

P&PS People and Park Support

SADC REGIONAL PROGRAMME FOR RHINO CONSERVATION

MAIN EXCERPTS FROM THE SADC RMG's 2002-2004 BLACK RHINO STATUS REPORT SUMMARY FOR NAMIBIA, SOUTH AFRICA AND ZIMBABWE

Keryn Adcock, June 2005
Semester 12; Task 2.4-2.2.



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MAIN EXCERPTS FROM THE SADC RMG's 2002-2004 BLACK RHINO STATUS REPORT SUMMARY FOR NAMIBIA, SOUTH AFRICA AND ZIMBABWE

Compiled for the SADC Rhino Management Group
by Keryn Adcock
June 2005

RMG

SADC RHINO MANAGEMENT GROUP



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IMPORTANT:

NOTE ON THESE EXCERPTS FROM THE SADC RMG BLACK RHINO STATUS REPORT SUMMARY (2002-2004)

Please note that these excerpts attempt to show the overall status and performance of black rhino in the 3 countries during the three summary years without giving confidential information on individual rhino area identities, locations, population sizes and area sizes.

Never-the-less, because of the highly endangered status of the black rhino, please treat the information provided here with due sensitivity for the confidentiality / security needs of the rhino areas and rhino private and government stakeholders.

1. INTRODUCTION

This black rhino status report summary for Namibia, Zimbabwe and South Africa provides:

- *a synthesis of important issues requiring action in black rhino conservation;*
- *an assessment of progress towards the national conservation goals for each subspecies of black rhino;*
- *an overview of the performance of each population and subspecies of rhino in each country;*
- *a summary of current patterns of reproduction, mortality and behaviour among the region's black rhino, and of black rhino management, monitoring and research activities undertaken during this period; and*
- *detailed syntheses of individual black rhino population performances, management and monitoring over the three-year period 2002 to 2004.*

The black rhino remains a critically endangered species. The purpose of status reporting by each black rhino population is to update and improve vital information on these animals, and so help hasten the achievement of the overall conservation goals for each subspecies as given in each country's black rhino conservation plans.

All participants in this status report summary are encouraged to understand and assess the performance of their population(s) in the context of the current overall status of each subspecies and the relative performance of sister populations.

In this way, participants can better undertake management decisions which promote progress to National black rhino conservation goals.

NAMIBIA:

Namibia is the stronghold for the arid-adapted *Diceros bicornis bicornis* subspecies, and has a national goal to develop and conserve genetically viable populations totalling at least 2000 of these rhino.

ZIMBABWE

The inclusion of much of Zimbabwe's *Diceros bicornis minor* black rhino metapopulation in regional status reporting for the first time is of particular value in our efforts to share experiences on black rhino conservation. Zimbabwe has shown longstanding innovation in its efforts to save the species and grow the national herd to at least 2000 rhino under the most difficult of circumstances.

SOUTH AFRICA

The updated conservation target for the black rhino ecotypes in South Africa are to reach genetically viable populations totalling at least 1850 *D.b.minor* and 90 *D.b.bicornis* by the year 2012 in natural habitat in the region.

The longer term goals are to attain 200 *D.b.bicornis*, and 2000 *D.b.minor* in at least 3 populations of >100 rhino and 10 populations of >50 rhino.

The *D.b.michaeli* subspecies is to be limited to one population on private land in South Africa, with excess progeny to be repatriated to East Africa.

Swaziland is also a member of the Rhino Management Group, but did not submit a status report on their population during the period under review.

Please note that Namibia and Zimbabwe wish not to publicise the numbers of black rhino in individual populations, thus each of their populations are given code numbers in the text of this report.

2. MAIN FINDINGS AND ISSUES ARISING

2.1. Summary of information on Namibian, South African and Zimbabwean black rhino metapopulations from Jan. 2002 to Dec. 2004.

The main features of each different black rhino metapopulation in Namibia, South Africa and Zimbabwe are summarized in the tables below.

These features need to be digested in light of the vital national goals for each subspecies and the need to reach these *as rapidly as possible*.

Table 2.1. Summary of the status and performance of black rhino subspecies in Namibia, South Africa and Zimbabwe. *Note: Past imprecise population estimates for Namibia's S1-E population, the lack of proper population estimates for Kruger National Park (South Africa, D.b.minor), and for some of Zimbabwe's D.b.minor populations, make these metapopulation growth rates rough estimates only.*

Metapopulation:	NAMIBIA		SOUTH AFRICA		ZIMBABWE	
	<i>D.b.bicornis</i>	<i>D.b.bicornis</i>	<i>D.b.michaell</i>	<i>D.b.minor</i>	<i>D.b.minor</i>	
Avg. Annual Growth Rate	Est. 4.8%	9.4%	2.9%	Est. 3.8%	Est. 1.9%	
Metapopulation Total '04	1023	75	39	1227	563	
Total # of populations	23 breeding	4 breeding	1 breeding 1 confined	32 breeding 8 male-only	13 breeding	
Year Metapopulation Target Reached at Current Growth	2000 rhino in 2019 (15 years)	90 rhino in 2 years, 200 rhino in 2015 (11 years)	No goal	1850 rhino in 2016 (12 years) 2000 rhino in 2018 (14 years)	2000 rhino in 2072 (68 years)	
BREEDING POPULATIONS MEETING PERFORMANCE TARGETS: Number (and %)						
with 5%+ Growth	12 (50%)	3 (75%)	0 (0%)	State 6 (40%) Private 6 (43%)	5 out of 5 (avail. data Lowveld)	
with <4% Mortality	18 (75%)	4 (100%)	2 (66.7%)	State 9 (60%) Private 11 (79%)	4 out of 5 (avail. data Lowveld)	
with >=33.3% Adult Females calving per year	8 (33.3%)	3 (75%)	0 (0%)	State 4 (27%) Private 4 (29%)	0 out of 4 (avail. data Lowveld)	
Numbers of Translocations, New Populations, and AfRSG –rated and Key / Important Populations						
Translocations '02-'04	61	10	12	87	47	
new populations '02-'04	7 (29 rhino)	1 (5 rhino)	0	Breeding 8 (58) Males 5 (11 rhino)	1 (46)	
Number of Key 1, 2 & 3 popns	2			5	3	
Number of Important popns	3	2	1	3	7	
Number of Populations (and Black Rhino) by Land Ownership						
State Land	4 (729)	3 (55)	1 (2)	18 (1068)	4 (153)	
Private Land	18 (147) (custodianship)	1 (20)	1 (37)	21 (158)	9 (410) (custodianship)	
Communal Land	1 (146)	0	0	1 (1)	No info.	
TOTAL	<i>23 popns</i>	<i>4 popns</i>	<i>2 popns</i>	<i>40 popns</i>	<i>13 popns</i>	

Table 2.1 continued. *Note: mortality and calving data exclude South Africa's Kruger National Park, for which no data were provided. *Excludes HUP missing calves*

MORTALITY & CALVING	NAMIBIA	SOUTH AFRICA (excl. Kruger NP)	ZIMBABWE
Most Frequent Causes of Death (% of deaths)	Fighting: 13% Accident/Injury: 13%	Fighting: 21% Missing, Pres. Dead: 8%*	Poaching/snaring etc. 33% approx. Fighting: 6%
# of black rhino poached '02 to '04	0	5	37+
Annual % Infant (0-1 yr) mortality	2%	9.8%	No info.
% Capture & Translocation mortalities	4.9%	7.2%	1.9%
Average Observed Inter-Calving Interval	<i>D.b.bicornis</i> : 2.8 years	<i>D.b.bicornis</i> : 2.1 years <i>D.b.michaeli</i> : 4 years <i>D.b.minor</i> : 3 years	Approx. 2.7 years
Average Observed Age at First Calving	7.5 years	7.7 years	Approx. 7.3 years

2.2. Issues, opportunities and threats

1. Hunting of black rhino

In October 2004, the 13th CITES (Convention for the International Trade in Endangered Species) conference passed separate resolutions involving Namibia (*D.b.bicornis*) and South Africa (*D.b.minor*) to allow the trophy hunting of 5 male black rhino in each country.

Despite heart-felt objections by many NGO's and individual conservationists about the ethics, wisdom and ability to control the hunting of such endangered and charismatic animals, the majority of conservationists felt that the limited hunting of black rhino should bring about a win-win situation.

With limited hunting, rhino guardians (owners, custodians, communities and State conservation authorities) can generate much needed income towards monitoring, managing and protecting these animals; while increasing to options for removal of surplus male black rhino to the benefit of :

- reducing intra-specific fighting,
- reducing inbreeding
- maintaining female calving productivity/survival, and
- ultimately increasing national metapopulation growth.

From the private owner, community owners and custodians, the revenue generated would assist in maintaining the financial sustainability of holding and caring for black rhino populations on their land. *This should be seen in the light of massive pressures in Namibia and South Africa to turn more land to agricultural produc-*

tion, usually to the exclusion of wildlife.

DEAT issued a call to provinces for applications to trophy hunt black rhino in January 2005, unfortunately in several cases this did not reach the proper conservation people in time both for comment on permit issue criteria and to send to interested parties (potential applicants) before the quota was assigned by DEAT.

While black rhino hunting is an important opportunity in this species' conservation, there are also threats. It should not be underestimated how much the eyes of the world are on us to ensure that hunting is carried out ethically and to the benefit of black rhino conservation and increase.

The African Rhino Specialist Group proposed i) a set of criteria for assessing eligibility to be considered for a hunting quota,; ii) a transparent system to allocate the quota, and iii) an auditable control system.

Namibia included similar criteria in their CITES hunting proposal. All black rhino are under the authority of the Namibian MET which will oversee the hunting; while Namibia also has a Game Produce Trust Fund which will ensure the funds return to black rhino conservation within the relevant State and Community or Custodian populations.

However, *in South Africa we believe there are gaps in the quota allocation process which are possibly a threat to the intention and spirit of the black rhino hunting decision.*

We would like RMG member organizations and individuals to urge DEAT and concerned conservationists to consider the AfrSG recommendations which we believe will help ensure

that black rhino hunting is done in the best possible manner. We particularly have to guard against bad practices such as the limited quota going to put-and-take hunting, hunting in non-viable and non-breeding populations, and speculation in male rhino for purposes of profit without direct benefits to viable black rhino breeding programmes. *The issue of hunting in male-only populations on an arbitrary basis is not sanctioned by any serious rhino conservationist. These and related issues obviously need to be tackled within the rhino community and DEAT.*

Summary of relevant AfRSG recommendations on black rhino hunting:

From Leader-Williams et al. (2004) "Trophy hunting of black rhino *Diceros bicornis*: proposals to ensure its future sustainability" (see refs.)

The quota allocation process must...

- Ensure that any offtakes are biologically sustainable and based on good monitoring;
- Ensure that there is no discrimination between State and private sector applicants;
- *Reward good biological management and long term commitments to black rhino conservation;* and
- ensure that appropriate internal and external controls are in place.
- State agencies proposing to hunt should demonstrate that the funds generated will be reinvested into rhino conservation

An allocation system is proposed that combines a process of initial screening with a weighted lottery.

An international auction of the hunts is also proposed once quotas have been allocated, to ensure maximum prices are obtained.

Towards these ends, in identifying suitable rhino...

- Preference for hunting should be given to geriatric or post-reproductive males.
- Males > 7 years old can be hunted where they have fought excessively, broken out, disrupted the existing social structure, or have been the main contributor to breeding for many years in a small population.

The proposed male to be hunted should...

- have been on the property for a minimum of 3 years in a breeding situation (to promote long term commitment by the private sector to breeding goals); and
- constitute no more than 15% of the population.

For eligibility to qualify for entry to hunt the lottery:

The population where the hunting is proposed should...

- be a breeding population larger than 6 individuals;
- have a natural habitat ecological carrying capacity of more than 10 black rhino;
- Have no fewer than 1 male to 3 females; and
- be free ranging, with strategic food supplementation only.
- The population concerned should submit annual black rhino status reports to the Rhino Management Group showing adequate monitoring and population knowledge, and owners should willingly participate in black rhino metapopulation conservation efforts.

The quota allocation lottery should be a transparent process based on a system of non-transferable, individually identifiable tickets assigned to individual rhino candidates (a one-time non-refundable levy is proposed to cover costs of running the lottery and screening the populations by the RMG). Each rhino will be allocated a number of tickets according to the size of the host population (see below). Once a rhino on a property has been drawn, its remaining tickets are removed from the lottery before the next draw.

No. of Tickets	Population Size
1	7-15
2	16-30
3	31-50
4	>50

Regarding controls:

- The South African conservation authorities and interested parties should develop a generic code of conduct for the hunting industry giving guidelines for hunting of black rhino.
- DEAT should demonstrate it is obtaining accurate information from provinces regarding black rhino sales and hunts, as well as keeping track of inter-provincial movements and exports of live rhino and trophies.
- The effectiveness of the CITES permit issue system should be subject to external audit by TRAFFIC.

2) *Increased threats to Zimbabwe's black rhino: Mandatory sentences for rhino crimes have been dropped.*

In 2004, a person involved in a SA / Zimbabwe cross-border smuggling syndicate was captured red-handed for horn dealing. Wildlife authorities assumed he would get the mandatory 5 year jail sentence, but he was convicted and released after only 6 months. In appealing against his trivial sentence it was discovered that the Zimbabwean mandatory sentences for rhino crimes have been dropped.

The Letter from Attorney General's office in response to the appeal was: "It is pertinent to note that offences for contravening Section 45 of the Parks & Wildlife Act no longer provide for minimum and maximum mandatory sentences. This is by virtue of amendment of the Act and many others by the Criminal Penalties Amendment Act (No. 22/2001). It therefore means that the courts have jurisdiction to impose penalties they feel appropriate. It is an established principle of sentencing that imprisonment is reserved for serious offences and repeat offenders....." (Clearly, the court and prosecutor did not regard this as a serious offence).

The RMG is therefore urged to work quickly through SADC to make representation to the Zimbabwean government to re-instating previous legislation with regard to rhino crimes.

This retrogressive step in legislation is a major threat to all the gains that Zimbabwe has made in saving their rhino from extinction from poaching. In recent years, cross-border poaching from Zambia has seriously affected one State population. Cases of local Zimbabwean involvement in poaching have also occurred there recently. As yet, full-scale, deliberate poaching of rhino in conservancies has not materialized but if no heavy penalties result, criminals may see this as being now worthwhile. Full support needs to be given to conservationists in that country to handle the situation.

3) Several potentially large black rhino populations have been created

Several additional large land areas became available to black rhino conservation during this summary period. The new areas which have potential for more than 50 black rhino are listed on the right:

Namibia:

P15-Eh (350 km²) custodian area

Namibia is the country in most need of working towards finding even more large areas that have the capability to protect and carry >50 black rhino. It is likely that none of the smaller new rhino custodian areas created during this period have capacity for more than 20 rhino, due to the aridity of most of the country.

South Africa:

P17: 346 km² private

WSNR: 346 km² State

(World Heritage Site)

P15: 182 Km² private/partnership*

*Part of the WWF / EKZN Wildlife Black Rhino Range Expansion Project: see box on next page

P19: 170 Km² private / partnership*

Zimbabwe

L-B2a: 2,300 km² conservancy

New Breeding Populations:	Namibia	S.Africa	Zimbabwe
Total Km ² Newly Available Land	770 km ²	1,509 Km ²	2,500 km ²
V. Rough Overall Carrying Capacity Estimate	115 rhino	275 rhino	450 rhino
CC Range + or—(rhino)	+ or - 40	+ or - 60	+ or - 85
Rough Net Density (Rhino per 10km ²)	1.5	1.8	1.8

The WWF / EKZN Wildlife Black Rhino Range Expansion Project:

The black rhino range expansion project got underway during this summary period. P15 becoming the first recipient of black rhino in this historic partnership between State (EKZN Wildlife) and private sector in KwaZulu-Natal.

The way it works is that EKZN Wildlife places a founder group of black rhino on the partner's land. EKZN Wildlife retains ownership of these founders, but half of the offspring become the property of the private landowner(s) and EKZN Wildlife retains ownership of the other half. The landowners have contractual obligations to protect the rhino, employ a certain density of game guards trained to specified standards, install and maintain fencing to specified standards, and to monitor and report on the population in detail.

Once the population builds up to 75% of the estimated carrying capacity of the area, removals can begin, thus increasing regional rhino numbers progressively.

The aim of the Black Rhino Range Expansion Project is to increase numbers of black rhino by increasing the land available for their conservation, thus reducing pressure on existing reserves and providing new territory in which they can breed up quickly. It does this by identifying large pieces of land with an ecological carrying capacity of 50 or more black rhino on which a viable founder population of about 20 rhinos can be released. To reach this, neighbouring landowners usually have to remove internal fences, thus consolidating smaller pieces of land into more ecologically viable blocks and benefiting many species besides black rhino.

P19 will become the second area in this range expansion programme, and will receive breeding groups in 2005 (they currently have 1 male black rhino).

The next phase of the project will involve community land areas in Zululand. In some cases, community land claims involving several farms have raised the opportunity to consolidate land and bring much needed community involvement in black rhino conservation.

With time, depending on the availability of rhino for removal, and if the project continues to receive donor support, partnerships can be created with landowners in other provinces and even other countries.

(For information: Jacques Flamand, 082 7059710)

4) *D.b.minor* metapopulation growth is still slow in South Africa, but performance among some private black rhino populations improves.

From 1997, estimated *D.b.minor* metapopulation growth has been below the minimum acceptable 5% per year. Problems in EKZN Wildlife areas (identified in 1997 and still prevailing in 2004) have had the biggest effect in slowing overall growth. Each of these areas has its own issues which are discussed in later sections.

Slow growth in most private *D.b.minor* areas has also been problematic, but several of these populations showed far better performances during this summary period. Private net contribution to this subspecies has not yet been significant, but will become so if their new growth rates can be sustained. The new populations created during this period should also begin to contribute, provided landowners make the maximum of land available. *Some owners have restricted the new rhino to small sections, which could soon become problematic from a browse and rhino territorial perspective.*

GFRRRC, PNP and MDGR showed the best growth rates among larger populations of this subspecies this period.

5) KNP plans improved estimate with park-wide black rhino block count.

The KNP black rhino population status remains the biggest question mark in the region. Good news is that staff are planning to undertake block counts for black rhino as has been done in Namibia's S1-E Park with good success. *This action should receive a high priority in the region's black rhino agenda, and we look forward to seeing the results.*

6) Greater inputs are needed to improve or maintain knowledge on some black rhino populations.

State rhino areas in all three countries have struggled to maintain population monitoring standards due to staff reductions, staff turnovers and budget restrictions in their state conservation agencies. Some Private areas have also battled to maintain adequate levels of monitoring. The following is recommended to both the State and private rhino areas to address monitoring needs:

Management teams in each area should carry

out **needs assessments**, to determine what it will take to maintain or improve knowledge of their rhino population. This should cover

- staff training in field monitoring and information handling aspects,
- field and information-handling manpower
- Field and data-handling equipment needs.
- Decision-makers within conservation organisations need to understand their responsibility to black rhino conservation, and take the necessary steps to ensure adequate staffing and operational budgets for black rhino monitoring, security and management, remembering that the increased benefits to black rhino also accrue to many other species in the protected area.
- Where critical resources cannot be allocated to rhino monitoring, support from outside agencies should be sought. This could be in the form of training, personnel to undertake special intensive surveys, or funding for equipment or specific activities.
- The RMG should compile and maintain a list of potential funding organizations, specialized rhino monitoring / security trainers and available resources, training material or courses for use by rhino areas in need of input. This could be made available to all RMG black rhino areas via an internet website.
- To assist owners of private land rhino areas in managing population performance information requested by the RMG, easy-to-use databases should be provided by the RMG (e.g. the SADC Wildb database and / or a simple spreadsheet database for summarizing vital population history, calving, mortality and other event data for small populations).

Areas which need additional inputs to help maintain or improve knowledge of their populations include South African State areas: KNP, MNP, Nyati section of AENP, sections of GFRRC, MDGR, OGR, HiP, MGR, ESNR, NGR, and TGR. South African Private areas: P9, P7.

Namibian State areas: S1b-K; Namibian Custodian areas: (large areas where monitoring is more difficult) P3-Ns, P6-Ed; P7-Er, P8-Ogv; P15 –Eh.

Zimbabwean State areas: S-S1; S-C1; S-Mt1, S-Md1; Zimbabwean Conservancies: L-B1, the new L-B2? possibly some midlands conservancies?

Such support would include (where necessary) intensive surveys, ear-notching programmes, actions to increase field-ranger monitoring training, and more active support for monitoring from higher-

level conservation staff.

6) Specific habitat assessments for black rhino are needed in some areas.

Due to concerns about underlying habitat suitability and/or possibly high rhino or other browser stocking levels, proper assessments of habitat conditions are needed in some black rhino areas. These include: P12, P9, IGR, TGR, NGR, (plus ESNR and WSNR for minerals in particular). Current male areas TDRNR, SNR, and other Free-State areas should be professionally re-evaluated if female introductions are being considered.

Nambia's S1b-K and P2-Okg areas should also have detailed habitat assessments undertaken, but for different reasons. These areas have consistently produced very good black rhino performances, and a better understanding of the habitat feature that have allowed this would be of great value.

7) Black rhino resources are available to assist all black rhino areas.

For items a)-d) below contact Dr Richard Emslie, African Rhino Specialist Group tel: (S. Africa) 033 3434065 e-mail: emslieratfrsg@telkomsa.net

a) Conservation Plan for the black rhinoceros *Diceros bicornis* in South Africa (2005). This plan is currently being revised and will be sent to all black rhino owners/authorities in SA later in 2005.

b) Proceedings of a SADC Rhino Management Group (RMG) workshop on Biological Management to meet continental and national black rhino conservation goals 24-26 July 2001. Compiled by Richard Emslie. SADC Regional Programme for Rhino Conservation

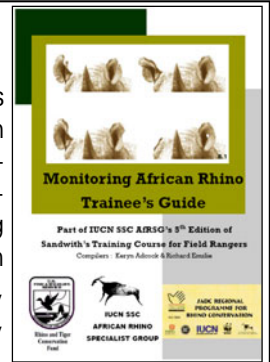
Covers: Background Strategic planning issues and fundamentals of black rhino population biology and management; Case studies; Workshop results on Monitoring population performance; Monitoring resources; Approaches to harvesting.

c) Wildb Database: Manages information on individual rhino sightings/events, individual animal identification features and histories. Produces summary tables on population features over requested time periods.

d) Black Rhino Management for Private Landowners in South Africa: An Introductory "Rhino Management Group" Guide (2001).

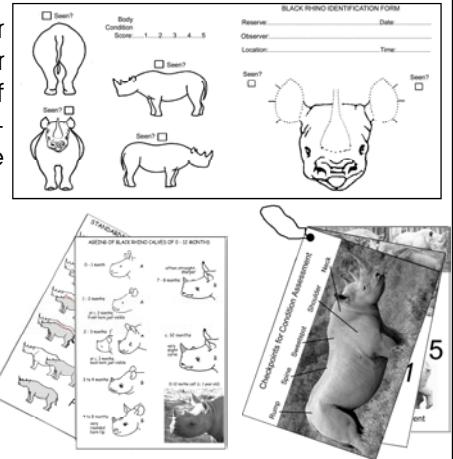
Monitoring African Rhino: The IUCN SSC African Rhino Specialist Group's Revised "Sandwith" Rhino Monitoring Course

This modular course provides the necessary information, suggested training methods and visual material (60+ posters, trainee and field booklets) for training field rangers in the monitoring of free-ranging black and white rhino populations: Module 1 Conservation Background, Module 2 Black Rhino Biology, Module 3 Patrol and Tracking Techniques/ Approaching Rhino on Foot, Module 4 Map Work and GPS, Module 5 Using Binoculars, Module 6 Ageing Rhino, Module 7 Sexing Rhino, Module 8 Identification Features - Ears, Module 9 Clean Rhino, Module 10 Identification Features - Horns, Module 11 Identification Features - Body Scars; Use of the Field Recording Notebook, Module 12 Rhino Condition Assessment.



The course can be taught over a number of days, or over a longer period one or two modules at a time (during on site training days or afternoons). The course helps ensure and promote standardization of data collection across the African continent especially regarding ageing and condition assessment systems which enable results to be compared between parks as well as countries.

- Courses using trained instructors can be arranged for groups of staff from interested rhino areas. Alternatively training material can be obtained on CD which will need to be printed and implemented by relevant rhino owners/custodians.
- Contact Dr Richard Emslie, African Rhino Specialist Group tel: (South Africa) 033 3434065 e-mail: emsliafrsg@telkomsa.net



SCENE OF THE CRIME TRAINING COURSE

This course is run by a professional Wildlife Investigator, and can be arranged for a group from interested landowners/custodians. The main focus is what to do and what not to do when a rhino crime event occurs (i.e. a rhino is poached), with associated before and after aspects also covered. Subjects include:

First person on a crime scene (what to do/not do); Improving personnel observational skills; Report writing, Statement taking; Exhibit collection; Presenting evidence in court; Working with police and prosecutors. There are also modules on Advanced investigation and Rhino horn identification.

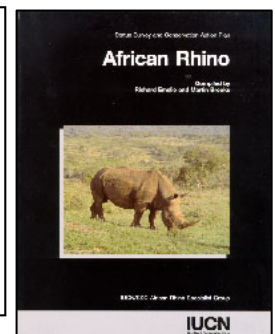
Contact: cell: Rod Potter (South Africa) 082 772 8343 e-mail: rodpotter@absamail.co.za

Later in 2005, the following database systems will be completed and can be made available to interested rhino-holders: **Wildlife Investigator Database**. This manages information on suspected and actual wildlife crime incidents. **Microtrack Database**. This manages microchip transponder information, allowing tracking of microchip transponder inventories and deployment and easy tracing of rhino identities in the event of deaths or horn recoveries. Contact: Rod Potter, details as given above.



African Rhino - IUCN SSC African Rhino Specialist Group Status Survey and Conservation Action Plan (1999)—> download from <http://www.rhinos-irf.org/technicalprograms/afesg/index.htm>

<—Papers from Pachyderm (Journal of IUCN SSC African Rhino, Asian Rhino and African and Asian Elephant Specialist Groups) giving latest continental rhino statistics and trends. Other scientific papers on rhino in Africa and Asia also appear. download from <http://iucn.org/themes/ssc/sgs/afesg/pachy/index.html>



Visual Assessment of black rhino browse availability (Manual). Training manual and field procedures/data sheets for the standardized surveying and assessment of black rhino browse availability. Contact : Keryn Adcock tel: 033 3434065 e-mail: keryna@telkomsa.net. Training courses can be arranged on request.

The updated **SADC RMG Black Rhino Carrying Capacity Manual and Model V.2.** will be available from Keryn Adcock at the end of 2005.

2.3. Major achievements in black rhino population and individual female performance.

Best performing black rhino populations

Namibia:

P2 Okg (Custodian population)

Initiated 1993 with 2 males and 4 females (3 of which were subadult). Zero mortality rate, 15 calves produced, 12 rhino donated to start new populations.
19.9% growth achieved from '02 to '04.

South Africa:

GFRRC—SK (Eastern Province State Population)

Initiated 1986, 28 rhino introduced over 11 years, 62 calves born versus 16 deaths in 18 years.
12.1% growth achieved from '02 to '04.

Zimbabwe:

L-B1 (Conservancy population)

No details available before 2002. During 2002 to 2004:
land available to rhino halved by land occupations,
27 calves produced, 4 rhino poached, 46 removed.
12.9% avg. ann. growth achieved under the most difficult circumstances.

FEMALE LIFETIME ACHIEVEMENT AWARDS:

Rhino Area	Female	Rank	Age at First Calving	Avg. ICI	First Calf	No. of Calves	Most Recent Calf	Years of calving	Calves died young?	Average Annual Rainfall
AFNP/AENP	Blompot	1		1.9	Oct-87	10	Oct-04	17.0		100/484
PNP	13 Dongalina	2		2.4	Feb-86	8	Oct-02	16.7		630
GFRRC	Nodwebile	3	7.6	2.4	Feb-90	7	May-04	14.3		398
C1-K	Z3-21 Matilda	4	+7	2.5	Jan-87	7	Dec-01	14.9		110
PNP	18 Dengezi	5		2.8	Jun-83	8	Jan-03	19.5		630
C1-K	Z5 +02 Tina	6	13?	2.8	Jun-85	7	Apr-02	16.8	1	110
AENP/P2	Vega	7		2.9	Mar-86	7	Oct-03	17.6		484/485
S2-W	13F	8	+7	3.0	Jan-86	7	Dec-03	18.0	1	370
PNP	27 PigaPicha	9		3.0	Feb-82	7	May-00	18.3		630
C1-K	Z7 82 Verity	10	13?	3.1	Jun-85	7	Mar-04	18.8	2	110
PNP	9 Gijima	11	7.5	3.2	Jan-84	7	Jun-03	19.5		630
C1-K	Z1-5 Suzi	12		3.4	Aug-83	7	Jan-04	20.5	2	110
						Total	89		Died young: 6	

3. METAPOPOPULATION STATUS AND TRENDS BY COUNTRY

Each black rhino population can be seen as part of a greater metapopulation of each subspecies within (and indeed, between) countries.

Achieving rapid metapopulation growth is the underlying rationale for black rhino management in each rhino area, for the creation of new populations, and for the translocations that take place between rhino areas.

Rapid metapopulation growth is required to ...

- ***conserve genetic diversity in black rhino***
- ***build numbers up to viable long term levels***
(= metapopulation goals)



The *minimum* desirable growth rate is 5% per year

Each population and metapopulation should aim to achieve growth in excess of this.

3.1. Metapopulation growth rates and time to achieve conservation goals

Namibia : *D.b.bicornis*:

A national total of 1 023 was estimated for Namibian *D.b.bicornis* in 2004.

Over the last 3 years, the main Namibian population S1-E has been refining methods to estimate population size and structure. This resulted in 2004 S1-E population estimates of around 664 black rhino, slightly lower than *the 2001 estimate of 700 which is believed to be an overestimate*. This adjusted estimate made it impossible to calculate the '02 to '04 Namibian *D.b.bicornis* metapopulation growth directly.

A revised estimate of metapopulation growth was therefore made using the S1-E growth rate from 1996 to 2004, C1-K growth rate from 2002 to 2004, and S1b-K + Custodian population average annual growth of 6% over this same period, as shown at right. Therefore an estimated annual metapopulation growth rate of **4.8%** was achieved from January '02 to December '04.

C1-K	S1-E	Custodian + S1b-K
Current Average Annual Growth		
2.40%	5.10%	6%
Avg. Population Totals, '02 to '04		
143	664	147
Proportion of Metapopulation		
15%	70%	15%
Component of National Avg. Growth Rate		
0.40%	3.50%	0.90%
Total National Avg. Growth Rate :		4.8%

Overall, this summary period saw a slowing in the growth of several populations. Higher mortality rates from a variety of accidental causes or disease seemed to play a role, along with severe dry conditions in some areas.

Several new population were started, including one in a large custodian area. However new properties were of smaller size *on average* than in previous years. These may in future require greater manipulation and present challenges to maintaining overall growth in Namibia.

More details are given in later sections.

At this rate, the target of 2000 black rhino will be achieved by 2019

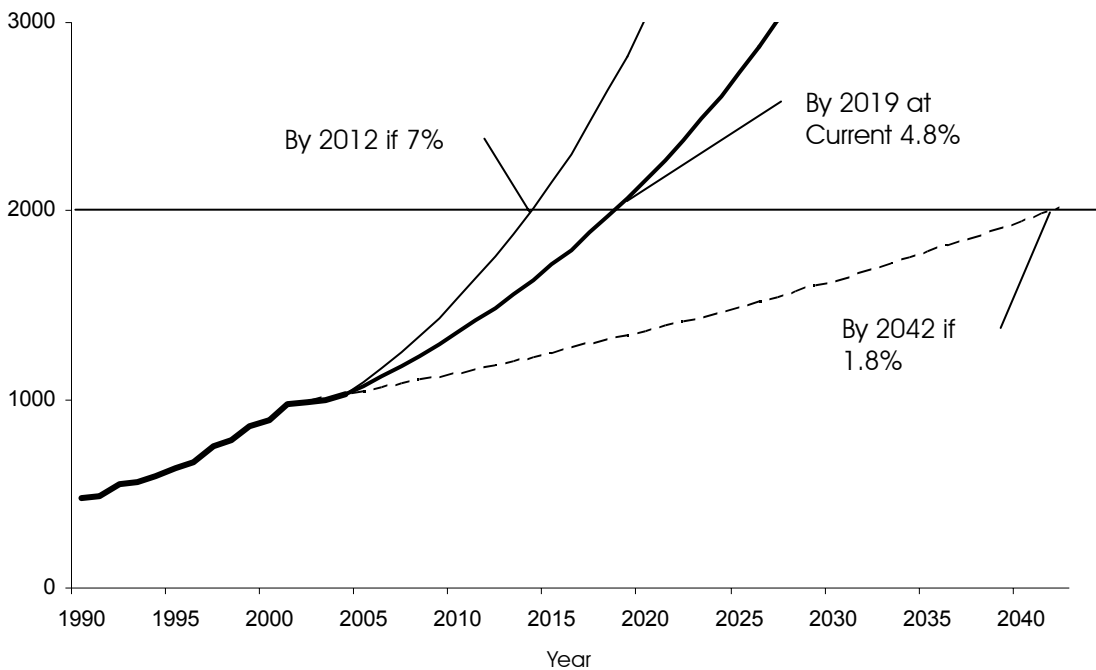


Figure 3.1. *D.b.bicornis* population increase in Namibia, and projected time to reach the national metapopulation goal of 2000 given the current estimated annual growth rate.

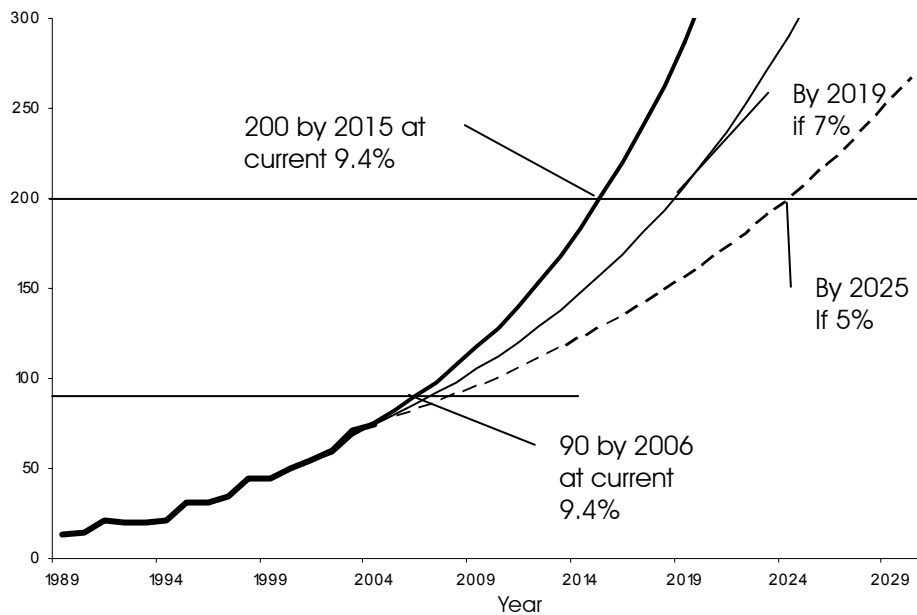
South Africa : *D.b.bicornis*:

The goal for this subspecies is a minimum of 200 animals in South Africa. The country had a total of 75 *D.b.bicornis* by December 2004, with Namibia contributing 4 animals to SANParks in 2003. This was to assist with increasing founder numbers and the genetic base for the subspecies in this country.

This subspecies was the best-performing in South Africa, with the 3 established populations contributing sound growth towards the national total. The females of the privately owned P1 population in particular calved well this period. The high mortality rates in AENP during the '99-'01 summary period have not been repeated, and the rhino there have settled and bred well. Only the newly-established MZNP population had difficulties, with male aggression to females resulting in removal of the only breeding bull.

Avg. Annual Growth rates, '02 to '04

VNP	8.7%
AENP	9.3%
MZNP	0.0%
P1	12.6%
SA <i>D.b.bicornis</i>:	9.4%



If the current growth rate of 9.4% per year can be maintained, the time linked goal of 90 *D.b.bicornis* will be achieved ahead of time, by 2006 instead of 2012.

200 *D.b.bicornis* will be achieved in 2015 at the current growth rate.

Figure 3.2. *D.b.bicornis* population increase in South Africa, and projected time to reach the national metapopulation goal of 200 given the current estimated annual growth rate.

South Africa : *D.b.michaelli*

The process of translocating the *D.b.michaelli* from AENP and KANP to private reserve P2 was nearly completed this period, but for 2 animals out of 39 for the subspecies. The stage-by-stage removals have taken their toll on overall growth in this subspecies, partly with the loss of at least 1 calf during the moves, and partly (it is surmised) because females spent so much more time without males to cover them during the whole process.

South Africa no longer has a national goal for *D.b.michaelli*. These animals will contribute to East African rhino programmes where possible.

Avg. Annual Growth rates, '02 to '04

AENP	0.0%
P2	4.9%
SA <i>D.b.michaelli</i>:	2.9%

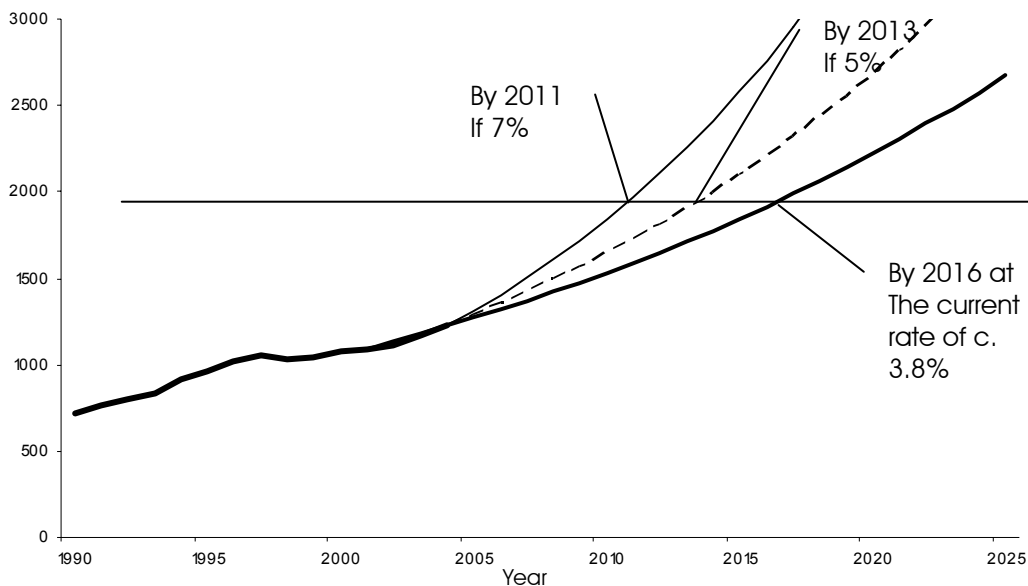
South Africa : *D.b.minor*

With no formal population surveys in Kruger National Park, and possible uncertainties in the important HIP estimate, the *D.b.minor* average annual growth rate estimate of 3.8% is only approximate.

An estimated 1227 of this subspecies occurred by Dec. 2004. Outside of KwaZulu-Natal, where some populations have had severe difficulties this summary period, State populations have performed very well. The privately held populations have also on the whole shown improved breeding and lower mortality rates. Recently created populations in large areas in KZN and Limpopo should show dividends in the next few years, at a time when improved information for the two largest SA populations should also become available.

Avg. Annual Growth rates, '02 to '04

Eastern Province	12.1%
EKZNWildlife	-1.4%
SANParks	pres. 5%
North West PTB	12.6%
Limpopo DFED	11.2%
Free State DTEEA (males)	0.0%
Private	6.6%
SA <i>D.b.minor</i>:	3.8%



The time-linked goal of 1850 *D.b.minor* will not be reached by the target date of 2012 at current estimated growth rates. It will be reached in 2016.

Figure 3.3. *D.b.minor* population increase in South Africa, and projected time to reach the national metapopulation goal of 2000 given the current estimated annual growth rate.

Zimbabwe : *D.b.minor*

Details of past black rhino numbers in Zimbabwe were not available for this summary. The 2004 national population estimate is 563 black rhino. This makes use of 2003 estimates for 4 of the 13 populations. An **estimated national growth rate of 1.9%** for this period was calculated as shown on the right. Poaching in the main State Intensive Protection Zone and snaring problems in conservancies were the primary detrimental influences on the metapopulation.

At this average annual growth rate, Zimbabwe will take 68 years to reach its national goal of 2000 *D.b.minor*.

State areas	Lowveld Cons.	Midlands Cons.
Estimated Avg. Ann. Growth Rates		
-5.40%	7.25%	-1.60%
Population		
153	291	119
Proportional Contribution to Total		
27%	37%	37%
Contribution to National Growth		
-1.5%	3.7%	-0.3%
Overall National Growth:		1.9%

3.2. An overview of populations and translocations of black rhino

Namibia : *D.b.bicornis*.

By December 2004, Namibia had a total of 1022 black rhino in 23 populations (in 1989 there were 421 rhino in 3 populations).

Seven new populations were successfully initiated in 2002-2004, while another new population introduction attempt failed due to severe dry conditions (S5-N).

Namibia translocated 61 black rhino over this summary period, compared to 32 in the previous period.

Land Ownership:	Number of Populations	Number of Rhino
Communal	1	146
State	4	729
Private	18	147
Total	23	1022

SUMMARY OF NAMIBIAN *D.b.bicornis* TRANSLOCATIONS:

State areas S1 and S1b to Custodian areas: 33

Other State areas to Custodian areas: 7

Custodian to Custodian: 15

Custodian to State:: 2

State to South Africa: 4

*29 Black Rhino to
7 new populations*

South Africa : *D.b.bicornis*:

75 *D.b.bicornis* occurred in 4 populations in South Africa by 2004, as shown in table 3.5

One new population was initiated in the Mountain Zebra National Park in 2002.

Ten rhino of this subspecies were translocated, all into State areas (table 3.3). Four of them were *D.b.bicornis* received from Namibia in return for rhino promised to Botswana by Namibia, which needed to be the *D.b.minor* subspecies.

Land Ownership	Number of Populations	Numbers of Rhino
SANParks	3	55
Private	1	20
Total	4	75

SUMMARY OF SOUTH AFRICAN *D.b.bicornis* TRANSLOCATIONS:

Namibia to State: 4

State to State: 6

5 Black Rhino to 1 new Population: 5

South Africa : *D.b.michaelli*:

D.b.michaelli in South Africa comprised 39 animals in two population by December 2004 (table 3.6)

All but 2 animals were translocated from Addo sections to the private area, and two zoo animals were received there in 2004 (table 3.4).

Land Ownership	Number of Populations	Numbers of Rhino
SANParks	1	2
Private	1	37
Total	2	39

SUMMARY OF SOUTH AFRICAN *D.b.michaelli* TRANSLOCATIONS:

State to private: 10

UK Zoo to private: 2

No new populations

South Africa : *D.b.minor*

SUMMARY OF SOUTH AFRICAN *D.b.minor* TRANSLOCATIONS:

North West Parks :

12 rhino to 2 private areas

Ezemvelo KZN Wildlife:

11 rhino to 2 State areas

15 rhino to 1 State—private partnership programme

16 rhino to 6 private areas

Total : 45

Private:

All 17 to 7 private areas

SANParks:

4 rhino to Botswana

5 rhino to Zambia

8 to 2 private areas

1 to 1 State area

Other

87 *D.b.minor* translocations occurred in South Africa from '02 to '04. Two new State and 10 new private populations were set up. 7 Male-only populations existed by 2004.

	Number of Populations	Number of Rhino
Eastern Prov. NC	1	100
EKZN Wildlife	10	452
SANParks	2	396
North West PTB	2	106
Limpopo Prov. DFED	1	11
Free State DTEEA	2	4
Private	20	157
	37	1226

Zimbabwe : *D.b.minor*

Zimbabwe black rhino numbered an estimated 563 in 2004. Over half the rhino are in custodianship on private land, and two such private custodian black rhino areas have status as KEY populations.

47 translocations took place, from one lowveld conservancy to another.

Land Ownership	Number of Populations	Numbers of Rhino
State	4	153
Private	8	380
No Owner	1	30
Total	13	563

3.3. AfRSG-rated Key and Important black rhino populations

Key populations (*critical* for the wider survival of the subspecies)

Key 1: >100 *trend stable or increasing*

D.b.bicornis

Namibia

S1-E, also >50% of subspecies

C1-K

D.b.minor

S. Africa

HiP

KNP

GFRRC

Zimbabwe

Lowveld S1

Key 2: 51-100 *trend stable or increasing*

D.b.minor

Zimbabwe

Midlands MGD1

S Africa

PNP

MGR

Key 3: >50, trend decreasing

D.b.minor

Zimbabwe

Lowveld B1

State S1

Important populations (important for the wider survival of the subspecies)

Imp.1: 20-50 *trend stable or increasing*

D.b.bicornis

Namibia

S2-W

S1b-K

P7-Er

S. Africa

P1

Addo ENP

D.b.minor

S. Africa

IGR

MDGR,

MNP

Zimbabwe

Lowveld C1

State MT1

State MD1

Lowveld C1

Lowveld M1

Lowveld B2

D.b.michaeli

S. Africa

P2

Imp.3: trend decreasing, but 20-50 in breeding contact in a protected area

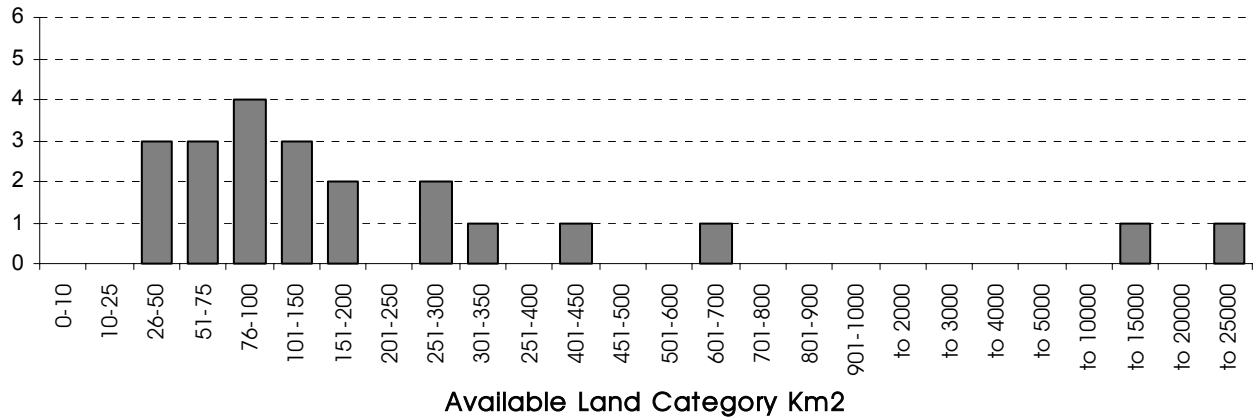
D.b.minor

Zimbabwe

Midlands G1

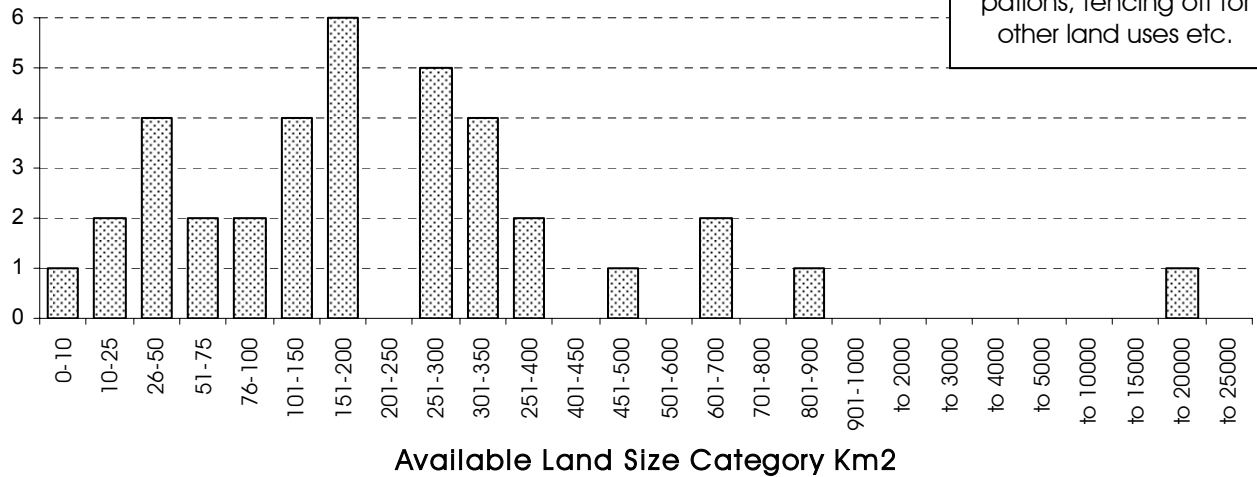
3.4. Available land areas for black rhino in Namibia, South Africa and Zimbabwe

Not all land within a given property is available to black rhino. Below is the frequency distribution of available land size classes in the 3 reporting countries.

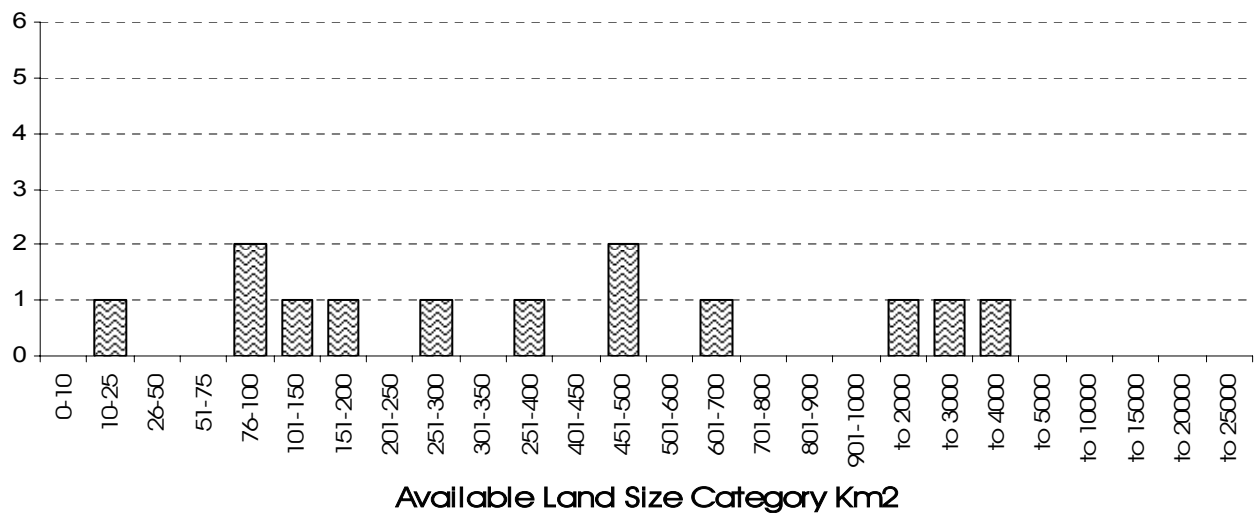


■ Namibia

Reasons for unavailable land include dams, pans, steep terrain, land occupations, fencing off for other land uses etc.



▨ South Africa



▩ Zimbabwe

Figure 3.3 The Number of populations in different available land size categories in Namibia, South Africa and Zimbabwe., as of 2004.

4. SUMMARY OF POPULATION PERFORMANCES

This section summarises the main information relevant to understanding the performance of each black rhino population. Each population is discussed in greater detail in section 9 (see also table 9 for long-term summary statistics per population, including removals and introductions by year). Tables 4.1 to 4.5 facilitate an overview of individual population performances covering this summary period (Jan.2002 to Dec. 2004), and the previous summary period for comparison (Jan. 1999 to Dec. 2001) Note:

- for small populations, small changes in numbers represent large % differences, for both growth and mortality rates. *The same numerical change in a large population will represent a smaller % change in the population.*
- New populations of 3 years old or less are still establishing, and no realistic prediction of their performances can yet be made.

Measures of population performance

Underlying Average Annual Growth Rate:

Should exceed 5%

This combines the effect of calving successes and mortality losses, and accounts for introductions and removals. *Human induced losses from poaching or capture deaths etc. are counted as removals for the purposes of finding the underlying biological population growth rate.* Growth varies from year to year, but an average over 3-5 years provides a useful indicator of performance.

Mortality rate: **Should be below 4%**

Available evidence suggests that more than **4%** mortality per year on average is getting excessive, while mortality rates below 3% are "normal". Mortality becomes especially serious when females are involved.

Ratio of Adult Males to Adult Females:

In popn.s of < c.100: not > 0.8 % per &
In other populations <0.67 but not < 0.25 %
per &

Male mortality rate is naturally higher than female mortality rate due to fighting. Over time, most populations develop a skewed adult sex ratio with more females than males. However slightly more males than females are born which can lead to excessive males in fenced areas.

Where performance standards are not routinely met, an underlying problem in the population could need management attention.

Average percentage of adult females calving per year: **Should exceed 33%**

This index is actually derived from the *ratio of number of calves born in a year to the number of females of 7+ years in the population, expressed as a %*. The rationale is that all females should be able to produce a calf in their 7th year of age (this is the average age at first calving in black rhino). Where individual female breeding records on inter-calving intervals are not available, this index provides a sound assessment of female performances.

The Index measures the core breeding success of a population. In the case where all adult females are calving, the % would approximately reflect the achieved average inter-calving interval among females. In most cases *the % reflects ICIs and the additional effects of delayed ages at first calving beyond 8 years, and of adult females not calving for an extended time for some reason.* In calculating the average % of adult females calving per year, the calves of females which calve as subadults (<7years) are included in the count of calves, but the subadult mothers are not added to the numbers of F (adult) females. These calves act like a bonus: they generally reflect good conditions and rightly boost the index of breeding performance.

Table 4.1.	Population 2004	Available Area (km ²) 2004	Density rhino per 10 km ² 2004	Avg. Adult Males/ Fem '02-04	Avg. Ann. Popn Growth Rate '99-01 '02-04	Avg. Ann. Mortality Rate '99-01 '02-04	Avg. % of F Females Calving/year '99-01 '02-04
<i>D.b.bicorns</i> : Performance indicators							
Namibian Ministry Of Environment and Tourism							
Communal							
C1		0.065		0.86	7.0% 2.4%	2.9% 1.4%	26.5% 16.0%
National Parks / Reserves							
S1		0.51		0.86	ni 5.1%	ni 1.3%	ni 22.7%
S1b		1.21		0.61	ni 6.0%	ni 3.5%	ni 26.2%
S2		0.96		0.67	7.1% 7.5%	1.9% 2.4%	25.0% 22.9%
S3		0.47		0.50	11.1% 9.1%	0.0% 0.0%	33.3% 33.3%
S5		na		na		66.0%	na
	729	13,672					
Custodian							
P1		0.57		0.43	0.0% -3.9%	6.4% 8.3%	50.0% 22.2%
P2		1.23		0.50	16.6% 19.9%	0.0% 0.0%	41.7% 41.7%
P3		0.45		0.55	8.4% 11.0%	3.0% 0.0%	50.0% 33.3%
P4		1.56		1.00	14.5% 15.9%	0.0% 0.0%	33.3% 55.6%
P5		1.56		0.60	14.5% 11.1%	0.0% 0.0%	33.3% 33.3%
P6		0.46		0.77	11.2% 0.0%	0.0% 6.4%	44.4% 20.0%
P7		0.37		0.85	19.4% 5.4%	5.6% 3.6%	0.0% 50.0%
P8		0.43		1.13	0.0% -2.6%	4.8% 6.8%	66.7% 13.3%
P9		1.60		1.50	0.0% 10.1%	12.5% 0.0%	0.0% 100.0%
P10		0.67		0.60	0.0% 6.3%	8.3% 4.8%	0.0% 41.7%
P11		0.53		1.00	0.0% 6.4%	0.0% 4.8%	0.0% 22.2%
P12		0.83		(subad.)	-- -8.33%	-- 8.33%	na
P13		0.70		0.33	-- 0	-- 0.0%	na
P14		0.33		(males)	-- 0	-- 0.0%	na
P15		0.06		(subad.)	-- 0	-- 0.0%	na
P16		0.80		0	-- 0	-- 0.0%	na
P17		0.60		0	-- 0	-- 0.0%	na
P18	147	2,838		1.00	-- 0	-- 0.0%	na
				0.88		3.8%	29.5%

Table 4.2. *D.b.bicornis* performance Indicators for South African areas

<i>D.b.bicornis</i> : National Parks Board of South Africa	Population	Available Area (km2)	Density rhino per 10 km ²	Avg.Adult Males/Fem	Avg. Ann. Popn Growth Rate	Avg. Ann. Mortality Rate	Avg. % of F Females Calving/year
	2004	2004	2004	'02-04	'99-'01 '02-04	'99-'01 '02-04	'99-'01 '02-04
Totals		2,616			7.1% 9.4%	5.72% 1.94%	41.8% 37.2%
KANP			na				
VNP			0.50	0.5	11.9% 8.7%	0.0% 0.0%	33.3% 33.3%
AENP			1.32	0.69	-4.7% 9.3%	8.7% 2.5%	43.1% 41.5%
AFNP			na	na			
MZNP			0.24	na		0.00%	0.00%
Private							
P1	20	770		0.2	19.0% 12.6%	0.0% 2.1%	43.3% 46.7%

Table 4.3. *D.b.michaelli* performance Indicators for South Africa

<i>D.b.michaelli</i> : National Parks Board of South Africa	Population	Available Area (km2)	Density rhino per 10 km ²	Avg.Adult Males/Fem	Avg. Ann. Popn Growth Rate	Avg. Ann. Mortality Rate	Avg. % of F Females Calving/year
	2004	2,004	2004	'02-04	'99-'01 '02-04	'99-'01 '02-04	'99-'01 '02-04
Totals		340			8.80% 2.9%	2.10% 3.86%	43.50% 23.3%
AENP			na	1.00	0 0.0%	0.00% 6.06%	0.0% 0.00%
KANP			na	1.00	0.0% 7.8%	4.2% 2.2%	0.0% 31.1%
Private							
P2	37	340	1.09	1.00	7.8% 4.9%	1.5% 2.2%	31.1% 25.9%

Table 4.5. *D.b.minor* performance Indicators for South Africa: Private Areas

	Population 2004	Available Area (km ²) 2004	Density rhino per 10 km ² 2004	Avg. Adult Males/Fem '02-04	Avg. Ann. Popn Growth Rate '99-'01 '02-04	Avg. Ann. Mortality Rate '99-'01 '02-04	Avg. % of F Females Calving/year '99-'01 '02-04
Private							
P3		0.70	0.70	0.57	-12.1%	15.3%	16.7%
P4		4.40	4.40	ni	ni	0	na
P5		1.13	1.13	0.25	-12.1%	7.8%	55.6%
P6				male	na	0	na
P7		1.00	1.00	1.13	8.7%	0.0%	33.3%
P8		2.31	2.31	0.27	0.0%	4.2%	11.1%
P9		1.11	1.11	0.50	0.0%	5.6%	16.7%
P10		0.51	0.51	0.67	0.0%	14.3%	50.0%
P11		0.77	0.77	0.67	0.0%	0.0%	25.0%
P12		0.17	0.17	1.00	0.0%	0.0%	0.0%
P13		0.25	0.25	1.00	0.0%	0.0%	0.0%
P14		0.37	0.37	1.36	0.0%	0.0%	0.0%
P15		0.82	0.82	0.70	0.0%	0.0%	0.0%
P16		4.00	4.00	1.50	0.0%	0.0%	0.0%
P17		0.17	0.17	1.00	0.0%	0.0%	0.0%
P18		0.55	0.55	1.00	0.0%	0.0%	0.0%
P19		0.06	0.06	male	na	0	na
P20		7.14	7.14	ni	ni	ni	ni
P21		0.09	0.09	male	na	0	na
P22		0.33	0.33	male	na	0	na
P23		0.19	0.19	males	na	0	na
	158	2,563		0.70	-1.1%	7.8%	26.1%
							25.8%
							2.4%
							6.3%

Table 4.6. *D.b.minor* performance indicators for Zimbabwe populations

		Population	Available Area (km ²)	Density rhino per 10 km ²	Avg. Adult Males/Fem	Avg. Ann. Popn Growth Rate	Avg. Ann. Mortality Rate	Avg. % of F Females Calving/Year
		2004	2004	2004.00	'02-04	'99-01 '02-04	'99-01 '02-04	'99-01 '02-04
<i>D.b.minor</i> :								
Zimbabwe Total:		563	12,396					
Zimbabwe Parks and Wildlife Management Authority								
State								
S-C1				0.88	ni			
S-MT1				1.89				
S-MD1				0.94				
S-S1				0.48				
		153	2,133					
Lowveld Conservancies								
L-B1				1.00	ni	12.9%	4.42%	ni
L-C1				0.06	ni	11.2%	ni	ni
L-M1				1.13	0.64	10.7%	1.1%	ni
L-S1				0.54	1.37	5.8%	3.84%	28.57%
L-B2a				0.09	1.11	6.7%	1.93%	33.10%
L-B2b				1.40	1.60	12.0%	0.00%	22.22%
		291	9,550			2.7%	1.67%	6.67%
Midlands Conservancies								
M-G1				3.00				
M-H1 (semi captive)				5.33				
M-I2				1.63				
M-GD1				1.30				
		119	713					

Namibian *D.b.bicornis* custodian populations

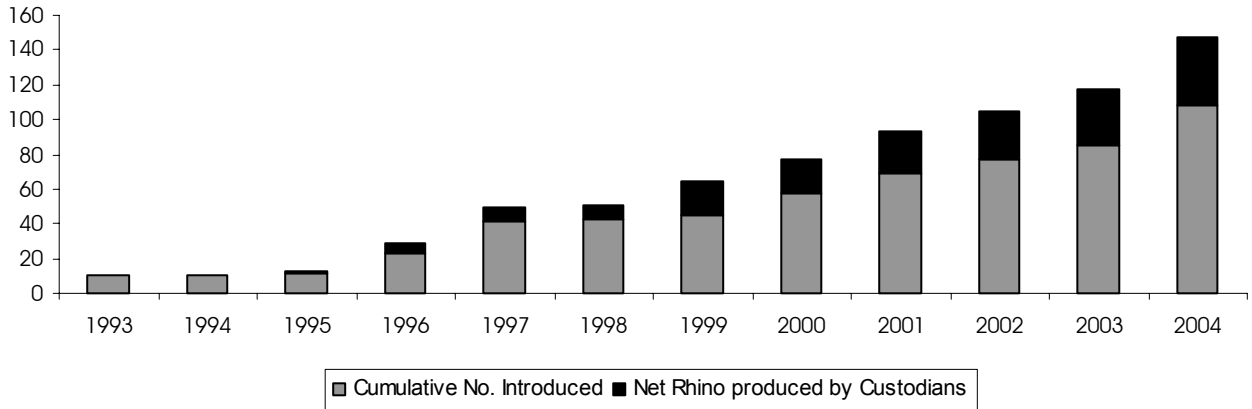


Figure 4.1. Introductions of black rhino onto private land in the Namibian black rhino custodianship programme from 1993 to 2004 (108 rhino) and net addition rhino produced by the custodianship populations (43 rhino).

4.2. South African *D.b.bicornis* populations

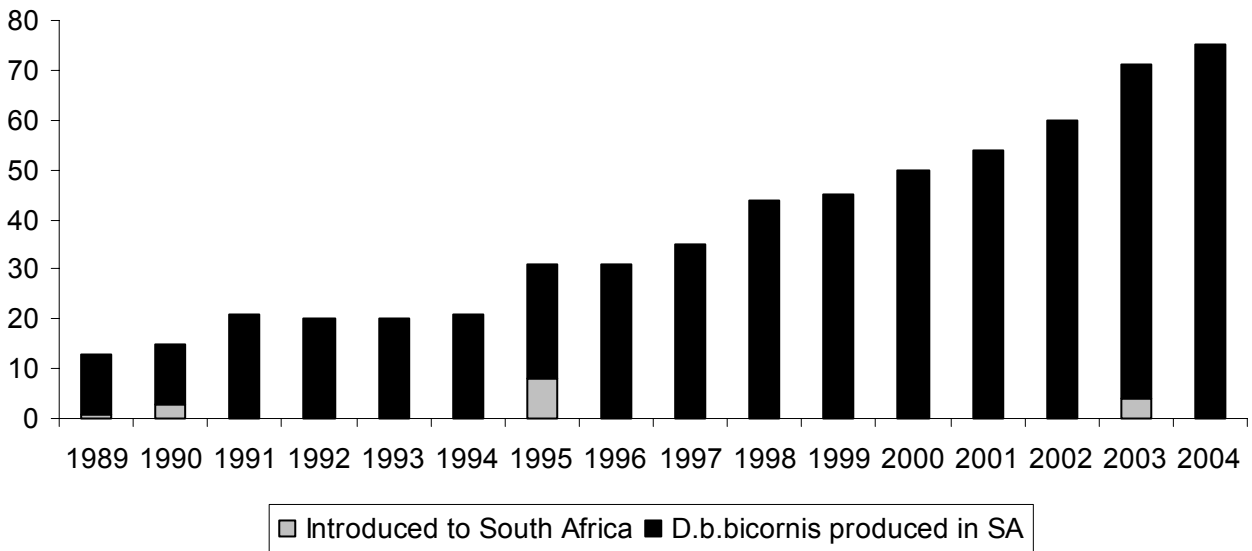


Figure 4.2. Introductions of *D.b.bicornis* to South Africa, and population numbers in this country from '89 to '04.

4.3. South African *D.b.minor* populations: Ezemvelo KZN Wildlife

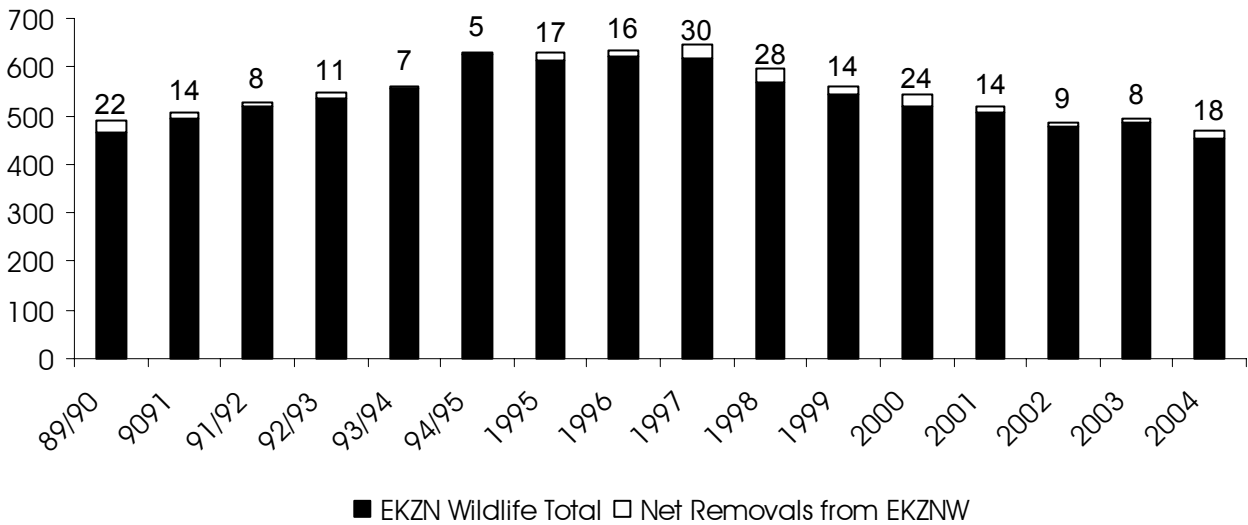


Figure 4.3. Population totals in all EKZN Wildlife areas and removals from these areas, 1989 to 2004.

Overall performance among EKZN Wildlife populations and translocations from KZN.

From 2002 to 2004, the number of *D.b.minor* in EKZNW areas went from around 500 to around 450 rhino (see fig. 4.3). One new EKZNW population was created. Adding 35 removals from EKZNW areas (avg. 2.4% removals out per year), the direct net contribution from EKZNW to *D.b.minor* was apparently negative (-15 rhino).

EKZN Wildlife has been the source of 260 rhino to other (non EKZNW) southern African areas since 1989. Among 5 areas (sectors) that received 224 of the EKZNW introductions from 1989, and where growth from these could be traced, an additional 115 *D.b.minor* have resulted (see fig. 4.4).

Thus at least 375 (260+115) additional rhino have effectively resulted from EKZNW translocations out of their areas.

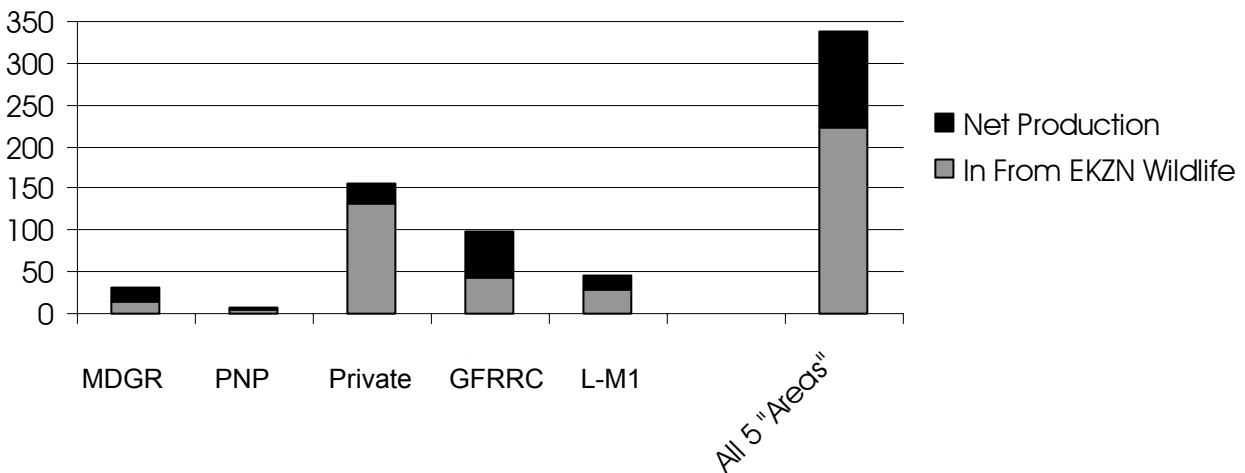


Figure 4.4. Net production from 224 *D.b.bicornis* black rhino introduced from EKZN Wildlife since 1989 to 5 sectors where individuals could be traced.

4.4. South African *D.b.minor* populations on private land

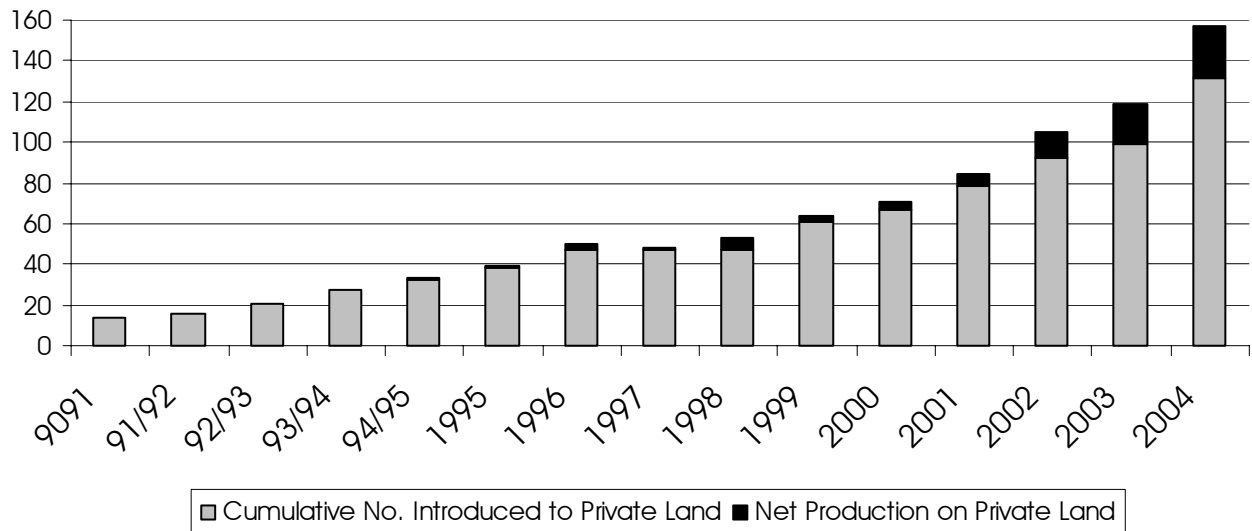


Figure 4.5. Net production from 132 *D.b.minor* black rhino introduced to private land from 1989.

Overall performance of private *D.b.minor* populations

53 *D.b.minor* were introduced to private land from '02 to '04. By 2004, private land areas had 157 black rhino in total. 32 calves were born among private rhino, but 12 rhino died, resulting in a net addition of 20 black rhino to total *D.b.minor* numbers over this period.

An improved overall 6.6% avg. ann. growth was achieved among private areas, versus -1.1% during '99 to '01. Private areas however still need to improve further to better their contributions to the metapopulation total. Since 1989, 132 black rhino have been received by private areas (see fig. 4.5). 92 calves were born but 62 animals died, giving a net 30 rhino added to the metapopulation from private areas. 8 males resided in 4 male-only private populations by 2004.

5. BLACK RHINO MORTALITIES

Mortality data were available from all Namibian rhino areas in this summary period, but in South Africa, there was no data for the Kruger NP population. Zimbabwe provided basic mortality information for 7 of their 14 populations, but for two of these it was for 2004 only.

Annual mortality rates average **1.8% per year in Namibia**, and **3.7% in South Africa** (versus 2.7% and 4.4% per year respectively for the '99 to '01 period). An annual mortality rate could not be calculated for Zimbabwe.

5.1. Overall mortality patterns

Available details of all mortalities reported in the 3 countries are given in tables 5.1 to 5.3.

In South Africa, mortality patterns were broadly similar to previous years, but with more unknown cause deaths and fewer old age and missing/presumed dead cases (fig.5.1).

declined. The increases in predation deaths came from known lions which kill rhino in S1-E. In other areas, fighting increased and what seems like a run of bad luck had struck, with accidents, elephant, drought and cold, and disease related cases increasing (fig. 5.1).

In Namibia, where data from S1-E was included for the country, patterns were different to past years. Only poached, capture and missing rhino death cases

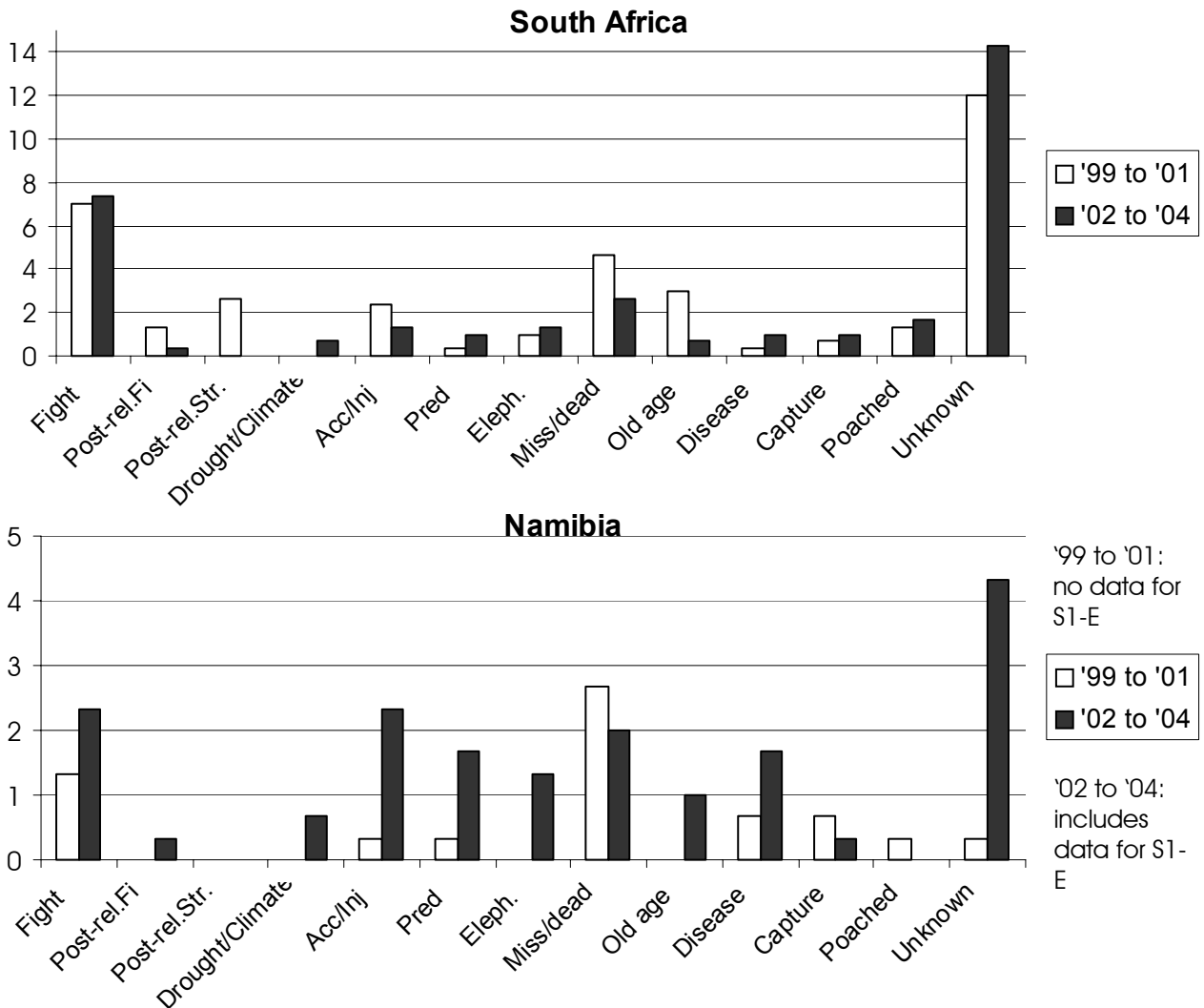
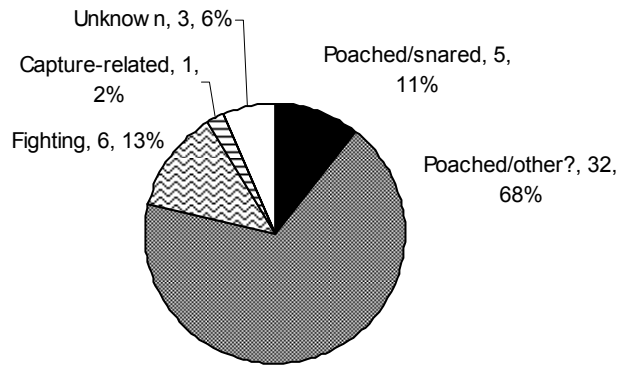


Figure 5.1. Number of deaths per year by cause for South Africa and Namibia.

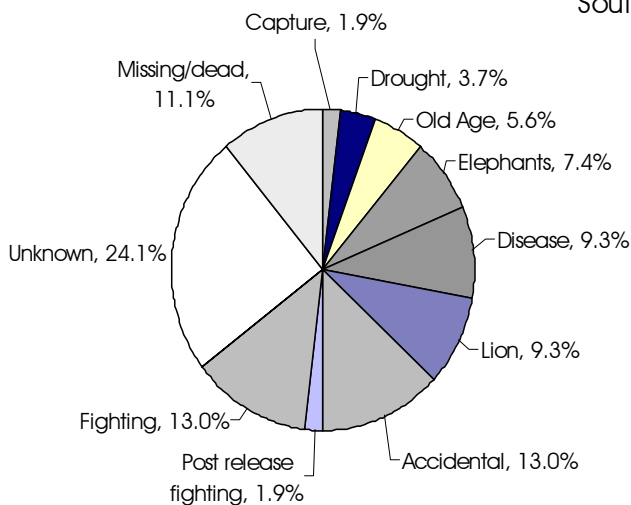
In Zimbabwe, poaching was the most prevalent cause of death (fig. 5.2).

Zimbabwe: Causes of reported black rhino death 2002 to 2004 (47 cases)



Fighting deaths were a prominent feature in all three countries, but were more of a problem in South Africa than the other two countries. Seven black rhino a year were lost to fighting in South Africa. Later analyses show that it is not primarily males being affected by fighting, even though males may be the protagonists.

Namibia: Causes of Black Rhino Death, 2002 to 2004 (54 cases)



South Africa: Causes of Black Rhino Death, 2002 to 2004 (97 cases)

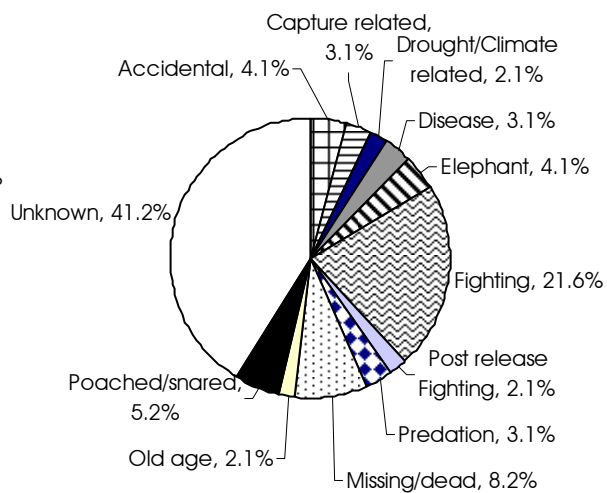


Figure 5.2. Percentage breakdown of mortalities by cause for Namibia , South Africa and Zimbabwe..

5.2. Mortality patterns in different age and sex classes

Estimates of the annual rate of deaths among different age classes, and among adult males versus females, are shown on the right.

In Namibia, a large decline in the annual rate of A/B calf mortalities was recorded (from 13% in '99 to '01 to 2% of calves per year this period). However, the rate may be under-estimated in the S1-E park where all individual rhino are not closely monitored. Subadult mortality rate also declined slightly.

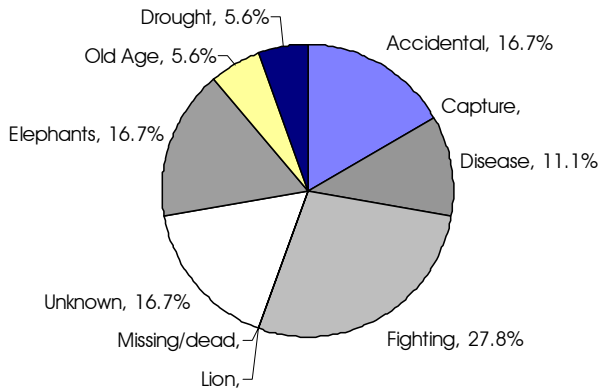
In South Africa, rates were similar to past levels in calves and subadults but lower in adult males and females.

Age-specific annual mortality rates		
Namibia	South Africa	Age Class
2%	9.8%	A/B Calves
2.5%	3.8%	C/D/E Subadults
0.9%	2.9%	F Females
1.7%	2.9%	F Males

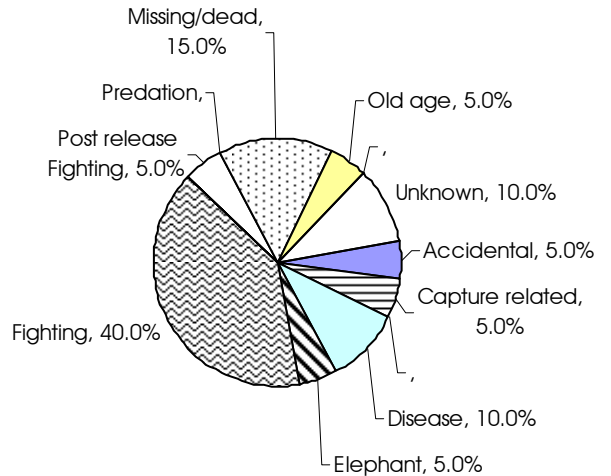
In Namibia, elephants claimed 4 females in 2 custodian areas. Fighting made up c. 28% of female deaths and 13% of male deaths. Various mishaps claimed other females. Only 1 died of old age. Fighting and elephant affected fewer males than females in Namibia, but lions claimed 4 subadult males in S1-E. (fig. 5.3).

In contrast to Namibia, fighting (including post release fighting) was the cause of death in 45% of the female mortalities in South Africa, and 39% of male deaths. Only 2 females and 1 male were known to have died of old age. (fig. 5.3).

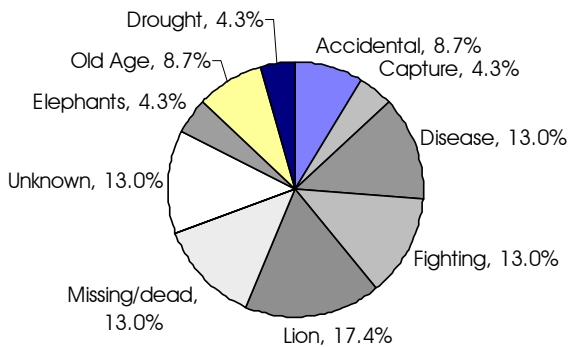
Namibia: Causes of Death Among Female Black Rhino (18 cases)



South Africa: Causes of Death Among Female Black Rhino (20 cases)



Namibia: Causes of Death Among Male Black Rhino (23 cases)



South Africa: Causes of Death Among Male Black Rhino (36 cases)

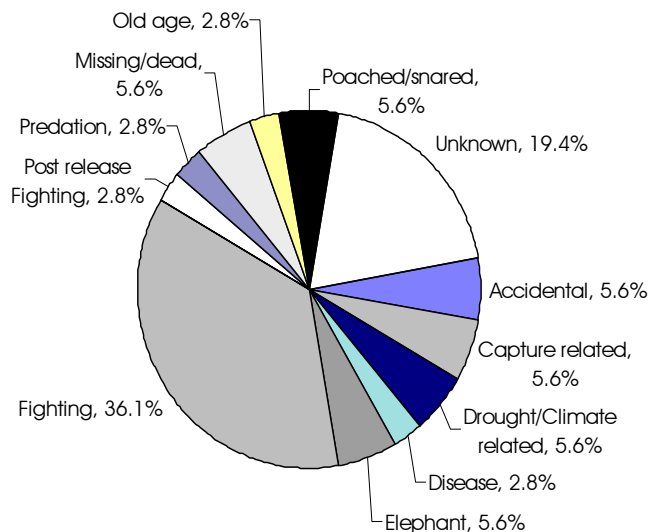


Figure 5.3. Percentage breakdown by cause of death among males versus females in Namibia and South Africa.

Infant (≤ 1 year old) deaths were disproportionately common in South Africa, making up nearly 20 % of deaths where that age group makes up less than 10 % of the total SA population (fig. 5.4). The proportion of deaths that were subadults was similar to their proportion in the total population.

In Namibia, the proportion of deaths that were infant (≤ 1 year old) deaths was similar to the proportion of infants in the population, but subadult deaths were more frequent than could be expected from their proportion (25%) in the population (fig. 5.4).

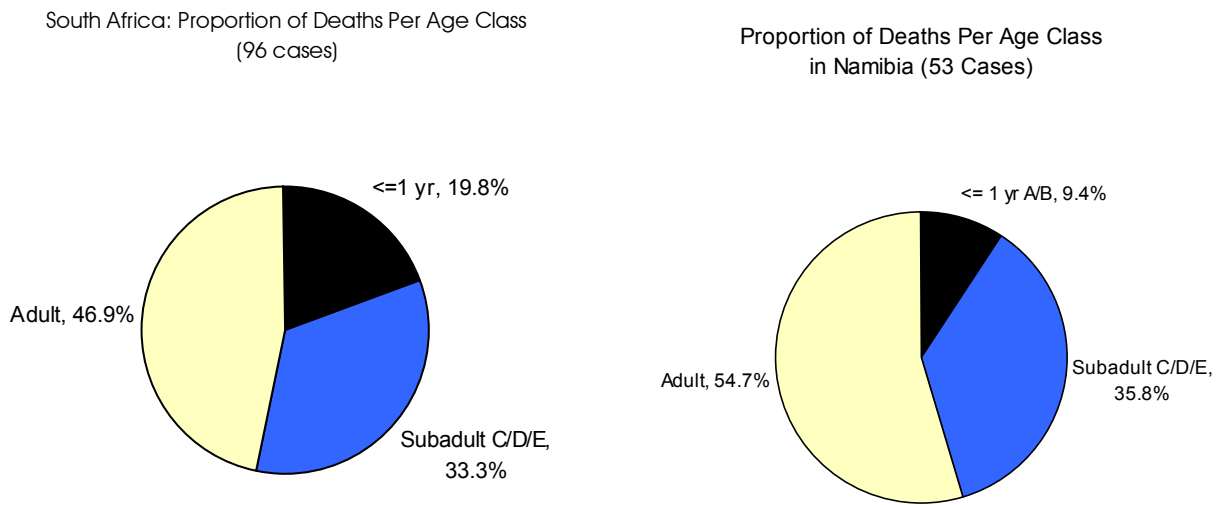


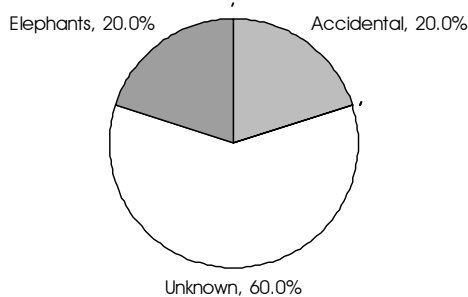
Figure 5.4. Percentage breakdown of mortalities by age in Namibia and South Africa.

Most causes of infant death were not known in Namibia, but one elephant-related and one accidental death occurred (fig 5.5).

In South Africa, several young calves were lost to snaring (fig. 5.5). This was also the case in Zimbabwe (table 5.3). One suspected case of a rhino of < 1 yr old being predated by lion was reported from HiP, but more cases of missing infant calves

(which have not been reported by HiP on a concerted basis as yet) may or may not be due to predation. So far, Pilanesberg and S1-E which have notable lion populations have not yet documented calf (≤ 1 yr) predation or significant numbers of missing infants.

Namibia: Causes of Death Among Black Rhino ≤ 1 Yr Old (5 cases)



South Africa: Causes of Death Among Black Rhino ≤ 1 Year Old (19 cases)

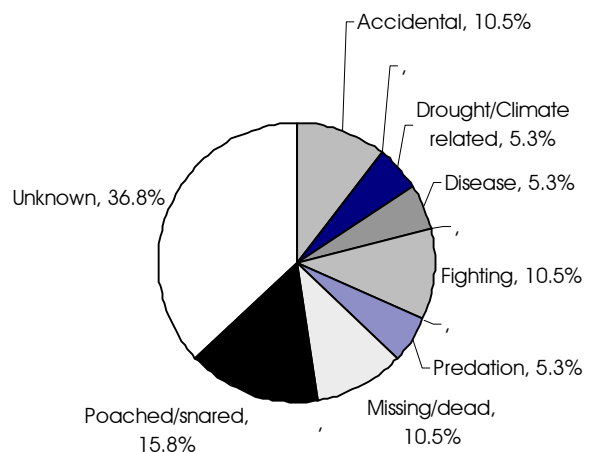


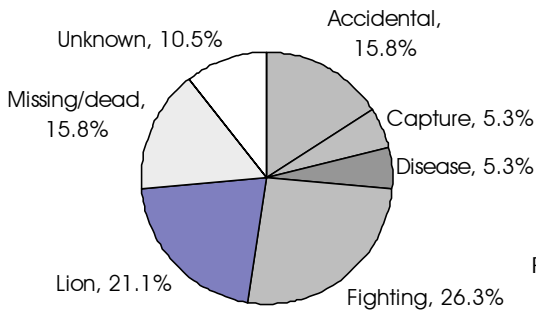
Figure 5.5. Percentage breakdown by cause of death among calves of ≤ 1 year old in Namibia and South Africa.

In Namibia, predation appears to be a more significant factor than among subadults rather than infants (fig. 5.6. top left). It is probably at the stage where young rhino leave their mother's protection that they become more vulnerable to predation. However, death from attack by bull rhino is still the most important cause of death among such vulnerable youngsters. This was especially the case in South Africa during this period. (fig 5.6. top right). P3 staff are of the opinion that bull aggression may be responsible for more young rhino (infant and subadult) deaths than imagined.

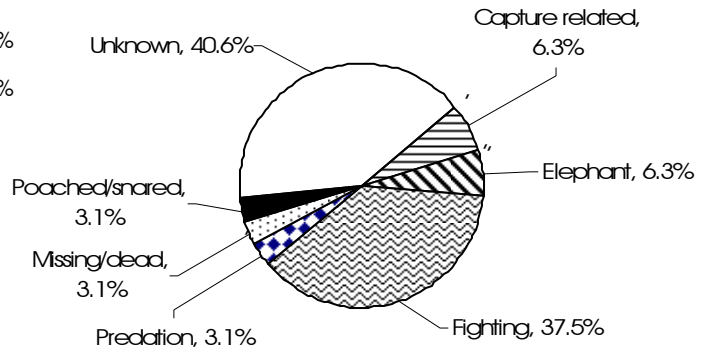
Capture-related deaths among translocated rhino in this age class are a concern in both countries in fig 5.6; while Zimbabwe also lost a calf during translocations (table 5.3). The risks associated with moving immature rhino are still high.

Among adult rhino, a wide range of mortality factors were found, with fighting still being the dominant cause in South Africa. In this country and in Namibia extreme dry conditions claimed the life of a rhino each, in areas where new populations were being set up.

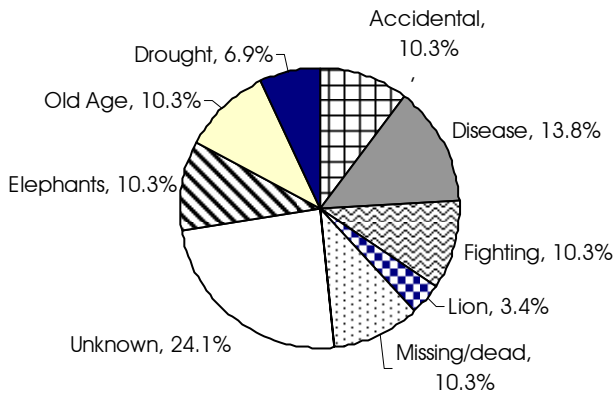
Namibia: Causes of Death Among Black Rhino 1 to 6.9 Yrs Old (19 cases)



South Africa: Causes of Death Among Black Rhino 1-6.9 Years Old (32 cases)



Namibia: Causes of Death Among Black Rhino >=7 Yrs Old (29 cases)



South Africa: Causes of Death Among Black Rhino >=7 Years Old (45 cases)

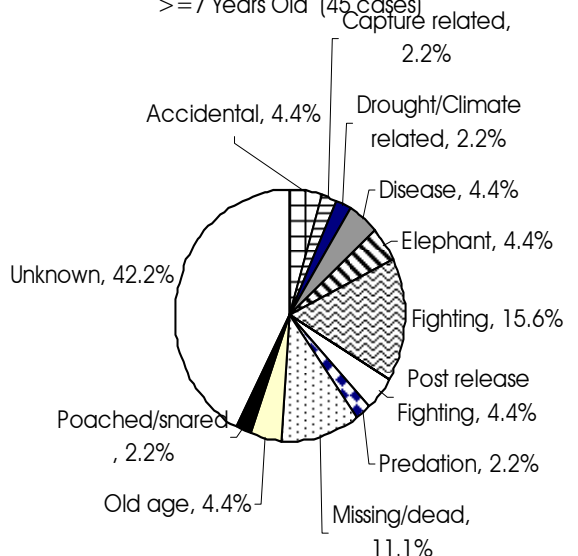


Figure 5.6. Percentage breakdown of mortalities by cause of death among subadult and adult age classes in Namibia and South Africa.

Table 5.1. Black rhino mortalities in *D.b.bicornis* in Namibia from 2002 to 2004.

Rhino Area	Year	Sex	Age Class	Age	Main Cause	Secondary Cause	Time Since Death	How Found	PM	Comments
Accidental										
S1b-K	2002	U	A	0y	Birth complications		<1 week	Routine patrol		Possibly aborted foetus. Negative for anthrax.
P8-Ogv	2003	F	F	10.5yrs	Birth complications		<1 mo.	Routine patrol	y	
P11-Ogm	2002	F	E	3yrs	Drowned		1 day			Gate was left open. While trying to drink at the pool, she fell in and drowned.
S1-E	2002	U	D/E		Mud		<1 week			Stuck in mud
S5-N	2003	F	F	7.5	Poisoned		1 day			Died after eating poisonous plants
P6-Ed	2002	M	E	c.3y6m	Septicemia	Worms	1 day	Trackers	y	Empysema, worms and stomach ulcers. Prev. wounded by a cable.
S1-E	2004	M	D/E		Stuck In Mud		<2 weeks			Anthrax negative
S1-E	2002	M	F		Injury	Capture	1 day			Captured for treatment to injury- died stress/ pneumonia
Capture related										
P7-Er	2002	M	E	6 yrs	Capture Myopathy		1 day			
S5-N	2003	F	E	6-7 yrs	Boma-related		1 day		y	Female hit boma wall with horn and suffered a heart stroke
Drought/Climate related										
S6-Nk	2003	M	F	19.3	Cold	Drought	ni			Boma'd 5 then 2 wks., died 2 wks. after release from cold spell/ drought conditions
S1-E	2004	F	F		Dehydration	Drought	<2 weeks			Animal was without water for a long time
Disease										
S1-E	2004	F	F		Cancer		<3 weeks			Infection & Starvation due to cancerous growth
S1-E	2003	M	F		Anthrax		5 months	Routine patrol		Blood strains still visible on nose and mouth
P12	2003	M	F	11y	Disease	Fighting	<1 week	Owner	y	Signs of disease (plant poisoning or Black Quarter), plus non-leathal fighting wounds
S1-E	2002	F	F		Disease			waterhole	y	Necrotic colitis+peritonitis (intestinal problems)
Elephants										
P6-Ed	2002	M	F	11y2m	Elephants		1 day	Anti Poaching Unit	y	Spine injured by elephant attack - could not walk.
P1-Oj	2003	F	F	8.7y	Elephants		1 day	Patrol	y	
P1-Oj	2003	F	F	20-21y	Elephants		<1 week	Helicopter		Mother killed while protecting her new born calf. Calf killed aswell
P1-Oj	2003	F	A	0-2w	Elephants	Starvation	<1 week	Helicopter		New born calf of female killed by elephant. Died of starvation presumably
Fighting										
P6-Ed	2003	F	E	4y3m	Fighting		1 day	Boma	y	Injured by male during courtship. Died despite treatment in boma
P10	2004	M	F		Fighting		1 day	Routine patrol		Possible fighting with another male
S1-E	2002	M	F		Fighting		1 day		y	
S1-E	2004	F	D/E		Fighting		<3 weeks			
S1-E	2004	M	F		Fighting		<1 mo.			Broken back leg
S1-E	2004	F	D/E		Fighting	Euthenased	<1 mo.			Moved to small camp i for injuries to right hind leg from fight
P7-Er	2004	F	E	4	Fighting	Dehydration	1 day	Staff	y	
Post release fighting										
P8-Ogv	2002	F	C	13mo.	Post release fighting		1 day	Routine patrol	y	Infected stab wound which penetrated the chest area.

Table 5.1 continued. Black rhino mortalities in *D.b.bicornis* in Namibia from 2002 to 2004.

Rhino Area	Year	Sex	Age Class	Age	Main Cause	Secondary Cause	Time Since Death	How Found	PM	Comments
					Predation					
S1-E	2002	M	D/E		Lion		<2 weeks			Killed by 3 Okondeka rhino killers
S1-E	2002	M	D/E		Lion		2 days			Killed by 3 Okondeka rhino killers
S1-E	2003	M	D/E		Lion		2 days	Routine patrol		Killed by 3 Okondeka rhino killers
S1-E	2004	M	D/E		Lion		<3 weeks		y	
C1-K	2002	U	F		Lion					
					Missing / dead					
C1-K	2002	M	F	29 +-1yr	MPD		na			Not been seen for >1.5 years
C1-K	2002	M	F	31 +-5yrs	MPD		na			Not been seen for >1.5 years
P8-Ogv	2003	M	F	9 yrs	MPD		na			Not seen to 2004
S2-W	2002	U	C		MPD		na			Not seen to 2004
S2-W	2003	U	D		MPD		na			Not seen to 2004
S2-W	2003	U	C		MPD		na			Not seen to 2004
					Old age					
C1-K	2002	F	F	29	Old age	Euthenaised	1D	Game drive	y	Heavy tooth wear
C1-K	2004	M	F	31	Old age	Fighting			y	Fighting with other male recorded - major injury to rear leg
S1-E	2002	M	F		Old age?		2 days			Negative for Anthrax, 5 lions on carcass but did not kill rhino
					Unknown					
S1-E	2002	F	F		U		1 day	waterhole	y	Bleeding from nose but tested negative for Anthrax
S1-E	2002	U	B/C		U		<1 week	Patrol		Negative for Anthrax, no signs of predation
S1-E	2002	F	F		U		<1 yr	Air		Negative for Anthrax
S1-E	2003	U	F		U		<5 yrs	Routine patrol		Only old back horn found
S1-E	2003	M	F		U		<4 yrs	Routine patrol		Very old carcass
S1-E	2003	M	F		U		10 days	Routine patrol		
S1-E	2003	U	A		U		1 month	Routine patrol		Only head and rib cage left
S1-E	2004	U	D/E		U		<6 mo.			Old Carcass
S1-E	2004	U	U		U		<6 mo.			Old Carcass
S1-E	2004	F	D/E		U					Old Carcass, Only Head And Horns Found
S1-E	2004	U	F		U		<1 week	Air survey		
S1b	2003	U	A	<1 week	U		<1 week	Rhino Patrol		
C1-K	2002	M	F	27-30yrs	U	Natural	>1year	Rhino census		Identified by horn shape

Table 5.2. Black rhino mortalities in all subspecies in South Africa from 2002 to 2004 (excluding Kruger National Park)

Rhino Area	Sub-species	Year	Sex	Age Class	Age	Main Cause	Secondary Cause	Time Since Death	How Found	PM	Comments
						Accidental					
HIP	<i>minor</i>	2003	M	F	30+	Shot- self defense		n/a	n/a		Shot in self-defence on a wilderness trail.
HIP	<i>Minor</i>	2004	F	F	24y	Old injury		<1 week	Officer Patrol	y	Old injury to right hind leg. Stomach empty - 14 month old foetus in womb.
NGR	<i>minor</i>	2003	U	A		stuck in mud	crocodiles	<1 Day	Officer patrol		killed by crocodile or eaten by crocodile when stuck in mud
P8	<i>minor</i>	2003	M	B	8 Mo.	Acc.injury	Septicemia	<1 Day	Rhino Patrol	y	Injured by stump/thorn which became septic. Was seen limping wks before
						Capture related					
MGR	<i>minor</i>	2003	M	F	<20	Capture-related	Disease	<1 Day	Bornas		Got an infection in HIP bornas after capture from MGR
P14	<i>minor</i>	2002	M	E	6.6	Capture stress/ff?	Poached?	ni	ni		Did not settle well, depressed behaviour. 2 fence guards took horns
AENP	<i>michaeli</i>	2002	?	C	1+	capture-related					Died in AENP in move to Thaba Tholo
						Drought/Climate related					
IGR	<i>minor</i>	2002	M	A		Cold	Exposure	<1 Day	Routine patrol		
W5NR	<i>minor</i>	2004	M	F	10y	Dehydration		<1 Day	Air	y	Dehydration. Severe drought, suspected rhino lacked access to fresh water
						Disease					
P3	<i>minor</i>	2003	M	F	21 yrs	Disease		<1 Day	Routine Patrol		Increased liquid on lungs due to internal lung abscess.
MGR	<i>minor</i>	2003	F	F		Prolapse	Internal injuries	<1 week	Officer Patrol		Seen in very poor condition, died in pan with bladder protruding from vulva.
P8	<i>minor</i>	2003	F	A	12 days	Septicemia			In Bornas	y	Sepsus in umbilical cord.Neglected by mother and taken in for hand-raising.
						Elephant					
HIP	<i>minor</i>	2003	M	E	4yrs	Elephant		ni	Rhino Patrol		Seen injured a few days before its death By Dr J Flamand
TGR	<i>minor</i>	2003	F	F		Elephant	Septicemia	<1 mo.	Officer Patrol	y	Suspected elephant. Post Mortem done
MGR	<i>minor</i>	2003	U	E		Elephant		<1 week	Officer Patrol		Signs of a struggle with elephant
MGR	<i>minor</i>	2004	M	F		Elephant			Routine Patrol		Skull cracked, many other bad wounds
						Fighting					
P2	<i>michaeli</i>	2004	F	D		Fighting		<1 Day	Manager		Left by mother who was calving again. Alone and harassed/injured by young bull
ESNR	<i>minor</i>	2004	M	F		Fighting		<1 week	Rhino Patrol		Two rhinos seen chasing each other in the region about a week previously
OGR	<i>minor</i>	2003	F	F		Fighting		ni	ni		Year / Date unknown, 2002, 2003 or 2004
GFRRC	<i>minor</i>	2003	M	D	2y6mo.	Fighting		<1 Day	Field Rangers	y	Ear notching caused premature break up of mother and calf bond
GFRRC	<i>minor</i>	2004	M	D	3.4 y	Fighting		<6mo.	Routine patrol		Had old fighting injuries, left mother then was attacked by bull and died.
IGR	<i>minor</i>	2004	M	E		Fighting		<1 week	Routine patrol		
P11	<i>minor</i>	2002	F	E	12 yrs	Fighting	Killed by bull	<1 Day	Telemetry	n/a	Mamma - skull and horns collected
P1	<i>bicornis</i>	2002	F	E	3y5mo.	Fighting		<1 Day	Routine patrol	y	50cm wound to the groin area, blood loss, and shock
P7	<i>minor</i>	2003	M	D/E		Fighting					
P3	<i>minor</i>	2004	M	D	c.2.5	Fighting					

Table 5.2. Continued	Sub-species	Year	Sex	Age Class	Age	Main Cause	Secondary Cause	Time Since Death	How Found	PM Comments
P14	<i>minor</i>	2004	M	B	c.1yr	Fighting		<6mo.	Routine drive	Killed by bull
TGR	<i>minor</i>	2002	M	C/D		Fighting		n/a		Injured in fight, taken to HIP bomas for treatment died
NGR	<i>minor</i>	2002	M	C		Fighting		<1 week		Fighting - clean animal, horns recovered
MGR	<i>minor</i>	2002	F	F		Fighting		<1 Day	Routine Patrol	
MGR	<i>minor</i>	2003	M	C		Fighting		<1 Day	Officer Patrol	Fighting injury with bull rhino
MGR	<i>minor</i>	2003	M	F		Fighting	Capture stress	<1 Day	Officer Patrol	Was ousted by another bull, took refuge along river + in the community area.
AENP	<i>bicornis</i>	2004	M	F		Fighting		<1m	Ranger Patrol	
MNP	<i>minor</i>	2002	D	F	3.4	Fighting		<1 week		Caught up in a confrontation/attempted mating of 2 other cows by 2 bulls.
HIP	<i>minor</i>	2002	F	B		Fighting?		<2wks	Wilderness Trail	Suspected killed by bull rhino. Hyacena ate carcass
HIP	<i>minor</i>	2002	F	F	15-25yrs	Fighting?		<1 week	Wilderness Trail	Fighting suspected
HIP	<i>Minor</i>	2004	F	F		Fighting?		<1 week	Vultures	Major puncture wounds on hind leg, vulva, small puncture wound on right flank.
HIP	<i>Minor</i>	2004	M	E	5y	Fighting?		<1 week	Officer Patrol	Cause of death unknown, possible fighting injuries
P8	<i>minor</i>	2004	M	F		Post-release fighting		<1 Day	Near Bomas	Injured in fight with bull 3 months after introduction to male camp
						Predation				
HIP	<i>minor</i>	2002	U	F		Lion				
HIP	<i>minor</i>	2003	U	A	3 mo.	Lion?		ni	Routine patrol	Suspected Lion predation - 3 subadult Lion found eating carcass
HIP	<i>minor</i>	2003	M	C	1y4mo	Lion?		ni	Routine patrol	Suspected Lions - carcass eaten.
						Missing/dead				
GFRRC	<i>minor</i>	2003	U	B	7mo.	MPD		na		Mother seen without this calf
GFRRC	<i>minor</i>	2002	F	E		MPD		>1yr		Not seen since 1999
IGR	<i>minor</i>	2004	U	F		MPD		>1yr		Last seen 03/99
IGR	<i>minor</i>	2004	M	F		MPD		>1yr		Last seen in 2000
IGR	<i>minor</i>	2004	M	F		MPD		>1yr		Last seen 08/99
P2	<i>michaelsi</i>	2002	U		2 mo.	MPD		<3m		n/a Phantom - born 10/2002 gone by 12/2002
TGR	<i>minor</i>	2004	F	F		MPD				missing since 2001
TGR	<i>minor</i>	2004	F	F		MPD				missing since 1999
						Old age				
HIP	<i>minor</i>	2002	M	F		Old age				
HIP	<i>minor</i>	2002	F	F		Old age				
						Poached/snared				
MGR	<i>minor</i>	2004	M	B	10mo.	Snare	MPD	<6mo.	Never Found	A snare was removed from this calf, mother always seen alone after this.
WGR	<i>minor</i>	2004	M	F	8y	Poached		<1 day	GSP	Wounded by poachers, died later, horns not taken.
MGR	<i>minor</i>	2002	U	B		Snare		1 Month	Anti Poa.Unit	Horns missing
MGR	<i>minor</i>	2002	U	C		Snare	Euthanasia	<1 Day	Game Capture	Severe snare wound on back leg, plus neck
MGR	<i>minor</i>	2003	U	B		Snare		<6mo.		Poaching snare (only found bottom jaw)

Table 5.2 Cont. Sub-species

	Sub-species	Year	Sex	Age Class	Age	Main Cause	Secondary Cause	Time Since Death	How Found	PM	Comments
MGR	<i>minor</i>	2003	U	F		Unknown		< 1 week	Officer Patrol		Died naturally - not poached. Horns removed by poachers after death.
HIP	<i>minor</i>	2002	U	C		U					
HIP	<i>minor</i>	2002	U	F		U					
HIP	<i>minor</i>	2002	U	F		U					
HIP	<i>minor</i>	2002	M	F		U					
HIP	<i>minor</i>	2002	U	D		U			Routine patrol		
HIP	<i>minor</i>	2002	U	E	4-5yrs	U		> 1yr	Routine patrol		Found in thick bush
HIP	<i>minor</i>	2003	U	F	20+	U		> 1yr?	Routine patrol		Very old carcass
HIP	<i>minor</i>	2003	U	F	15+	U		ni	ni		
HIP	<i>minor</i>	2003	U	D	3-4yrs	U		< 1yr	ni		Found in reeds
HIP	<i>minor</i>	2003	F	F		U		ni	Routine patrol		Died in river
HIP	<i>minor</i>	2003	M	F		U		ni	Tourists		Spotted from Viewsite
HIP	<i>minor</i>	2003	U	F		U		ni	Officer Patrol		
HIP	<i>minor</i>	2003	U	E		U		ni	Routine patrol		
GFRRC	<i>minor</i>	2002	?	A/B		U					old carcass found
GFRRC	<i>minor</i>	2002	?	A/B		U					skull found
GFRRC	<i>minor</i>	2004	U	F		U		< 6mo.	Routine patrol		One of '00 Foundeais
IGR	<i>minor</i>	2003	M	D	2y3m	U		< 1mo.	Routine patrol		
IGR	<i>minor</i>	2003	M	B	6 mo.	U		< 1 week	Routine patrol		
P11	<i>minor</i>	2002	F	A	< 1 mo	U		ni			No details
NGR	<i>minor</i>	2002	U	F		U		< 6mo.	Routine patrol		
NGR	<i>minor</i>	2002	M	F		U		< 1yr	Routine patrol		
NGR	<i>minor</i>	2002	U	F		U		< 1yr			
NGR	<i>minor</i>	2002	U	D		U		< 1mo.		n/a	
NGR	<i>minor</i>	2003	U	D/E		U		< 6mo.	Rhino monitor		Only anterior horn collected
NGR	<i>minor</i>	2003	U	D/E		U		< 6mo.	Air		Seen from air by Game Capture. Carcass could later not be located
AENP	<i>bicornis</i>	2004	M	E	4y	U		< 3m	helicopter		
TGR	<i>minor</i>	2002	M	F	9 yrs	U		< 1yr	DWAF		Tep 10
TGR	<i>minor</i>	2003	U	B	6 mo	U		< 1mo.			
MGR	<i>minor</i>	2002	U	B		U		< 1 week	Routine Patrol		
MGR	<i>minor</i>	2002	U	A		U		< 1yr			
MGR	<i>minor</i>	2002	U	F		U		c.2yrs			
MGR	<i>minor</i>	2002	U	F		U		< 1yr			
MGR	<i>minor</i>	2003	U	C		U		< 1mo.			Lower Jaw found in the veld
MGR	<i>minor</i>	2003	U	E		U		< 6mo.	Routine Patrol		
MGR	<i>minor</i>	2003	U	E		U		< 6mo.			Horns missing
P2	<i>minor</i>					U					Killed in AENP - No details
HIP	<i>Minor</i>	2004	U	U		U					No details
HIP	<i>Minor</i>	2004	U	U		U					No details
HIP	<i>Minor</i>	2004	U	U		U					No details

Table 5.3. Black rhino mortalities in *D.b.minor* in some Zimbabwe populations from 2002 to 2004.

RESERVE	YEAR	SEX	AGE	HAGE	CAUSE1	CAUSE2	COMMENTS
5 L-B1	2002	U	U		Accident		
14 L-B2	2002	U	Calf	?	Capture-related Poached/snared/ other	Malnutrition	Mother injured calf/milk dried at Bornas
13 L-S1	2005	U	Calf		snare or lion		
13 L-S1	2005	U	Calf		snare or lion		
5 L-B1	2002	U	Calf		Snared		
5 L-B1	2002	U	Calf		Snared		
13 L-S1	2003	F	F		Poached		Shot by poachers, horns taken
13 L-S1	2003	U	Calf		Poached		Shot by poachers, horns taken
8 M-G1	2004				snare		
4 S-S1	2004	30x*U	30xU		Poached/other		30 mortalities reported, how many poached was not said
5 L-B1	2002	U	U		Fighting		
5 L-B1	2002	U	U		Fighting		
11 L-M1	2002	M	Adult		Fighting		
11 L-M1	2002	M	Calf		Fighting		
11 L-M1	2003	M	Adult		Fighting		
11 L-M1	2004	M	U		Fighting		
11 L-M1	2004	U	Calf		Unknown		
13 L-S1	2003	U	Subadult		U		
13 L-S1	2003	U	Subadult		U		

5.3. Capture and translocation mortalities

Capture and translocation related mortalities cover deaths related to actual capture, boma'ing, travel and release, and to the next few months post-release (approximately 3 months but sometimes more, where post release stress and fighting are a factor).

For many years during the '90s, mortality rates of 8% to 9% were experienced among translocations in South Africa. During the '99 to '01 period, this figure rose to 11%, with a large spate of deaths during re-introductions to AENP and P3. During the current period, the **SA translocation-related mortality rate was 7.2%**, a slight decrease.

Namibian rates also declined slightly from 6.3% in the previous summary period to 4.9% this period.

Zimbabwe had the most successful translocations, with only **1.9%** mortality.

The information on moves and deaths is summarized below, with more details on each death in table 5.4.

NAMIBIA - MET Translocations

Rhino Moved	Died	% mortality	
61	3	4.9%	1 capture myopathy, 1 boma-related, 1 post-release fighting

SA - EKZN WILDLIFE Translocations

Rhino Moved	Died	% mortality	
45	2	4.4%	1 boma-related, 1 post release fighting
47 (2 foetuses)	4	8.5%	As above but including 2 abortions during boma'ing

SA - PRIVATE Translocations

Rhino Moved	Died	% mortality	
17 (+1 newborn)	1+1 new born	11.1%	1 post release fighting, 1 newborn death just after mother's release

ZIMBABWE - PWMA Translocations

Rhino Moved	Died	% mortality	
47	1	2.1%	Linked to stress and events related to capture/offloading to bomas.

The GFRRC Reserve Complex experienced a case where the immobilization of a calf for ear notching seems to have precipitated its death. The calf did not re-unite with its mother as is usual. The mother was apparently nearing full term pregnancy and rejected the calf, who wandered away from his usual haunts and was attacked by other males and killed. This is

the only immobilization-linked death in 64 ear-notchings undertaken in this reserve from 2001 to 2004 (shown below).

EASTERN PROV. Immobilized for ear-notching

Ear-notched	Died	% mortality	
64 (incl. 2001 notchings)	1	1.6%	1 case of subadult killed in fighting after immobilization: the ear notching caused premature break up of mother and calf bond

Table 5.4. Black rhino mortalities linked to captures and translocations.

Rhino Area	Sub-species	Year	Sex	Age Class	Age	Cause 1	Comments
NAMIBIA							
P7-Er	<i>bicornis</i>	2002	M	E	6 yrs	Capture myopathy	
S5-N	<i>bicornis</i>	2003	F	E	6-7 yrs	Borna-related	Female hit boma wall with horn and suffered a heart stroke
P8-Ogv	<i>bicornis</i>	2002	F	C	13mo.	Post release fighting	Infected stab wound which penetrated the chest area
SOUTH AFRICA							
KZN WILDLIFE							
MGR	<i>minor</i>	2003	M	F	<20	Capture-related /Disease	Got an infection in HIP bomas after capture from MGR
PRIVATE							
P14	<i>minor</i>	2002	M	E	6.6	Capture stress/fi? / Poached?	Did not settle well, depressed behaviour. 2 fence guards took horns
P11	<i>minor</i>	2002	F	F	12 yrs	Post-release Fighting	
P8	<i>minor</i>	2004	M	F		Post-release fighting	Injured in fight with bull 3 months after introduction to male camp
P11	<i>minor</i>	2002	F	A	<1 mo	U	New born calf of female who had arrived pregnant and calved just after release
SANPARKS							
AENP	<i>michaeli</i>	2002	?	C	1+	capture-related	Died in AENP in move to Thaba Tholo
ZIMBABWE							
L-B2	<i>minor</i>	2002	U	Calf	ni	Capture-related / Malnutrition	Lack of nutrition (mother possibly dried up) and injuries sustained when mother horned calf on offloading into bomas.i.e. linked to the translocation process
OTHER CAPTURE-LINKED CASES							
KZN WILDLIFE							
MGR	<i>minor</i>	2003	U	Foetus		Aborted	BF 60 female aborted in Imfolozi bomas, was the released into Imfolozi
MGR	<i>minor</i>	2003	U	Foetus		Aborted	BF 56 female aborted in Imfolozi bomas
EASTERN PROV.							
GFRC	<i>minor</i>	2003	M	D	2y6mo.	Fighting	Ear notching caused premature break up of mother and calf bond

6. REPRODUCTIVE PERFORMANCE DETAILS

Inter-calving interval (ICI) is the time between calves: the shorter the better. Naturally we should only be pleased about short intervals between *surviving* calves, as a neonatal death can be followed by rapid conception and another birth within a short time also.

Often, *long* ICIs reflect delayed conception or unsuccessful pregnancies. Problems with male fertility or performance could be a factor in delayed conceptions. Alternatively, where rhinos are not closely monitored, it is possible that long ICIs involve undetected births plus early neonatal deaths.

Females (like other large mammals) generally need to achieve a minimum body weight before they have a high chance of conceiving, i.e., fertility is linked to body weight / condition. Young females tend to reach this minimum weight (80% of adult weight) in their 6th year, so that they calve for the first time in their seventh year. If a female is in sound condition, she can fall pregnant much earlier

SUMMARY	ICI '02 to '04	ICI '99 to '01	AFC '02 to '04	AFC '99 to '01
Namibia	2.8	3.1	7.5	8
S.Africa	2.1	2.2	8.2	8.1
S.Africa <i>D.b.minor</i>	3	3.2	7.7	c.7.5
S.Africa	4	2.3	6.8	

and calve in her fifth or sixth year.

Tables 6.1 to 6.3 show ICI and age at first calving (AFC) data for the three reporting countries. A few populations had most females producing their first calf at younger than 7 years old, which indicates generally favourable nutritional conditions in these areas. Zimbabwe's L-S1 is a good example.

D.b.bicornis in South Africa showed the best average inter-calving intervals (see summary above) as in previous years. ICI's among *D.b.michaeli* slowed during the lengthy translocations / re-introductions of this subspecies into Thaba Tholo during this period.

Table 6.1. Summary of available female inter-calving interval and age at first calving data for 2002 to 2004 in Namibia.

	Average Calving Interval	Sample Size	Conf. +-	Average Age at First Calving	Sample Size	Conf. +-
<i>D.b.bicornis:</i>						
Namibia						
S2-W	3.1	7	4m			
S3-H	2.1	2				
C1-K	3	15		12.1	1	>1y
P1-Oj	2.5	1	1m	7.2	1	6m
P2-Okg	2.5	5	6m			
P3-Ns	2.4	2	6m	8.3	1	6m
P4-Otv	2.5	3	1m	5.1	1	1y
P5-K	3.5	2	6m			
P6-Ed	2.9	2	6m			
P7-Er	1.7	2	6m			
P9-Okt				6.3	2	6m
P10-Sc				7.1	1	1m
	2.8	41		7.5	7	

Table 6.2. Summary of available female inter-calving interval and age at first calving data for 2002 to 2004 in South Africa.

	Average Calving Interval	Sample Size	Conf. +/-	Average Age at First Calving	Sample Size	Conf. +/-
South Africa						
VNP	2.3	2				
AENP Nyati	2.2	2		9.3	1	
AENP Darlington	1.8	3		7.5	1	
AENP Main and extensions	2.3	2		7.8	1	
P1	2.2	7	1m			
	2.1	16		8.2	3	
<i>D.b.michaeli</i>						
P2	4.0	6		6.8	1	2m
<i>D.b.minor</i>						
South Africa						
GFRRRC - SK	2.7	17		7.7	9	1y
GFRRRC - DD	2.2	1		6.9	4	1y
IGR	3.7	10		11.5	1	1m
MGR	4.1	3		7.3	1	6m
TGR	4.4	1	4m			
WGR	2.9	2	1m	14.9	1	3m
MNP	3.1	3				
MDGR	2.8	5				
PNP	2.4	16	3m	7.9	9	4m
AGR	3.7	2		7.4	1	
P5	3.7	3		6.4	1	1m
P3	2.7	2				
P8	2.9	2	2m			
P7				6.0	1	1y
P10				8.0	2	1y
P11				7.0	1	1y
P14				6.4	3	6m
						1y
	3.0	50		7.7	35	

Table 6.3. Summary of available female inter-calving interval and age at first calving data for 2002 to 2004 in Zimbabwe.

	Average Calving Interval	Sample Size	Conf. +/-	Average Age at First Calving	Sample Size	Conf. +/-
Zimbabwe -mostly long term data						
L-S1 - all females	2.84	28				
L-S1 - females born there	2.65	13		6.4	13	
L-M1 '02 to '04	2.7	10				
S-S1 (State)	2.33	24		8.13		
S-MT1 (State)	3.33			7.67		
S-C1 (state)	3.17			7.50		
	<i>Can't calc.</i>	?		<i>Can't calc.</i>	?	

Most *D.b.bicornis* areas had short ICI's (table 6.1 and 6.2), and P1 in SA showed great female performances. Namibia's S2-W showed lengthened average ICI's compared to last summary period, where a 2.2 year average had been achieved among 6 cases.

Among *D.b.minor*, S-S1 in Zimbabwe and PNP in South Africa have shown consistently good ICI's.

IGR, MGR and TGR showed the longest average ICIs for areas with data available. These areas went through a severe drought which no doubt affected calving success greatly, but TGR and IGR especially have habitat problems and have generally shown

poor productivity and high death rates for several years (refer to these reserves' individual population histories for details).

P5 appeared to have long ICI's, possibly related to the removal of the aggressive, but only dominant, bull from the rhino area. This could have led to females not being covered and falling pregnant as routinely as desired.

No obvious reason can be found for the slow calving among the AGR females, except that the bias to males may have dampened the females' enthusiasm for breeding—it is hoped their calving success will improve in years to come.



Photo-c. Kirsten Bond

7: OBSERVATIONS ON BEHAVIOUR

7.1 Ranging behaviours

Namibia

C1-K

(From Hearn, 2003). The data for a sample of known male and female rhinos was used to analyse home ranges.

The home range of males in the C1-K population varied from 39.79 km² to 791.02 km² (mean=164.96 ± 175.21 km²; *n*=20).

The home range of females in the C1-K population varied from 26.37 km² to 514.50 km² (mean= 158.77 ± 117.93 km²; *n*=26). The mean home range of females across the C1-K zones differed significantly (Kruskal Wallis, $\chi^2 = 12.719$, *df* = 5, *P* = 0.026).

(Below) Mean and range of home range for adult males with more than 10 individual fixed sightings, calculated using minimum convex polygon, for each of the revised zones of the Kunene range area.

Zone	<i>N</i>	Mean	Range (km ²)	Std. Error
1	3	455.70	174.14-791.02	180.01
2	2	115.49	98.70-132.27	16.79
3	2	52.10	40.97-63.22	11.12
5	3	141.44	90.12-235.96	47.32
6	8	85.54	39.79-223.77	21.46
7	2	244.12	242.48-245.77	2.32

(below) Mean and range of home ranges for adult females with more than 10 individual fixed sightings, calculated using minimum convex polygon, for each of the revised zones of the C1-K range area.

Zone	<i>N</i>	Mean	Range (km ²)	Std. Error
1	4	218.04	164.02-313.19	32.68
2	2	167.96	70.55-265.36	97.41
3	3	34.45	29.78-39.36	2.77
5	4	190.29	144.24-245.76	21.36
6	9	79.86	26.37-190.51	17.62
7	2	334.17	259.18-514.50	52.25

S3-H

In S3-H, home range sizes of two female black rhino ranged from 90 to 113 km² (mean= 103 km²), and they used only 50% of the available park area. Dispersal of these females has not taken place since first introduction (from du Preez 2004), and they prefer to remain in the vicinity of important springs in the reserve, using the main river valley and adjacent plateaus.

South Africa

TDRNR (male only population)

Two males were introduced into different locations at TDRNR. Their range sizes were estimated at 2 000 - 3 500 ha each.

P10

After 3 years at P10, the rhino were starting to show signs of extending their home ranges, recce'ing into new areas then returning to their range. Approximately 6000 ha of the Farm is now being used by all the rhino, which are offering high-quality tourism experiences. Groups of 4 rhino are regularly seen.

Adult male home ranges are a maximum of 30 to 40 km² (3000 to 4000 ha) each adult females are around 15 to 20 km².

WGR Game Reserve

WGR reported the following estimates of range size, determined over 3 years of sightings:

WM5: FM (13.5-15.5 yrs)	1025 ha	(20 sightings)
WM6: FM (12-14 yrs)	1532 ha	(6 sightings)
WF2: FF (>24 yrs)	2203 ha	(5 sightings)
WF4: FF (13.7-15.7 yrs)	1334 ha	(13 sightings)
WF5: FF (10.3-12.3 yrs)	1075 ha	(10 sightings)
WF6: FF (9.5-11.5 yrs)	1655 ha	(5 sightings)

GFRRC Reserve

The South Western sector of this reserve has very high densities of rhino. – up to 15 animals in 3 500 ha (0.43 rhino/km²), with groups of up to 9 rhino seen interacting together. The presence of the favoured c.1m *Euphorbia bothae*, which is not found in such abundance elsewhere at GFRRC, appears to attract the animals and increase social interactions. The flat-terrain of this section may also attract the rhino.

P8

By 2004, the 4 adult bulls at P8 had their own distinct territories based on the old fences that had been removed once the bulls had settled down. They do cross these lines but skirmishes result, and they so far have retired to their own areas so that to date no serious male problems have arisen. (Maps of ranges for rhino in 2004 were provided, but without a scale, so no range size could be estimated).

P1

Home range sizes for all individuals ≥ 7 years at 31st December 2004 (J Shaw):

Home ranges were calculated using 90% MCP for each individual from sightings data collected between October 2003 and December 2004.

♂ Bwana	29.7 km ²	n= 23
♀ Bogale	54.6 km ²	n= 32
♀ Inyani	61.2 km ²	n= 32
♀ Kagale	48.4 km ²	n= 39
♀ Nantoni	51.4 km ²	n= 33
♀ Usuk	42.0 km ²	n= 36

Average ♀ home range 51.5 km² (SD = 7.1)

Ranges from release (April) to Dec '04?	Yrs	Age Class	Sex	Range Size with Wanderings(ha)
01 – 'Ngogotshane'	17+	F	F	1700
07 – 'Stuquza'	5	E	F	1200
10 – 'Godweni'	4	E	M	800
131 – 'Dougal'	11+	F	M	1400
136 – 'TGR'	11+	F	M	1500
14 – 'Paris'		E	F	2300
146 – 'Potty'	17+	F	M	3000
147 – 'iMfolozi'	7+	F	F	800
170 – 'Harriet'	7	F	F	3400
243 – 'Ngenisa'	5	E	F	600
251 – 'Betty'	8	F	F	900
300 – 'Umkhandi wensimbi'	4	E	M	1500
72 – 'Ntshonilanga'	7	F	M	1500
75 – 'Amadodamabili'	6	E	M	900
76 – 'Jaluka'	5	E	M	700

<—P15:

The following information was provided on the ranges of newly-released black rhino at P15: The number of sightings used and method of calculation were not provided.

7.2 Behaviour related to introductions (breeding groups)

Namibia

S5-N

An E-class female from S1b-K was brought into S5-N. Severe dry conditions prevailed at this site, and the rhino started to feed prolifically on wild tobacco (*Nicotiana sp.*) in the riverbed next to the dam. She went into a coma and died.

South Africa

P2

P2 management devised a good scheme to facilitate the multi-stage process required to introduce the *D.b.michaelli* to the property. When a group of rhino was due to arrive, management would capture the independent males from the already-established herd, and keep them in separate fenced paddocks. The new arrivals would be boma'd for some weeks. Their "new" dung would meanwhile be spread around the reserve, and in the paddocks of the temporarily removed males. Established rhino dung would also be placed in the bomas of the new rhino. The new rhino would be released, and then after some time, the temporarily removed males would be released back into their former area. Their procedure worked well, and no direct introduction-related fighting mortalities have occurred.

Thaba Tholo also has a plan to deal with excess males – by relocating them to a separate (fenced) section of the property. In Feb 2005, Manager R Els said that 6 excess males were residing in a separate 3600 ha area removed from the breeding herd. The males showed great mutual tolerance and to date only 1 known fighting incident has occurred among 2 of them.

A case occurred of a D-class female being harassed and killed by a bull around a year after her introduction. She had left her mother who was about to give birth again.

P12 Private Reserve

One male (4 yrs) and one female (5yrs) black rhino were purchased in 2002. They had apparently been in "bomas" all their lives. They were boma'd for 4 months at P12, then released into the main 11 800ha area of this 12 000ha reserve for 1 month. However, management found it extremely difficult

to monitor them in this large area, and they were losing condition. In the opinion of the management, this was due to the stress of being in a large area for the 1st time in their lives, lack of surface water, and the mountainous terrain. The 2 rhinos were recaptured and put into the 200ha camp for ease of daily monitoring and for the availability of water. Simultaneously, the rhinos' ears were treated: the male's ears were infested with ticks which caused large amounts of damage.

Their condition is monitored daily by vehicle. They are very relaxed. They apparently socialize with the other animals in the camp (including Sable and buffalo).

The 2 rhinos walk the entire 200ha camp, of which 30-40% is old lands with no trees, and 60 – 70% is bush. The rhinos have been observed eating *Dichrostachys cinerea*, *Ziziphus mucronata*, *Lanena discolor* and "stokroos" (shrub).

MZNP

One mature male, two subadult males and two adult females were introduced to MZNP in March/April 2002. The one cow Faru's condition deteriorated in response to aggression shown towards her by the bull Maleka. She was relocated to the old section of the park just after the initial release. However the bull also managed to get into this old section and continued to harass the cow. The decision was taken to remove the bull (Maleka) before he either killed the cow or her calf. Faru's condition picked up slowly following the removal of the bull and the monitoring teams have been watching closely over the past two years eagerly awaiting the cow Dundi's first calf. There has still not been any calf born to this cow since being translocated to MZNP, but there are indications that Faru has had a new calf early in 2005 (most likely sired by Maleka before he was removed).

AENP Elephant National Park

The monitoring by S Downie and L Mavrandonis has highlighted some interesting behavioural encounters. SANParks is at present trying to get these data collected in a more quantitative manner and have succeeded in terms of plotting sightings records to provide basic indications of habitat use.

P8 Game Ranch

In 2002, the young male Ollie (8 yrs) was repatriated from Johannesburg Zoo where he has been since 1996. He was boma'd for 2 months at P8. His body condition was moderate, and his behaviour timid. He stuck to nearby feeding grounds on release. He mixed with no.8, but they fought.

He then moved to human habitation on own. Supplementary food was supplied to him from then on.

Another young female was introduced in 2002, and boma'd for 1 month at P8. She was released in moderate body condition, but was timid and stuck to a small range which had poor browse. She was provided with Lucerne and cubes, which she ate..

7.3 Male black rhino behaviour

South Africa

P8

The dominant bull 65 at P8 was thought to be semi infertile, as only one of the 3 females on this property had produced calves since introductions in 1996. There were no also births from August 2000 up to March 2004 from any of the 3 established females at P8. Bull 65 had been observed attempting to mate with them on a few occasions, but was reported to have had problems in penetrating. It is believed that his penis was injured in fighting with another bull in late 2000. Bull 65 was removed from the property and placed in a separate camp on another, separate property. In 2004 a mature bull introduced from TGR was placed in the Ngwenya camp with bull 65, who killed him. Since the removal of bull 65 from P8, calves have been born to the bull ZeroZero and No. 8 Gwala.

P3

Anton Walker of this reserve has observed that adult bulls are responsible for more calf deaths

than is generally thought. It is the recommendation of management to remove excess bulls and or remove calves (particularly bull calves) when they separate from their mothers.

P5

Two E-class bulls have consistently remained in each others company for a few years now.

TDRNR (male only population)

Two males were introduced into different locations at Tussen-die-Riviere. After some months, they met up and have since stayed together, eating, sleeping, walking and even playing together.

GFRRC

There was concern that the immobilization of a male calf in 2003 lead to its' premature separation from its mother and its consequent death through attack by an older bull. The mother was heavily pregnant and ready to produce her next calf, and may not have allowed the young male to return to her after it was immobilized.

All other young rhinos immobilised in the same way soon reunited with their mothers after wake-up. The stage of pregnancy of the mothers may have been a factor.



Photo c. Mitch Reardon

8: NEW METHODS IN MONITORING OF BLACK RHINO

Namibia: Population estimation using aerial block counts

(From du Preez 2004 – S1-E). This survey method (recommended by R du Toit of Zimbabwe) involves aerial counting of rhino within a stratified-random sample of blocks (patches) within the park. Sampled blocks are searched thoroughly so as to detect and count all black rhino present, and each rhino found is sexed and placed in an age category. The final estimate comes from extrapolating sample results to the rest of the park.

The methodology is as follows: The Park GIS map is overlaid by a 4x4 km sample block grid system. Budgetary limitations specify the total number of blocks that can be counted. Stratification takes place to optimise sampling of blocks and ensure the lowest possible confidence intervals around the Park estimate. In this Namibian Park, four strata were used: East-High density, East-Low density, West-High density, West-Low density. Strata identification was based on mapping the probability of rhino occurrence per 4x4 block, based on habitat type, soil type, estimated number of rhino at the nearest waterhole, and modelled rhino density from the previous year's count. Using the total affordable sample size (320 blocks or 41.5% coverage in this case), a specially designed spreadsheet programme determines the allocation of the number of blocks to count per stratum, so as to minimise overall variance in the final estimate. The specified number of blocks are then chosen at random within each stratum, and an efficient flight plan is devised to get to all specified blocks. These are each flown intensively, using a GPS to keep within the block boundaries. All sightings are georeferenced. Sighting outside the block boundaries are strictly excluded.

Namibia: Issues around monitoring in S1b – K, using photographic full-moon water hole counts and daytime foot patrols

In the past, mistakes were made in identifying rhino from film negatives and prints where the inner ear notched 4 and 40 were sometimes overlooked. However, re-examining past film using visible notches in combination with horn patterns, all rhino could be correctly identified.

Daytime photography was found to be more difficult and dangerous than night waterhole photography. Monitors could not get as close to the rhino, and were often charged. The rhino stayed in thick bush

by day, which obscured ear details in photos. However, once the rhino became well known the daytime photos complimented the full-moon night photo work.

Inadequate water provision at waterholes meant that other animals hung around waterholes all night waiting for them to fill. These animals became alarmed when monitors left the vehicle to photograph a rhino, and often scared off the rhino before it could be photographed. Elephant damage and lack of maintenance were the causes of the inadequate water provision.

Full-moon counts were badly affected by cloud cover later in the year (early wet season). The poor lighting made focusing difficult and affected photo quality.

South Africa: GFRRC: Use of a microlight to find and identify black rhino

A microlight aircraft is used at GFRRC, and has improved the frequencies of locating and identifying rhino. In '03, over 85 flights (115.2 hours), 755 rhino sightings were made (6-7 rhino/hour). Of these, 278 rhino sightings were positive ID's (36%). In '04, over 68 flights, 681 sightings were made at 9.2 rhino per hour, 35% of these were positively identified.

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GFRRRC B Fike (the field rangers based at Double Drift, "Botha's Post", Retreat" and "Kamadolo, D Brown, Dr P Lent, W Erlank, F Winkel, M Birch)

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P12 L Burger, N Prinsloo

P16J de Kock

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P2 R Els

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MGR C Mulqueeny, B Nxele, C Greaver (Field Rangers, S Thusi, S Sibiya, H Mthembu, D Khanyaga, D Kelly)

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WSNR C Greaver

P11 H van Schalkwyk

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S3-H P du Preez (P Lane)
P1-Oj R Fryer
P2-Okg R Fryer
P3-Ns R Fryer, R Loutit, (H Voigts, HO Reuter, S Simonkaas)
P4-Otv R Fryer
P5-K R Fryer
P6-Ed R Fryer
P7-Er R Loutit, R Fryer, (P Joubert, HO Reuter, Trackers, reserve manager)
P8-Ogv R Loutit, R Fryer, B Tindall, R Raue, S Crawford, Trackers
P9-Okt R Loutit, R Fryer, (Z Cooper, C&J Bergmann)
P10-Sc R Fryer
P11-Ogm R Fryer
P12-Oo R Fryer
P13-Ep R Fryer
P14-Sh R Fryer
P15-Eh R Fryer
P16-Uu R Fryer
P17-Pa R Fryer
P18-Okb R Fryer

Zimbabwe

L-B1 N Anderson, R du Toit
L-B2 N Anderson, R du Toit
L-S1 G Connear, R du Toit
L-M1 S Clegg, R du Toit
L-C1 R du Toit
M-G1 H Madzikanda
S-S1 Intensive Protection Zone N English
S-Mt1 Intensive Protection Zone D Tom
S-C1 Intensive Protection Zone Warden Mangoyi

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It is with great sadness that rhino conservation faces the loss of Blythe Loutit, Mike Hearn and Hans Hansen who each passed away in early 2005. The profound contributions and dedication of these lovely people was an inspiration to us all, and we will always miss them.

Finally the RMG members would like to extend their sincere thanks and appreciation to **Dr Martin Brooks** who acted as chairman of the Rhino Management Group from 1989 to 2004, when he resigned.