
succeed in the short term. The African Rhino Specialist Group believes the preferred fallback option would be to move all the remaining animals to an ex-situ fenced sanctuary outside of Cameroon, where they could be looked after under temporary custodianship, as part of a negotiated bilateral agreement. This option would save the western black

rhinos and give Cameroon more time to raise funds and create the necessary conditions for in-situ rhino conservation that will succeed in future. Once the authorities will have met the required conditions and rhino numbers will have built up in the ex-situ sanctuary, the rhinos could be reintroduced back into Cameroon.

SADC regional program for rhino conservation

Richard H. Emslie

IUCN-SSC AfRSG Scientific Officer

Dr Rob Brett has been appointed SADC rhino program coordinator and has taken up his position in Harare, Zimbabwe.

Reviews of rhino conservation in SADC range states were undertaken from June to September 2000. A key part of these reviews was to identify and solicit

potential projects for funding by the SADC Regional Program for Rhino Conservation. At a meeting of the SADC rhino program consortium meeting scheduled for 9–10 October 2000, potential projects for funding were to be reviewed and program budgets and activity plans drawn up for the next six-month period.

African rhinos numbering 13,000 for first time since the mid-1980s

compiled by Richard H. Emslie

IUCN-SSC AfRSG Scientific Officer

White rhino

Southern white rhino (*Ceratotherium simum simum*) numbers have continued to increase to an estimated 10,377 in 1999, up from 8441 in 1997, 7532 in 1995 and 6784 in 1993.

Part of the big increase from 1997 to 1999 is because of the revised Kruger National Park figures that were based on a 15% aerial distance sampling estimate. To err on the side of caution, it was decided to take the lower 95% level as the Kruger population estimate.

All countries with wild white rhinos recorded increasing populations, with the exception of Zambia, which recorded a decline of one. Two white rhinos were seen alive in Mozambique, but whether they are

escapees from Kruger Park in South Africa is unknown.

South Africa remains by far the most important range state, with 94% of the wild population, amounting to 9754 white rhinos; while Zimbabwe (208), Kenya (164) and Namibia (163) conserve most of the remainder. Just over 22% (2319) of the continental total is now privately owned.

Northern white rhinos remain limited to Garamba National Park in the Democratic Republic of Congo but have fared better in the second civil war. Surveys have confirmed at least 24 animals existing and quite possibly as many as 7 others. Subsequent information from Dr Kes Smith suggests the true population is towards the higher side of this range.

Black rhino

Continent-wide, black rhino numbers stabilized at about 2400 between 1992 and 1995, increasing up to 2600 by 1997. Encouragingly, the latest 1999 black rhino estimate of ~2700 indicates numbers continue to creep upwards. The major range states are still South Africa (1074), Namibia (695), Zimbabwe (435) and Kenya (420). While the increase is encouraging, some rated populations in a number of range states have been performing suboptimally and may be overstocked.

The most critically endangered subspecies remains the western subspecies, *Diceros bicornis longipes*. While there have not been any new surveys, remaining rhinos are still restricted to a small scattered population in northern Cameroon.

Overall numbers of the eastern *D. b. michaeli* were pretty stable, with the majority (86%) being conserved in Kenya.

Namibia remains the stronghold of the south-western black rhino, *D. b. bicornis*, conserving 94% of the estimated 737 animals in 1999.

The most numerous subspecies, the southern central *D. b. minor*, occurs in six range states, of which South Africa with 1000 (68%) and Zimbabwe with 435 (30%) are by far the most important. Some Zimbabwe populations in particular continue to show rapid growth. Overall numbers have increased from 1298 in 1995 to 1363 in 1997 to 1467 in 1999. The recent invasions of Zimbabwean conservancies by war veterans is, however, a cause for concern.

Numbers by country

Table 1 shows total numbers of African rhino, with the numbers broken down by country and subspecies. It should be noted that estimates based on speculation or old data are not included in the population totals given.

Table 1. Numbers of white and black rhinos in Africa in 1999: by country and subspecies

Species, subspecies	White rhino				Black rhino					
	<i>C. s. cottoni</i> (northern)	<i>C. s. simum</i> (southern)	Total	Trend ^a	<i>D. b. bicornis</i> (south-western)	<i>D. b. longipes</i> (western)	<i>D. b. michaeli</i> (eastern)	<i>D. b. minor</i> (south central)	Total	Trend ^a
Botswana	–	31	31	up	–	–	–	–	–	–
Cameroon	–	–	–	–	–	10	–	–	10	down?
Chad	–	–	–	–	–	temp	–	–	temp	–
D R Congo	28	–	28	up?	–	–	–	–	–	–
Kenya	–	164	164	up	–	–	420	–	420	stable
Malawi	–	–	–	–	–	–	–	7	7	up
Mozambique	–	2	2	down?	–	–	–	extinct?	0	–
Namibia	–	163	163	up	695	–	–	–	695	up
Rwanda	–	–	–	–	–	–	6	–	6	up
South Africa	–	9754	9754	up	42	–	32	1000	1074	up
Swaziland	–	50	50	up	–	–	–	10	10	up
Tanzania	–	–	–	–	–	–	32	15	47	up
Zambia	–	5	5	down	–	–	–	–	–	–
Zimbabwe	–	208	208	up	–	–	–	435	435	up
Totals	28	10377	10405	up	737	10	490	1467	2704	up

Compiled by the IUCN-SSC African Rhino Specialist Group

Table excludes speculative guesstimates. Ivory Coast southern white rhinos are excluded as these are semi-captive and out of range. Numbers were compiled at the 2000 AfRSG meeting held in Tanzania from 26 May to 1 June 2000, with some totals updated later. Countries listed with no rhinos may possibly have rhinos, but this needs confirmation. Exact Swaziland numbers were given to the AfRSG but are being kept confidential for security reasons. The table shows approximations to true number. Numbers of *D. b. minor* in Tanzania may well be higher, but this requires confirmation.

C. s. – *Ceretherium simum*; *D. b.* – *Diceros bicornis*

^a Trend refers to the underlying performance of populations and ignores changes in numbers caused by translocations.

Table 2. Number of *key* and *important* African rhinoceros populations by country in 1999

Rating	Black rhino			White rhino			Rated populations key & important
	Key 1	Key 2	Important	Key 1	Key 2	Important	
Cameroon	1	0	0	0	0	0	1
DR Congo	0	0	0	1	0	0	1
Kenya	0	2	7	0	1	2	12
Namibia	2	0	1	0	0	3	6
South Africa	2	1	6	4	5	25	43
Swaziland	0	0	0	0	0	1	1
Zimbabwe	0	3	4	0	0	5	12
Total	5	6	18	5	6	36	76

Terms as defined in the African Rhino Action Plan:

Key 1 – population increasing or stable, $n > 100$ or 50% of the subspecies

Key 2 – population increasing or stable and $n = 51-100$ or 26–50% of the subspecies

Important – population increasing or stable and $n = 20-50$

'Key' and 'important' populations

Table 2 shows that by 1999, continentally there were 76 AfRSG-rated *key*¹ or *important* rhino populations. In 1999, the 76 populations rated *key* and *important* conserved 84.2% and 83.3% of Africa's black and white rhinos respectively. Corresponding proportions of the subspecies conserved in AfRSG-rated populations varied from 76.1% (eastern black) to 83.3% (southern white) to 85.8% (south-western black) to 86% (south central black) to 100% for the two rarest subspecies (northern white and western black). The key-rated populations alone conserve just over three-quarters of both black and white rhinos in the wild. By way of contrast, the 47 unrated black and 197 unrated white rhino populations conserved 427 and 1736 rhinos respectively.

Breakdown of rhino numbers by management model

While three out of every four African rhinos are still conserved in state-run protected areas (75.6%), 18.27% are privately owned and a further 3.68% managed by the private sector on a custodianship basis for the state. Rhinos on communal land account for a further 1.22% with only 1.21% under other models.

The bulk of privately managed black rhinos are under custodianship on behalf of the state (17.86% of all black rhinos). Only 2.81% of black rhinos are

privately owned. This differs from white rhinos, where 22.29% (2319) of all white rhinos are privately owned.

More black rhinos than white rhinos occur on communal land (160 vs 20), accounting for 5.18% of all black rhinos.

In 1999, of the 251 known discrete white rhino populations in Africa, 178 (70.9%) were privately owned, and 52 occurred in state-run protected areas. However, many of these privately owned white rhino populations are small with an average size of only 13 rhinos, compared with an average population of 153 in state-run protected areas.

Of the 84 discrete black rhino populations in 1999, 49 occurred on state-protected areas with an average size of 41 rhinos. Of those that are privately managed, 22 populations (roughly a quarter) were managed on a custodianship basis (average size, 22). In 1999 there were 8 privately owned black rhino populations, although all were small, averaging only 9.5 rhinos each.

In four of the white rhino range states (Botswana, Kenya, Namibia and Swaziland), more white rhinos occur on privately managed or owned or communal land than on land managed by the formal state conservation bodies. In Zimbabwe in 1999, approximately twice as many black rhinos were managed by the private sector on a custodianship basis (293) than were conserved in state-run protected areas (142). A further 190 black rhinos were also managed under custodianship in Kenya, Namibia and Swaziland with 76 being privately owned in South Africa.

¹ For a definition of *key* and *important* populations, see the IUCN AfRSG's African Rhino Action Plan.

In 1999, 4 out of the 11 AfRSG-rated *key* white rhino populations in the world and a further 17 of the 35 AfRSG-rated *important* white populations occurred on private land. One of the five *key* populations was a national park linked to adjacent private game reserves.

In contrast to the pattern with white rhinos, there are many black rhinos on private land in Kenya, Namibia, Swaziland and Zimbabwe that are managed on a custodianship basis for the state (as opposed to being privately owned). In 1999, the 11 AfRSG-rated *key* populations of black rhinos included 2 Zimbabwean conservancies and 1 Kenyan sanctuary; with a further 5 *important* custodianship populations. From 1997 to 1999, numbers of black rhino managed by the private sector on a custodianship basis increased from 394 to 483.

Black rhino numbers have in general declined markedly over the last decade on much of the communal land where they used to occur. At present,

17.64% of the south-western black rhinos and 2.04% of the eastern black rhinos are conserved on communal land. Overall, 5.18% of Africa's black rhinos were found on communal land in 1999, compared with only 0.19% of Africa's white rhinos. In South Africa and Kenya, local area or municipal authorities run a limited number of reserves and conservation areas. The Masai Mara National Reserve in Kenya is run by the local Narok and Trans Mara county councils, while in Tanzania the Ngorongoro Area Authority manages Ngorongoro and the surrounding area. South Africa also has seven small municipally owned and run parks that have a few white rhinos. In 1999 such municipal or county council or local-area-authority parks held 39 white rhinos and 42 black rhinos, accounting for about 0.62% of Africa's rhinos. All such black rhinos are of the eastern subspecies, making up 8.57% of this subspecies in the wild.

Progress with developing statistical models to determine the source and species of recovered illegal rhino horn in Africa based on analyses of its chemistry

Richard H. Emslie,¹ Martin Brooks,¹ Julia Lee-Thorp,² Anna Jolles,³ Wyatt Smith,⁴ Nanette Vermass⁴

¹IUCN-SSC African Rhino Specialist Group, ²University of Cape Town, Department of Archaeology,

³Cornell University, ⁴Anglo-American Research Laboratories Pty. Ltd.

It is often said that 'you are what you eat'. Because elements and different isotopes present in food plants, affected by climate, geology and type of plant, can be absorbed into rhino horn through the digestive processes, chemical analysis of rhino horn offers the potential of determining both the source of the horn as well as the species of rhino that produced it.

Results of the WWF-funded AfRSG continental horn fingerprinting project, which aims to develop forensic techniques to determine the source and species of rhino horn based on analysis of its chemistry, have been written up in a detailed confidential final report submitted to WWF.

This report discusses the statistical analysis of rhino-horn chemistry data for samples of horn from populations holding approximately 70% of Africa's

rhinos. After dealing with problems of high data dimensionality, multicollinearity and zero values, successful species and source-identification models were built using discriminant functions—often with 100% post-hoc classification success. Horn chemistry was also related to rainfall and primary productivity, and horn tips were found not to differ consistently chemically from the rest of the horn. The best source-determination models used data from all three labs and analysed data for the two species separately at the finer spatial scale of park or area within a park. Graphical presentation of the results (canonical plots, traces and icon plots) also enables them to be understood by laymen.

However, despite these successes, results should be treated as preliminary until they are validated