceros. Some private black rhinoceros owners therefore donate excess black rhinoceroses to the expansion program and no additional habitat is acquired through the live sales of black rhinoceros. Despite a 10 fold increase in poaching, landowner perceptions and commitment to black rhinoceros conservation remains strong, although a few sites have disinvested in keeping black rhinoceros.

An additional limitation in the BRREP has been finding properties of a sufficient size (usually greater than 200 km²) that have the capacity to host rhinoceros populations with a growth potential to become Key rated populations of over 50 black rhinoceroses. For this reason the program is now considering areas outside of the country for possible reintroduction of black rhinoceros within the species' former range. In other cases, while habitat may be available, there is insufficient infrastructure and resourcing to effectively protect the species, therefore rendering such areas unsuitable recipients of black rhinoceroses. Furthermore, in some cases political interference constrains the program, so that only 3-4 animals are introduced per property rather than larger biologically sustainable populations. In addition, finding potential animals for translocation is being constrained by poaching pressure, and more recently disease constraints associated with removing animals from potential donor parks such as Kruger National Park.

Density-dependent social constraints of black rhinoceroses require interventions such as translocations. Several South African national parks, such as Au-grabies, Cambedoo, Kalahari, Karoo, Namaqua, Richtersveld, and Tankwa National Parks, that may provide suitable habitat within the historical distribution of the south-western black rhinoceros (Skead 1980), are options for reintroductions, but currently do not have adequate security measures in place or do not have adequate fencing. There is a potential for rhinoceros horn sales to increase incentives for the keeping of black rhinoceros and thus to promote increased habitat conservation.

Protection from harvest

24. Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from harvest?	>15%	1
	5-15%	2
	<5%	3
	None	4
	Uncertain	5

In 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. Two thirds of the national population (73%) is conserved within state protected areas (1,382 individuals). National parks, under the management of South African National Parks (SANParks), are custodian to 31% of the country's black rhinoceroses.

The CITES prohibition on the international trade in rhinoceros horn for commercial purposes, in existence since 1977 and implemented in an attempt to reduce poaching and the illegal sales of rhinoceros products, is also considered to be a mechanism that affords 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 black rhinoceros. In KZN, black rhinoceroses have been removed from three state reserves, because they cannot be adequately protected within these reserves. Poaching has occurred in most state owned protected areas, and some protected areas are struggling to combat these illegal activities. For the KNP, this is primarily due to the long permeable border with Mozambique, and that country's inadequate legal and wildlife protection systems. 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 also failed to effectively provide strict protection to the species, despite the numerous anti-poaching measures implemented in South Africa (Emslie, 2013; Emslie *et al.*, 2013; Knight, 2016; Rademeyer, 2016). It does appear from the latest poaching figures that the number of rhinoceroses poached per annum is on the decline, though while the number of rhinoceroses poached in KNP has decreased, there is evidence that poaching has increased in other hotspots, particularly in northern KwaZulu-Natal. Poaching from a national perspective has not yet resulted in a significant population decline of the black rhinoceros, as the number of births recorded per year still exceeds the number of deaths recorded. However, the KNP subpopulation is beginning to show signs of decline, which means that despite the significant resources that have been deployed towards gaining control over illegal activities, current protection measures are insufficient in the long term. These measures importantly fail to address the cause of the escalating poaching levels (high demand for black market horn at high prices, i.e. the low supply to demand ratio, coupled with poverty and unemployment in rural communities). Local South African and Mozambican men are contracted by crime syndicates to poach rhinoceroses. These poachers usually receive 1000 to 9000 US\$ per kg of horn (whereas 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).

Most importantly, 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) 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) for protected areas >100,000 ha (Conway, pers. com.), it is estimated that between R0.87 billion and R1.29 billion per annum is required to secure rhinoceroses in the state owned protected area system. KNP currently spends approximately R3 million per annum primarily on rhinoceros protection. Between 2009 and 2017 private game farms and reserves have spent collectively approximately R2 billion on the management and specifically the protection of rhinoceroses. Furthermore, a large portion of the rhinoceros security and enforcement budgets in a number of provinces are funded by international donors and are thus at risk of donor fatigue. It is unlikely that the current investment in the protection of rhinoceroses from current sources (government and donors) can be sustained in the long term. It is thus important that alternative sources of revenue be explored to protect rhinoceroses. 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. At present, the majority of private reserves have to fund their own security measures (Rubino & Pienaar, 2017). 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.

As a result of the continuing 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, 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 (Biggs *et al.*, 2013; Conrad, 2012; Di Minin *et al.*, 2015; Ferreira, Pfab & Knight, 2014). 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.

There are at least four concerns relating to the potential effects of legalisation (Fischer, 2004). In relation to potential ‘destigmatization’ of rhinoceros horn use in consumer markets, Moyle (2018) however argues that there is no strong empirical or theoretical evidence that stigmatizing 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 animal traditional medicine (ATM) users in Vietnam concluded that there is no evidence of social ‘stigma’ from rhinoceros horn consumption, and that the introduction of a legal supply of rhinoceros horn has the potential to ‘crowd out’ rhinoceros horns sourced from poachers 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 rhinoceros horn within a legal and regulated trade. The study also found that there is likely to be a small increase in the number of people who might consume more rhinoceros horn due to legalization, and thus recommended that sufficient supplies of legal stock be available to meet demand. In relation to the concern that illegally obtained rhinoceros horn will be laundered into the legal trade, 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 size of the legal market thus involves a trade-off between laundering and competition. 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.

Irrespective of whether trade is legalised or not, Haas and Ferreira (2016) further suggest that in order to maintain rhinoceros subpopulations, 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. It is further argued that providing legal job opportunities for young men in rural communities would further improve the protection of rhinoceros and reduce the poaching risk (Haas & Ferreira, unpubl; Jewkes, *et al.*, 2012).

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

Black rhinoceroses are utilised for trophy hunting, photographic tourism and recreation in accordance with the sustainable use principle that is enshrined in the Constitution of the Republic of South Africa and embedded in NEMBA. The species is listed as endangered 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. Hunting affects only a very small proportion (0.2%) of the national population. 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 (published in April 2012) are being implemented effectively. Trophy hunting of black rhinoceros is well-managed, and it is unlikely to have a deleterious effect on the population as a whole. Animals to be hunted are selected based upon a strict set of criteria (see Knight *et al.*, 2012). Given the strict approval criteria and approval process, there is a high confidence in the measures applied to prevent overuse.

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References

1. **Adcock, K., 2006.** Darwin Initiative / SADC RMG Black Rhinoceros Carrying Capacity Model Version 2.1. RMG, Pietermaritzburg.
2. **Adcock, K. (compiler), 2014.** (Confidential) Status and management of black rhinoceros in Namibia, South Africa Zimbabwe, Botswana, Malawi and Zambia, January 2006 to December 2011. SADC Rhinoceros Management Group report.
3. **Adcock K., 2016.** Status and Management of Black Rhinoceros in South Africa January 2012 to December 2014. SADC RMG report, Port Elizabeth. 41pp.
4. **Adcock, K., Knight, M., Du Preez, P., Kotting, B., Fike, B., Hearn, M., Uri-Khob, S., Hofmeyr, D., Dell, S., Nxele, B., Clinning, G., De Goede, N., Rossouw, D., Greaver, C., Hannekom, C., Marchant, A., Van Dyk, G., Els, R., Ferreira, H., Sholto-Douglas, A., Walker, A. & York, G., 2010.** *An analysis of 18 years of SADC Rhinoceros Management Group population history data.* SADC Rhinoceros Management Group, Port Elizabeth, South Africa. Funded by the U.S. Fish and Wildlife Service Rhinoceros and Tiger Conservation Fund.
5. **Ayling, J., 2013.** What sustains wildlife crime? Rhinoceros horn trading and the resilience of criminal networks. *Journal of International Wildlife Law & Policy*, 16(1), pp.57-80.
6. **Biggs, D., Courchamp, F., Martin, R., & Possingham, H.P., 2013.** Legal trade of Africa's rhinoceros horns. *Science* 339:1038–1039.
7. **Beytell, P.C., 2010.** Reciprocal impacts of black rhinoceros and community-based ecotourism in North-West Namibia. Thesis (MA (Geography and Environmental Studies), University of Stellenbosch, 2010.
8. **Buk, K.G. & Knight, M.H., 2012.** Habitat suitability model for black rhinoceros in Augrabies Falls National Park, South Africa. *South African Journal of Wildlife Research*, 42(2); 82 – 93.
9. **Clauss, M., Castell, J. C., Kienzle, E., Dierenfeld, E. S., Flach, E. J., Behlert, O., Ortmann, S., Streich, W. J., Hummel, J. and Hatt, J.-M., 2006.** Digestion coefficients achieved by the black rhinoceros (*Diceros bicornis*), a large browsing hindgut fermenter. *Journal of Animal Physiology and Animal Nutrition*, 90: 325–334.

10. **Conrad, K., 2012.** Trade bans: a perfect storm for poaching. *Tropical Conservation Science* 5(3): 245-254.
11. **Conway, A.J and Goodman, P.S., 2013.** Strategy for the Management of Black Rhinoceros (*Diceros bicornis minor*) in KwaZulu-Natal. Ezemvelo KZN Wildlife, Pietermaritzburg, South Africa.
12. **Cooney, R., Freese, C., Dublin, H., Roe, D., Mallon, D., Knight, M., Emslie, R., Pani, M., Booth, V., Mahoney, S. and Buyanaa, C., 2017.** The baby and the bathwater: trophy hunting, conservation and rural livelihoods. *Unasylva*, 68(1), p.249.
13. **Cumming, D.H.M., Du Toit, R.F. and Stuart, S.N., 1990.** *African elephants and rhinoceros*. IUCN.
14. **Di Minin, E., Laitila, J., Montesino-Pouzols, F., Leader-Williams, N., Slotow, R., Goodman, P.S., Conway, A.J. and Moilanen, A., 2015.** Identification of policies for a sustainable legal trade in rhinoceros horn based on population projection and socioeconomic models. *Conservation Biology*, 29(2), pp.545-555.
15. **Emslie, R.H., 2013.** African Rhinoceros – Latest Trends in Rhinoceros Numbers and Poaching (No. CoP16 Inf. 51). CITES Secretariat, Geneva, Switzerland.
16. **Emslie, R.H. & Adcock, K., 2016.** A conservation assessment of *Diceros bicornis*. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
17. **Emslie, R.H. & Brooks, M., 1999.** African rhinoceros: Status survey and conservation action plan. Gland: IUCN/SSC African Rhinoceros Specialist Group.
18. **Emslie, R.H., Milliken, T., & Talukdar, B., 2013.** African and Asian Rhinoceros – Status, Conservation and Trade (No. CoP16, Doc. 54.2 Annexe). CITES Secretariat, Geneva, Switzerland.
19. **Emslie, R.H., Milliken, T., Talukdar, B., Ellis, S., Adcock, K., & Knight, M.H., 2016.** African and Asian Rhinoceros - Status, Conservation and Trade. CITES CoP17 Doc 68 Annex 5. A report from the IUCN Species Survival Commission (IUCN SSC) African and Asian Rhinoceros Specialist Groups and TRAFFIC to the CITES Secretariat pursuant to Resolution Conf.9.14 (Rev. CoP15).
20. **Ferreira, S.M., Greaver, C.C., & Knight, M.H., 2011.** Assessing the population performance of the black rhinoceros in Kruger National Park. *South African Journal of Wildlife Research* 41:192–204.
21. **Ferreira, S.M., & Okita-Ouma, B., 2012.** A proposed framework for short-, medium- and long-term responses by range and consumer States to curb poaching for African rhinoceros horn. *Pachyderm* 51:52–59.
22. **Ferreira, S.M., Pfab, M., & Knight, M., 2014.** Management strategies to curb rhinoceros poaching: alternative options using a cost-benefit approach. *South African Journal of Science* 110:01–08.
23. **Ferreira, S.M., Botha, J.M., & Emmett, M.C., 2012.** Anthropogenic Influences on Conservation Values of White Rhinoceros. *PLoS ONE* 7(9): e45989. doi:10.1371/journal.pone.0045989
24. **Ferreira, S.M., Bissett, C., Cowell, C.R., Gaylard, A., Greaver, C., Hayes, J., Hofmeyr, M., Moolman-van der Vyver, L. & Zimmermann, D., 2017.** The status of rhinoceros in South African National Parks. *Koedoe*, 59(1), pp.11-pages.
25. **Fischer, C., 2004.** The complex interactions of markets for endangered species products. *Journal of Environmental Economics and Management*. 48; 926-953.
26. **Harper, C., Ludwig, A., Clarke, A., Makgopela, K., Yurchenko, A., Guthrie, A., Dobrynin, P., Tamazian, G., Emslie, R., van Heerden, M. & Hofmeyr, M., 2018.** Robust forensic matching of confiscated horns to individual poached African rhinoceros. *Current Biology*, 28(1), pp.R13-R14.
27. **Hitchins, P.M., & Anderson, J.L., 1983.** Reproduction, population characteristics and management of the black rhinoceros *Diceros bicornis minor* in the Hluhluwe/Corridor/Umfolozi Game Reserve Complex. *South African Journal of Wildlife Research* 13:78–85.
28. **Hübschle, A.R., 2015.** Game of horns: transnational flows of rhinoceros horn. Dissertation published in Cologne, IMPRS-SPCE (Studies on the Social and Political Constitution of the Economy), Universität zu Köln; 2015 Sep 30; pp. 1-424.
29. **Janssens & Trouwborst, 2018.** Rhinoceros conservation and international law: The role of Wildlife treaties in averting megaherbivore extinction. *Journal of International Wildlife Law and Policy*.

30. **Jewkes R, Morrell R, Sikweyiya Y, Dunkle K, & Penn-Kekana L., 2012.** Men, Prostitution and the Provider Role: Understanding the Intersections of Economic Exchange, Sex, Crime and Violence in South Africa. *PLoS ONE* 7(7): e40821. doi:10.1371/journal.pone.0040821
31. **Knight, M., 2017.** African Rhinoceros Specialist Group report. Rapport du Groupe de Spécialistes du Rhinoceroscéros d'Afrique. *Pachyderm* 58: 17-35.
32. **Knight, M.H., 2016.** African rhinoceros specialist group report. *Pachyderm* 57, 12–42.
33. **Knight, M.H., Balfour, D., & Emslie, R.H., 2012.** Biodiversity management plan for the black rhinoceros (*Diceros bicornis*) in South Africa: 2011-2020. Department of Environmental Affairs.
34. **MacMillan, D., Bozzola, M., Hanley, N., Kasterine, A. & Sheremet, O., 2017.** Demand in Viet Nam for rhinoceros horn used in traditional medicine, International Trade Centre, Geneva, Switzerland.
35. **Malan, E.W., 2011.** Forage availability and dietary selection of black rhinoceros *Diceros bicornis minor* on Mokopane Biodiversity Conservation Centre, Limpopo Province. MTech Dissertation, Tshwane University of Technology, Pretoria.
36. **Moodley, Y., Russo, I.R.M., Dalton, D.L., Kotzé, A., Muya, S., Haubensak, P., Bálint, B., Munimanda, G.K., Deimel, C., Setzer, A. and Dicks, K., 2017.** Extinctions, genetic erosion and conservation options for the black rhinoceros (*Diceros bicornis*). *Scientific Reports*, 7, p.41417.
37. **Moyle, B., 2018.** Wildlife markets in the presence of laundering: a comment. *Biodiversity & Conservation* 26: 2979-2985.
38. **Owen-Smith, R.N., 1988.** Megaherbivores. The influence of very large body size on ecology. Cambridge University Press, Cambridge.
39. **Rademeyer, J., 2016.** Tipping point: Transnational organised crime and the war on poaching. Part 1 of a 2-part investigation into rhinoceros horn trafficking in southern Africa. In: The Global Initiative Against Transnational Organized Crime.
40. **Rubino, E.C. and Pienaar, E.F., 2017.** Applying a conceptual framework to rhinoceros conservation on private lands in South Africa. *Endangered Species Research*, 34, pp.89-102.
41. **SADC RMG status reports:** Southern African Development Community Rhinoceros Management Group – Status and Management of Black Rhinoceros reports (various) from 1994 to 2014.
42. **Skead, C.J., 1980.** *Historical mammal incidence in the Cape Province. Volume 1, The Western and Northern Cape*, The Department of Nature and Environmental Conservation of the Provincial Administration of the Cape of Good Hope, Cape Town, pp. 277–311.
43. **Taylor, A., Balfour, D., Brebner, D.K., Coetzee, R., Davies-Mostert, H., Lindsey, P.A. and Shaw, J., 2017.** Sustainable rhinoceros horn production at the pointy end of the rhinoceros horn trade debate. *Biological Conservation*, 216, pp.60-68.
44. **Thomas R. 2010.** Surge in rhinoceros poaching in South Africa. *TRAFFIC Bulletin* 23:3.