

# RHINO NOTES

## Rhino population sizes and trends

*Richard Emslie*

IUCN SSC African Rhino Specialist Group; email: emsleifrsg@telkomsa.net

### Introduction

The IUCN SSC's African Rhino Specialist Group (AfRSG) has met every two years since 1991, and updates the status of the African rhino at these meetings with data primarily being provided by official range State representatives. The continental statistics on rhino numbers were most recently updated at the 9th meeting of the IUCN SSC AfRSG held in Tanzania from 24-30 May 2008. The latest numbers reflect the best population estimates as of 31 December 2007.

Unlike many species, African rhinos are frequently monitored using techniques which provide relatively accurate and precise population estimates. Many rhino populations routinely use ear-notching; which allows the population either to be completely known or accurately estimated using Rhino Bayesian Mark-Recapture analysis, provided a significant proportion of the population are individually identifiable. However in very large populations (>750) or in very large areas (4,000+ km<sup>2</sup>) individual-based monitoring may not be feasible, and then aerial or ground distance-sampling counts (white rhino) or stratified aerial block count methods (black and white rhino) can be employed. The latter methods however are less precise (i.e. have bigger confidence levels around individual estimates) and the use of modeling to smooth estimates over time can help reduce the impact of year to year sampling variation on continental totals. The majority of African rhinos are monitored using a combination of the approaches above allowing the assessment of trends in overall numbers over time.

Estimates based on speculation or very old data (speculative guesstimates) are not included in the population totals given in these tables. Only country totals by sub-species are presented here, as individual population details are kept confidential at the request of some countries (although these are provided to the AfRSG by range States).

### **White rhino**

At a continental level, numbers of white rhinos (*Ceratotherium simum*) have continued to increase up to an estimated 17,500 by the end of 2007 as shown in figure 1.

### **Northern white rhino**

A decision by the Democratic Republic of Congo on the implementation of a survival strategy for the last remaining northern white rhinos in Garamba National Park is still awaited following the September 2007 meeting reported on in *Pachyderm* 43. However

results from recent surveys have proved very disappointing. There were an estimated four rhinos still present in late 2006, and while spoor was seen in a number of locations, there was only one direct sighting in 2007. The most recent surveys undertaken by the Congolese wildlife authority and African Parks Network with support from FFI and US Fish and Wildlife have failed to confirm their continued presence. Further intensive efforts are planned for the second half of 2008, using extensive systematic foot surveys with expert international trackers to

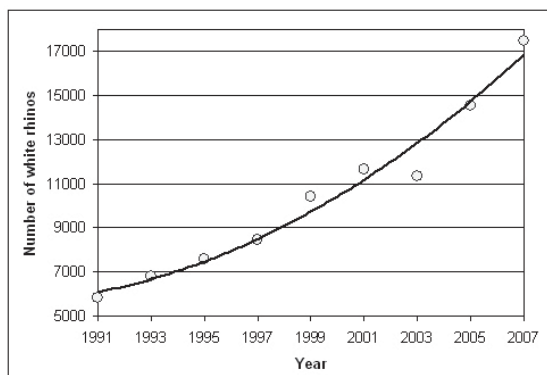


Figure 1. White rhino population trend, 1991-2007. Changes in estimated numbers of white rhinos in Africa since 1991 with fitted second-order polynomial trendline (IUCN SSC AfRSG data).

thoroughly search potential rhino range, including the adjacent Domaines de Chasse with additional searching using aerial reccees, routine foot patrols and community intelligence. Hopefully the animals will be located during these more extensive surveys, but should they not be, then the future of the subspecies will indeed be bleak as it may depend on the up to four potential breeders held in Dvur Kralove in the Czech Republic. This subspecies currently faces the greatest threat to its continued existence since 1984.

### **Southern white rhino**

Southern white rhino (*C.s.simum*) numbers continue to increase rapidly reaching an estimated 17,500 in 433+ populations in Africa by December 2007. All surviving southern white rhinos (including those in zoos) are derived from founder stock which ultimately came from only one breeding population which had been reduced to only 20-50 animals by 1895.

The apparent dip in numbers of white rhinos from 2001 to 2003 shown in figure 1 simply reflects sampling error around the estimate for the largest population of southern white rhinos (i.e. the 2003 estimate for this population was probably at the 'low' end due to sampling chance). The biggest population continues to grow with both 2006 and 2007 sample aerial count (27% coverage with distance sampling) estimates higher than in 2005. When viewed over time, population estimates for this population also show a clear and marked upward trend with a sum of squares error minimisation model producing a best-fit model through count estimates since 1997 indicating an average net annual growth rate of just under 9.1%. To reduce the impact of year to year count estimate variability due to sampling chance, it was decided to use the more conservative 2007 modelled estimate of 8,629 when compiling the 2007 South African and continental totals<sup>1</sup>. There are now more white rhinos in this one population than there were in the whole continent in 1997.

The last complete survey of the status of white rhino on private land in South Africa was in 2004. 2007 estimates were however available for 106 private populations in three provinces, Greater Kruger private reserves and many of the larger private populations in other provinces. Numbers in these populations increased from 1,930-2,562 from 2004-2007 giving an annual growth rate of 9.9% which reflects both biological growth and increases due to translocations in of more rhino from State reserves. To estimate numbers on other private populations in South Africa last surveyed in 2004-2006 a more conservative 6.2%<sup>2</sup> annual growth rate was modelled to reflect both continued purchases of rhino from State land and probable continued biological growth of populations

<sup>1</sup> A sums of squares error minimisation best fit model was applied to Kruger NP white rhino data from 9 counts from 1997-2007, varying both the starting population size in 1997 and average annual growth rate. This generated a more conservative 'smoothed' modeled 2007 estimate of 8,629 compared to the higher 8,876 and 9,548 estimates derived from the 2006 and 2007 distance sampling aerial sample counts. The lower modelled estimate was used for 2007 in case the 2007 estimate derived from the 2007 aerial sample was at the 'high' end due to sampling chance.

<sup>2</sup> An annual growth rate of 6.2% was applied to estimate numbers on private properties last surveyed in 2004 as this was the recorded growth rate for rhinos on private land in South Africa from 2004-2007 (including private land in Greater Kruger). Over the same period, the recorded underlying biological growth rate for white rhinos on private land (excluding Greater Kruger) was 5.9% (Castley and Hall-Martin 2004). With around 220 surplus white rhinos being sold by the State each year in South Africa (Knight 2008), and even allowing for increased levels of trophy hunting since 2004, it is probable that numbers on private land have also continued to increase due to continued translocations from State land. In 2004, females outnumbered males on private land by almost 2:1 (Castley and Hall-Martin 2004), and given this very favourable sex ratio a 6.2% modelled growth rate is conservative. It is also below the recorded 14.9% annual growth (including translocations) recorded on 71 private populations in South Africa where estimates were available for both 2004 and 20007. The numbers of white rhinos on private land in South Africa and number of AfRSG-rated Key and Important populations on private land are due to be updated and revised following a detailed WWF-funded survey of the status of white rhinos on private land scheduled to start in late 2008.

(as observed in other populations and which has been the long-term trend). Updated figures for numbers on private land in South Africa will be available in 2009 following a detailed survey scheduled for late 2008.

Numbers of southern white rhinos in other range States have also increased from an estimated 831 in 1997 to 1225 in 2007 with over 300 in each of Namibia, Zimbabwe and Kenya. Numbers in Botswana have exceeded 100 for the first time since the late 1980s.

### **Black rhino**

Overall, numbers of black rhino have also increased reaching 4,200 by the end of 2007. Since numbers bottomed out at 2,410 in 2005, numbers have increased by 1,790 in the wild in the 12 years (a 74.3% increase).

### **Western black rhino**

Following the 2006 AfRSG meeting it is reported that it was feared that the western black rhino had probably gone extinct. Since then there have been no further reports of any confirmed sightings or spoor of rhino in Cameroon.

### **Eastern black rhino**

The number of eastern black rhino (*D.b.michaeli*) continues to increase in the major range State (Kenya) up to 577 in 2007 compared to 430 in 2001 (an average annual growth of 5.0% over the period). Numbers of this sub-species continue to increase rapidly in Tanzania and in the out of range in South Africa which has grown to become a **Key2** population. Discussions are underway which may result in the out of range South African animals being translocated back to former eastern black rhino range in Tanzania. The single confirmed black rhino remaining in Rwanda died in 2006, but the national conservation agency has reported the existence of one additional animal, but this has not yet been independently confirmed. There has been no confirmation of the continued existence of a possible 2-4 in Ethiopia. Numbers of eastern black rhinos have reached 700 for the first time since 1984.

### **South-western black rhino**

Numbers of south-western black rhino (*D.b.bicornis*) also continue to increase in both Namibia (its strong-

hold conserving 92.5% of the subspecies) and South Africa with an estimated continental total of 1,505 in 2007. Numbers in South Africa have exceeded 100 for the first time.

### **South-central black rhino**

Numbers of south-central black rhino (*D.b.minor*) have also increased since 2005 to reach 1,995 by 2007 with underlying growth rates (3.4%) showing a slight improvement although still below minimum target levels of 5%.

South Africa is the major range State for this subspecies conserving almost two-thirds of animals in 2007. The estimate used for the largest population of this subspecies are conservative, and this population could well hold another 40 rhinos. A block count trial was successfully undertaken in the southern section of this park with a limited number of blocks also counted in the central area. The undertaking of a planned block count survey over the whole park should improve knowledge of this AfRSG-rated **Key I** population. The second largest population of this subspecies has, as yet, not responded positively to removals and has continued to decline. Investigations are underway as to try to ascertain the causes of this. Estimated numbers of this subspecies on other South African populations have increased by 6.9% per annum from 607 in 2005 to 693 by 2007. Encouragingly numbers of rhinos on some other previously underperforming south-central black rhino populations in South Africa have returned to productivity following increased removals.

Zimbabwe is another major range State, conserving approximately 28% of this subspecies in 2007. Increased snaring and poaching deaths in Zimbabwe populations are of major concern. These have resulted in a slight decline in numbers compared to a revised updated 2005 estimate. Fortunately underlying growth rates in a number of Zimbabwean populations in the Lowveld continue to be amongst the highest in Africa and growth in these populations have largely cancelled out the poaching/snaring losses which have been increasing. However if the latter were to escalate further, then numbers in this important "Big 4" range State could start to significantly decline.

Further founder rhinos were translocated to Zambia to help restock North Luangwa National Park with more introductions taking place in 2008.

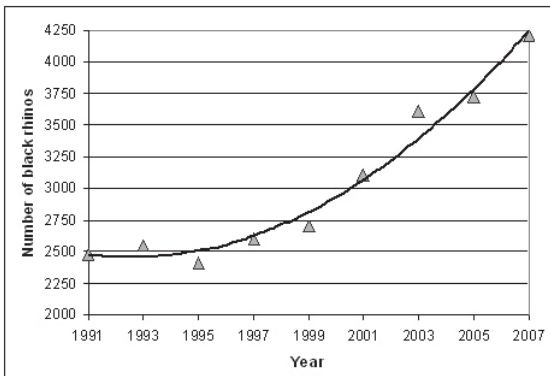


Figure 2. Black Rhino population trend, 1991-2007. Changes in estimated number of black rhinos in Africa since December 1991 with fitted second-order polynomial trendline (IUCN SSC AfRSG data). Note how numbers bottomed out in the early 1990s reaching a low of 2,410 in 1995, but have increased since then to reach 4,200 by Dec 31 2007.

### Changes in numbers of AfRSG-rated Key and Important populations

The continued increase in overall numbers of black and white rhinos is reflected in increases in the number of AfRSG-rated rhino populations, although this continues to be primarily due to an increase in the number of *Important* and *Key 2+ Key 3* populations rather than the largest *Key 1* populations (Table 2). There are now an estimated 2133 rated *Key* and *Important* rated populations in Africa up from only 60 in 1995.

By the end of 2007 the eight white and six black *Key 1* rated populations conserved 68.79% and 47.50% of Africa's white and black rhinos respectively (Figure 3). The 18 and 13 *Key 2+Key 3* white and black rhino populations conserved an additional 6.77% and 19.34% rhinos. Thus, despite only accounting for 6.0% and 14.4% of all white and black rhino populations in Africa, the AfRSG-rated *Key*-rated populations conserved approximately three-quarters (75.56%) and two-thirds (66.84%) of Africa's black and white rhino respectively. The proportion of all rhino conserved by *Key* populations is increasing for both black and white rhino.

The estimated number of *Important* white rhino populations has almost trebled in 12 years from 22 in 1995 to 61 in 2007 with the number of *Important* black rhino populations also increasing over the last 12 years from 16 in 1995 to 27 in 2007. As of December 2007, *Important* populations in 2007 conserved a further 10.31% and 18.75% of Africa's black

and white rhinos respectively. Despite the increase in number of *Important*-rated populations and the number of rhinos conserved in them, the proportion of the total number of rhinos conserved in *Important* populations is declining.

The remaining 347 and 86 generally smaller unrated 'other' white and black rhino populations conserved 14.13% and 14.41% of wild white and black rhinos respectively in 2007. The proportion of the total number of rhinos conserved in these unrated populations is also declining.

Table 3 shows that the average number of rhinos per population by population rating for each species. Average sizes are similar between the two species except for the *Key 1* white rhino populations where the average number/*Key 1* white rhino population is heavily influenced by two very large populations that together conserve 64.4% of Africa's white rhinos. Figure 3 shows that while AfRSG *Key* and *Important* rated populations together conserve a similar proportion of Africa's rhinos (85.87% white and 85.59% black) the smaller *Key 2+Key 3* and *Important* populations conserve a bigger share of total numbers for black rhinos.

### Rhinos under the various ownership models

The breakdown of estimated numbers of African rhinos and numbers of rhino populations as at the end of 2007 is given in Table 4, broken down according to species, subspecies and management/ownership models. The white rhino in the Kruger National Park, Manyeleti Game Reserve and Letaba Ranch areas of Greater Kruger National Park are listed under State,

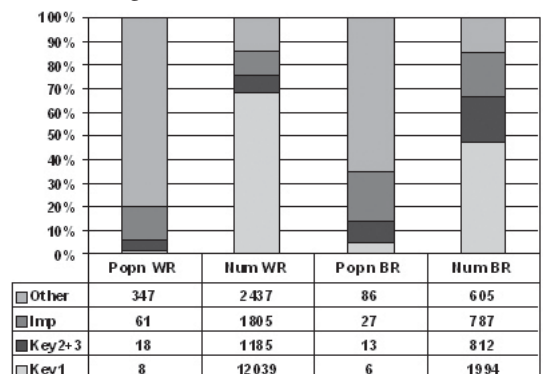


Figure 3. Breakdown of numbers of populations and numbers white (WR) and black (BR) rhinos by continental AfRSG population rating as of 31 December 2007.

Table 1. Numbers of white and black rhinos in Africa as of 31 December 2007 by country and subspecies



Compiled by IUCN SSC African Rhino Specialist Group

Species	White rhino				Black rhino					
	C.s.cottoni	C.s.simum	Total	Trend	D.b.bicornis	D.b.longipes	D.b.michaeli	D.b.minor	Total	Trend
Botswana		106	106	Up				7	7	Stable
DR Congo	4		4	Stable?						
Kenya		303	303	Up		577		16	577	Up
Malawi									16	Up
Mozambique		9	9	?				?	?	Spoor?
Namibia		370	370	Up	1,394				1,394	Up
Rwanda									1	Stable?
South Africa		16,273	16,273	Up	113			1,321	1,488	Up
Swaziland		89	89	Up				18	18	Up
Tanzania								56	123	Up
Uganda		6	6	Stable+Intro						
Zambia		1	1	Down				16	16	Stable+Intro
Zimbabwe		341	341	Up				558	558	Down
Totals	4	17,500	17,500	Up	1505	0	700	1995	4200	Up

Table excludes speculative guesstimates.

Numbers were primarily compiled at the US Fish &amp; Wildlife Rhino &amp; Tiger Conservation Fund and WWF African Rhino Programme sponsored 2008 IUCN SSC AfrSG Meeting held in Tanzania, May 2008.

Species and subspecies totals &gt;500 have been rounded to the nearest 5 rhinos.

Table 2. Number of **Key** and **Important** African rhinoceros populations by country at 31 December 2007

RATING	Black rhino			White rhino			Total
	KEY1	KEY 2 +KEY 3	Imp	KEY1	KEY 2 +KEY 3	Imp	KEY & Imp
Botswana	0	0	0	0	0	2	2
DR Congo				1	0	0	1
Kenya	0	6	5	1	1	2	15
Malawi	0	0	0				0
Mozambique	0	0	0	0	0	0	0
Namibia	2	0	4	0	1	3	8
South Africa	3	3	8	6	13	47	82
Swaziland	0	0	0	0	1	1	2
Tanzania	0	1	2				3
Uganda				0	0	0	0
Zambia	0	0	0	0	0	0	0
Zimbabwe	1	3	6	0	2	6	18
<b>TOTAL 2007</b>	<b>6</b>	<b>13</b>	<b>27</b>	<b>8</b>	<b>18</b>	<b>61</b>	<b>133</b>
TOTAL 2005	6	9	26	6	14	51	112
TOTAL 2003	5	9	22	6	11	45	98
TOTAL 2001	5	11	19	5	9	44	93
TOTAL 1999	5	6	18	5	6	36	76
TOTAL 1997	5	7	15	5	6	33	71
TOTAL 1995	5	6	16	6	6	21	60

while those resident in five adjoining linked private nature reserves are listed as privately owned. The total Greater Kruger population itself is however counted as only one population, as intervening fences have been dropped between the component reserves.

### Numbers of populations by model

In 2007, 83.2% of the 434 known discrete white rhino populations in Africa were privately owned compared with only 54 populations occurring in State-run or State/private run protected areas. While privately owned white rhino populations are more numerous, many of these are small with an average size of only 14 rhinos, compared to an average of 244 rhinos per State-run parks.

Of the 132 discrete black rhino populations in 2007 (up from 115 in 2005), 55 occur on State protected areas with an average size of 50 rhinos. Of 69

black rhino populations managed by private landowners, 40 populations (roughly a third) are managed on a custodianship basis (average size = 23). Numbers of privately owned populations continue to increase numbering 25 in 2007, although with the odd exception these are generally very small (averaging only 11 rhinos each).

Table 3. Average number of rhinos (rounded) per population for the different AfRSG continental population importance rating

	Key 1	Key2+3	Important	Other (non-rated)
White rhino	1,505	66	30	7
Black rhino	332	62	29	7

Table 4. Numbers of African rhinos under the various management systems in Africa 31 December 2007

Species	White rhino					Black rhino					Total black & white rhino	
	C.s.cottoni (northern)	C.s.simum (southern)	Total	D.b.bicornis (south-western)	D.b.michaeli (eastern)	D.b.minor (southern-central)	Total	Both species				
Number of rhinos (popns)												
Biosphere (State&Private owned)	-	16(1)	16(1)	-	-	-	-	-	-	-	-	16(1)
Communal custodianship	-	42(4)	42(4)	160(1)	1(1)	3(1)	164(3)	206(7)				
Municipal/County Council	-	39(7)	39(7)	-	36(2)	-	36(2)	75(9)				
Other (Defence Force/Zoo NRs)	-	47(9)	47(9)	-	-	4(1)	4(1)	51(10)				
Private custodianship	-	-	-	200(24)	265(6)	437(10)	902(40)	902(40)				
Pvt cust'p with progeny sharing	-	-	-	-	-	70(4)	70(4)	70(4)				
Privately owned	-	4,913(361)	4,913(361)	33(2)	54(1)	189(22)	276(25)	5,189(386)				
State	-	12,441(51)	12,441(51)	1,114(12)	341(12)	1,282(31)	2,737(55)	15,178(106)				
State owned – joint Pvt mgmt	4(1)	-	4(1)	-	2(1)	7(1)	9(2)	13(3)				
TOTAL	4 (1)	17,498 (433)	17,502(434)	1,507 (39)	699 (23)	1992 (70)	4,198 (132)	21,700 (566)				
Percentage of rhinos												
Biosphere (State&Private-owned)	-	0.09%	0.09%	-	-	-	-	0.07%				
Communal custodianship	-	0.24%	0.24%	10.62%	0.14%	0.15%	3.91%	0.95%				
Municipal/County Council	-	0.22%	0.22%	-	5.15%	-	0.86%	0.35%				
Other (Defence Force/Zoo NRs)	-	0.27%	0.27%	-	-	0.20%	0.10%	0.24%				
Private custodianship	-	-	-	13.27%	37.91%	21.94%	21.49%	4.16%				
Pvt cust'p with progeny sharing	-	-	-	-	-	3.51%	1.67%	0.32%				
Privately-owned	-	28.08%	28.08%	2.19%	7.73%	9.49%	6.57%	23.91%				
State	-	71.10%	71.08%	73.92%	48.78%	64.36%	65.20%	69.94%				
State owned – joint Pvt mgmt	100.00%	-	0.02%	-	0.29%	0.35%	0.21%	0.06%				

Table excludes speculative guesstimates  
Greater Kruger counted as one population but rhinos within Kruger National Park, Manyaleli Game Reserve and Letaba Ranch listed under State while those in adjoining private reserves listed under Privately-owned.

## State-run National Parks and Game Reserves

Table 4 shows that just over two-thirds (69.94%) of African rhinos are still conserved in State-run protected areas, with 23.91% privately owned and a further 4.48% managed by the private sector on a custodianship basis (with or without progeny sharing) for the State. Rhinos on communal land account for a further 0.95%, with only 0.72% of the continent's rhinos managed under other models.

### Private ownership

In 2007 28.07% of Africa's southern white rhino were privately owned. Just over half (14) of the 26 AfRSG-rated *Key* white rhino populations in the world and almost two-thirds (40) of the 61 AfRSG-rated *Important* white populations (i.e. more than half) occurred in privately owned populations. One of the eight *Key* populations was a State National Park linked to adjacent smaller State run and private Game Reserves.

The number of privately owned black rhino also continues to increase, reaching 276 in 2007 up from only 76 in 1999.

### Private custodianship

In contrast to the pattern with white rhinos, there are many black rhinos on private land in Kenya, Zimbabwe, Swaziland and Namibia that are managed on a custodianship basis for the State (as opposed to being privately owned). The bulk of privately managed black rhinos are under custodianship on behalf of the State (21.49% of all black rhinos) with only 6.57% of black rhinos being privately owned. In 2007, the 19 AfRSG-rated *Key* populations of black rhino included four Zimbabwean and three Kenyan custodianship populations; with a further nine *Important* custodianship populations. Over the 10 years 1997-2007

numbers of black rhinos managed by the private sector on a custodianship basis (with or without sharing of progeny) have increased from 394 to 902 (an average increase of 8.6% per annum).

### Communal land

More black rhinos than white rhinos occur on communal land (164 vs 42) accounting for 3.91% of all black rhinos.

### Municipal/County Council/Area Authority reserves

In South Africa and Kenya there are a limited number of reserves and conservation areas run by local area or municipal authorities. The Masai Mara National Reserve in Kenya is run by the local Narok and Trans Mara county councils. South Africa also has seven small municipally-owned and run parks that have a few white rhinos.

### Global status of rhinos in captivity (intensive management)

Estimates presented by Evan Blumer at the 2006 AfRSG meeting indicated that there were an additional 240 black rhino (171 eastern, 69 southern and 0 south-western) and 760 white rhino (10 northern and 750 southern) under intensive management worldwide. Current numbers are not known.

## References

- Castley JG, Hall-Martin AJ. 2004. The status of white rhinoceros, *Ceratotherium simum simum*, on private land in South Africa - a summary of findings from a survey conducted in 2004. Unpublished WWF Report.