GENERAL NOTICES • ALGEMENE KENNISGEWINGS

DEPARTMENT OF ENVIRONMENTAL AFFAIRS

NOTICE 1191 OF 2015

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

THE BIODIVERSITY MANAGEMENT PLAN FOR WHITE RHINOCEROS (*Ceratotherium simum*)

I, Bomo Edith Edna Molewa, Minister of Environmental Affairs, hereby publish the Biodiversity Management Plan for the White Rhinoceros (*Ceratotherium simum*) in South Africa in terms of section 43(1) *(b)(i)* read with section 43(3) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), set out in the Schedule hereto.

BOMO EDITH EDNA MOLEWA
MINISTER OF ENVIRONMENTAL AFFAIRS

SCHEDULE

BIODIVERSITY MANAGEMENT PLAN FOR THE WHITE RHINOCEROS (*Ceratotherium simum*) IN SOUTH AFRICA

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Cite as: Knight MH, RH Emslie, R Smart & D Balfour. 2015. Biodiversity Management Plan for The White Rhinoceros (*Ceratotherium simum*) in South Africa 2015-2020. Department of Environmental Affairs, Pretoria. South Africa.

EXECUTIVE SUMMARY

The Southern white rhino *Ceratotherium simum* was historically found in southern Africa. Hunting and poaching reduced the population to between 20 - 50 animals in the iMfolozi area (now Hluhluwe-iMfolozi Park in KwaZulu-Natal) by the end of the 19th century. By the beginning of 2012 the South African population had increased in size to represent over 93% of Africa's wild white rhino. The saving of this species is hailed as one of Africa's greatest conservation success stories. Kruger National Park and Hluhluwe-iMfolozi Park accounted for an estimated 53% and 13% of South Africa's white rhinos in 2012, respectively. The private sector has also played a major role in rhino conservation by conserving about 24% (4,520) of the national population by 2012. The communal sector is beginning to play an increasing role in the conservation of the species.

Although South Africa's white rhino have increased at an average of 6.6 % per annum from 1991-2012, this growth is under pressure from resurgent and escalating poaching of rhinos for their horns. This upsurge in poaching has coincided with soaring costs for protecting rhino, increased risks to owners and conservation staff and the rhinos themselves. Worryingly, incentives (e.g. live sale prices) for rhino conservation have been generally declining. If these trends continue this will threaten continued increases in numbers of rhino and extent of suitable habitat under rhino management as well as reducing funds available for field conservation action, especially by the important source populations.

Rhinos act as "flagship species" because they require large areas and significant protection measures that help to conserve a wide range of biodiversity, particularly where wildlife-based land-use systems have been established. The conservation of these rare and charismatic animals also attracts donor as well as state support, with the latter being stimulated by the national prestige of rhino conservation projects and the fact that rhinos are a major attraction for eco-tourists, in turn creating jobs and attracting important Forex, adding significant value to wildlife operations. Where markets have been established, such as in South Africa, rhinos have a high value in live sales, thus generating revenue for wildlife operations. Both black and white rhino are part of our national heritage, and also have spiritual/existence value for many people. The increased levels of poaching that have been experienced since 2008 are cause for major concern. If poaching rates continue to escalate year on year as they have been doing then this could result in numbers starting to decline in just a few years.

The previous Minister of Water and Environmental Affairs Ms Buyelwa Sonjica held a summit on rhino's from 5-6 October 2010 in Pretoria. The summit was held to augment and endorse the current initiatives against rhino poaching and afford stakeholders an opportunity to reflect on the current interventions and harness further political and broader stakeholder commitment. One of the recommendations of the summit under the Monitoring and Evaluation key issue was the development of a BMP for white rhino as the BMP for black rhino was in process then. In addition, the development of the white rhino BMP is to enhance conservation efforts with regard to the species as well as achieving the target in terms of the Delivery Agreement. Additionally, the development of this BMP came about in response to an instruction from the Environmental Parliamentary Portfolio Committee as a result of the current upsurge in rhino horn poaching. The development of the BMP also reflects on the commitment of the key partners involved to work together in order to effectively achieve priorities highlighted in the Minister's rhino summit as well as try to curb the illegal poaching and trade in rhino horn.

The main purpose of BMP-S in terms of NEMBA is to ensure the long-term survival in the wild of the species and provide for monitoring and reporting on the progress with implementation of the plan. The BMP for white rhino will build upon an initial "*Strategy for conservation and sustainable use of wild populations of southern white rhino Ceratotherium simum in South Africa*" that had been developed following a stakeholder workshop convened by

the SADC Rhino Management Group and approved by MINMEC on February 29th 2000 (RMG 2000). The Rhino Management Group (RMG) initiated the process to develop the BMP for the white rhino.

The draft South African white rhino BMP has a logical structure with a 5 year time horizon with targets. The plan has a long term vision and a shorter term conservation goal covering the time period of this plan. By achieving the short term goal progress will be made towards realising the longer term vision. The plan identifies a number of key components with associated objectives.

GLOSSARY OF TERMS

Adaptive genes: Functionally significant genes that result from the propagation of advantageous mutations through positive selection.

Biodiversity Management Plan for Species*:* A tool to guide the management of indigenous species (and any sub-specific taxa) and groupings of indigenous species that are adversely affected by similar threats and enables the evaluation of progress with regard to such management.

Ecotype: A group of organisms within a species that is adapted to particular environmental conditions and therefore exhibits behavioural, structural or physiological differences from other such members of the species.

Intensive breeding: Rhinos usually in small to very small areas, in or out of historical range, living at compressed density and spacing, with routine partial food supplementation, with frequent levels of husbandry and veterinary interventions, and a manipulated or partially manipulated breeding system.

IUCN Red List of Threatened Species List: (also known as the **IUCN Red List** or **Red Data List**), is a comprehensive inventory of the global conservation status of plant and animal species which provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as **Critically Endangered**, **Endangered** and **Vulnerable**) as well as to examine trends in numbers and status of listed threatened species over time.

Meta-population: In a meta-population the various individual populations in a country or region are managed as part of an overall national or regional herd with interchange of animals (genetic material) between the constituent subpopulations. A meta-population is not simply a set of separate rhino breeding groups within the region - there has to be some form of managed gene flow between the individual populations that make it up. Rhinos are managed as part of a meta-population to meet demographic and genetic conservation goals.

Native Species/Indigenous species*:* A species is defined as **indigenous** or **native** to a given region or ecosystem, if its presence in that region is the result of only natural processes, with no human intervention. NEMBA defines an indigenous species as a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity. It thus excludes agricultural and domesticated livestock and plants.

Private Rhino Owners: Refers collectively to individuals who either own white rhinos or manage white rhinos on behalf of the owners.

Put-and-take: Denoting a system whereby animals are deliberately introduced to an area for removal through consumptive-use practices (e.g. typically trophy hunting) within a relatively short time period (generally less than 25% of a generation for long-lived animals such as rhino).

Selective breeding: The intentional breeding of selected individuals with specific traits in an attempt to produce offspring with similar characteristics or with improved traits.

Species: The National Environmental Management and Biodiversity Act, 10 of 2004 (NEMBA) defines a species as a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind, and includes any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population. This definition applies in this document.

Subspecies: Any natural subdivision of a species that exhibits small, but persistent, morphological variations from other subdivisions of the same species living in different geographical regions or times, but which are likely to interbreed and produce viable offspring if put together with another subspecies of the same species.

Vita-darting: Refers to the almost simultaneous firing by a 'green hunter' of a dart loaded with a vitamin supplement injection under the guidance of a veterinarian, who fires another dart to immobilise the animal. It is normally done as part of a management operation. In essence vita-darting allows a green hunter to 'shoot' the rhino without killing it and to help fund a necessary management action, while getting round a prohibition of the South African Veterinary Council on veterinarians allowing green hunters to immobilise rhino themselves under their guidance.

ACRONYMS

AfRSG	African Rhino Specialist Group of IUCN's SSC
BABS	Bioprospecting, Access and Benefit Sharing
CBD	Convention on Biological Diversity
CoI	Commission of Inquiry
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of Parties
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
ECC	Ecological Carrying Capacity (Zero population growth density)
ECPTA	Eastern Cape Parks & Tourism Agency
ECWG	Environmental Crime Working Group of Interpol which is now formally linked with the RESG
EKZNW	Ezemvelo Kwa-Zulu Natal Wildlife
GEF	Global Environment Facility
IMC	Inter-Ministerial Committee
IUCN	International Union for Conservation of Nature
KNP	Kruger National Park
LATF	Lusaka Agreement Task Force
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
NPA	National Prosecuting Authority
NSSSRP	National Strategy for the Safety and Security of Rhinoceros Populations
NWCRU	National Wildlife Crime Reaction Unit
NWPTB	North West Parks and Tourism Board
NWR	Northern White Rhino
SADC	Southern African Development Community
SADC RMG	SADC Rhino Management Group (see Appendix 1 for details)
SADC RPRC	SADC Regional Programme for Rhino Conservation (not currently operational)
SADC RRG	SADC Rhino Recovery Group (not currently operational)
SANParks	South African National Parks
SANDF	South African National Defence Force
SAPS	South African Police Services
SOP's	Standard Operating Procedures
SSC	Species Survival Commission (of the IUCN)
SWR	Southern White Rhino
ToPS	Threatened or Protected Species.
RESG/Interpol ECWG	Rhino & Elephant Security Group/Interpol Environmental Crime Working Group. After holding joint meetings for a number of years these two groups merged and the RESG is now formally linked with the Interpol ECWG.
RIM	Rhino Issues Management.
RhODISTM	Rhino DNA database system based at Onderstepoort's Veterinary Genetics Laboratory, University of Pretoria.
PH	Professional Hunter
PHASA	Professional Hunters Association of South Africa

VGL	Veterinary Genetics Laboratory, Onderstepoort, University of Pretoria (that runs the RhODISTM forensic Rhino DNA analysis system and database).
WAZA	World Association of Zoos and Aquaria
WWF	World Wildlife Fund

ACKNOWLEDGEMENTS

- This plan was jointly developed at a stakeholders workshop organised by the SADC RMG attended by South African members of the SADC Rhino Management Group (K. Adcock, D. Balfour,,A. Conway, J. Eksteen, R. Els, R. Emslie, R. Hustler, P. Jones, M. Knight, J. Koen, S. Meintjies & P. Nel) and other invited stakeholders (G. Bauer, M. Boshoff, K Brebner, T. Carroll, D. de Villiers, K. du Toit, H. Els, M. Eustace, C. Harper, E. Hermann, J Okori, K Odendaal, R. Martin, K. Maggs, P. Novellie, K. Odendaal, S. Palos, J. Shaw, E. Schulze, R. Smart, A. Steyn, L. Steyn, M. t' sas Rolfes & M van Heerden). The plan represents the consensus view of those at the workshop representing SADC RMG, IUCN SSC AfRSG, South African Dept. Environmental Affairs, DEDEA Eastern Cape, Eastern Cape Parks & Tourism Agency, Ezemvelo-KZN Wildife, Free State Dept. of Environment Affairs and Tourism, Mpumalanga Parks & Tourism Board, Northern Cape Dept. Environment & Nature Conservation, North West Parks and Tourism Board, SANParks, Veterinary Genetics Laboratory – University of Pretoria, Wildlife Ranchers South Africa, Private Rhino Owners Association, Rhino & Elephant Security Group/Interpol Environmental Crime Working Group, TRAFFIC, National Prosecuting Authority, National Wildlife Crime Reaction Unit, Professional Hunters Association of South Africa, The Hunters Confederation of South Africa, South African Police Service, SA Hunters and Game Conservation Association, Private Specialists in rhino conservation and resource economics, and representatives of some private rhino owners/managers. RMG representatives from Limpopo, Gauteng and Western Cape Provinces were also invited but unfortunately were unable to attend the workshop. It was later reviewed at the 2013 RMG meeting. Further comments from Dr P Goodman, Dr R Kyle and Mr B Coverdale are appreciated.
- Mike Knight, Richard Emslie are thanked for helping facilitate and organise the workshop. Russel Smart is also thanked for logistic support and for together with Dr's Knight and Emslie assisting with compiling a draft plan following the workshop. The document represents the consensus view of the workshop and not necessarily that of the compilers or all of the organisations represented at the workshop.
- Richard Emslie would like to thank core sponsors of the AfRSG Scientific Officer in 2011-12, namely US Fish & Wildlife Service's Rhino & Tiger Conservation Fund , Save the Rhino International, The International Rhino Foundation, WWF African Rhino Programme (with funding from WWF Netherlands), and the UK's DEFRA for helping sponsor his time to assist with reviewing and drafting of this document.
- CHASA is thanked for sponsoring the workshop & EWT logistical support to make it happen.
- Thanks are extended to the sponsors mentioned above for facilitating the development of this stakeholder plan. The plan represents the consensus views of the participating stakeholders and does not necessarily represent the views of the various sponsors.

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1. INTRODUCTION

Rhinoceroses, commonly known as rhino, belong to one of the few remaining categories of mega-fauna surviving today. The white (*Ceratotherium simum*) and black (*Diceros bicornis*) rhinos are native to Africa**.** Asia conserves another three surviving species of rhino.

The white rhino that weighs from 1,600 to 2,700 kg is Africa's second largest land mammal after the elephant. It is a grazing mega-herbivore and historically has had a more restricted distribution than its browsing relative, the black rhino. Two subspecies of white rhinos are recognized by the IUCN SSC AfRSG. These are the northern white rhino (NWR) *Ceratotherium simum cottoni* and the southern white rhino (SWR) *C. s.simum*. The NWR used to range over Chad, Central African Republic, Sudan, Uganda, and north eastern Democratic Republic of Congo (DRC) but by 1984 following rampant poaching throughout its range, only one remaining confirmed wild population occurred in Garamba National Park in the DRC. Unfortunately, due to escalating poaching in the early 2000's this population was also wiped out by 2007. The last four potential breeding northern white rhino from a zoo in the Czech Republic have been moved to a rhino sanctuary in Kenya where it is hoped a move to the wild will encourage breeding. These animals are unfortunately inter-related and in the absence of any further animals being found in the wild it will be necessary to intercross these remaining NWR with SWR in an attempt to at least conserve some adaptive northern rhino genes. Reports of a possible small number surviving in a remote area of southern Sudan remain unconfirmed. Thus, this subspecies is close to extinction.

The SWR was historically found in southern Africa; but again owing to hunting and poaching by the end of the 19th century the population was reduced to around 20 - 50 animals in the iMfolozi area of what is now Hluhluwe-iMfolozi Park in KwaZulu-Natal. In 1960 the subspecies was still restricted to this one population. In 1961 the late Dr Tony Harthoorn developed techniques to immobilize and move white rhino, and together with Dr Ian Player and others in the then Natal Parks Board, Operation Rhino began with the first translocation to nearby uMkhuze Game Reserve. That same year the first rhinos were translocated to Kruger NP which received in the region of 320 over the next 12 years in what has proved to be a very wise and productive investment. However, by the beginning of 2012 the South African population had increased to about 18,900 animals representing just over 93% of Africa's wild white rhino. The saving of this species is hailed as one of Africa's greatest conservation success stories. Kruger National Park and Hluhluwe-iMfolozi Park accounted for an estimated 53% and 13% of South Africa's white rhinos by the beginning of 2013, respectively. The private sector has also played a major role in its conservation conserving about 24% (4,520) of the national population by 2012. Although South Africa's white rhino have increased at an average of 6.6 % per annum from 1991-2012, this growth is under pressure from resurgent and escalating poaching of rhinos for their horns. This upsurge in poaching has coincided with soaring costs for protecting rhino, increased risks to owners and conservation staff and the rhinos themselves. Worryingly, incentives (e.g. live sale prices) for rhino conservation have been declining. As a result some owners have started to sell off their rhino. If these trends continue this will threaten continued increases in numbers of rhino and extent of suitable habitat under rhino management. In addition it will lead to reduced funds available for field conservation action, especially for the important source populations.

1.1. Why the White Rhinoceros (*Ceratotherium simum*) requires a Biodiversity Management Plan

The white rhino is currently listed under the international IUCN Red List as Near Threatened (Emslie 2011) and nationally as Least Concern (Friedmann & Daly. 2004). However, given the recent continued escalation of poaching and the fact that the national list is outdated, both of these Red Listings are under review. Preliminary suggestions indicate that the national listing may change to Vulnerable (Emsilie R, pers comm). The IUCN's

African Rhino Red List Authority is to update the international status. It is also currently listed as a protected species in terms of section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA). In addition, South Africa's white rhino population is included in CITES Appendix II but only for the export of live animals to appropriate and acceptable destinations, and the export of hunting trophies. All other specimens of the South African white rhino population are deemed to be included in Appendix I for which international commercial trade in horn and other rhino products is currently prohibited. The white rhino warrants special attention as a species both through its global status as well as its conservation dependence and current poaching threats. Hence, the development of a Biodiversity Management Plan (BMP-S) for this species to ensure its long-term survival in the wild has become inevitable.

This plan builds upon an initial "Strategy for conservation and sustainable use of wild populations of southern white rhino *Ceratotherium simum* in South Africa" that had been developed following a stakeholders workshop convened by the Southern African Development Community (SADC) Rhino Management Group and approved by MINMEC on February 29th 2000 (RMG 2000); but which is now outdated and needs to be expanded and revised. In addition, the plan is informed by the National Strategy for the Safety and Security of Rhinoceros Populations in South Africa (DEA 2011) and the Rhino Issues Management Report (DEA 2013).

At the Rhino Summit in 2010, the then South African Minister for Environmental Affairs requested the SADC RMG to assist with developing a national white rhino biodiversity management plan. The SADC RMG organised a multi-stakeholder workshop to develop this plan. It was jointly developed by South African members of the SADC RMG and invited experts and representatives of many stakeholders (see Acknowledgements). In addition of ensuring the long-term survival in the wild of the species, NEMBA also provides for monitoring and reporting on the progress with implementation of the plan.

1.2 Rhinos as flagship species

Where wildlife-based land-use systems have been established, rhinos act as "flagship species" because they require large areas and significant protection measures that help to conserve a wide range of biodiversity (du Toit 2006). The conservation of these rare and charismatic animals also attracts donor as well as state support, with the latter being stimulated by the national prestige of rhino conservation projects and the fact that rhinos are a major attraction for eco-tourists, in turn creating jobs and attracting important Forex. Where markets have been established, such as in South Africa, rhinos have a high value in live sales, thus generating revenue for wildlife operations. Both black and white rhino are part of our national heritage, and also have spiritual/existence value for many people.

Rhinos can add significant value to wildlife operations. For example between 2000 and 2005, live sales of white and black rhinos from Hluhluwe-iMfolozi Park generated the equivalent of 60% of the park's conservation budget; and surveys of tourists in this park, as well as in private reserves in South Africa and Namibia, indicate that 7-14% of total wildlife viewing value can be ascribed to rhinos (Spenceley & Barnes, 2005). Moreover, they have had considerable value at times, with white rhino sale prices averaging R360,000/animal by the Big three sellers (KZN Wildlife, SANParks & Vleissentraal) in 2008 when a record 350 rhinos were sold (Emslie, unpublished data, Milliken & Shaw 2012)). The average price declined to an ~ R260,000 per animal in 2012 when fewer (150) animals were being sold. In 2013 there was a short-lived spike in average per animal prices back to that noted in 2008, which subsequently fell to ~R300,000 animal when even fewer (60) animals were being sold on the market in 2014. Overall turnover by the Big three has declined from R100 million in 2009 to less than R20 million in 2014. Loss in this revenue has placed increased financial stress on the statutory organisations in their expensive fight against poaching.

1.3 The aim and objectives of the Biodiversity Management Plan

NEMBA provides the opportunity for any person, organisation or organ of state desiring to contribute to biodiversity management to submit to the Minister, for approval, a draft management plan for an indigenous or migratory species warranting special conservation attention. The Norms and Standards for the development of Biodiversity Management Plans for Species (BMP's), developed in terms of section 9 of NEMBA, outlines the process, format and scope that should be used to develop biodiversity management plans for indigenous species.

The aim of a Biodiversity Management Plan (BMP) is to to ensure the long-term survival in nature of the species (and any sub-specific taxa) to which the plan relates. They enable the evaluation of conservation progress and management. The BMP also sets out key actions and strategies needed to ensure that monitoring, protection, conservation and sustainable management of the species will contribute to meeting conservation goals and contribute towards meeting the long-term vision for conservation of the species in question. BMP's form part of a dynamic and continuing management planning process and allows for review and monitoring of actions to accommodate changing priorities and emerging issues. However, they are only as good as their implementation which is why it is important to evaluate success of plans against indicators of success and measurable targets identified in the plans, and adapt accordingly.

The purpose of the plan, in terms of NEMBA, is to provide for the responsible person, organization or organ of state responsible to monitor and report on the progress with implementation of the plan; and to be consistent with NEMBA, the National Environmental Management Principles, the National Biodiversity Framework, any relevant international agreement, and any other relevant environmental management plans.

2. BACKGROUND

2.1 Continental and National White Rhino Trends – The importance of South Africa

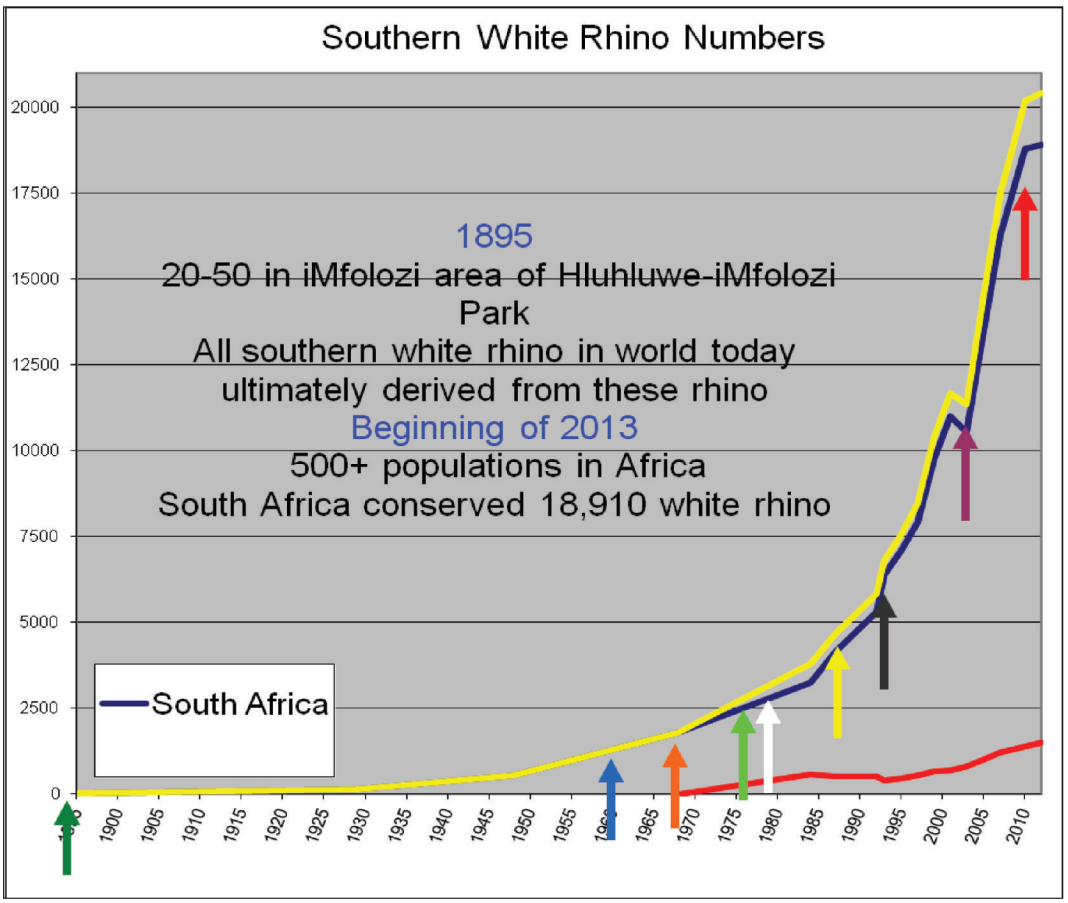

Figure 1. Increase in southern white rhino numbers since 1895 showing key events/milestones and the continental importance of South Africa in conserving over 93% of this species by the beginning of 2012. Total numbers of wild white rhinos in Africa are shown by the yellow line with blue and red lines showing numbers in South Africa and the rest of Africa, respectively. Arrows from left to right show. **1895**: Only 20-50 southern white rhinos left in the iMfolozi area of what is now Hluhluwe-iMfolozi Park. **1961**: In 1960 there still was only one population of southern white rhino in the world. However following the development of translocation techniques, the first translocations started. Translocations to Kruger National Park also started in 1961 and continued over the next 12 years. **1968:** Start of sport hunting of white rhinos. **1977:** Rhinos onto CITES Appendix I. **1980:** Record drought in Hluhluwe-iMfolozi with 446 white rhino translocated in one year **1989**: White rhinos allowed to fetch their economic value on auctions encouraging private sector to primarily buy rhinos to breed them up. **1994:** South African obtains partial down-listing of its white rhino to CITES Appendix II (for live sales to approved and acceptable destinations and export of hunting trophies only). **2004:** Swaziland gets a similar partial down-listing for their white rhino at CITES, and **2008**: Start of major escalation in poaching.

Since 2008 there has been a marked and continued escalation in poaching (Fig. 2). As current poaching levels in 2014 are in the region of two-thirds of net population growth rates, they considered to be fractionally sustainable. However the Kruger National Park (KNP) population may already have reached the tipping point and if year on year increases in poaching rates continue, then very shortly deaths will start to exceed births threatening to reverse the successes achieved. White rhino account for the majority (~95%) of poached animals.

Thus addressing the escalating poaching is the biggest challenge that needs to be addressed for the life of this plan.

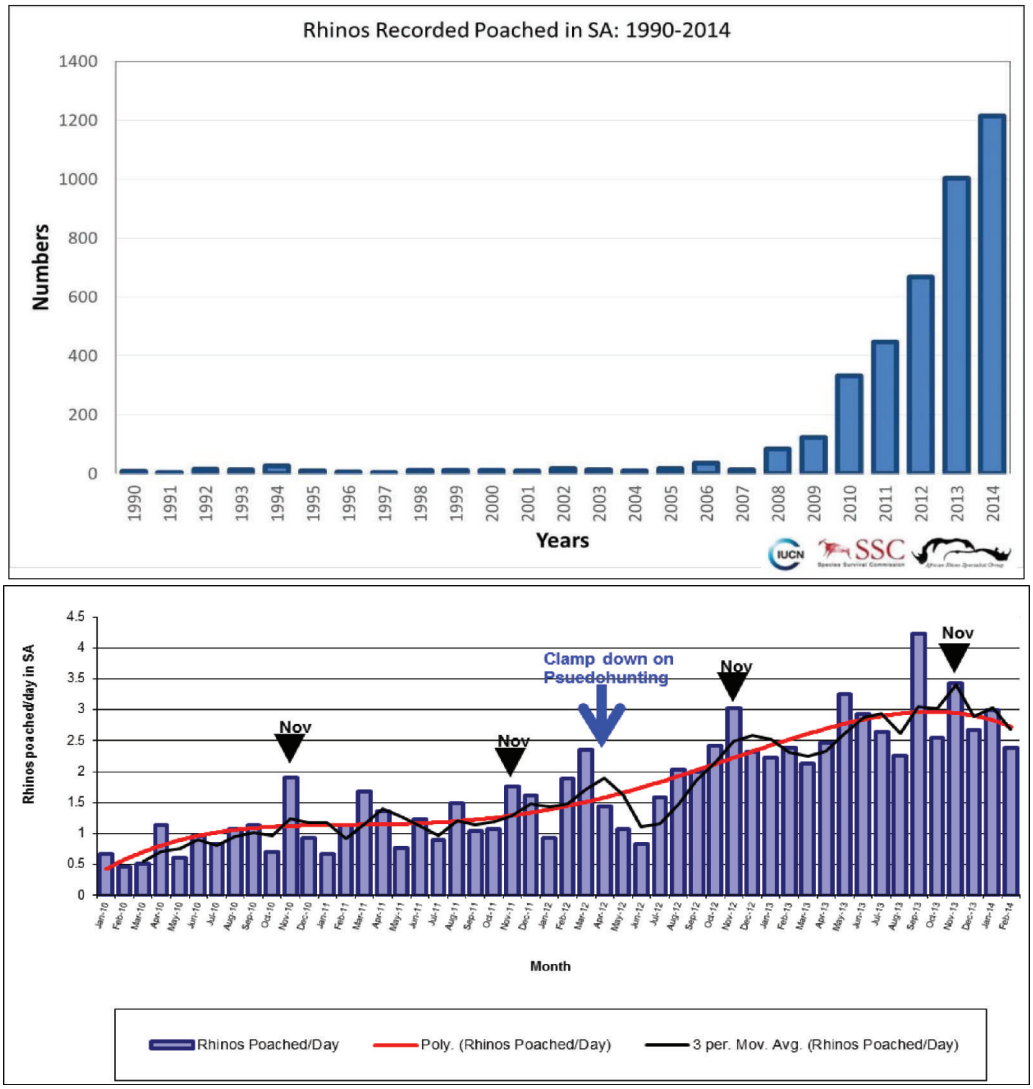

Figure 2. Graphs showing the marked and continued escalation in rhino poaching in South Africa. Top graph shows annual change in poaching since 1990 while the bottom graph illustrates this by month to indicate the variation over time and the smoothed (red line) increase. The graphs show total poaching (both species) of which white rhino account for ~95% of poaching incidents.

2.2 Subspecies/ecotypes in South Africa

2.2.1 Taxonomy

South Africa's SWR *C. s. simum* is the only subspecies for the region. Its NWR (*C. s. cottoni*) cousin was restricted to northern Central Africa (Fig. 3). The latter is extinct in the wild, with a newly introduced group of four (now three) animals from the remaining seven animals held in captivity to a private reserve in Kenya. The historical/natural range of the SWR (following Rookmaaker 2012) was largely restricted to the mesic savannas of South Africa, Botswana, Namibia, Zimbabwe and Mozambique.

Groves *et al.* (2010) argued using a phylogenetic species concept supported by morphological and genetic differences that the NWR should be considered as a separate species *Ceratotherium cottoni*. Following Heller (1913), Rookmaaker (http://www.rhinoresourcecenter.com/species/nile-rhino/) proposed that it should be referred to as the 'Nile rhinoceros'. It was suggested that the two species separated about 1.1 - 1.4 million years ago. However, as there are a number of alternative ways to classify species,

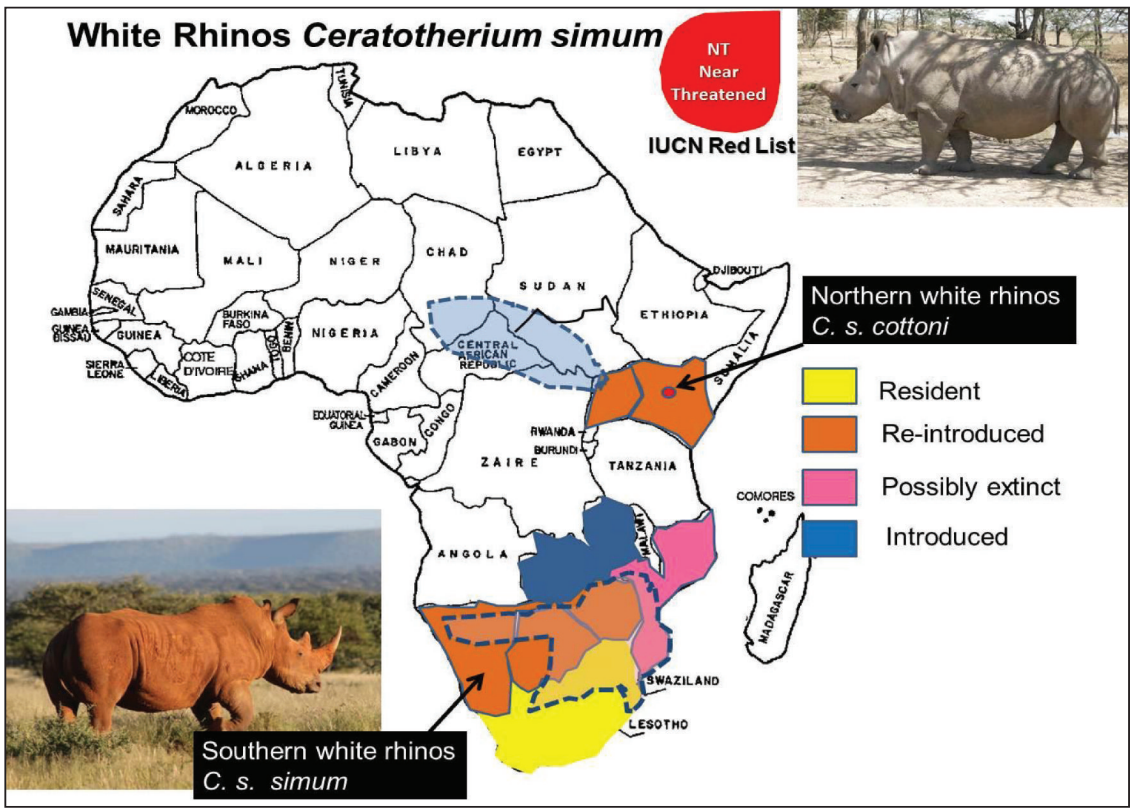

Figure 3. Historical distribution of Southern (SWR) *Ceratotherium simum simum* and Northern (NWR) *C. s. cottoni* white rhinos (following Rookmaaker 2012) and their current distribution (as per country). Their separate historical ranges are indicated by light blue areas surrounded by blue dashed lines. The only original population of white rhinos remained in South Africa from which all other populations have been introduced or re-introduced, there is no universal agreement on this issue. Conservation scientists often prefer to rely upon the biological species and mate recognition concepts that argue that if two separated populations, irrespective of minor morphological differences, recognise each other and mate successfully producing viable offspring that they should be considered the same species. Groves *et al.* (2010) paper is generally not accepted given the small sample sizes used, choice of nuclear and mitochondrial genes studied, and interpretation of the results (Harley *pers comm*; Kingdon & Hoffmann 2013).

2.2.2 Distribution in South Africa

From a single remnant population of 20-50 animals, in what is now the Hluhluwe-iMfolozi Park in KwaZulu-Natal, the SWR is now well distributed in South Africa (Figure 3). This was made possible through the development of translocation techniques in the 1960s. White rhinos have been reintroduced to former range states of Namibia, Botswana, Zimbabwe and Mozambique (Figure. 3). The Mozambiquean population introduced into the transfrontier Limpopo National Park adjoining Kruger National Park is considered to be possibly extinct from recent intense and persistent poaching activities. In the absence of NWR, and the Pleistocene records for white

rhinos east of the Nile River, extralimital (not found within a given geographical area) populations of this subspecies have been introduced in Kenya, and recently in Uganda. Although SWR did not occur north of the Zambezi River, a small population has been introduced in Zambia.

2.2.3 Population trends in South Africa

Figure 1 above shows the rapid population growth of the southern white rhino population. Over the 19 years between 1991-2010 white rhino numbers in South Africa increased on average by a net +7.2% per year. While the levels of poaching at the time of writing were considered sustainable (i.e. net births still considerably exceed deaths), if this trend were to continue at the current year on year rate (~36%), the population may start to decline in the 2015-2017period (depending on underlying growth rates).

2.2.4 Major constraints

The increased levels of poaching that have been experienced since 2008 are cause for major concern. If poaching rates continue to escalate year on year as they have been doing then this could result in numbers starting to decline in just a few years.

The continued rapid increase in numbers and range of white rhino is now contingent upon primarily private land owners and communities making additional land available for rhino conservation (as state reserves that could take white rhino already have them and homes for surplus animals need to be found elsewhere – although northern KNP could be stocked but would be ill-advised under the current poaching crisis). Declining incentives and increased costs and risks are now being linked to an increasing number of owners looking to get rid of their rhinos. Live sale prices declined from 2008-2011 but in recent year's prices appear to have increased again. This may in part be a reflection of speculative buying by some owners hoping that a trade in horn may be approved by CITES in future and lower numbers of white rhinos being sold by one of the biggest suppliers (SANParks) in recent years. These trends threaten and are likely to constrain future growth in rhino numbers and range.

Insufficient human and financial resources are also constraining conservation of white rhino in the field. In particular additional resources are urgently required to help address the escalating poaching that has occurred following an increase in illegal demand for rhino horn in South East Asia and a sharp rise in black market horn prices.

3. CONSERVATION STATUS AND LEGISLATIVE CONTEXT (Relevant International Conventions and South African Legislation)

3.1. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

South Africa is a Party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which is an international agreement between governments, and aims to ensure that international trade in specimens of wild plants and animals does not threaten their survival. With the exception of South Africa's and Swaziland's populations of the SWR, the white rhino is listed in Appendix I of CITES, which requires strict international trade control. South Africa's white rhino population was included in CITES Appendix II in 1994, but only for the international trade in live animals to appropriate and acceptable destinations and for the export of hunting trophies, which hunters must retain as mementoes of their hunts. CITES Resolution Conference 11.20 defines the term appropriate and acceptable destination as a one where the Scientific Authority of the State of import is satisfied that the proposed recipient of a living specimen is suitably equipped to house and care for it. All other specimens of this species are deemed to be included in Annexure I, which means that international trade for commercial purposes is prohibited (the purpose of importation may not be for commercial purposes) in accordance.

To give effect to the provisions of the Convention and to ensure effective implementation thereof in South Africa, the CITES Regulations were published in the *Gazette* for implementation on 5 March 2010. Moreover, the Minister responsible for Environmental Affairs has an obligation in terms of Section 59 of NEMBA to monitor compliance in South Africa with the provisions of CITES, and to consult the Scientific Authority on issues relating to trade involving specimens of, among others, CITES-listed species.

The exportation of live rhinoceros from South Africa requires a permit issued in terms of Chapter 7 of NEMBA, and in compliance with the provisions of both the Threatened or Protected Species (ToPS) Regulations, 2007 and the CITES Regulations, 2010. To ensure that live rhinos are exported to appropriate and acceptable destinations, the Minister of Environmental Affairs and Members of the Executive Council responsible for the conservation of biodiversity in the respective provinces (MINMEC) have approved the following criteria, which have to be met by captive facilities abroad wishing to acquire or keep rhinoceros imported from South Africa:

- The facility where the rhino will be kept must be an institutional member of either the World Association of Zoos and Aquaria (WAZA), or institutional or affiliated members of WAZA e.g. Pan-African Association of Zoos and Aquaria (PAZAAB), or accredited members of regional zoo associations recognized by the CITES Management Authority of the state of import, as a reputable association. These associations must require zoos or captive facilities to:
  - Keep a high standard of husbandry and veterinary care;
  - Maintain animal record systems;
  - Contribute to conservation activities with written conservation action plans for the institution, with specific reference to rhinos;
  - Contribute to relevant scientific studies to improve the conservation status of species, with specific reference to rhinos;
  - Promote education as a key component of the institutions' mission;
  - Have a written policy that outlines the type of research that it conducts, with specific reference to rhino; and

- Develop a risk management plan that identifies and assesses potential risks for injury / harm to specimens kept in facilities and the visiting public and employees.

- Exports for re-introduction purposes will only be approved if the export is to range states of the specific species to be introduced
- Both horns of the rhinoceros to be exported must be micro-chipped and DNA samples must be taken prior to export. The DNA samples must be sent to the Veterinary Genetics Laboratory at Onderstepoort for analysis and DNA banking.

In addition to the adherence of the above-mentioned criteria, the following additional information must also be submitted in terms of section 88(2)(a) of NEMBA in order for the relevant issuing authorities to consider permit applications for the export of live rhino from South Africa:

- A letter from the CITES Management Authority of the importing country to the relevant issuing authority, indicating that the rhino horn will not be used for commercial purposes;
- Written confirmation from the CITES Scientific Authority of the importing country, that the destination is appropriate and acceptable and that the facility is able to house and care for the rhino in accordance with Resolution Conference 11.20;
- Documentary proof that both horns of the rhino to be exported have been micro-chipped and DNA samples taken.

3.2 Convention on Biological Diversity (CBD)

The Convention on Biological Diversity and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their utilisation to the Convention on Biological Diversity of which South Africa is a signatory provides a framework and principles for conservation of biodiversity, sustainable uses and fair and equitable sharing of benefits derive from use of genetic resources.

Furthermore, South Africa has an international responsibility to conserve the southern white rhino found in South Africa. The objectives of the Convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The programmes of work developed under the CBD encourage parties to take a wide range of actions to secure biodiversity conservation and sustainable use.

The Convention also provides for the establishment of a system of protected areas or areas where special measures need to be taken to conserve biodiversity. Parties are required to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species of threatened species in natural surroundings through development and implementation of plans and other management strategies.

3.3 World Heritage Convention

The World Heritage Convention is a Convention concerning the protection of the world's cultural and natural heritage considered of outstanding value to humanity. It provides for the identification, protection and preservation of cultural and natural heritage, including the habitats of threatened species, around the world considered of outstanding value to humanity. Countries submit places for designation under the World Heritage List.

3.4 SADC Protocol on Wildlife Conservation and Law Enforcement

The SADC Protocol on Wildlife Conservation and Law Enforcement provides a clear rationale for ensuring that any national or regional goals for rhino conservation refer to the interdependency between human welfare and sustainable management of wildlife resources, within which the "flagship" role of rhinos is highlighted. Implementation of rhino conservation projects with a development orientation is also in accordance with one of the ten principles that were expressed in the "Agenda for Action" that was drafted at the World Parks Congress in Durban in 2003. Rhinos are particularly appropriate as "flagships" for regional cooperation in resource management because the decline of many of the sub-continent's rhino populations was due to cross-border poaching and illegal trading networks that extended through several countries. Showing a reversal of this trend, through regional cooperation in law-enforcement, sharing of rhino management expertise, and sharing of rhinos through meta-population management, would be a very graphic demonstration of SADC's effectiveness. South Africa as the major white rhino range state has and can continue to play the major role by being the source of founder white rhinos to re-establish the species in the SADC Region.

The draft SADC Law Enforcement and Anti-Poaching Strategy that is embedded in the above SADC protocol emphasises the need for a cooperative and more integrated response to addressing the illegal killing and wildlife trade.

3.5 Lusaka Agreement

Although it is not one of the seven Parties that have formally ratified the Agreement; South Africa is one of three other countries that are signatories to the Lusaka Agreement. The Lusaka Agreement is a treaty between many African nations that seeks to "reduce and ultimately eliminate illegal trade in wild fauna and flora and to establish a permanent Task Force for this purpose." The Lusaka Agreement Task Force (LATF) members, endowed with broad diplomatic immunities, are charged with the task of investigating violations of various national laws and presenting evidence to the appropriate countries. However to date it appears the LATF has had limited impact.

3.6 African Strategy on Combating Illegal Exploitation and Illegal Trade in Wild Fauna and Flora in Africa (Brazzaville Strategy – 30th APRIL 2015)

The overall objective of the strategy (http://unep.org/PDF/Brazzaville_Strategy.pdf) is to prevent and reduce with the view of eliminating the illegal exploitation and illegal trade in wild fauna and flora in Africa through the domestication and implementation of an Africa wide strategic framework. It has been formulated to guide a common, coordinated response by countries in Africa to combat the illegal exploitation and illegal trade in wild fauna and flora.

3.7 Kasane Declaration

The 2015 intergovernmental Kasane declaration (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/417231/kasane-statement-150325.pdf) built upon the earlier London Declaration calling for joint cooperative efforts to eradicate the market for illegal wildlife products, ensure effective legal frameworks and deterrents, strengthening of law enforcement, and ensuring sustainable livelihoods and economic development.

3.8 Relevant South African Legislation

3.8.1 National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003) (NEMPAA)

NEMPAA provides for the protection and conservation of ecologically viable areas representative of South Africa's biodiversity and natural landscapes and seascapes in protected areas. Protected areas in South Africa offer a viable tool for habitat protection and the protection and maintenance of ecologically viable numbers of the white rhino and their associated species and habitats.

3.8.2 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) – (NEMBA)

NEMBA gives effect to the constitutional commitment to take reasonable legislative measures that promote conservation by providing for the management and conservation of biological diversity and the sustainable use of indigenous biological resources. Chapter 3 provides for the planning and monitoring of biodiversity. Sections 43 (1)(b) and (c) provide for any person, organisation or organ of state, desiring to contribute to biodiversity management, to submit to the Minister for approval a draft biodiversity management plan (BMP) for an indigenous or migratory species warranting special conservation attention. Section 44 empowers the Minister to enter into an agreement with any person, organisation or organ of state for the implementation of a BMP.

In relation to the regulation of restricted activities involving white rhino, NEMBA further empowers the Minister in terms of:

- Section 56, to publish, by notice in the Gazette, a list of critically endangered species, endangered species, vulnerable species or protected species;
- Section 57, to:
  - regulate the carrying out of restricted activities involving a listed threatened or protected species or a CITES-listed species by means of a permit,
  - prohibit the carrying out of a restricted activity involving a listed threatened or protected species, if such activity has a negative impact on the survival of the species, or
  - exempt a person from the requirement of a permit in relation to a listed threatened or protected species or a CITES-listed species.

The white rhino is listed as a Protected species in terms of section 56(1) of NEMBA.

NEMBA further enables the issuing authority in terms of section 88(2)(e) to defer a decision to issue a permit, in terms of section 92(a) to refuse a permit, in terms of section 93 to cancel a permit, or in terms of section 93B to suspend a permit, in certain circumstances.

The ToPS Regulations, the National Norms and Standards for the marking of rhinoceros and rhinoceros horn and the hunting of rhinoceros for trophy hunting purposes and the CITES Regulations are legislative tools promulgated in terms of NEMBA that regulate restricted activities involving white rhino, particularly including the hunting of white rhinos and the legal export of the hunting trophies.

The current penalty upon conviction of an offence in terms of NEMBA, involving white rhino, is:

- A fine, not exceeding R10 million, or a fine equal to three times the commercial value of the specimen or restricted activity involved, whichever is the greater;
- Imprisonment, not exceeding 10 years, or
- Both such fine and imprisonment.

3.8.2.1 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Regulations, 2010

CITES was drafted as a result of a resolution adopted in 1963 at a meeting of members of the IUCN and formally implemented in 1975. CITES is a voluntary international agreement and is legally binding on the Parties which provide a framework which is then translated into relevant domestic legislation to ensure that it is implemented at the national level. It is an international agreement between governments aimed at ensuring that international trade in specimens of wild animals and plants does not threaten their survival. Species are categorized into two main groupings based on how endangered they are as a species. Species listed in Appendix I are those threatened by extinction and trade in these is not allowed unless there are extraordinary circumstances; those listed in Appendix II are not necessarily threatened by extinction but there needs to be some control to ensure this does not happen.

CITES works by regulating international trade listed in the Appendices of CITES. For these species, import, export, re-export and introduction from the sea is regulated through a permitting system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that permitting system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species.

White rhino are categorised as threatened and are also listed in Appendix I; and have an annotated partial down-listing for live sales to appropriate and acceptable destinations and for the export of hunting trophies. No trade in loose horn or any other specimens of rhino, for commercial purposes, is currently allowed.

3.8.2.2 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004): Threatened or Protected Species (ToPS) Regulations, 2007

The Threatened or Protected Species (ToPS) Regulations under NEMBA came into force on 1 June 2007 and provide for the protection of species that are threatened or in need of protection to ensure their survival in the wild. A permit is required in order for a person to carry out a restricted activity concerning rhino. These restricted activities include hunting, capturing, killing, cutting parts off, importing or exporting into or from South Africa, having in possession of exercising physical control over any rhino; breeding, translocating, moving, selling, donating or accepting any rhino or any of its products or derivatives as a gift.

It is compulsory in terms of the ToPS Regulations for the owner of a sanctuary, breeding facility, commercial exhibition facility, or for a wildlife trader to register his/ her facility. However, the registration does not authorize the carrying out of any restricted activity; the afore-mentioned persons thus still need to obtain the relevant permit issued in terms of Chapter 7 of NEMBA. White rhino may not be transported to a protected area (proclaimed as such in terms of NEMPAA) if the protected area falls outside its natural distribution range. This prohibition is not applicable to an extensive wildlife system that has NOT been declared as a protected area.

The ToPS Regulations prohibit the hunting of white rhino in the following manners/ circumstances:

- Put and take hunting of captive-bred white rhino;
- In a controlled environment;
- If the rhino is under the influence of a tranquilizing, narcotic, immobilizing or similar agent;
- By means of a bow and arrow;
- By means of darting;
- By means of poison, traps, snares, flood- or spot lights or darting;

- With an automatic weapon, a weapon discharging a rimfiring cartridge of .22 of an inch or smaller, a shotgun or an air gun;
- By luring it by means of bait, smell, sound or any other luring method;
- Motorized vehicles, except for the tracking of the white rhino if the hunt takes place over long ranges, for allowing a physically disabled person to hunt;
- Aircraft, except for the tracking of the white rhino if the hunt takes place over long ranges; or
- Dogs, except if the dogs are used to track a wounded white rhino, or for the purpose of pointing, flushing and retrieving a li white rhino.

White rhino may not be transported to a protected area (proclaimed as such in terms of NEMPAA) if the protected area falls outside its natural distribution range. This prohibition is not applicable to an extensive wildlife system that has NOT been declared as a protected area.

Although the ToPS Regulations prohibit the hunting of white rhino by means of darting it by the hunter, it does not prohibit the darting of white rhino by a veterinarian or other person authorised by the South African Veterinary Council for management purposes, disease control procedures or scientific research, veterinary treatment, or for translocation. The marking of rhino horns by means of a microchip is compulsory in terms of the ToPS Regulations.

3.8.2.3 Norms and Standards for the marking of rhinoceros and rhinoceros horn and for the hunting of rhinoceros for trophy hunting purposes

The Norms and Standards for the marking of rhinoceros horn and the hunting of white rhinoceros for trophy hunting purposes were published in the *Gazette*, No. 32426, for implementation on 20 July 2009. These norms and standards were amended in 2011, and the revised Norms and Standards for the marking of rhinoceros and rhinoceros horn and the hunting of rhinoceros for trophy hunting purposes were published in the *Gazette* for implementation, Notice No. 35248, on 10 April 2012.

Although the marking of rhino horns by means of a microchip is compulsory in terms of the ToPS Regulations, the norms and standards further require that:

- all live rhinos sold and transported after the commencement of the amendments, be microchipped;
- in addition to the microchip, all detached rhino horns 5 cm or more in length be marked by means of punch die or indelible ink by an official of the issuing authority, using the formula ZA/ serial number/ year/ weight;
- DNA samples of live rhinos darted for translocation, treatment or other management purposes, and of detached horns, be collected and dispatched to the Veterinary Genetics Laboratory of the Faculty of Veterinary Science of the University of Pretoria, for analysis for the purpose of DNA profiling.

The norms and standards further provide an extensive procedure for the management of rhino hunts, and require that all rhino hunts must take place in the presence of an official of the issuing authority who is authorised in terms of provincial legislation to conduct compliance inspections, but preferably an environmental management inspector from the province concerned.

3.8.2.4 The Bioprospecting, Access and Benefit Sharing (BABS) Regulations of 2008

The Bioprospecting, Access and Benefit Sharing (BABS) Regulations of 2008 fall under NEMBA. The BABS Regulations promote conservation of indigenous biological resources and sustainable utilization of its

components whilst ensuring fair and equitable sharing of benefits derived from their commercialization in the neutraceutical, pharmaceutical, cosmeceutical, agricultural and other relevant industrial sectors. The use of South Africa's indigenous biological resources and/or associated traditional knowledge for bioprospecting purposes as well as export from the Republic of South Africa of any indigenous biological resources for purposes of bioprospecting or any other research is regulated in terms of Chapter 6 of NEMBA and the associated Bio-prospecting, Access and Benefit Sharing (BABS) Regulations, 2008. Hence the use of rhino horn for Bioprospecting purposes will fall under the regulatory scope of BABS Regulations.

Bioprospecting is defined in terms of NEMBA as "any research on, development or application of indigenous biological resources for commercial or industrial exploitation, and includes: systematic search, collection or gathering of such resources or making extractions from indigenous biological resources; utilization for purposes of any information regarding traditional uses of indigenous biological resources by indigenous communities; research on, application of , development or modification of any such traditional uses of the indigenous biological resources; or the trading in and exporting of indigenous biological resources in order to develop and produce products, such as drugs, industrial enzymes, food flavours, fragrances, cosmetics, emulsifiers, oleoresins, colours, extracts and essential oils.

Bioprospecting comprises of two phases, namely: Discovery phase which is the systematic scientific research process in search of valuable chemical and genetic constituents of biological resource where the nature and extent of any actual or potential commercial or industrial exploitation is not sufficiently clear or known to begin the process of commercialisation; and Commercialisation phase which describes research, development or application of indigenous biological resources where the nature and extent of any actual or potential commercial or industrial exploitation is sufficiently established to begin the process of commercialisation.

Commercialisation in relation to indigenous biological resources, includes the following activities:
(a) the filing of any complete intellectual property application, whether in South Africa or elsewhere;
(b) obtaining or transferring any intellectual property rights or other rights;
(c) commencing product development, including the conducting of market research and seeking pre-market approval for the sale of resulting products; or
(d) the multiplication of indigenous biological resources through cultivation, propagation, cloning or other means to develop and produce products, such as drugs, industrial enzymes, food flavours, fragrances, cosmetics, emulsifiers, oleoresins, colours and extracts; and
(e) trading in and exporting of indigenous biological resources to develop and produce products such as drugs, industrial enzymes, food flavours, fragrances, cosmetics, emulsifiers, oleoresins, colours and extracts;"

3.8.2.5 Domestic Moratorium on Horn Sales

Currently a national moratorium, issued in terms of NEMBA (*Gazette* No.31899, Notice No. 148, 13 February 2009) prohibits the trade (which includes selling or donation) of rhinoceros horn, or any product or derivative thereof within South Africa, until further Notice. The Minister may uplift the moratorium if the factors that have caused the moratorium to be implemented in the first place, cease to exist. A recent report that assessed the viability of up-lifting the moratorium (Taylor *et al.* 2014) recommended not doing so at this stage. However, it is argued that the national sale of horns, if controlled properly, would largely negate the illegal sale of horns, as well as lead to a greater declaration of the amount of horn being held in private hands (DEA 2013).

3.8.3 Provincial and other legislative provisions

Apart from the National Environmental Management Act No. 107 of 1998 (NEMA) and some of its related Specific Environmental Management Acts, the nine provincial conservation acts/ ordinances are the major regulatory instruments for the regulation of wild plant and animal species in South Africa.

In extreme cases the prohibition of activities involving wildlife may be instituted at provincial level by means of a moratorium, if such a prohibition is required on provincial level only, and provided that the provincial legislation adequately provides for the MEC to prohibit such activity. Other Acts such as the Animals Protection Act (Act No. 71 of 1962) which regulates animal welfare in South Africa is also applicable to wildlife. The Animal Health Act, Animals Diseases Act (Act No. 35 of 1984), Medicines and Related Control Substances Act (Act 90 of 1997) and the Animal Matters Amendment Act (Act No. 42 of 1993) which falls under the jurisdiction of the Department of Agriculture, Forestry and Fisheries may also be relevant to white rhino conservation as it plays a significant role in veterinary care of animals.

4 PLAN STRUCTURE

The South African white rhino Biodiversity Management Plan has a logical structure with a 5 year time horizon with targets and is schematically illustrated in Figure 4. The plan has a long term vision and a shorter term conservation goal covering the time period of this plan. By achieving the short term goal progress will be made towards realising the longer term vision. The plan identifies a number of Key Components with associated objectives that have all been deemed key to achieving the plan's goal. The diagram also shows that a series of Actions/Strategies are required to achieve each Key Component objective; and that progress towards meeting Key Component objectives can be assessed using associated indicators of success.

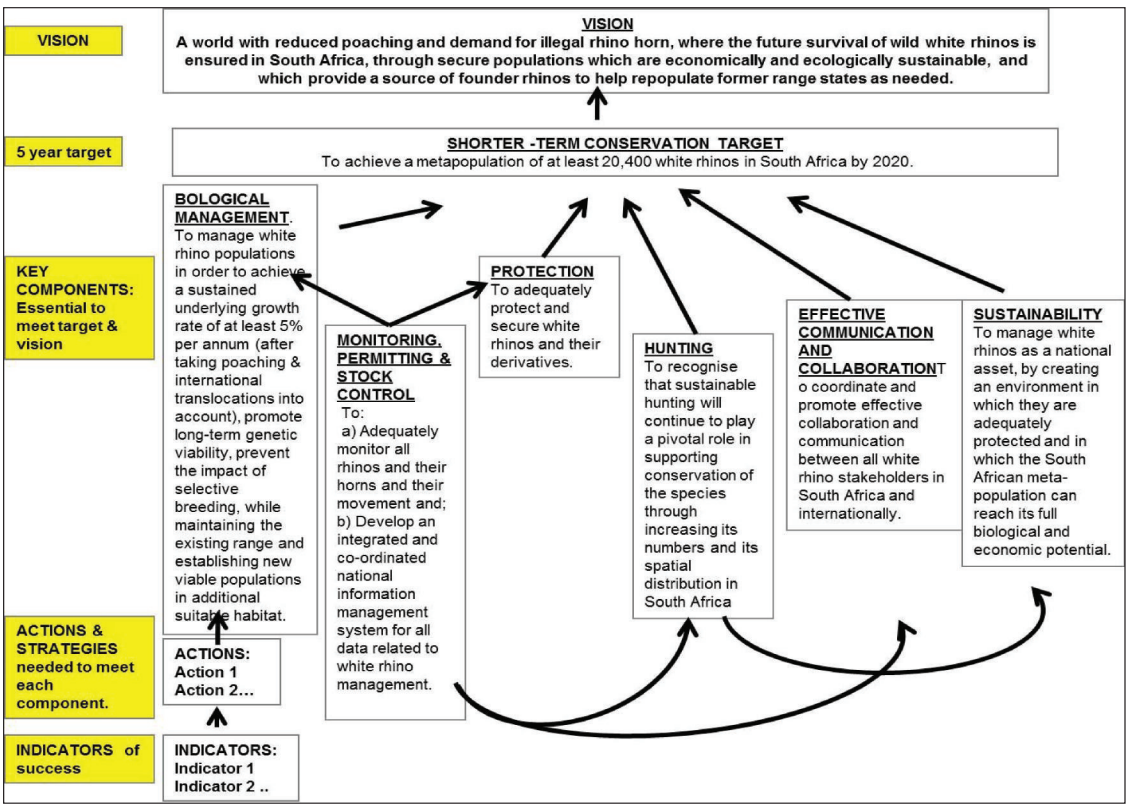

Figure 4. The South African white rhino Biodiversity Management Plan structure at a glance. See Key Component sections for a list of recommended actions and indicators. Arrows indicate direction of relationships.

After listing the longer-term vision and shorter-term goal the main body of the plan follows. This section lists each key component together with its associated objective and rationale. Strategies/actions to achieve that specific objective and indicators of success are then listed. (For additional detail readers should consult listed sources/references where more information can be found or attached Appendices).

4.1 VISION AND SHORT -TERM TARGET

With the year on year escalation in poaching from 2007-2014 and increasing numbers of private sector owners either selling their rhino, moving them to other countries or considering getting rid of them (sometimes referred to as unbundling), there has been a change in standard targets and goals of achieving a 5% net minimum growth to simply reducing the impact of poaching on the number and range of rhinos in South Africa. Although the South African white rhino population continues to grow, albeit slowly, with some critically important populations such as

that in KNP possibly having exceeded the tipping-point (between annual growth and poaching induced mortality), it remains imperative to keep the population as vibrant as possible, providing the necessary buffer to poaching. In this current climate where births only marginally exceed deaths from natural mortality, hunting and poaching, every endeavour should be made to keep the underlying population growth as high as possible. None-the-less, it does pose important questions as to how many rhinos can South Africa support and how many is enough. The former relates to an ecological & socio-economic capacity while the latter refers to demographic requirements associated with managing a small population.

With regard to how many white rhinos can South Africa provide for,, this question is inherently difficult to answer as it is largely determined by the economic incentives to conserve rhinos on private and communal lands and the state making more land available. Facilitating the occupation of white rhino into the largely vacant northern half of KNP may support another 5,000 white rhino, on top of at least another Key 1 (>100 rhino) population on state land would provide the greatest growth prospects. This would suggest the state could possibly support a total of about 19,000 on state land. However, under the current poaching threat translocating a large number of rhinos to the northern half of Kruger National Park would not be wise, though rhinos are being translocated to other safer areas in other range state, mainly through private initiatives - at this stage.

By contrast, expansion of the rhinos in the private/communal environment is largely dependent upon economic incentives and socio-political issues associated with land. Assuming the current ~5,000 in private/communal hands could be increased by a further third, would take the total South African white rhino population ceiling to about 25,600 animals (36% increase on the current population). This is marginally less than the predicted 27,750 animals under a 5% annual growth rate[1]. Excluding the northern Kruger option and current poaching crisis may realistically see the national population grow to a maximum of about 20,600 (or 9.2% increase on the current population). At the current 2% annual rate of increase, it would take until about 2019 to reach such a target, just outside the proposed time frame of this plan. Setting a population target of about 20,400 by 2018 may be achievable.

With reference to the question of how many is enough, the current 18,800 white rhino and target of about 20,400 provides an effective population size of about 6,500. Flather *et al.(*2011) suggests that one needs thousands, not hundreds, to reduce the probability of stochastic extinctions to acceptably low values. Having grown from a small founder population size of 20-50 animals largely from a single locality raises the important issue of the population's genetic diversity. Coutts (2009) found the genetic diversity of the white rhinoceros to be lower than that seen in any other rhinoceros species and that seeded populations did not have reduced levels of heterozygosity relative to the source population. Furthermore, Coutts (2009) noted that the SWR population apparently had gone through a genetic bottleneck prior to the 19th century extirpation and recommended that population recovery should focus on establishing larger populations (>100 individuals) to reduce further genetic attrition through genetic drift.

With the wildlife industry covering ~205,000 km^2 and generating about R4.3 billion in 2007 (K du Toit, *pers comm*) it plays a pivotal role in the conservation of wildlife in South Africa. The ~5,000 white rhinos on private and communal hands are carried on about 10% of these lands and along with other rare species they are said to generate about 50% of revenue from live sales. White rhinos thus play an integral part of the wildlife industry as an umbrella species and revenue generator.

Thus, mindful of the above points and South Africa's role in the conservation of this Near Threatened (IUCN Red List) white rhino *C. simum,* and their potential role in the wildlife economy of South Africa, the vision for country's white rhino:

4.1.1 Vision

A world with reduced poaching and demand for illegal rhino horn, where the future survival of wild white rhinos is ensured in South Africa, through secure populations which are economically and ecologically sustainable, and which provide a source of founder rhinos to help repopulate former range states as needed.

4.1.2 Short-term (5 years) conservation target

Given the current escalating poaching the realistic goal would be

To achieve a meta-population of at least 20,400 white rhinos in South Africa by 2020 [1,2,3,4]

1. Under normal conditions in the absence escalating poaching levels, the short-term goal would have been to achieve a minimum population growth rate of 5% over the next 5 years, with at least 27,750 white rhino by the end of 2020. But at an estimate 2% annual growth after poaching the population is expected to reach about 20,400 by plan end.
2. This growth rate reflects the underlying growth rate of the meta-population – i.e. is independent of any increases or decreases in numbers due to export or import of rhino out or into the country.
3. Progress against the population target should be assessed regularly and not just at the end of the plan lifespan and annual targets should be adjusted to reflect international translocations in or out of the country and any revisions and improvements in baseline population estimates at the start of the plan period.
4. It is useful to understand that the limiting factor in reaching this target of 20,400 is not biological management alone (although it plays a role) but the reduction in poaching induced mortalities.

5 KEY COMPONENTS

5.1 PROTECTION

5.1.1 Objective

To adequately protect and secure white rhinos and their derivatives.

5.1.2 Rationale

In order to achieve the Protection objective the following strategy outcomes require implementation in accordance with the National Strategy for the Safety and Security of Rhinoceros Populations (NSSSRP). The main aim is to contribute towards population stabilization and/or increase by reducing the illegal killing of rhinos. Law enforcement on the ground can also contribute to international efforts to reduce the illegal supply of rhino parts and their derivatives to end user markets. The implementation of effective legislation, integrated and proactive law enforcement including improved investigation techniques, cooperative proactive intelligence management and effective prosecutions together should contribute towards meeting this objective.

5.1.2.1 Short-term interventions

Implementing an immediate action plan aimed at mitigating the current threat to the white rhino population posed by the escalation in poaching and the illegal trade in rhino horns and its associated by-products;

5.1.2.2 Long-term interventions

Securing the shared commitment of government (at the national and provincial level), private land owners', local communities and international stakeholders, as well as the necessary financial and manpower resources and political will to implement this policy;

Supporting the established national coordination structure for information management, law-enforcement response, investigation and prosecution;

Developing an integrated and coordinated national information management system for all information related to rhino species in order to adequately inform security related decisions;

The following constraints to achieving the objective are identified as:

- Lack of human capacity (numbers and skills),resources and funding;
- The level of poaching and its increasing rate as a result of the increase in the illegal demand for horn;
- Lack of national coordination and the fragmentation of effort;
- Lack of understanding, prioritisation; sense of apathy from both state and private sector;
- Lack of legal & political cooperation across local frontiers and internationally.
- Increasing corruption with increasing value of horn, and;
- Ineffective intelligence operations (including lack of sharing of information and inadequate analysis of data).
- A need for a greater focus higher up the criminal pyramid (which is likely to require international cooperation).
- Increasing human population sizes and disposable incomes in major user countries indicating all else being equal demand will increase year on year.

5.1.3 Activities, Indicators, Responsibilities & Threats/Comments

1. Field law enforcement			
Activity	**Responsibility**	**Indicators of success**	**Threats to deliver &/or comments**
• Undertake regular risk and threat assessments.	NWCRU; National and Provincial conservation authorities, Regional Managers; Ranch/Farm Managers	Functional and coordinated NWCRU risk assessments completed.	Fragmented communication. Outcome & recommendations not acted upon.
• Secure reserves/private game farms with adequate deployment of suitably equipped, trained, and effectively deployed law enforcement staff	Regional Managers; Provincial conservation authorities; Park/reserve/Ranch/Farm Managers	Staff levels: In smaller reserves at the very least of one field ranger per 10 km^2, while in large reserves minimum ranger numbers should be equal to or exceed the square root of reserve area (in km^2) e.g. a 500 km^2 reserve should have >22 rangers. Reduced poaching activities. Improved detection rate	Lack of funds. Political support. Senior management that in some cases do not appear to appreciate the need to get the law enforcement basics right first before progressing to hi-tech solutions. Basic conditions of employment act limiting time in the field by rangers.
• Train and motivate staff effectively in anti-poaching procedures	Regional Managers; Park/reserve/Ranch/Farm Managers	Training plan in place. Performance records. Improved detection rate of poachers & carcasses.	Lack of funds. Labour laws Lack of leadership. Law enforcement sometimes not being given a high enough

			priority. In some cases inadequate selection criteria such as favouring academic paper qualifications rather than bush experience and willingness to work in the field. In some cases lack of an adequate and tough screening process to weed out unsuitable candidates for field ranger jobs.
• Secure funding for ongoing ground surveillance and all law enforcement.	Conservation authorities (HOD, CEO, GM, Directors), DEA, Private Sector, Civil Society	Funds match needs analysis	Lack of funds (economic down turn).
• Equip staff adequately.	Regional Managers; Park/reserve/Ranch/Farm Managers	Equipment list matches needs analysis	Lack of funds. Poor asset control. Lack of adequate leadership in some reserves.
• Ensure appropriate boundary fencing, maintenance & checking done in accordance with fencing plan (where fences exist and or required).	Regional Managers; Park/reserve/Ranch/Farm Managers	Fencing SOPs in place. Reduced breaches of fence.	Lack of funds. Inadequate leadership.
• Ensure adequate communications for coordination of patrols and reaction to incursions.	Regional Managers; Park/reserve/Ranch/Farm Managers	Improved detection rate of poachers. No conflicts with friendly forces.	Poor training. Poor communication. Infrastructure needs. Inadequate investment.
2. Coordination & implementation of investigations & prosecutions of illegal activities			
Activity	**Responsibility**	**Indicators of success**	**Threats to deliver &/or comments**
• Immediate implementation of National Strategy & Security Plan for Rhinos Action Plan;	Conservation authorities (HOD, CEO, GM, Directors), DEA, Private Sector, law enforcement authorities (NPA, SANDF, SAPS, Customs & Excise, Asset Forfeiture)	Provincial action plans supporting National plan in place & accepted.	Insufficient political will/commitment. Lack of resources. Fragmentation of conservation & law enforcement authorities.

• Identify stakeholders and secure a shared commitment;	Conservation authorities (HOD, CEO, GM, Directors), DEA, Private Sector, law enforcement authorities (NPA, SANDF, SAPS, NPA, SARS, Customs & Excise)	National Rhino Coordinating Committee (NRCC) and Provincial rhino security forums in place & functioning.	Apathy from State authorities and general stakeholders.
• Address financial and manpower resources and political will to implement;	Conservation authorities (HOD, CEO, GM), DEA, law enforcement authorities (NPA, SANDF, SAPS, Customs & Excise), Private Sector	Sufficient budget and resources from State and Private Sector in place.	Poorly performing economy. Lack of political will. NB. Can be self-driven by State and Private Sector. Basic Conditions of Employment Act.
• Establishment of a national coordination structure for information management, law-enforcement response, investigation and prosecution.	DEA, NPA, SAPS, SANParks, SANDF, Provincial conservation authorities.	National Coordination structures in place and functioning and approved by all provinces.	Lack of buy-in from national/Provincial Departments. Poor support for a national integrated system Not enough quality wildlife investigators employed.
• Conduct joint operations, law-enforcement actions.	DEA, NPA, SAPS, SANDF, Provincial conservation authorities, SANParks, private sector.	Arrests made. Successful convictions	Feedback of information. Resources. Communication. Lack of transparency and trust. Lack of political will. The Government Department that stopped cross border operations in Mozambique. Need for authority for rangers to act in Mozambique with indemnity.
• Promote co-operation, sharing and a common understanding of best practices and minimum standards across the spectrum of organisations conserving rhinos	Regional Managers; Investigating Officers, Ranch/Farm Managers/Study Group Leaders	Standard Operation Procedures (SOPs) in place; Rhino Joints/Forums operational; Rhino Security Nodes operational; Manuals available	Lack of cooperation from some provinces. Division between SANParks/Kruger and rest of country.
• Obtain high-level political commitment and mandate;	Conservation authorities (HOD, CEO, GM, Directors), DEA, SAPS. Private	Increased budgets; Greater cooperation across law	Insufficient political and black ownership in wildlife/rhino industry. Corruption.

	Sector and respective Associations, National Prosecuting Authority	enforcement authorities, New policies; MOUs in place; Altered legislation, Bail refused automatically.	Lack of understanding of the economic value of wildlife as an industry and the job creating and rural empowerment potential of conservation. Senior management in some cases without appropriate skills or experience and as a result may fail to understand the critical importance of getting the basics right (especially active law enforcement and investigations/intelligence gathering). Rhino poaching not seen as a priority crime.
• Lobby and secure additional financial resources, through private sector donors and/or grants;	Conservation authorities (HOD, CEO, GM, Directors), DEA, Private Sector and respective Associations	Guidelines in place. Adequate funds in place.	Lack of suitable mechanism to channel and prioritise acquired funds. Lack of guidelines. Difficulty of or constraints preventing appropriately spending of donor money on most effective and cheapest (e.g. if procurement requires using an inefficient, sub-standard and expensive service provider over other better cheaper suppliers or due to inappropriate staff selection and hiring procedures).
• Establishment of a permanent National Wildlife Crime Reaction Unit (NWCRU);	DEA, NPA, Justice Dept, Customs, SARS, SAPS, Private sector.	National Wildlife Crime Reaction Unit in operation. Implementation plan in place; Secondment of specialised investigators, prosecutors & magistrates. Increased arrests & successful convictions.	Political will, Support from Provinces. Support across Departments. Need for all players to be considered as equal irrespective of agency if contributing and fully participating.
• Engage with and support regional & international initiatives to secure arrests and prosecutions of illegal rhino horn traffickers	CITES, DEA, NWCRU, Dept. Foreign Affairs, INTERPOL, SADC Rhino & Elephant Security Group/Interpol Environmental Crime Working Group	MOUs in place; Aligned legislation; Increased international arrests. Reduced incidents in trafficking of horn.	Lack of international support. Not recognized as priority crime. Need for greater intelligence focus outside reserves and country – i.e. greater focus on whole criminal pyramid and not just level 1s and 2s on the ground.

• Crime Scene Management	Regional Managers; Investigating Officers, Ranch/Farm Managers/Study Group Leaders	Intelligence Networks in place & operational. Fewer cases lost on technical grounds. Increased proportion of successful convictions. Number of Scene of Crime courses held and number of attendees pass.	Lack of funds. Lack of support from SAPS & NPA. NPA need involvement. Very good and internationally recognized courses available but need for more courses.
3. **Collation & analyses of crime intelligence data**			
Activity	**Responsibility**	**Indicators of success**	**Threats to deliver &/or comments**
• Developing a functional, integrated and coordinated national information management system and database that is an easy to use, trusted source with links to relevant international crime databases.	DEA, NPA, SAPS, SANParks, SANDF, Provincial conservation authorities, private sector.	Database (inclusive of CITES permits) in place & functional. Increase in rate of arrests & convictions. Reduction in pseudo-hunts. Increased compliance. Increased use of international intelligence information in arrests/conviction	Poor communication/feedback. Lack of support from provincial authorities. Non provision of data. Lack of data dissemination to management level. Need private sector input e.g. SADC RMG Some provincial authorities in the past feel as if they have been treated as second class citizens. Need to share information more widely including with key people in other major range states.
• Analyse the consolidated and internationally linked crime-intelligence databases using best available software to facilitate arrests & prosecutions locally & internationally and target strategic individuals in transnational organised criminal networks	DEA, NPA, SAPS, SANParks, SANDF, Provincial conservation authorities, private sector, SARS, Customs & Excise, NGOs.	Key international arrests Reduced effectiveness of criminal syndicates	Lack of trust. Lack of legal support. Unwilling to share information. Poor intelligence data & networks. Corruption. GEF 5 funded forensic & intelligence database cooperation study should assist
• Develop and maintain an intelligence gathering network and an informer management system focused on providing actionable intelligence	DEA, SANParks, Provincial conservation authorities, SAPS, private sector. RESG/Interpol ECWG, TRAFFIC, Interpol and Pathfinder and TRAccc.	A national information system and database in place & functional. Insights gained from analysis of data that were not previously known/apparent.	Lack of trust. Lack of legal support. Unwilling to share information. Poor intelligence networks.

		Proportion of rhino poaching cases where convictions are obtained as direct result of actionable intelligence. Budgets for informer networks	
4. **Co-operative security relations with neighbours**			
Activity	**Responsibility**	**Indicators of success**	**Threats to deliver &/or comments**
• Implement common community-based security and policing initiatives;	Conservation authorities (HOD, CEO, GM, Directors), Provincial conservation authorities HOD, CEO, GM, Directors, Private Sector	Joint operations; Security nodes; Increased arrests;	Lack of communication.
• Investigate & implement viable alternative economic opportunities, especially in communities adjacent to critical rhino populations currently without good employment opportunities	Conservation authorities; Department of Trade & Industry; Department of Social Welfare; DEA; International relations office	Feasibility studies of potential economic activities Implementation of viable options with jobs created Reduction in local poaching	Lack of community support. Organised crime. Lack of resources. Inadequate incentives. Constraints to empowerment posed by lack of legal horn trade.

5.2 MONITORING, PERMITTING & STOCK CONTROL

5.2.1 Objective

To:
a) Adequately monitor all rhinos and their horns and their movement and;
b) Develop an integrated and co-ordinated national information management system for all data related to white rhino management.

5.2.2 Rationale

To provide an inventory system as a basis for informed security and biological management decision making.

Monitoring of rhinos and their derivatives (horns stocks) is an essential auditing tool in good conservation management practice. The 'auditing' procedure is important in that it allows the conservation agency/owners to track rhino numbers, their distribution, performance, and their security (inclusive of horn stocks). This remains an essential and justifiable expense in the face of rampant rhino poaching driven by escalating illegal black market prices for horn. It provides one with the means of assessing the effectiveness of anti-poaching activities and security systems. South Africa continues to be heavily criticized at the International level for its continued failure to have an integrated national database system and better handle on numbers and distribution of white rhinos and horn stocks.

Without monitoring annual population estimates, demographics, performance, mortality patterns, animal behaviour and translocations, one is not able to adaptively manage rhino populations for maximum meta-population growth – critical in providing an important buffer to poaching. Sharing this information at the national and regional level is important in assessing the: delivery on rhino population targets; reasons for variation in population performance; and lessons learnt. The method of monitoring rhinos is determined by the size of the population, size of area, habitat, resources (human & capital) and objectives for the protected area in question (du Toit. 2006). These can range from detailed individual identification tracking through to population estimation techniques from ground and/or aerial based platforms.

Critical to monitoring is the database management, storage and analysis of the data to make informed meaningful decisions/recommendations. This can relate to population status, distribution, performance, and security at the site and national levels. In the case of South Africa with rhinos distributed on state, private and communal lands, but regulated at the Provincial level, it remains important to consolidate this important information at the national level to enhance decision making. This relates to the need for a national, electronic permitting system for all restricted activities associated with ToPS permit management.

At the current escalating illegal price for rhino horn, it remains a very valuable resource that need be adequately secured. Rhino horn can originate from a number of sources, namely natural mortality, planned dehorning, seizures of illegal horn, break-offs through fighting and/or translocation, and trophy hunting. Control of the horn from these sources to the strong rooms need to have a well-managed document trail (weights, dimensions, marking, transponder insertion, and DNA sampling) following national procedures that are in line with international guidelines (Milledge 2005). Managing and securing these rhino horns stocks remains essential to prevent such horn entering the illegal market. In compliance with CITES Resolution Conf.9.14 (Rev.) all parties need to provide details of horn stocks to the CITES Secretariat prior to every Conference of the Parties to CITES.

5.2.3 Activities, Indicators, Responsibilities & Threats/Comments

1. Central database & permitting process			
Activity	**Responsibility**	**Indicators of success**	**Threats to deliver &/or comments**
• Develop and implement a secure national centralised web-based electronic permitting system to issue permits for the regulation of all restricted activities*	DEA	Electronically issued permits.	Financial constraints. *(as defined in Section 1 of the Biodiversity Act 10 of 2004 and includes possession of live rhino / rhino horn, capture, transport, sale, export/import, darting, release, hunting, dehorning). Provincial parochialism and an unwillingness to give up rights and recognize the need for a national integrated system.
• Development of a secure live white rhino web-based database and information management system linked to a national electronic permitting system	DEA / TRAFFIC	Functional database and survey reports. Few complaints.	Software availability. Security of data to hacking. Lack of confidence and trust in some provincial officials by private sector. Lack of cooperation by some in the private sector who may not want to share data to cover criminal activity or hide from SARS.
• Issue of permits dependent upon provision of white rhino survey data	DEA	Data on rhino populations available annually	Requires inclusion within the Norms and Standards / TOPS regulations.
2. Monitoring of populations.			
Activity	**Responsibility**	**Indicators of success**	**Threats to deliver &/or comments**

• Monitor white rhino population data by reserve/farm every year. (Minimum data required includes number of animals, demographics, and data on mortality (natural & poached), sales, hunting, spatial use, removal/introductions).	Park/Reserve/ Farm managers.	Annual reliable survey report. Specific database. SADC RMG report.	Lack of funds. Lack of support from private rhino owners.
• Establishment of an ongoing annual national status report of all white rhino in South Africa (similar to current SADC RMG black rhino reporting framework)	DEA / SADC RMG	Survey report. Development of standardized report format for white rhino status reporting. (Need be simpler and less detailed than the current SADC RMG black rhino reporting)	Requires inclusion within the Norms and Standards / TOPS regulations. Cooperation of private land owners. Quality of annual surveys on large state & private reserves.
• Monitoring of rhinos, horn stockpiles and rhino movements nationally	Conservation authorities (HOD, CEO, GM, Directors), DEA, Private Sector (e.g. PROA), Wildlife Translocation Association.	Centralised data base in place & functional. ToPS compliance. List of registered rhino properties. Gap between estimates of what horn stocks should be there and declared stocks narrows,	Lack of Provincial support. Mistrust by private sector. Under reporting. Lack of cooperation by private sector. Need a national SOP on stock pile management
3. Security & management of rhino horns stocks			
Activity	**Responsibility**	**Indicators of Success**	**Threats to deliver &/or comments**
• Rhino Horn Stockpile Management, DNA sampling and Security Protocols in place in reserves/private properties	Regional Managers; Investigating Officers, Ranch/Farm Managers/Study Group Leaders	Property rhino horn database & protocols in place & functional. Less illegal horn on market. DNA profiling of horn stock piles & entry onto national database.	Lack of cooperation by private sector. Concerns about security of data being given to some provinces. Lack of secure integrated national reporting system.
• Establish secure rhino horn databases in all provinces and national conservation authorities	TRAFFIC / DEA / provinces/SANParks	Functional, current databases	In accordance with rhino Norms and Standards (as amended).

(e.g. SANParks)			
• Rhino horns from all sources including organs of state and private owners must be registered & secured on rhino horn databases with DNA samples submitted to RhODIS lab	Private owners and organs of state (application). DEA and provincial authorities (registration).	All rhino horns registered. All horns stored securely (lockable safe). Less illegal horn on market. Number of different horns from stockpiles on RhODIS. Proportion of known stockpile on RhODIS	Lack of cooperation by private sector. *(e.g. natural and capture mortalities, pick-ups, seizures, hunting etc.). ^ (e.g. including museums, Universities etc.). Insufficient VGL lab capacity and funding to process all routine samples although this situation expected to improve with GEF, SAB Boucher, WWF SA and other support.
• Support research & development of new DNA forensic investigative techniques to improve the prosecution rate & reduce the illegal trafficking of horn.	NRCC, NGOs, VGL, GEF.	RhODIS DNA database operational & profiling undertaken for all rhino management/poaching horn/animal samples. .	Lack of resources (funding, equipment & capacity). GEF 5 funded forensic & intelligence database study project should assist.

5.3 SUSTAINABILITY

5.3.1 Objective

To manage white rhinos as a national asset, by creating an environment in which they are adequately protected and in which the South African meta-population can reach its full biological and economic potential.

5.3.2 Rationale

South Africa's white rhino population is currently threatened by a combination of economic forces and inappropriate and/or conflicting policies, laws and regulations. Although white rhino provide significant economic benefits to society, the current allocation of white rhino benefits and costs do not fully serve the interests of South Africa or the rhinos. Sustainability is defined here as the ongoing viable existence of the white rhino population and its economic contribution to the broader wildlife industry and its beneficiaries.

White rhinos generate legal and illegal economic value in five principal ways: their 'existence value'; for the viewing pleasure of tourists; live sales; trophy hunting; and for their body parts (especially horn) which are prized in certain cultures for their ornamental, food, status and medicinal purposes; and supporting environmental infrastructure. At present, South African rhino owners and custodians (that consist of private landowners, communities and public organizations, i.e. the people of South Africa) bear the substantial costs of rhino protection but derive perceptively fewer benefits. These costs manifest as both direct financial costs of anti-poaching, loss of rhinos and regulatory compliance costs, as well as in indirect opportunity costs, such as forgoing potential income from rhino products such as horn and on occasion limiting international live sales of surplus animals. At present, the benefits of rhinos flow mostly to other interest groups. For example, environmental NGOs and the media capture much of the existence value, the broader tourism industry also benefits, and the significant value of the rhino horn trade is currently captured entirely by organised crime.

The current situation is unsustainable. Existing funding sources need to be increased, but are more likely to decline over the next five years as current levels of donor and state funding are unlikely to be sustained. At a time of increased poaching extra resources are also needed to try to stop the poachers before they kill rhino. However, declining live sale prices and incentives are negatively impacting on budgets for rhino conservation. It has been suggested that rhinos need to start paying more for them if their numbers and range are to continue increasing.

Some have questioned whether traditional approaches of increased law enforcement measures with demand reduction initiatives can work to reduce poaching given that many end-users seem unconcerned about the fate of rhino and criminal syndicates are currently making significant amounts of money. Some have suggested that we may be dealing with a situation like prohibition and the war against drugs where significant law enforcement efforts will ultimately not be successful. Some have argued that legalizing trade in horn could help reduce poaching and contribute to expanding range and numbers of white rhino by:

- Substituting horn currently obtained for the SE Asian markets through the killing of rhinos, with horn from other sources that did not require animals to be killed (e.g. stockpiles, natural mortalities and possibly also dehorning in some populations);
- Generating significant revenue that could be used to significantly enhance law enforcement effort;
- Further incentivizing and encouraging end-user markets to seek legal supplies of horn;
- Sending a message to potential and existing speculators that rhinos are not going extinct; and
- Increasing incentives to conserve rhinos and especially by providing an opportunity to economically empower poor rural communities with land suitable for rhino.

The rationale would be to:

- Jointly address all the key factors that determine the sustainability of South Africa's white rhino population, namely ecological, socio-economic and financial;
- Achieve maximum population growth by managing existing populations at below ecological carrying capacity (this implies translocations to new areas to keep established populations productive);
- Engage in intense captive breeding operations in selected situations only. At all costs the typical zoo-type groups of a few animals placed in very confined situations with total reliance on supplementary feeding which has been shown to be associated with poor reproductive performance and which might be associated with selective breeding creating domesticated rhino different from wild rhino should be discouraged. However there is a continuum from small zoo paddocks to free ranging wild systems and there is a need to be guided by empirical evidence which can show what types of more intensive management are associated with enhanced reproductive performance and lower poaching. Ideally more intensive operations should not disincentivise conservation on the broader landscape, nor encourage the fragmentation of the landscape into small pockets rather than taking down of fences to create bigger areas. If demand for live rhinos from more intensive operations and prices paid remains high, this could help incentivize and benefit wild rhino areas. Provided there is not selective breeding and reproductive performance is good and poaching is lower, some more intensive operations may provide an insurance policy and could potentially be a source of founder rhino to restock wild rhino areas once the poaching crisis has passed
- Reduce the existing economic and social costs of the current rhino conservation reality in South Africa. These costs include financial costs of anti-poaching, loss of human and rhino lives, enforcement, judicial and imprisonment costs, regulatory/bureaucratic costs, lost potential trophy fees from the trophy hunting market, etc.; The funding that could be raised could make security provision more affordable and allow for greater proactive intelligence and detection efforts aimed at catching more poachers before they kill rhino.
- Create / enhance positive economic incentives to encourage further rhino breeding and range expansion and to finance protection. More intensive operations may be better suited to help increase the number of poorer rural communities (inclusive of those with relatively small land holdings) that benefit economically from wildlife.
- Redistribute rhino benefits and costs in a more equitable and effective manner – i.e. that benefits flow to rhino owners (private, communal and state) so as to cover their costs and provide positive conservation incentives and;
- Provide some time for demand reduction efforts to work.

As stated earlier, the Department of Environmental Affairs was mandated by Cabinet to investigate the feasibility of a proposal for the legalization of trade in rhino horn at the 17th Conference of Parties (CoP17) of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). If it is concluded that South Africa should trade, this will be tabled at COP17. To assist the Department in its task, the Minister appointed a Committee of Inquiry to evaluate the possibility of trade and to make recommendations to the Inter-Ministerial Committee (IMC) appointed by Cabinet.

5.3.3 Activities, Indicators, Responsibilities & Threats/Comments

1. To enhance the economic contribution of white rhinos to the national economy.			
Activity	**Responsibility**	**Indicators of success**	**Threats to deliver &/or comments**
• The promotion of ecologically linked, larger white rhino populations for ecotourism & ecological integrity on state, private and community land	Government, private & communal role players	Measurable increase in range of rhinos Increased average size of individual free-range populations of white rhino Increased number & diversity of rhino owners Number of cases where fences have been dropped to develop larger contiguous conservation areas with rhinos.	Illegal hunting & poaching. Rampant captive & selective breeding of rhinos.
• Exploring new and innovative mechanisms including incentives for conserving white rhino on communal land	State, private & communal role players, NGOs (e.g. WRSA, PHASA etc.)	Increased wild rhino on communal land Increased number of communal land owners with rhinos Increased financial return specifically from rhinos	Illegal hunting. Collapse of rhino market. Capacity shortfalls. Corruption.
• Elevating the profile & public awareness (including to politicians) of the positive contribution of white rhinos to the land owner and national economy	DEA, NGOs, Provincial conservation agencies, PROA,	Increased public awareness of rhinos & their value Availability of economic statistics on rhino values Increasing range of wild rhino Increased budgets for rhino conservation	Mixed messaging. Conflicting advocacy from animal rights groups. Lack of wildlife (especially those of rhinos). Economic statistics.

• Encouraging new innovative mechanisms (consumptive & non consumptive) for sustainable financing of white rhino populations on all rhino range lands.	State, private & communal role players, economists, NGOs	New rhino conservation models successfully implemented with more rhinos on more range Proposal for trading in horn submitted to COP17	Organised crime. Corruption. Lack of capacity & professionalism. Insufficient quality of strategic lobbying. Concerns about the possibility of selfish politicians and other persons of power receiving financial benefits without reinvesting back into the industry.
2. **Possible legalisation of trade as a mechanism to reduce poaching and increase funding available for conservation and protection**[1]			
Activity	**Responsibility**	**Indicators of success**	**Threats to deliver &/or comments**
• Investigate the feasibility of a legalised trade in rhino horn (This would need to demonstrate how after a thorough consideration of all the pros and cons of all possible options that this is a workable & good option and that it can be effectively managed from source to end user markets)	Resource economists, market analysts, trade specialists, WRSA.	Commission of Inquiry (CoI) report Completed document accepted by peer group with backing from South African primary stakeholders (National and Provincial conservation agencies and private & community rhino owners) Number of films made and/or presentations given and or papers/articles written.	Tardiness in developing details of any proposal and lobbying for it allowing anti-trade groups to attack the concept of trade. An international "more of the same – enhanced law enforcement and demand reduction approach" being promoted with little consideration for sustainable use and livelihoods. Inability to effectively argue the case. Significant funding required Difficulty in getting 2/3rd of CITES Parties to support such a move. Simplicity of views from some developed countries suggesting that more protection and demand reduction is all that is needed. No trading partners identified. Concerns as to how the trade could be policed in end user markets to the prevent development of parallel illegal black market for laundered horns.

[1] Activities to be guided by the recommendations emanating from the Committee of Inquiry process and approved by the Inter-Ministerial Committee and Cabinet

• Identify a core group of media-friendly spokespersons to present the sustainability argument to the public and start presenting it (first to South Africans, then internationally)	Members, DEA Media Spokesperson	Agreed upon list; Media materials.	Limited funds. First has to be approved as a strategy by the Minister.
• In the event the above feasibility study finding in favour of proposing trade in rhino horn, work towards developing a proposal to trade in rhino horn for CITES.	DEA	Submission of proposal to CITES by deadline for discussion at CoP17 or CoP 18, whatever recommended.	Dependent on government acceptance. Lobbying and professionally explaining and selling proposal to CITES management authorities worldwide would be expensive Obtaining the necessary 2/3rds majority will not be easy. Would need to clearly demonstrate to the international community that the primary motive of any proposal was to reduce poaching and to help meet stated conservation objectives and not purely to make money; and that such a trade could be adequately controlled at all stages of the trade chain to ensure that illegal laundering doesn't occur and a large parallel illegal trade develops which threatens rhinos in other range states.
• Address the potential adverse impact of existing regulations and regulatory structures (TOPS, permitting) on the sustainable use of white rhino (e.g. on the hunting industry, dehorning for protection)	DEA, WRSA/ PROA, PHASA, RMG	Streamlined enabling regulatory system Integrated secure national online permitting system set up and operational.	Remain open to review impacts (positive & negative) to existing legislation. Resistance to streamlining bureaucratic legislative regulations.
• In the event the above feasibility study finding in favour of trade in rhino horn, develop a well-articulated strategic & technical proposal on how the trade should be managed, monitored and delivered on in the national and international context.	DEA/RMG/ other relevant government departments (SARS, Customs & Excise); Relevant foreign trading country, WRSA,	Accepted strategy/technical document	Dependent on SA Government support. Lack of clarity of details of trading mechanism & monitoring down the entire supply chain. Concerns that discussing and motivating for a legal trade sends "the wrong message" to key consumer countries and may hamper demand reduction efforts.
3. Strategically engage in international demand reduction programmes			

Activity	Responsibility	Indicators of success	Threats to deliver &/or comments
• Develop and support a demand reduction strategy.	DEA.	Commission of Inquiry report Accepted strategy/technical document Base line measures of demand against which future reduction can be measured.	International misunderstanding & potential conflict of demand reduction & trade strategies. Ensure that demand reduction does not compromise the strategic goal of sustainable use.
• Engage in and support international efforts to understand the dynamics, economics and use of rhino horn and rhino derivatives.	DEA, other relevant government departments (SARS, Customs & Excise).	Technical documents and economic models which are reliable and broadly accepted	Conflicting messaging of trade in horn and demand reduction.
• Engage in identified international demand reduction activities	DEA, other relevant government departments (SARS, Customs & Excise).	Reduction in demand in consumer states. Reduction in poaching. Drop in black market price.	Conflicting messaging of trade in horn and demand reduction.

5.4 BIOLOGICAL MANAGEMENT

5.4.1 Objective

To manage white rhino populations in order to achieve a sustained underlying growth rate of at least 5% per annum (after taking poaching & international translocations into account), promote long-term genetic viability, prevent the impact of selective breeding, while maintaining the existing range and establishing new viable populations in additional suitable habitat.

5.4.2 Rationale

It is not sufficient only to protect rhinos in order to conserve them. They also need appropriate biological management, to prevent overstocking, to prevent inbreeding, to maximize genetic diversity, and to meet other animal husbandry needs; and especially to maintain rapid meta-population growth rates and in so doing increase the ability of the meta-population to withstand a given amount of poaching. Biological management of rhinos has improved through regular and rigorous monitoring of individual rhinos and population performances (measured in many ways such as birth and death rates, inter-calving intervals, age at first breeding etc.). Monitoring of populations/individuals was addressed in the previous section.

Current population theory suggests that unless the zero growth population density (or what may be termed an ecological carrying capacity) is declining, or removals exceed maximum potential growth rates by harvesting at a fixed rate per annum, the population should respond by growing at least at that rate (see Appendix 2 for details). Thus, by removing at a constant rate of at least 5% and not more than 8% annually (but including poached animals when calculating total % removed) from established populations we are attempting to ensure that remaining animals in these populations continue to grow at least at this predetermined target rate (all else being equal). Thus if you lost 1% of the population to poaching in the year, one should remove another 4% of the population if undertaking set % harvesting at the minimum recommended 5% level. Alternatively, and especially in small populations it may be more practical to remove say 15% every three years which would be equivalent to an annual 5% removal. Harvesting also provides founder rhinos that can be used to set up new populations with the potential for rapid population growth, especially important to buffer the increasing threat from poaching. In addition, to expand the species range sales also have historically generated significant revenue for conservation agencies and owners, however, if there are insufficient numbers of suitable buyers with suitable areas wanting to establish new breeding populations this may limit the number of animals that can be removed. Thus set % harvesting is a win-win strategy, which should both maintain or enhance population vigour in the harvested population whilst also enhancing overall meta-population growth. Should rhino carrying capacity (zero growth density) change in populations being managed using set % harvesting, rhino densities should simply adjust to a new higher or lower level that can support the given % removal. This approach is also less dependent upon getting estimates of zero growth or maximum productivity carrying capacities correct. On the other hand, a failure to reduce densities of populations approaching or above zero growth densities by at least 5%/annum is likely to negatively impact on habitat and ultimately reduce population growth rates to below minimum target levels.

Larger free-ranging populations in suitable habitat generally perform better than smaller ones given the largely uninhibited ecological process between habitat, individuals and populations. There is a need to incentivise the dropping of fences to prevent fragmentation of the landscape. Following IUCN SSC AfRSG and SADC RPRC recommended best practices (see du Toit 2007 – downloadable link below and IUCN SSC African and Asian Rhino Reintroduction and Translocation Guidelines, available from the AfRSG webpage (www.rhinos-irf.org/afrsg) & Rhino Resource Centre), every effort should be made to establish larger populations (ideally >50 animals), in suitable habitat within the subspecies former range, using as broad a diversity of young adult founders as possible. Skewing the adult sex ratios in favour of adult females generally enhances population performance.

There is a strategic need to increase the number of emerging private land owners and communities conserving rhinos. This should improve the sustainability and spread of white rhinos on private and community land. However a number of conservation agencies have raised concerns about the number of applications for intensive rhino farming operations. We need to avoid very intensive zoo type captive breeding which has been shown to be associated with poor reproductive performance in white rhino (and especially a low proportion of pregnant females ultimately giving birth to calves; and apparent poorer performance of future generations of animals born in intensive conditions). However there may be intensive options where rhino breeding is good and rhinos may suffer less poaching thus potentially providing an insurance option to enable future restocking of wild areas if this were to be needed. Concerns have also been expressed that intensive rhino farming could foster selective breeding creating domesticated white rhino that are genetically different from wild rhino as has happened with Guinea fowl in South Africa and American bison. This potentially could reduce the wild rhino meta-population and possibly preclude intensive farms in future from restocking wild areas. Intensive rhino farming also might disincentivise conservation by encouraging fragmentation of the landscape into small pockets rather than encouraging the taking down of fences to create bigger conservation areas (which the Black Rhino Range Expansion Project (BRREP) has done). Horn produced under such very intensive conditions may also end up fetching lower prices in SE Asia should there ever be a legal trade. However, we currently do not know under what conditions reproductive performance under more intensive management is not compromised. It may also prove easier, cheaper and more effective to protect rhino under such conditions and provided conditions are conducive to numbers growing rapidly under intensive management , greater horn production should hopefully take some pressure off wild populations should a trade ever be approved by CITES. Currently data are required to evaluate and assess the pros and cons of intensive rhino farming options with a view to developing appropriate policies to support what is positive and act against what is shown to be or likely to be negative to rhino conservation. Thus there is a need to investigate this issue thoroughly to determine what should and what should not be allowed.

Conservation of white rhino in South Africa will only be of the indigenous Southern White rhino *C. s. simum* (unless some time in the future South Africa is called upon to assist with attempts to inter-cross southern with the almost extinct northern white rhino in a last ditch attempt to conserve at least some adaptive northern white rhino genes for eventual re-introduction into former range. The latter is currently being attempted in Kenya and it is unlikely there will be any need for South Africa to also participate in such breeding efforts).

To maximise genetic diversity and reduce the possibility of inbreeding within the fragmented rhino populations, every effort should be made to obtain as diverse array of founder animals as possible in newly established populations, as well as introducing unrelated animals once every generation (14 years) per established populations. This is dependent upon the population size and its demographics. Adult male swaps would provide the best return on investment. In smaller populations with a few breeding bulls,

these animals should ideally be exchanged as frequently as possible (ie not > every 15 years (generation)) to minimise inbreeding possibilities. Focusing on larger populations of >100 animals would provide the best option with regards maintaining genetic diversity (Coutts 2009).

5.4.3 Activities, Indicators, Responsibilities & Threats/Comments

1. Harvest established rhino populations to continuously stimulate growth.			
Activity	**Responsibility**	**Indicator of Success**	**Threats/comments**
• When populations exceed 50% of an accepted zero growth density (sometime referred to as Ecological Carrying Capacity (ECC)), implement the Set % Harvesting Strategy with minimum average removals of at least 5%/annum (and not more than 8%); or in smaller populations 15% every 3 years etc. to minimize the need for repeated and costly manipulations in the population. • Removals should account for the sex and age structure of the population to maintain the viability of the remaining herd. • Where possible, consolidate small and less viable groups.	Statutory & Provincial conservation management authorities and private/community rhino owners	All populations growing at a minimum rate of 5%/annum (from reporting). Proportion of established Key and Important populations where harvesting is in the range of 5-8% per annum on average over the previous 5 years.	If poaching escalates out of control, growth targets will not be achieved. Animals poached and hunted should be included when calculating translocation off-takes. For example if 4% of the population is poached and hunted this would leave 1% of the population that could be removed live under a 5% set percentage harvesting strategy? Over-harvesting (e.g. at >9% average removals) may lead to population declines, for example if financial pressures override sound management practices. A lack of proper population monitoring will inhibit good decision making. There may be pressure to fragment large populations into smaller, intensively managed units, perceived to enhance productivity for profit. Under-harvesting may lead to population stagnation and habitat decline. Do not only remove younger (sub-adults) animals as this ultimately can negatively affect the donor population's age distribution Lack of suitable buyers seeking rhinos to expand numbers and range may constrain the number of live sales. Increasing costs and risks and declining incentives (e.g. declining

			live sale prices) are leading to some owners getting rid of their rhino. To reverse this negative trend; which threatens continued good biological management of the species requires an enabling environment with sufficient incentives to encourage the continued increase in numbers and range is needed.
• Depending upon reserve management objectives, consider managing competing species to prevent habitat degradation in white rhino areas	Statutory & Provincial conservation management authorities, communal and private rhino owners	Stocking rates of other grazers analyzed for metabolic biomass per Km^2	Competing grazers may be stocked for a protracted period at densities which lead to degradation of rhino habitat, affecting their growth. Consideration need be given a holistic approach to conservation that does not deal solely with the needs of a single species.
2. **Establish new populations**			
Activity	**Responsibility**	**Indicator of Success**	**Threats/comments**
• Compile and make available national guidelines for the evaluation of suitable habitat for white rhino	SADC RMG	Guidelines document	Possible limited information on white rhino feeding habits.
• Set up new populations, ideally in wild free-range conditions, where possible with unrelated founders, and at starting densities below 50% of zero growth density (i.e. ecological carrying capacities) to allow for growth.	Statutory & Provincial conservation management authorities, communal and private rhino owners	All new populations are established in suitable habitat, in adequately secured sites, and are growing	Limited range expansion possibilities may arise due to lack of incentives to invest in rhino. Financial/security constraints.
• Undertake research to establish pros and cons of likely impacts of various intensive management models for white rhinos. Depending on results possibly consider whether or not guidelines or perhaps legal policies are needed to establish minimum recommended property sizes per Province suitable to support free-	Statutory & Provincial conservation management authorities and SADC RMG, PROA	Fact finding undertaken to set out pros and cons of alternative approaches. Workshop held to consider need for policy and possible restrictions (if appropriate) No "captive / intensive breeding – style farming operations arise that	There may be a proliferation of intensive breeding facilities in the country that could threaten conservation goals due to lack of compliance, lack of surveillance of properties and lack of consideration of impacts of different management models. Guidelines need to be developed but these need to carefully weigh up pros and cons of options and consider views of various stakeholders as well as possible negative and positive impacts /pressure on wild populations. The selective breeding of genetically different domesticated rhinos

ranging breeding herds of white rhinos with or without supplementary food but where performance will not be adversely affected by intensive management and ensuring that the numbers of wild rhino do not decline as a result This is likely to need a specific workshop following a fact finding research phase to ascertain current breeding performance in more intensive set ups.		have poor breeding performance and which will result in creation of genetically different selectively bred domesticated white rhinos. Guidelines produced on minimum ECC for establishing free ranging breeding herds of white rhinos with or without food supplementation. Independent analysis (by SADC RMG or IUCN SSC AfRSG) to assess performance and risks of different forms of more intensive rhino farming operations. Guidelines produced showing what forms of intensive operations should be permitted and what not. Guidelines for genetic management of more intensive operations to prevent selective breeding.	needs to be avoided and breeding of wild rhinos should be encouraged. Should a legal trade ever be approved by CITES horn from captive or semi-captive "domesticated" rhinos may be seen as inferior by SE Asian consumers. Lack of independent assessment of performance of existing more intensive operations Risk that selective breeding could potentially occur in very intensive operations – impacting on natural selection and risk of creating genetically different farmed and wild white rhino. If the latter happened then this would reduce the potential of farmed rhino to restock wild areas should this be necessary. Intensive breeding has potential animal husbandry risks eg, exposure to disease, increased stress levels
• Aim to set up at least two additional significantly sized populations with >20 founders and potential for >50 animals.	RMG to encourage & support creation of new significant populations, All stakeholders, State, communal, private and NGO's	At least two populations are created and growing	White rhino in zoo captivity breed poorly. Captive breeding sites with poor performance proliferate (although recognizing that there may be variants of more intensive management that do perform well and suffer lower poaching).
• Initiate plans for the creation of at least 1 more population of >200	All stakeholders, State, private, communal and NGO's	Plans are in place for a new large population site.	Sites may not be available for expansion/ amalgamation, or no new sites may be available, no funding available, lack of

rhino, via amalgamations of smaller sites, land expansions of established area, or setting up a new area.		Animals are delivered Population target met	cooperation, coordination and commitment. There may be lack of capacity in Provincial conservation authorities. Conflicting land use policies.
• New areas must meet with approved minimum criteria (to be developed) in order to introduce rhino.	Statutory & Provincial conservation management authorities and private rhino owners	Approved minimum criteria are met	As above
• Use recommended best reintroduction practices (e.g. as outlined in IUCN Rhino Reintroduction and Translocation Guidelines)	Statutory & Provincial conservation management authorities and private rhino owners	Guidelines not violated	
• Encourage new innovative schemes for black/communal south African private sector rhino farmers/owners into range expansion targets	Statutory & Provincial conservation management authorities	Increase in black private land owners & communities with rhinos.	Value of wildlife seen to be less than other commodities such as cattle.
3. **Management of Genetic Diversity**			
Activity	**Responsibility**	**Indicator of Success**	**Threats/comments**
• Where possible undertake genetic profiling in populations to monitor genetic diversity status, and assist with minimizing inbreeding in small populations.	Statutory & Provincial conservation management authorities, communal and private rhino owners	.	Lack of funding for genetic profiling and for timely transfer of animals for genetic reasons. Lower priority to DNA profiling for poaching cases Lack of concern / interest in genetic management of rhino by owners / conservation authorities.
• As a minimum precautionary measure in pops of <100 individuals introduce at least 1 breeding animal per 20 rhino every	As above	Animal transfers are made periodically	Need research to confirm or refine these recommendations. Financial constraints

generation (14 years) to introduce new blood. Guidelines to be updated in the light of any new research or modeling.			
• Manage populations for growth as described above (minimizes loss of genetic diversity due to genetic drift).	As above	Populations grow at a minimum of 5% per annum.	
• In smaller populations, to minimize inbreeding, remove either the offspring if they may begin breeding with their parents / siblings, or undertake an exchange of breeding bulls	As above	Population individual history data shows that transfers of related rhino occur where needed.	Financial constraints
4. **Manage Surplus Bulls**			
Activity	**Responsibility**	**Indicator of Success**	**Threats/comments**
• Maintain legal avenues to manage surplus bulls. This includes hunting, bull-only camps, translocation to areas needing bulls for demographic or for genetic exchange.	DEA, Provincial authorities.	Hunting continues, bulls are used for genetic exchange where possible, and bull camps are used when necessary to hold surplus animals which cannot be disposed of by these other means A national professional hunter (PH) register which has provisions to ban unscrupulous operators Prosecution and convictions of provincial officials associated with the spate of pseudohunting and illegal issuing of permit	The banning of rhino hunting would limit income for management and avenues for disposal of excess males. A total ban of hunting would most likely see shrinkage of rhino range and numbers, especially on private land.

• Undertake timely or pre-emptive removals of males when interference with population growth may arise.	Statutory & Provincial conservation management authorities, private & communal rhino owners.	Minimum loss of females and calves due to male aggression.	Financial resources
5. Disease Management			
Activity	**Responsibility**	**Indicator of Success**	**Threats/comments**
• White rhino disease surveillance and reporting may be required in all rhino populations.	Statutory & Provincial conservation management authorities, private & communal rhino owners, Veterinary Services	Disease surveillance reports	White rhino disease and mortality may increase
• In addition, certain notifiable diseases (such as TB) on other species (e.g. Buffalo) need reporting and control, because these affect the ability to make needed translocations of rhino from diseased areas.	As above	Rhino translocation not affected. Veterinary research that demonstrates that white rhinos do not pose a TB risk.	Disease in other species may prevent the proper management and use of rhino.

5.5 EFFECTIVE COMMUNICATION AND COLLABORATION

5.5.1 Objective

To coordinate and promote effective collaboration and communication between all white rhino stakeholders in South Africa and internationally.

5.5.2 Rationale

The current state of affairs is not conducive to effective collaboration between stakeholders. There is a lack of trust between the state institutions responsible for rhino management and the private sector rhino owners. There is a need to initiate mechanisms that improve coordination and collaboration between role-players, nationally and internationally, that ultimately builds lasting relationships and trust. There is an urgent need to enhance communications with rural communities, especially those adjacent rhino parks/reserves/ranchers, to include them as part of the solution to the rhino crisis by exploring potential benefit sharing and empowerment options. Communication and the sharing of information on biological management and protection of rhinos has been the cornerstone of the success of the SADC RMG and the IUCN African Rhino Specialist Group.

5.5.3 Activities, Indicators, Responsibilities & Threats/Comments

1. Communication & collaboration			
Activity	**Responsibility**	**Indicator**	**Threats/comments**
• Ensure that regular consultative forum meetings occur that builds trust and more effective working relationships between the private/communal rhino owner sector, communities adjacent rhino reserves and key state role-players in the rhino sector. (Including DEA, provincial and state authorities, all rhino custodians (state/private/communal), law enforcement agencies and NPA).	SADC RMG PROA DEA SAPS NWCRU	Meetings are held and minutes recorded and disseminated.	Lack of resources. Lack of information sharing leads to a loss in trust and cooperation.
• Develop and implement a national rhino communication strategy.	DEA/RMG- Shared responsibility (communication task team).	1.Task team established 2. Key messages for dissemination	Facilitate access to accurate and verified information for media use.

	PROA	identified. *(Role of white rhino in tourism, trade, hunting, conservation and heritage.)* *(The importance of controlled sustainable hunting and in the event the feasibility study supports a trade in horn[5], potential positive role of establishing a legal trade, in rhino conservation)* **3.** Strategy approved and implemented.	Anti-sustainable use groups interference. Develop information packages for use in international lobbying. Target audiences should include, amongst others, CITES management and scientific authorities, Chinese, Thais and Vietnamese.
• South Africa to continue to play an active role on International and Regional Groups such as IUCN SSC's African Rhino Specialist Group, RESG/Interpol ECWG and SADC RMG	South African country rep elected by SADC RMG South African members (DEA, SANParks, Provincial Agencies, Private Owner representatives and Experts)	South Africa continues to be represented at AfRSG, RESG/Interpol and SADC RMG meetings. Country reports and data provided to the AfRSG as mandated by CITES Resolution 9.14 Rev(15)	Lack of support for such international forums.

5.6 HUNTING OF RHINOS

5.6.1 Objective

To recognise that sustainable hunting will continue to play a pivotal role in supporting conservation of the species through increasing its numbers and its spatial distribution in South Africa

5.6.2 Rationale

The provision of a number surplus male annually to the trophy hunting industry has played a pivotal role in the white rhino population expansion onto private land. Together with ecotourism and live sales, hunting has given white rhinos a significant economic value, as well as incentivising its conservation and rewarding those that have successfully bred up white rhino. This has been recognised in rhino motion (26) approved at the 2012 IUCN World Conservation Congress in Jeju, South Korea.

In the early days of selling rhino to private owners, the waiting list for huntable bulls outstripped the availability of these animals, and Buys & Anderson (1989) found that perverse economic incentives at the time encouraged private owners to hunt their rhino. In other words trophy hunting rather than breeding at that time was the driving force of the initial expansion of rhino into private land. However this changed in 1989 when white rhinos were allowed to fetch a market value on auctions. From then the breeding of white rhino populations became the driving force and live sale prices continued to grow. Since sport hunting of white rhino started in 1968, numbers of white rhino in South Africa have increased over ten-fold, clearly demonstrating that trophy hunting of rhinos is sustainable.

The historical demand for trophy animals (from 1971-2004 it averaged between 30- 35, increasing to 70 per year) represents just under 0.4% of total white rhino population or about 1.4% of the rhino population on private land, and will not negatively affect the demographics of the population. These off-take levels have been sustainable and have been largely driven by the international trophy hunting market from those countries with a traditional big-game hunting history such as the USA which historically has provided the majority of white rhino hunters. As a result there has been no need to set a national hunting quota for white rhino. However, after 2004 the number of hunts increased to average just over 100 a year with a surge in hunts from hunters from previously non-traditional hunting countries (and especially Viet Nam). Hunt prices increased, pricing many of the hunters from traditional hunting countries out of the market. It was suspected that the intention of many of these hunters from SE Asia was to obtain horn legally and pass it onto the illegal market once it had been imported (in contravention of CITES permits which require trophies to remain non-commercial mementoes of a hunt). This pseudo-hunting has been a cause for concern both within and outside South Africa and has to some extent tarnished the reputation of South Africa and undoubtedly has been the source of significant amounts of rhino horn entering the illegal market. The rise in pseudo-hunting together with the surge in poaching has led to the possible contemplation of a need for a hunting quota given these removals exceeding the recommended 1% level. Encouragingly a number of initiatives introduced in February and April 2012 appear to have successfully clamped down on pseudo-hunting by SE Asians, and if this success is maintained, then once again it is likely that limited demand from traditional hunters

will act to limit hunting to well below sustainable levels and a quota is unlikely to be necessary. However, innovative means of using proxy hunters from more traditional and other big-game hunting countries (e.g. Czech Republic) have been noted and need to be checked.

In April 2012 the Department of Environmental Affairs implemented revised norms and standards for the marking of rhinoceros and rhinoceros horn and for the hunting of rhinoceros for trophy hunting purposes (see Appendix 4 for details). This saw the introduction of stricter controls for the granting of trophy hunting permits in South Africa and illustrated the serious light in which the department views the possible abuse of the permit system. The revised norms and standards clearly stipulate that hunting applicants must, amongst others, submit proof of membership to a recognized hunting association, may only hunt one white rhinoceros within a twelve month period and the hunt must be accompanied by an environmental management inspector or an official of the issuing authority. The official accompanying the hunt must also take DNA samples of the rhino horn and fit it with a micro-chip. It should be noted that should there be a clear abuse or absolute collapse in any of these controls or of provincial permitting systems, then the responsible Minister for Environmental Affairs reserves the right to institute a moratorium on hunting of rhinoceros. The Minister has made it clear that individuals found guilty of abusing the hunting permit system will be dealt with in a serious manner, as reflected in the maximum prison term of 40 years (equivalent to life in prison) being given to offenders.

Following the successful clamp down on pseudo-hunting after April 2012, concerns have been raised about an increase in proxy hunting whereby poor but genuine hunters in some countries are being persuaded to apply to hunt a white rhino but with the ultimate intention of making money for themselves by providing the trophies which are then shipped to user markets. Thus checking whether or not an applicant is a hunter may not be enough and there is a need for greater cooperation with countries whose citizens are applying to hunt white rhinos not only to ensure they can afford to hunt a rhino but also to encourage them to actively monitor possession of trophies after hunts to ensure they remain non-commercial mementoes of a hunt.

For a period non-lethal “green-hunting” of white rhinos was allowed in South Africa. It was later declared unethical by the South African Veterinary Council, preventing veterinarians to participate in this practice. Put-and-take hunting of captive-bred rhinos is prohibited in terms of the TOPS regulations. The only hunting currently sanctioned is lethal hunting of rhinos in extensive wildlife systems. There has been a recent emergence of an activity referred to as ‘vita hunts’ whereby a hunter (under the guide of a PH) darts the animal with vitamins simultaneously with the veterinarian, whose intention is to immobilize the animal for management reasons.

5.6.3 Activities, Indicators, Responsibilities & Threats/Comments

1.Sustainable hunting			
Activity	**Responsibility**	**Indicator**	**Threats/comments**
• Draw up a code of practice for hunting rhino	PHASA, WRSA, PROA, DEA & conservation NGOs	Accepted code of conduct	Adhere to fair chase principles - Legal requirements must be adhered to (local and foreign hunters) - State should not be prescriptive on the end-use of rhino horn as long as the off take meets the agreed upon figures for annual take-off. However for internationally exported hunting trophies to be used for anything more than non-commercial mementoes of a hunt, CITES would need to approve a proposal (two thirds majority of party votes required) to allow a legal trade in rhino horn. Needs support from CoI & IMC . Some have suggested increasing the time interval between hunts by clients should be increased from current 12 months to 36 months.
• Should a legal trade ever be approved by CITES, the issue of green hunts could be reinvestigated as a means of providing horn and further increase incentives to conserve rhino.) (Would need support from the CoI & IMC)	PHASA & SAVC	Well controlled and managed green hunts, including notching and collection of DNA samples	An expense item for game ranchers will become an income. Purpose of hunt to be indicated on permit application Currently green hunting is not allowed under ToPS regulations and is not supported by the Veterinary council. Uncertain about risks.
• Investigate the ethical and animal welfare aspects associated with vita hunting.	PHASA & SAVC	Well controlled and managed vita hunts, including notching and collection of DNA samples	Uncertain about risks to the animal and reputations of PHASA & SAVC. An expense item for game ranchers will become an income. Purpose of hunt to be indicated on permit application

• Centralise permitting system in place & functional	DEA (permit on line)	Implemented and easy accessibility with better control and real-time data	Ultimately more cost effective and less chance for corruption and confidentiality of information can be better maintained Problem provinces implicated in the issue of questionable permits in the past. Failure to date to effectively prosecute and convict corrupt provincial officials associated with pseudo hunting in the past.
• Accountable reporting system (database) in place & functional	DEA & VGL & PHASA	Implemented and easy accessibility with better control and real-time data	Qualified staff.
• Develop an effective national registration process that holds outfitters & PHs accountable for their actions	Provinces & DEA	Decline in number of unscrupulous incidents A system in place where a PH/outfitter can be barred from practicing in South Africa	Regulating authority must take responsibility for issuing, renewing and withdrawal of permits for Outfitters & PHs
• State & Provinces to contribute to expanding distribution of animals across provinces and increase of hunting areas	Provincial Nature Conservation & SANParks	Acceptance of controlled hunting in more protected areas	Income to state and province will increase and it will create areas where true fair chase and true trophy hunting will be possible again Potential conflict with protected areas objectives
• Investigate the need for a quota only as a last resort if the rhino population falls below a predetermined sustainable level.	DEA	Freedom of private owners to determine own management	The current population held by state and provinces is large enough to sustain the population numbers. Quotas and off take limits restricted to management in protected areas whilst privately owned rhinos managed by landowners Will increase bureaucracy.
• Raise public awareness that hunting of rhino contributes positively to the long term conservation of the species	PHASA, CHASA, DEA	Public acknowledgement and increase in awareness	The hunting industry is under considerable pressure from unscrupulous and unethical behaviour by some PHs and outfitters.

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APPENDIX 1: SADC RMG AND OTHER RHINO CONSERVATION GROUPS

SADC RMG

The Rhino Management Group (RMG) was founded in 1989 by South Africa and Namibia. Since then Swaziland and Zimbabwe have also joined. Since 2001 The Rhino Management Group (SADC RMG) has fallen under the SADC political umbrella and comprises representatives from each of the following bodies:

State conservation agencies in South Africa, Namibia, Swaziland and Zimbabwe:

South Africa: (Founder member)

- Department of Environmental Affairs (DEA)
- Eastern Cape Parks
- Ezemvelo-KZN-Wildlife
- Free State Department of Tourism, Environmental and Economic Affairs,
- Gauteng - Department of Agriculture, Conservation & Environment - Directorate of Nature Conservation
- Limpopo Department Economic Development, Environment and Tourism– Chief Directorate – Environment
- Mpumalanga Tourism and Parks Agency,
- Northern Cape Department of Environment & Nature Conservation,
- North West Parks and Tourism Board;
- South African National Parks (SANParks)
- Cape Nature

Namibia: (Founder member)

- Namibian Ministry of Environment and Tourism including National Rhino Coordinator and manager of Custodianship Programme

Swaziland:

- Big Game Parks of the Kingdom of Swaziland

Zimbabwe:

- Zimbabwe Parks and Wildlife Management Authority

Botswana:

- Botswana Department of Wildlife and National

Private owners of free-ranging rhinos in South Africa:

- Until recently one member represented the joint interests of private owners, but at the last RMG meeting in November 2010 a number attended as observers. Representation on the RMG is to be increased with regional representatives being appointed. Community black rhino custodians are also to be invited to be represented on the RMG.

Elected rhino experts

The Chair of the Rhino and Elephant Security Group of Southern Africa/Interpol Environmental Crime Working Group (RESG/Interpol ECWG)

The SADC RMG's role is to further regional cooperation amongst rhino range states in the region dealing with similar issues of meta-population management, and to assist the various conservation agencies and private landowners in achieving the conservation goals for black rhino.

As all the Provincial State Conservation Agencies in South Africa, SANParks and the South African private black rhino owners each have a representative on the SADC RMG – the RMG is ideally suited to manage and update the South African black rhino plan, which it has done since 1989. The first RMG black rhino conservation plan was released in 1989 and a revised second edition was produced in 1997. This version represents an extensively update and revised third edition of the plan.

The SADC RMG's strategies include the following.

- Evaluate the performance and management of each black rhino population in the region at regular intervals based on the annual RMG status-reporting programme.
- Identify problems or information needs affecting the achievement of the goals for black rhino in each country.
- Initiate, develop and coordinate appropriate programmes (meetings, workshops, projects) necessary to provide management advice and to develop appropriate conservation strategies to achieve the goals.
- Evaluate project proposals and make recommendations to relevant bodies.
- Provide advice on request to conservation agencies.
- Liaise closely with all relevant conservation authorities and funding agencies
- Manage the Conservation Plan for the Black Rhinoceros in South Africa (SA membership of RMG only), by collecting, analysing and interpreting the information it requires, by keeping it updated and ensuring its continued relevance, and by publicising the results of these activities in appropriate ways.

Other Rhino Conservation Groups

IUCN SSC African Rhino Specialist Group (AfRSG)

This was reconstituted in 1991, with a continental scope, following a period during which it was amalgamated with the African Elephant Specialist Group. As one of more than 100 specialist groups within IUCN's Species Survival Commission, the mission of the AfRSG is: *"To promote the long-term conservation and maintenance of viable populations of the six subspecies of Africa's rhinos in the wild"*.

The AfRSG comprises a Chairman, a partially-funded part-time Scientific Officer, representatives of most African rhino range states and a variety of rhino experts who operate as a network to address both strategic (e.g. government rhino policy) and implementation challenges for rhino conservation, ensuring that the best scientific knowledge is used as the basis for decision-making and field conservation programmes. To achieve this, meetings attended by the 30-40 members are held every two years, and in addition individuals or groups of members are assigned to contribute to important international, regional and national initiatives where their expertise is required. The value of the face-to-face nature of the exchanges helps establish a sense of belonging to a serious and relevant professional peer group, which strengthens the confidence and influence of government rhino conservation managers in particular. The AfRSG Chairman or individual members may be approached by any range state wishing technical support or advice. Further details of the AfRSG's role are provided on the AfRSG's web page www.rhinos-irf.org/afrsg.

The AfRSG, together IUCN's Asian Rhino Specialist Group and TRAFFIC currently has a mandate under CITES Resolution 9.14(rev), to on behalf of Range States, prepare and submit a summary report on rhino conservation for consideration at CITES CoP's.

SADC Regional Programme for Rhino Conservation (RPRC)

From 1999-2005 Phase I of the SADC RPRC was funded by the Italian Government and has now come to an end. Phase I of this programme was run by a consortium of SADC FANR, WWF SARPO, IUCN SSC AfRSG, CESVI (an Italian NGO) and IUCN ROSA. The programme provided expertise, specialized logistical support, training and catalytic funding for a wide range of projects of a regional nature or importance. The SADC RPRC Phase I helped bridge the gap between the high level umbrella strategy provided by the AfRSG and programme implementation by range states, by providing technical and financial support for a variety of regional projects. A Phase II concentrating on promoting a regional strategy for rhino conservation that is orientated towards SADC development policies with a specific focus on cross boundary translocations and rhino re-establishment in minor and former Range States within SADC was proposed. However no funding has been forthcoming for this initiative and at the time of writing the SADC RPRC is not operational. .

SADC Rhino Recovery Group (RRG)

A SADC Rhino Recovery Group was established by the SADC RPRC in 2001 (as a sister group to the SADC RMG) to place particular emphasis on the management needs of 1% of Africa's rhinos that are in the minor range states and where there is considerable scope for re-introduction projects and population expansion (Zambia, Botswana, Malawi, Mozambique, Tanzania, Angola). The RRG's aim was: "*To coordinate and facilitate the application of regional*

resources in establishing re-introduced rhino populations and managing remnant rhino populations, and ensuring their future viability". However, to date the RRG has achieved little and been largely ineffective. It had been proposed that its role would be taken on by a refocused SADC Regional Programme, but this has not happened and at the time of writing the RRG is not operational. It had been proposed that a SADC RPRC Phase II could focus on cross boundary support and translocations into RRG countries. Suggested terms of reference for a Phase II of the SADC RPRC were designed to be complimentary to and not duplicate the work of longer established bodies such as IUCN's AfRSG, SADC RMG and SADC RESG/Interpol ECWG. It also would make sense for anybody focusing on regional translocations to also include the major SADC RMG countries with extensive rhino conservation experience and capacity (including South Africa) and which would be the source of founder rhino for re-establishment projects in other countries.

Rhino and Elephant Security Group/Interpol Environmental Crime Working Group (RESG/Interpol WCWG)

The Rhino and Elephant Security Group grew out of a Security Sub-committee of the SADC RMG. It was formed in 1989 and met regularly till 1998 when it became dormant. The group was re-launched in 2001 with new, more focused terms of reference. It also came under the SADC framework. Since 2001, to save on costs and increase sharing of information, the RESG held back to back meetings with Interpol's sub-regional Environmental Crime Working Group. The two groups recently decided to merge to form the RESG/Interpol ECWG. The overall objectives of the group are to develop guidelines, strategies and databases for the effective and efficient protection of African rhino and elephant populations, to assist the various conservation agencies, communities and private landowners to minimise rhino and elephant poaching and the illegal trade in rhino horn and ivory, and to provide advice, training and coordination. The group also promotes procedures for effective investigation and prosecution of rhino and elephant crimes. Membership comprises representatives (usually wildlife investigators or managers) of rhino conservation management agencies, specialist police units, including Interpol Environmental Crime NCB representatives, and co-opted specialist technical members as required (e.g. from TRAFFIC, AfRSG, etc.). To save on costs and increase sharing of information, RESG meetings since the group's re-launch were held back-to-back with regional Interpol ECWG meetings and in 2009 the two groups formally combined to form the RESG/Interpol ECWG with revised joint terms of reference.

Provincial Rhino Committees

Ezemvelo-KZN-Wildlife has a long established Rhino Management Group that meets regularly. Its Chair is also a specialist member of the AfRSG and he is also a member of the SADC RMG.

SANParks also has its own Rhino Management Committee which since 2007 has been chaired SANParks' General Manager: Park Planning & Development who is currently also the Chair of both the SADC RMG and IUCN SSC AfRSG. This committee meets twice a year. SANParks also has a rhino committee operational for Kruger National Park issues alone.

APPENDIX 2: CONSTANT HARVESTING STRATEGY

In the absence of significant levels of poaching South Africa will reach its carrying capacity for white rhino and this is likely to be determined by economic incentives for the private sector and communities. As the country's white rhino numbers approach the country's carrying capacity the importance of managing for growth will become less and less important. However given the current high levels of poaching persist for the period of this 5 year plan it will be essential to continue to manage populations for rapid population growth in order to increase the buffer against the effects of heavy poaching and high levels of threat. For example given a population of 18,000 white rhinos, a 7% net meta-population growth rate is equivalent to a net growth of 1,260 rhino before poaching, compared to only 540 if the underlying growth is only 3%. The loss of a 1,000 rhinos would be sustainable with a 7% underlying growth but not if growth was only 3%. This is in the absence of any understanding of any impact that hunting may have on the breeding behaviour of the species.

It has been postulated that populations of large slow growing species such as rhinos with ramp shaped production curves should be maintained about 75%-80% (at the maximum sustainable yield level) of the zero growth density (sometimes termed ecological carrying capacity (ECC)) to maintain rapid population growth (McCullough 1992, Emslie 2001ab). While the "manage at or below 7% of EEC" approach can still be used in very small populations, accurately estimating ECC is difficult. Inaccuracies in ECC estimation can result in off-takes that may not be effective. For example if the ECC of a reserve is incorrectly overestimated by a third at 100 rhino when in fact its actual ECC is closer to 75 rhino, attempts to manage this population at 75 rhino (75% of estimated ECC of 100) will simply end up managing the population at its zero growth density rather than at an intended more productive density. Habitats are dynamic and ECC can change over time requiring ECC estimates to be regularly and accurately revised under the management at or below 7% of ECC approach. This is both difficult and is more costly in the long-term.

At a RMG workshop on rhino biological management, Goodman (2001) proposed that the "manage at or below 75% ECC" approach be replaced with an easier to implement constant or set % harvest strategy. For a number of reasons, the RMG workshop went on to recommended that except for very small populations a set % harvesting strategy should become the recommended approach for keeping black rhino populations productive (Brett *et al.* 2001). This strategy forms part of the current South African Black Rhino BMP. Although primarily developed for black rhinos this recommended constant harvesting strategy also can be applied to management of white rhinos.

With Set % harvesting one simply needs to obtain reasonably accurate population estimates and to translocate (remove) a set % of the population each year or every few years for small populations. If densities are below 50% of estimated ECC the population can be left alone to continue growing and no rhino need be removed. The theory behind Set % harvesting is that provided a population is not harvested above its potential intrinsic rate of increase (r_{max}) (which for rhinos in a naturally structured population is estimated at around 8-9% (Owen-Smith 2001)), the population's density should eventually adjust to a level which can sustain that particular level of off-take. Under this strategy, assuming a constant ECC rhino density should eventually adjust to a constant level where annual removals are cancelled out by net underlying population growth rates.

The beauty of this strategy is that reliance on getting accurate estimates of EEC and regularly updating them is reduced, and the animals themselves set their productive density. If EEC (zero growth density) for rhinos changes for any reason (e.g. following vegetation succession, drought, changing competitor densities etc.) then the population should re-adjust to a new density that can sustain the given set % harvest level. Empirical support for Set % harvesting comes from the observed reduction in underlying growth in a number of populations which have been harvested at less than 5% of the population. According to the theory, all else being equal, if one only removes 1% annually ultimately one cannot expect better underlying growth than 1%. The corollary is that to achieve at least 5% growth in well-established populations, one need to remove at least 5% of the population annually.

Goodman (2001) demonstrated that off-takes under the set % harvesting strategy are also likely to be more consistent from year to year which is of practical benefit to managers and game capture teams. The strategy also has built-in safeguards to protect against over-removal and incorrect estimates of ECC and automatically can deal with changing ECC over time. Should rhino carrying capacity (zero growth density) change in an area being managed using set % harvesting, then one simply can expect rhino densities to adjust themselves to a new higher or lower level that can still support the given % removal, providing some flux to the method.

By removing at least 5% annually from established populations we are attempting to ensure that remaining animals in these populations continue to grow at least at this predetermined target rate.

The RMG biological management workshop recommendation that removals should start when the population hits 50% of estimated ECC also allows some leeway for error in initial ECC estimation. If initial EEC estimates are correct (and all else being equal); given the hypothesised ramp shape production function proposed by McCullough (1992) we could expect initial underlying population growth rates to initially exceed the 5% removal rate for the first few years (as population performance can still be expected to be on the steep part of the growth curve at this stage). For example if a 9% underlying growth rate is achieved in the first year of 5% harvesting from a population just above 50% of ECC, the net result is that overall the population size would increase by a net 4% that year (i.e. 9% net underlying growth – 5% removals). However as densities increase, eventually density dependence can be expected to start to kick in and the population should stabilise at a density whereby the removals are matched by lower underlying growth rates at the same % level. The bottom line is that, as long as one is above 50% of ECC the set % harvesting strategy can allow for equilibrium to be approached from the top and the bottom.

Managers seeking to achieve underlying growth rates in excess of 5% can consider removing more rhino (e.g. 6-7%). However, set % removals should never exceed the potential intrinsic rate of increase of 8-9%. The density at which a population can sustain a regular 7% annual harvest is likely to be a little lower than the density that could sustain a regular 5% annual harvest. One unknown in this approach is the impact of regular harvesting on the social and thus reproductive potential of the harvested population and this requires additional research.

In addition to helping keep existing populations productive, harvesting also provides rhinos that can be used as founder animals to set up new populations with the potential for rapid population growth. This of course depends upon there being sufficient suitable new homes for surplus rhinos. If due to increasing costs and risks and decreasing incentives there are insufficient suitable places to move surplus rhino, then off-take levels will have to be reconsidered. Numbers lost to poaching should also be factored in to prevent over-removal.

Harvesting is a win-win strategy, which should both maintain or enhance population vigour in the harvested population whilst also enhancing overall meta-population growth by providing surplus rhinos that can be reinvested in other new areas with potential for rapid population growth.
In summary, the main advantages of set % harvesting rate over the manage at or below 75% of ECC approach are that:

- It does not require such an accurate estimate of the ecological capacity for rhinos, removing any controversy around this idea and possible concerns about the accuracy of carrying capacity estimates.
- ECC in reality may change over time and set % harvesting automatically allows for such changes.
- Estimates of ECC no longer need to be regularly revised.
- It does not require knowledge of the density at which maximum sustained yield can be achieved for a population.
- It is a simple and applicable concept for management.
- Off-takes are likely to be more consistent from year to year making planning by management and game capture teams easier

To minimise social disruption, or in very small populations consideration can be given to taking a bigger percentage removal once every few years such as 20% every 4 years (equivalent to averaging 5%/year).
Another option for managing very small populations for growth is to continue to keep these populations at or below 75% of ECC and monitoring performance in case ECC may have been over or under estimated.

The manage at or below 75% of ECC approach to harvesting for population growth is no longer recommended for larger populations where set % harvesting should be applied.

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