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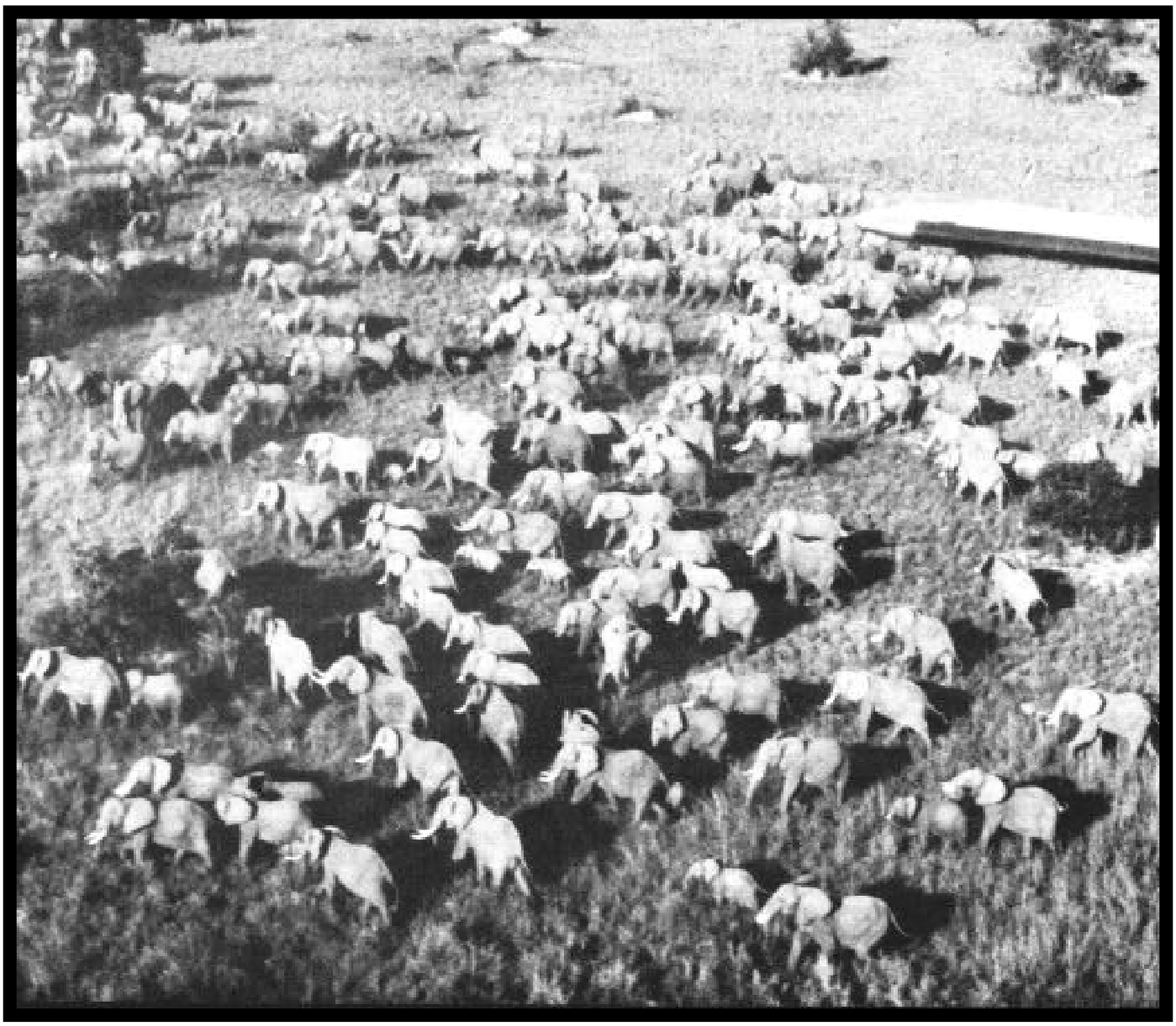
NEWSLETTER OF THE AFRICAN ELEPHANT AND RHINO SPECIALIST GROUP



NUMBER 4 DECEMBER 1984

INTERNATIONAL UNION
FOR CONSERVATION OF NATURE
AND NATURAL RESOURCES

SPECIES SURVIVAL COMMISSION

WCI
Wildlife Conservation International

PRODUCED WITH THE ASSISTANCE OF WCI,
THE CONSERVATION DIVISION OF THE NEW YORK ZOOLOGICAL SOCIETY

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Chairman's Report

A LOOK AT ELEPHANT AND RHINO CONSERVATION PROBLEMS AND PROGRESS

The IUCN specialist groups are reviewed at each General Assembly every three years, and although AERSG was convened a year after the 1981 assembly in New Zealand, giving us only a two-year stint I felt obliged to hand on the position at the November General Assembly in Madrid, rather than stand in for a further three years. I took on the chairmanship specifically to see AERSG underway, and now that it is, I must return to my own conservation interests, which have stood backburner in the meantime, but I hope still to actively support AERSG.

This is a convenient point to review what AERSG has done in the two years, and to suggest what lies ahead.

Where it is easy to say what should be done, it is hard to claim real progress when by definition conservation is holding the animal realm constant against the steady stream of universal change. The only real solution is to monitor regularly the number and distribution of elephants and rhinos, the trade in their products, and to assess the patterns and causes of change. This we have managed to do. Esmond Bradley Martin's rhino horn trade studies have been summarized in previous *News≠letters* and the Wildlife Trade Monitoring Unit, which we com≠missioned to do a detailed ivory update in 1982, has continued to produce regular reports. So, based on the field and trade studies, where do we stand? If the animal world is viewed restrictively as the protected areas, then, though regretable, it is understandable that elephants and rhinos are fast losing ground elsewhere in Africa. What is more worrying is that our largest land mammals are also disappearing within their allo≠cated realm: the 1 .2 million square kilometres of Africa enclosed within some 360 conservation areas. These are the conclusions of the 1983-84 surveys summarized in this *Newsletter.*

Douglas-Hamilton, taking only those regions, mostly sanctuaries, with repeated counts over a number of years, shows most of Africa to have lost large numbers of elephants in recent years ≠far more than human increase alone can explain. Given the better protection of sanctuaries and the resulting immigration of elephants from more vulnerable areas, the trend outside will be exaggerated. The field evidence is supported by the population modeling of Pilgram and Western (this *Newsletter).* They suggest the sharp downturn in the weight of tusks entering the world market since the late 70s indicates heavy overhunting. If we reckon that the number of elephants contributing to the annual 800 or so tonnes has increased from some 45,000 to 70,000 over the last eight years when mean tusk weights have declined from around 9 kg to 6 kg, we can compute that there could not have been many more than a million elephants in Africa when the tusk-weight decline began. That is close to the 1.3 million esti≠mated by Douglas-Hamilton in the late 70s and 1,19 given by the Wankie Workshop in 1982. When we add ivory used within Africa (presently being surveyed by Bradley Martin), last year's ivory export may have reached 1,000 tonnes, representing 90,000 or more dead elephants, almost twice the 5% annual offtake that the million or fewer elephant can sustain, and sufficient to halve the population in less than ten years.

Rhinos have fared far worse. Black rhinos have declined from around 13,000 in 1980 to less than 9,000 in 1984. Trade figures produced by Bradley Martin's 1983 Asian surveys show North Yemen, Singapore, Taiwan and South Korea to be acquir≠ing most of that horn. Northern white rhinos have declined from around 700 to less than 30 over the same time, and the last remnants, a confirmed 13, survive in Garamba National Park in Zaire. Only the status of southern white rhinos, which have increased from around 3,000 to 4,000 in recent years, give any reason for optimism.

There can no longer be any reasonable doubt that commer≠cial hunting is making heavy inroads into elephant populations, just as it has indisputably exterminated rhinos over most of Africa. Douglas-Hamilton has stated the case *clearly(Newsletter* 2), and the close correspondence in the disappearance of both elephants and rhinos (Western and Vigne, this volume), points to a common commercial trade.

We have complemented field and trade studies with elephant population models designed to test the consequences of various hunting methods, offtake levels, and trade regulations (Pilgram and Western, this volume). The models are already helping us to explain existing trade patterns and suggest methods for improving the commercial harvest without wiping out the elephant population. One far reaching conclusion shows that present hunting methods are unsound economically and that alternative methods could more than double the profitability to African governments and traders alike, while simultaneously improving the status of elephants.

As a result of the field, trade and computer modelling studies we are now far better placed to pin-point the problem areas, to suggest practical remedies, to coordinate conservation activities and to monitor progress. But, though now better placed to plan and coordinate conservation in future, we also undertook to promote action on the recommendations of the 1982 Wankie meeting of the joint elephant and rhino specialist groups, chaired then by lain Douglas-Hamilton and Kes Hillman.

How successful have we been? We were in a position to act on some 32 of 36 proposals. We got underway on each by writing letters to all relevant African heads of state and govern≠ment wildlife agencies signed by the Director General IUCN, drawing the attention to the Wankie action plan. We also enclosed the publication "Elephants and Rhinos in Africa: A Time for Decision", and outlined the priorities relevant to each country. The government follow-up has been mixed, but good in some important cases. Most improvements since 1982 are directly due to government action, rather than to international conservation agencies, though they have played a strong supporting role. This is as it should be.

On specifics, we were most concerned about the continued rhino horn trade and asked various agencies to intervene to stop traffic into the remaining free-trade countries: North Yemen, Singapore, Taiwan and South Korea in particular. African Wildlife Foundation successfully got North Yemen to ban imports, but the trade continues unabated. At our request, WWF/UK lobbied Singapore, and CITES has recently informed me that this country has banned horn imports and will soon sign CITES. We have had no success yet with Taiwan and South Korea, despite diplomatic initiatives. Hong Kong, which can legally re-export its stock of old horn has shipped all but 289 kg of 3,000 kg and is no longer a glaring loophole. There has, according to Bradley Martin, been a slow-up in the Far East trade, so signs are encouraging, but still inadequate. We have asked IUCN to press more strongly for effective trade bans where the loopholes still exist, particularly North Yemen, South

Korea and Taiwan. Namibia, the only remaining African state continuing legal rhino horn exports, agreed to discontinue doing so, as a direct result of a letter from AERSG.

We have been partly successful too on dubious ivory transa≠ctions, by mounting an international publicity campaign which contributed to Sudan's export ban (but only after levels rose in excess of a quarter of Africa's total shipments and destroyed most of the country's elephants), and by getting Japan to agree to some voluntary constraints on ivory imports.

Other Wankie priorities, and subsequent issues which crop≠ped up, have also been tackled by AERSG, including the initia≠tion of a forest elephant study, which Richard Barnes is about to begin in Gabon, negotiation of rhino shipments from South Africa to Texas, and efforts to direct funding to the three most important elephant and rhino ecosystems – Selous, Garamba and the Luangwa Valley, and to desert elephants and rhinos in Mali, Mauritania and Namibia.

Following a resolution by the African countries attending the Brussels CITES/TEC meeting to establish annual ivory export quotas, AERSG is advising the consultant, Rowan Martin, who is helping producer countries formulate the quotas and improve methods of marking and monitoring tusks. Our field surveys and computer models have a crucial role to play in setting target figures and monitoring procedures.

We have also played a key role in initiating field surveys of the northern white rhino, and follow-up research in Garamba National Park where the last few survive; both studies have been undertaken by Kes Hillman. Based on reports received from Garamba, AERSG at its September meeting in Botswana again urged IUCN to approach President Mobutu of Zaire with the intention of securing greater protection for the remaining 13 animals, and specifically to urge that they be placed in secure captive breeding herds. Various possibilities have already been worked out in the event that Zaire agree to our recommenda≠tions. The IUCN delegation will meet President Mobutu early in January. We have simultaneously promoted a captive manage≠ment programme for the northern white rhinos scattered throughout the world. Frankfurt Zoological Society has agreed to coordinate international zoo efforts.

Finally, we have been successful in promoting national rhino plans, especially in Kenya, by drawing attention to the rapid fragmentation of remaining stocks and advocating herd consolidation for greater security and biological integrity.

Black rhino Amboseli National Park, Kenya
[C.A.W. Guggisberg]

On balance, AERSG has made a good start and can claim real progress on most priority elephant and rhino issues, in as far as our voluntary nature and advisory role permit. Where we have undoubtedly failed is in addressing the West African frag≠mentation and disappearance of elephants, and in the wholesale killing of elephants and rhinos in C.A.R. and surrounding countries.

Future priorities, which were worked out at the Botswana meeting, will continue to centre on the rescue of the northern white rhino and the most significant ecosystems, the survival of important races and ecological types of elephants and rhinos, the promotion of national rhino (and perhaps elephant) plans, continued monitoring of both field and trade statistics, the technical evaluation of data and conservation strategies, identi≠fication of priorities, and their promotion by national and international conservation agencies. Our two highest priorities are to promote a world-wide ban in rhino horn trade and action on elephant conservation in West and Central Africa.

Regular six-monthly meetings in Africa have enabled specia≠lists to discuss conservation issues and priorities, and to arrive at a consensus. Though frequent meetings pulled in most members at one time or another, and built up momentum, it should in future be possible to hold meetings less often, perhaps once a year. The six-monthly *Newsletter,* which has been an extremely successful way of keeping members and other interested parties informed about elephant and rhino conservation, could play a far greater role.

I mentioned earlier that the main purpose of AERSG is to monitor the status of elephants and rhinos, pin-point problems, recommend practical solutions, coordinate programmes and keep track of how successful they are. These roles should be clearly distinguished from conservation and political activism – which is the function of national and international agencies. The distinction is fundamental to the impartiality and credibi≠lity of AERSG, and one that has been blurred in the past. I have tried to retain the distinction and bring about a more technical and advisory role, knowing full well how frustrating it is to both group members and those who would have it play a more active part. But we cannot credibly do both, and should recognize our strengths and limitations. At times we have become activists, by, for example, lobbying Sudan to impose an ivory export ban. We then did so only when there was some urgency and when we failed to get any response from IUCN. And here, I feel, lies the greatest weakness of the IUCN-SSC linkage.

The easiest task for AERSG is monitoring and recommending projects, the hardest is getting action, particularly out of IUCN. The northern white rhino is a case in point. It took nearly five years to launch a conservation programme, by which time the animals had dwindled from 700 to less than 30. IUCN claims they are too under-staffed to respond to any but the most urgent issues, yet recently, at the Madrid General Assembly, declared the northern white one of the world's dozen most endangered animals. If this isn't an emergency conservation issue, then what is?

What is the solution for AERSG? I suggest the best remedy in future is for the group to take IUCN at its word, to accept that it is too under-staffed to respond to recommendations, and to approach other international and national organizations directly on all urgent projects. Whichever organization takes the ball and runs is doing a service to the northern white rhinos of this world. And it is after all, the interest of elephants and rhinos which our specialist group is trying to serve.

David Western

LATE PRESS: DAVID CUMMING HAS ACCEPTED CHIRMANSHIP, AERSG

The Status of Rhinos in Africa

The black rhino *(Diceros bicornis)* is in a far more pre≠carious state than it was four years ago. The northern white rhino *(Ceratotherium simum cottoni)* is on the verge of extinc≠tion in the wild. The southern white rhino *(C.s. simum)* continues to increase in number and in many newly-constituted populations. These are the findings of our 1984 surveys.

The surveys took a year to complete and were based on questionnaires sent to wildlife authorities throughout Africa, a method used originally by Kes Hillman in 1979 when she conducted the first pan-African rhino census.

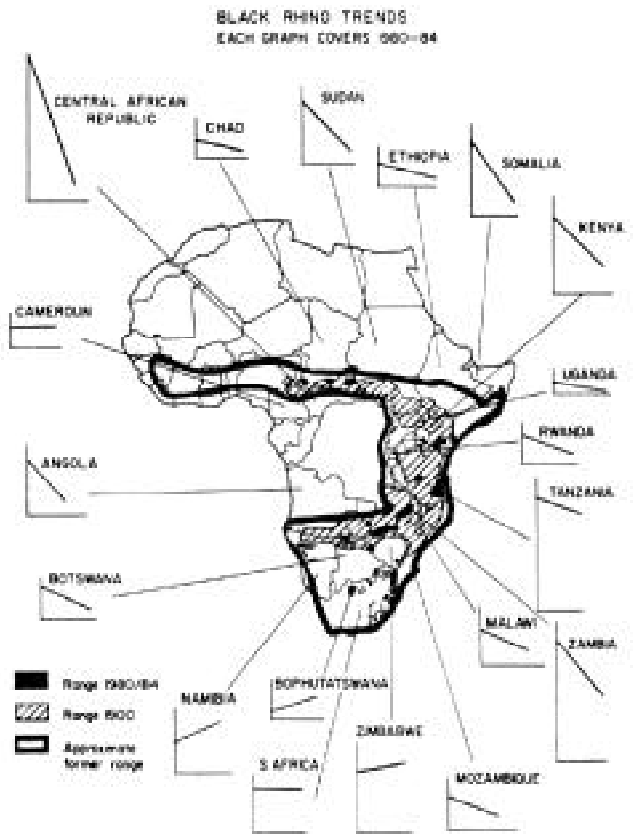
The questionnaires requested information on the size and range of rhino populations, whether accurately censused or estimated, and the name of the authority who provided the figures. Though many populations are too imprecisely known to be sure of exact figures, enough are sufficiently well censused to give us confidence that the overall estimates and trends are reasonably reliable. Full details will be released in a forthcoming publication. The following account summarizes the main findings.

In 1981 Kes Hillman estimated there to be between 10,000 and 15,000 black rhinos, <1,000 northern white rhinos, and 3,000 southern white rhinos. We estimate that in 1984 there are 8-9,000 black rhinos, about 3,920 southern white rhinos and near to 20 northern white rhinos. The 40% decline in estimates of black rhinos results partly from improved estimates of previous≠ly little-known populations, but predominantly from poaching losses. So, for example, the large reduction in Kenya's popula≠tion is due more to improved censusing than real losses, whereas the new figures for Sudan and C.A.R. almost certainly reflect poaching losses.

Table 1. Approximate number of black rhinos in Africa by country

Country	**1980**	**1984**
Tanzania	3,795	3,130
Zimbabwe	1,400	1,680
Zambia	2,750	1,650
South Africa	630	640
Kenya	1,500	550
Namibia	300	400
C.A.R.	3,000	170
Mozambique	250	130
Cameroon	110	110
Sudan	300	100
Somalia	300	90
Angola	300	90
Malawi	40	20
Rwanda	30	15
Botswana	30	10
Ethiopia	20	10
Chad	25	5
Uganda	5	0
Total	**14-15,000**	**8-9,000**

A national summary (Table 1*)* shows that nearly all countries have fewer rhinos than four years ago, but that most of the losses occured in the northern range of black rhinos. The



few countries with stable or increasing populations occur in southern Africa (Fig. 1) and account for only *30%* of the continental total.

By using Groves' (1967) classification of black rhino sub-. species and their geographic distribution, we can get some idea of how the seven recognized races have fared (Table 2). The three subspecies occupying the northern-most range, *ladoensis, brucii* and *longipes,* have virtually been exterminated. The remaining few hundred are widely scattered and heavily hunted and could become extinct in the next few years. *Chobiensis* in the southern continent has also dwindled to a hundred or so animals, and is in danger of extinction. *Bicornis,* though only a few hundred in number, seems well protected in southern Africa. *Michaeli,* which numbers several hundred, is well protected in various Kenya sanctuaries, but is still vulnerable elsewhere. *Minor,* the most widespread and numerous sub-species, numbers several thousand, or more than two third of all black rhinos, and is doing fairly well.

Table 2. Approximate number of black rhinos for each sub-species

Sub-species	**1980**	**1984**	**%change**	
chobiensis	330	100	70%	↓
longipes	3,135	285	91%	↓
minor	6,895	5,840	13%	↓
michaeli	3,480	1,975	70%	↓
brucii	300	90	70%	↓
ladoensis	345	110	68%	↓
bicornis	300	400	33%	↑
Total	**14-15,000**	**8-9,000**	**40%**	↓

The overall status of the white rhino continues to improve steadily (Table *3)* but once again geography distinguishes the fate of the northern and southern subspecies, the former falling from an estimated 650 in 1979 to less than 20 today, while the latter has increased to nearly 4,000 animals, up from only a few dozen early in the century. The northern race must be regarded as essentially extinct everywhere except Garamba National Park in northern Zaire, where poaching continues to threaten the last dozen or so animals (Hillman et al, in press).

Table 3. Approximate number of white rhinos in Africa by country

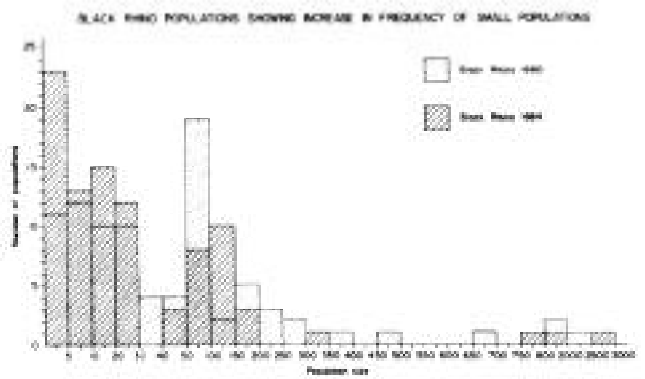
Southern White Rhinos

Country	**1980**	**1984**
South Africa	2500	3,330
Zimbabwe	180	200
Botswana	70	200
Namibia	150	70
Swaziland	60	60
Kenya	25	30
Mozambique	30	20
Zambia	5	10
Total	**3,020**	**3,920**

Northern White Rhinos

Country	**1980**	**1984**
Zaire	400	15
Sudan	400	10
C.A.R.	20	1
Uganda	1	1
Total	**<1,000**	**15—30**

Even more critical to their status than total number and loss rate is the rhino's fragmentation into tiny populations, which'are becoming rapidly more isolated (Fig. 2). Most rhinos survive in populations of less than 100 animals and only two popula≠tions, Luangwa National Park in Zambia and Selous Game Reserve in Tanzania, now number more than 1,000 animals.



Based on Iain Douglas-Hamilton's (pers. comm.) recent re≠analysis of Markus Borner's 1983 Selous census (see page 18), there may be reason to suspect that this vast reserve has lost up to three-quarters of its rhinos since Douglas-Hamilton's 1976 survey, which would lower the estimate from the present 3,000 to some 750 and the African total from some 9,000 to 6,750.

The picture for the black rhino looks bleaker than ever, the result of continued poaching, encouraged by trade in horn in both N. Yemen and the Far East (Bradley Martin, 1983).The remoter regions in central and northern sectors of the rhino's range seem to be the most vulnerable ——the result of increased military arms and well organized poaching gangs (Douglas-Hamilton, 1983; Western, 1983). Less than 390 black and white rhinos survive in Zaire, Chad, Uganda, Sudan, Ethiopia and Somalia, perhaps even half that number, a tenth of the estimates made only 5 years ago (Hillman, 1980). The losses accord with Bradley Martin's (1983) findings that virtually all the North Yemen imports arrive from Khartoum, the key trade outlet for horn originating in the rhino's entire northern range.

In East and Central Africa, from Kenya to Zambia, a region with about 60% of the continent's rhinos, the picture is more variable, though still grave. According to Borner's recent survey of Ruaha in Tanzania, virtually all of the 500 rhinos reported in the mid-1970s (Norton-Griffiths et al '80) have been killed and fewer than 20 survive. Similar poaching could soon reach Selous, the last stronghold of black rhinos, if it has not already done so. A review of the status of rhinos in Selous is urgently needed. On the other hand there is evidence from Kenya, Tanzania, and Zambia that the stronger muscle put into anti-poaching forces in various parks over the last few years has greatly slowed rhino losses in some important populations, especially the Luangwa Valley in Zambia. Plans for consolidat≠ing fragmentary arid vulnerable populations in safe sanctuaries are also underway in Kenya, a move which will increase protec≠tion of the remaining few hundred animals.

It is in Zimbabwe, Namibia and South Africa, which have 30% of Africa's black rhinos, that prospects look good and the results of active management programmes are most apparent. The lessons and methods learned here show that rhinos can be salvaged and rehabilitated within their former range. However, based on prevailing trends, unless similar national conservation plans are formulated immediately in the east and central African countries, most of Africa's remaining rhinos could be poached with in the next five years.

David Western and Lucy Vigne

Note: the figures are estimates based on the best information available.

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Trends in Key African Elephant Populations

The index of trends in elephant populations, summarized on a map of Africa, is derived from aerial surveys indicated by solid lines, and from less certain evidence depicted by dotted lines.

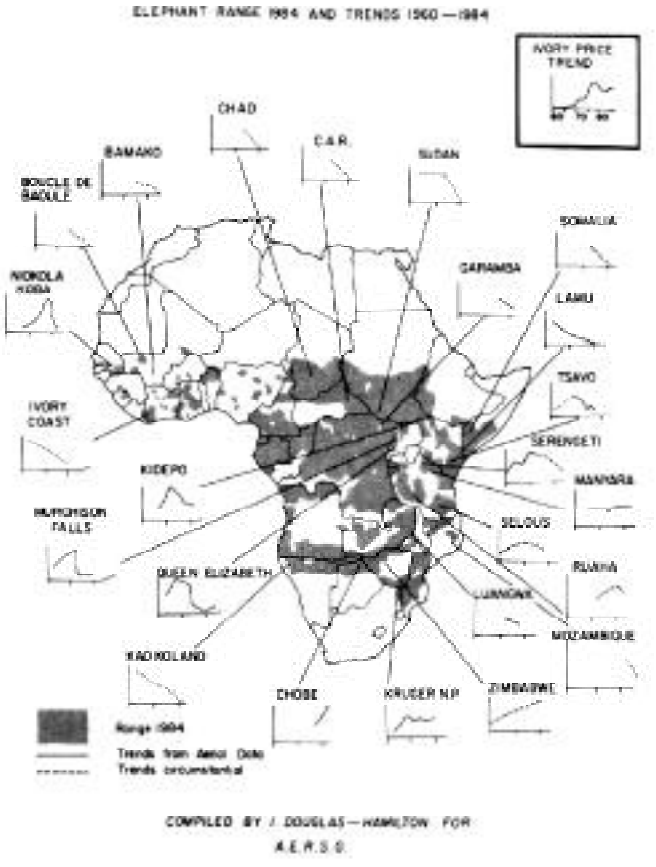
The elephants of Zimbabwe, South Africa and Botswana are more secure than others, either stable or expanding. In the rest of Africa reports of declines still dominate, especially in unprotected areas. Factors causing trends have been discussed in *Newsletter 2.*

The threat to elephants of poachers and the ivory trade has once more come to be generally appreciated.

It will be seen that a common trend of elephants in protec≠ted areas is a humpback curve; the upward part is caused mainly by elephants moving to safe areas, followed by a fall usually caused by excessive human predation. Several populations which have so far shown increases may fall later, others may increase as compression continues, but the overall current trend is decline. Apparent increases may in some cases be given by improved censusing.

The proportions each region contributes to the continent's elephant range and population are taken from a best case scenario, which assumes that ranges have changed little since the 1979 maps. These proportions may change when better information is available.

What follows is a selection of trends in key populations which in total give a fair representation of what is happening on the continent.'<u>These populations are underlined</u> and can be seen on the map of Africa. It is not comprehensive, but it does summarize all information on trends coming from questionnaire replies received since 1982.



West Africa *(3%* of range, 2% of population)

Senegal: The only viable population is in the <u>Niokola Koba</u> Park. Aerial counts showed an increase from an estimated 69 in 1967 to a maximum of 450 in 1979. Then the population rapidly collapsed to a current 50, due to poaching for ivory. We received reports from Andre Dupuy throughout the period. Some of the increases may have been due to improved techni≠ques but the decline must be real, and the humpback curve is based on the best data available so far for West Africa.

Mali: Aerial surveys by Watson in <u>Boucle de Baoule</u>, failed to locate elephants in 1981. Only tracks and one dead elephant were seen, and it is possible that five to seven elephants survive out of the population estimated at 70 in 1977, and 20 in 1980 by Lamarche. Another population south-east of <u>Bamako</u> has also declined, according to Lamarche from 60 in 1974, to 35 in 1980 and less than 20 today.

Professional ivory poachers with heavy guns were said to be the cause. Elsewhere in Mali the situation is not better. Four populations are said to have disappeared altogether, other populations are believed to be in severe decline (Olivier, Van Wijngaarden, pers. comm.). The only viable population left is in the Gourma area, but it has never been properly estimated.

<u>Ivory Coast</u>: Roth has just published elephant range maps and estimates for the whole country in *Mammalia.* Elephants are fragmented into 3540 isolated populations and their range has diminished by 83% since the turn of the century. He identifies poaching for ivory as the main cause of the estimated 1 ^{0}% rate of decrease.

Liberia: A new range map has been received from Peal who has called for assistance in putting together a properly organized census as an aid to protecting the species. He believes that the elephants have been declining in all parts of Liberia due to ivory poaching and loss of habitat.

Niger: According to Newby, Parc W, which is shared with Upper Volta and Benin, has become the nucleus for the remain≠ing elephants in the country. Despite poaching pressure, which he estimated at 20-30 elephants killed every year, out of a population of some 600 animals, he believes that the population is fairly stable and that ivory poaching does not seem to be a problem. He believes migration is taking place and that numbers have certainly increased over the last 25 years.

Togo: Additions have been made to our range map by the Directorate of Waters and Forests. The Department claims that there is no poaching of elephants and that the only elephant known to have died in the last year died of old age.

Upper Volta: Elephants were censused in the south-east of the country in 1981 by Bousquet, who returned an estimate of ^{2},^{3}00. Spinage has identified some small populations in the east of the country which have since disappeared. In spite of a hunting ban, poaching has remained at a high level throughout the country.

Central and Northern (61% of range, 37% of population)

Cameroon: Balinga found that the previous range map was accurate apart from an area omitted to the north of Yaounde which has been added and increases the elephant range by 9%.

Allo has modified the northern range suggesting a small reduc≠tion. Elephants are said to have increased in both the Waza and Kalamaloue National Parks through immigration from Chad, where a civil war has been raging. The Kalamaloue population has remained highly migratory. Reports on ivory poaching in the south have been conflicting.

Central African Republic: The most recent estimates are 10,000-15,000 elephants remaining in the country, compared to the first estimate of some 80-100,000 in 1976. According to Spinage, Ruggiero, and others ivory poaching has caused the collapse. This agrees with several other sources of information which we have received since 1978 regarding the flourishing and uncontrolled ivory trade and the formidable gangs of poachers operating with automatic weapons who often originate from Sudan or Chad.

Elephant in Parc National Gounda-St. Floris, C.A.R.
[R.G. Ruggiero]

Chad: Ngaragdussou, a biologist working for Waters and Forests in Ndjamena finds the 1979 range map still substantially correct, but has no way of estimating elephant numbers other than to identify a herd of 200-400 that live in the extreme south. Because of the war and intensive poaching, the elephants spend much of their time on the move. There is a considerable commerce in ivory unlawfully authorized by various administra≠tive officials. In view of the numerous forays of Chadian poachers into northern C.A.R., it is reasonable to suppose that the Chadian elephants have suffered a similar decline to those in

C.A.R.

Congo: A reply from Oko, of the Waters and Forests Trade Department, indicates that the range should be extended in the south-west and south of the country. No information was received on numbers or trends.

Zaire: Hillman and Borner's 1983 census in Garamba National Park indicated a decline of approximately 60% between 1976 and 1983. It is likely that surrounding, unprotec≠ted areas suffered a more severe decline. Parry suggests that large areas of north-east Zaire bordering Sudan are now devoid of elephants that have been killed by Arab poachers armed with automatic weapons.

In another part of Zaire elephants still appear to be secure. Professional hunter Robin Hurt found dense and undisturbed elephants in 1984 living in hunting block 7 along the C.A.R. border. The elephant population did not appear nervous, and he saw very few skeletons and none that was recent.

Sudan: According to Parry, Arabs from the north, organized into bands of approximately 60 and armed with Kalashnikov and G3 automatic rifles, raid protected and wilderness areas, in the dry season. The poachers are highly mobile, often operat≠ing on horseback and camel, nullifying the elephant's prime defence of being able to outwalk its human predators.

There have been a few fragmentary aerial surveys that support the widespread reports that elephant populations have collapsed. In the best case it is likely that Sudan has lost half of its elephants since 1975, but it is not improbable that the elephant decline has been similar to that of Uganda, a population crash of the order of 90% in the space of five years.

Somalia: Elephant poaching in Somalia was almost elimina≠ted between 1971 and 1976. According to Bunderson, the elephants appeared to be expanding northwards, to the dismay of the agriculturalists along the rivers. This range expansion was attributed to effective protection by Abel and Fagotto. Some elephants may also have immigrated from Kenya where poaching was bad at that time. On an aerial survey in 1976 elephant carcasses were found at a highest density along the Kenya border.

Then in 1977 poaching for ivory got under way at a much higher rate. Omar (1981) wrote that elephant poaching, had suddenly increased with the easy availability of automatic weapons, and that the country had lost over half its elephants in the previous five years. (See *Newsletter 2).*

East Africa (14% of range, 29% of population)

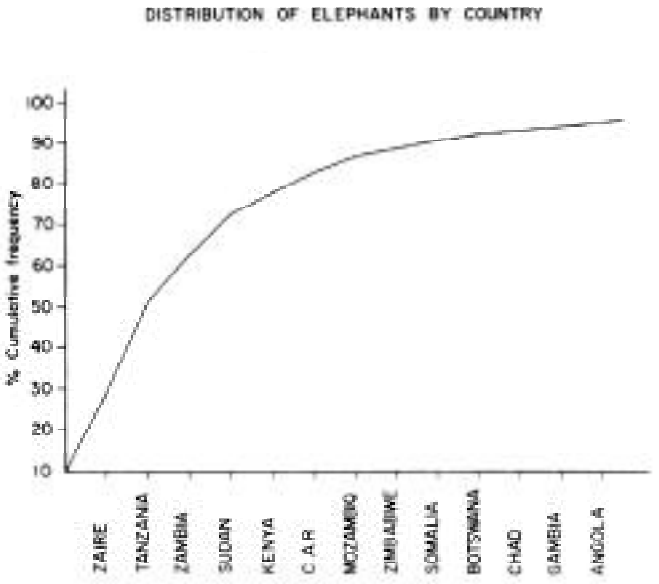
Ethiopia: Ashine suggests a slight shift in the range of the southern elephant population, otherwise there is no new infor≠mation. It is not known how the drought has affected elephants.

Kenya: The unprotected elephants of Lamu declined from 1976 onwards with poaching reported as exceptionally severe in the 1980 to 1983 period. Elephants have not been seen in the vicinity of the Kiwaiyu Tourist Camp for the last three years, where formerly they were plentiful, especially in the month of August. Apart from Lamu, elephant poaching is not as serious in Kenya as it was in the late 1970 s before the ban on private ivory trading. The trend of the Tsavo elephants, still the most important population in the country, has been compiled by Ottichilo and shows the classical humpback curve.

Tanzania: Aerial surveys in the Selous Game Reserve suggest a 20-30% decline in elephants and a *50-75%* decline of rhinos in the northern area between 1976 and 1981. If, as is likely, the population increased in the period 1960 to 1975, then the Selous elephants have also followed a humpback curve. The same may be true of Ruaha and Serengeti which showed increases in the sixties and seventies, if they are now in a down≠ward phase. Manyara is a special case, a small park where, elephants initially increased in the fifties through immigration, in the late sixties through natural reproduction, and then in the absence of poaching or culling have remained relatively stable, being controlled by periodic disease.

Decreases in unprotected areas of Tanzania are thought to have been major. A carcass ratio map for Tanzaniadated 1977-80 shows high carcass ratios especially in the north of the country.

Uganda: Elephant numbers in each of the three national parks, Queen Elizabeth Murchison and Kidepo followed the humpback curve over the last 25 years. After the severe decline of the late seventies. poaching appears to be held in check by the national parks' rehabilitation programme backed by



UNDP and EEC, but no new hard information has come in since the 1982 surveys reported in'*Newsletter 1.*

Rwanda: Nicole Monfort writes that the 25 elephants still survive and are well in the Akagera Park, survivors of an eradi≠cation scheme where adults were shot and small calves were immobilized and transported.

Southern Africa (21% of range, 32% of population)

Angola: A reply from the Ministry of Agriculture indicated that no hard data is available on account of the war. Reports continue of guerillas trading ivory for arms, but no quantitative measures have been obtained.

Zambia: A count in the

Luangwa Valley in 1979, suggested that elephant numbers had declined by approximately 30%. The evidence available suggests that poaching may initially have caused a build up in numbers in the better protected areas, followed by a reduction. Whatever may have been the case formerly, it now appears that, the remaining elephants have been compressed with in the national park, and recent reports suggest that despite local overcrowding the overall decline has continued.

Botswana: The country-wide range may be somewhat smaller than thought previously; Botswana is one of the few countries where elephants may be stable or increasing. Recent aerial surveys in Chobe National Park have returned record dry season concentrations of elephants.

Mozambique: According to Tello, the elephant range still covers a third of the country, but the largest components in the centre and south of the country may have become fragmented between 1975 and 1983. By 1983 Tello believed that elephants in Niassa and Rovuma in the north and Marromeu in the centre of the country were increasing and expanding their range.

The elephant situation since 1982 has changed radically for the worse through most of the country, with the exception of the north. The national elephant estimate, based on aerial reconnaissance and informed guesswork, fell sharply from about 51,000 in 1982 to about 27,000 in 1984. The actual numbers are not as important as the trend.

The principal reason has been increasing civil strife, with units of the army, the militia and the "resistance" each poach≠ing in areas which they control. Gorongoza National Park has been overrun by rebels of the resistance, who have killed elephants for ivory and meat, reducing their numbers from an estimated 6,000 to 2,000. In the centre and west of the country the fall in elephant numbers is estimated to be of the order of 65% in the space of two years. Only in the Zambezi Utilization area was there some increase, due to immigration of elephants into a relatively safe area. Pitched battles were fought between rebels and wildlife departmental staff in this area.

In the south declines are thought to be more severe, of the order of 76% with the exception of Maputo Reserve, where numbers are still estimated around 200. In the north, Rovuma, Niassa, Cabodelgado ranges seem stable.

Zimbabwe: Cumin ing quoted a *5%* annual increase in a 1981 questionnaire survey. This value is taken for the graph. The secure status of the elephants in Zimbabwe appears to be the result of strong government support for conservation policy.

South Africa: Elephants in the Kruger National Park, after a dramatic increase through immigration and natural reproduc≠tion in the sixties, are now held stable by culling.

Namibia: The population of the Etosha National Park is thought to be secure, but the western elephants living in desert conditions in Kaokoland are under threat. 1982 aerial censuses revealed some 220 animals left, which are unanimously agreed to be in decline due to poaching. In the latest Namibia Wildlife Trust *Newsletter,* a figure of 3,000 was quoted for the Kaoko≠land elephants in 1962 from the Odendaal report, which has been used as the base for the trend graph.

I. Douglas-Hamilton
Note: Sources available from author

Managing African Elephants for Ivory Production

In the last *Newsletter***,** we presented information indicating that large regional populations of African elephants may be in decline due to over-killing. A substantial decline in the number of elephants is to the long-term advantage of no one involved in the ivory trade. Producing nations, carvers and traders will all suffer financial losses.

In light of the economic drawbacks of a large decline in elephant numbers, those involved in the ivory trade should be interested in management strategies that will preserve both African elephant numbers and ivory production at a high level for the foreseeable future.

In this article we will discuss several general types of manage≠ment strategies and their effects on long-term ivory production. These management strategies are expressed as regulations of killing patterns.

The results were obtained through the use of a computerized simulation model. Basic parameters of elephant population dynamics, such as natural mortality and fertility, were built in, and a variety of management strategies were tried. Both population response and ivory production were recorded.

Constant Weight of Harvest

One strategy was to maintain a constant total weight of ivory harvested. The simulation adjusted killing intensity to main≠tain a nearly constant total ivory offtake by weight. Two types of killing were examined, one random and the other selective for large tusks.

The results were essentially identical for both killing techniques (Fig. 1). If the total weight of offtake was greater than that provided by natural mortality alone from a stable population, killing eventually exterminated the population. The greater the offtake, the more rapid the extermination.

Extermination resulted from the increased killing intensity necessary to maintain a constant weight of ivory offtake. Killing reduced the age of the population, which reduced the average tusk weight More tusks were needed to achieve the weight target, which translated into more elephants killed. The process fed on itself, leading to a population collapse.

Constant Number of Tusks

Another strategy was to harvest a constant number of elephants, which can be expressed as a number of tusks. The simulation adjusted hunting intensity so that nearly the same number of elephants was taken each year. Again, both random and selective killing were simulated.

The population impacts of both types of killing were similar (Fig. 2). Small increases in mortality could be compen≠sated for by increased fertility, but large increases could not

The weight of ivory harvest differed considerably for the two techniques. Selective killing had a high initial harvest as the largest-tusked animals were taken first, then a sharp decline as they disappeared. Random killing had a slowly declining weight of harvest as the population became younger through increased fertility.

Again, the greatest long-term harvest was achieved through natural mortality alone. The population could sustain killing and produce more tusks than it otherwise would, but these tusks were smaller and lighter, as was the overall harvest.

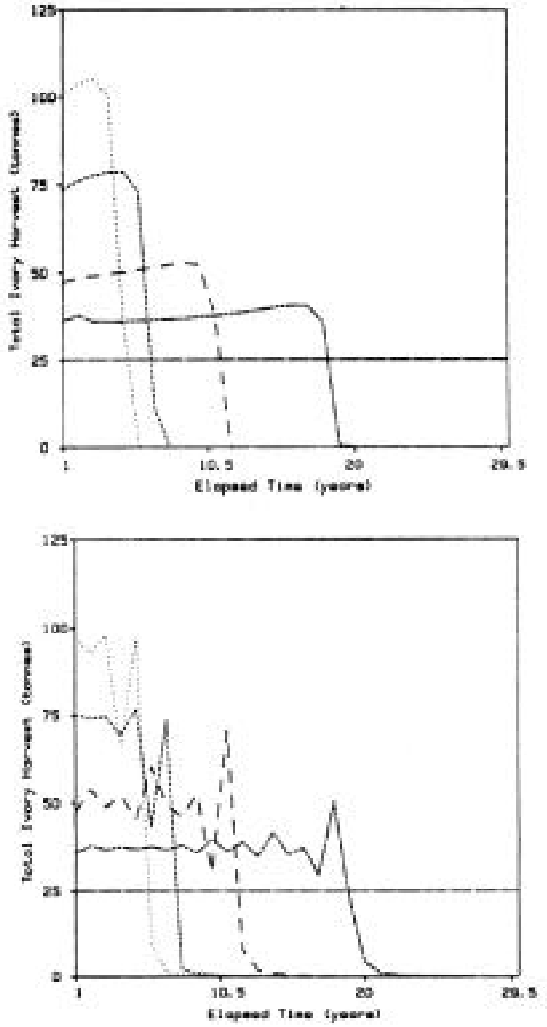


Fig. 1. Constant weight of harvest Ivory harvest per year. Lines represent different weight targets natural mortality only (—,—,—,—),
*150% the natural mortality harvest(**–– - - — - - ——**), 200% the natural mortality harvest **(— — — —),** 300% the natural mortality harvest **(- - - -),** 400% the natural mortality harvest **(. . . . .**). The results in the top graph were simulated using random killing and the bottom graph with killing intensity proportional to tusk size.*

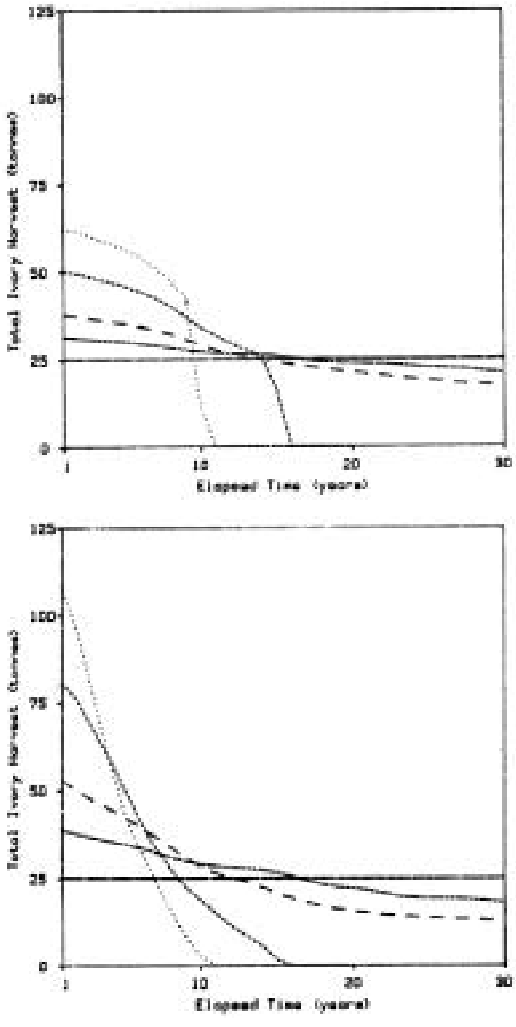


*Fig. 2. Constant number of deaths ivory harvest per year. Lines represent different death targets: natural mortality only **(—,—,—),** 150% the number from natural mortality **(- - — - - ———),** 200% the number from natural (— — —), 300% the number from natural mortality **(- - - - -),** 400% the number from natural mortality (. . . . .). The results in the top graph were simulated using random killing, and the bottom graph with killing intensity proportional to tusk size.*

Minimum Tusk Weight

The final strategy was to take no elephants with tusks smaller than a preset size. All elephants were taken as soon as their tusks reached minimum size, and totals for the simulated 30 years were calculated with natural deaths both included and excluded.

Total harvest for the 30 year simulation increased up to a minimum weight of 7 kg for both totals (Fig. 3). Above that, the total from killing only began to decline as female natural mortality was excluded. The total including natural mortality would continue to increase until it reached the value for natural mortality, which again produced the maximum harvest.

Mean tusk weight increased with minimum allowed weight, as would be expected. Mean weight is an important considera≠tion, because carvers prefer large tusks. They will pay more per unit weight for a large tusk than a small one, so profit. ability would probably peak at a higher minimum weight than would production.

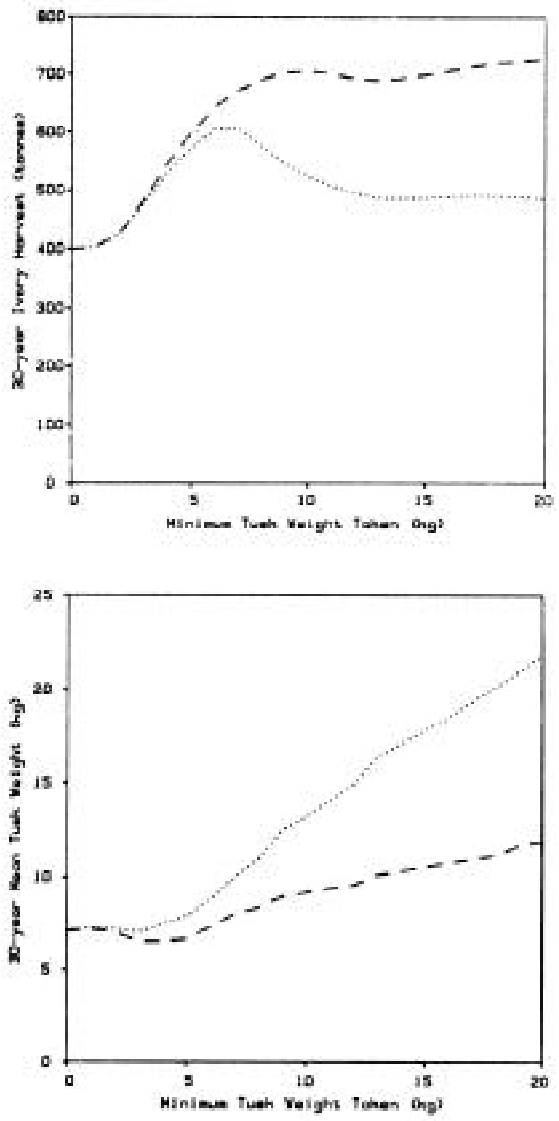


Fig. 3. Minimum tusk weight 30 year total harvest by mini≠mum weight. The lines represent different acceptance strategies accepting tusks below the minimum weight, if from natural mortality ***(— — — — —),*** *accepting only tusks above the minimum weight(. . . . .).*

Summary

The management strategies discussed can easily be expressed as regulations for the ivory trade, and all would be relatively simple to enforce. However, some would be more effective than others at ensuring large elephant populations and high ivory production in the long term.

Setting a weight limit on the harvest is by far the least effective technique. It is likely to encourage a steadily increasing number of deaths, as the population becomes younger and their tusks lighter.

A limit on the number of tusks taken is a reasonably effective management strategy. In a region with a number of local populations, a regional quota could allow for a series of local exterminations, but this could be monitored.

Setting minimum weights for tusks is a more secure form of protection, If the minimum were set high enough, female elephants could have enough reproductive years before being taken to allow an increase in numbers.

All these techniques, even those which allow an increase in the number of elephants, will reduce the ivory, yield per elephant. The maximum yield per elephant is achieved in the absence of killing through natural mortality alone.

Maximum production through natural mortality is an un≠usual finding, but tusk growth in elephants follows an unusual pattern. Most animals, such as beef cattle, achieve maximum production when cropped at or near the end of their growth spurt.

Tusk growth in male elephants, which provide the bulk of ivory production, never peaks. It increases at an exponential rate throughout life, so any hunting of male elephants removes them before the end of their growth spurt and reduces production.

The ideal management strategy, then, is to allow only natural mortality. This will provide the best protection against extermination, and also the greatest ivory production per elephant. Unfortunately, it would be almost impossible to enforce.

A compromise could be effected by setting a limit on the total number of tusks, in combination with limits on the mini≠mum weights accepted. As a management strategy, this could, in its most sophisticated forms, begin to approach the level of ivory production achieved by natural mortality alone.

As matters stand, the current exploitation pattern is most similar to constant weight of harvest. The total continental harvest has remained roughly constant, while mean tusk weight has declined and the number of elephants killed has increased (Caldwell 1984). This is the worst management strategy of those examined, and it is in the best long-term interests of all involved in the ivory trade to institute another in its place.

Tom Pilgram (WCI) and David Western

REFERENCE

Caldwell, J R (1984) Recent developments in the raw ivory trade of Hong Kong and Japan. *Traffic Bulletin,* 6, 16-20

Central African Republic Hit by Poachers

The Central African Republic has a history greatly shaped by its isolation in the centre of the continent. Although few long-term scientific studies have been conducted on the nation's wildlife, it has a reputation as an important reservoir of several threatened or endangered species. Well-watered and having one of the sparsest human population densities in sub-Saharan Africa, the C.A.R. was until recently home to many big-tusked elephants and one of the largest populations of black rhinos. It has been speculated that it has a few of the extremely rare northern white rhinos *(Ceratotherium simum cottoni)* in a couple of isolated areas. Portions of the south of the country are covered by dense equatorial forest still rich in forest elephants *(Loxodonta africana cyclotis)* and the south-western corner between the Cameroonian and Congolese borders is said to contain significant populations of lowland gorillas, chimpan≠zees and bongos *(Boocercus euryceros).*

Most of the Central African Republic is covered by wooded savanna which extends north to the sub-Sahelian regions near the Sudanese border near latitude 100 north. The almost roadless eastern region is virtually devoid of human population and is excellent habitat for elephants and rhinos. Land-use pressure by man is practically non-existent and large areas of land were inviolate until recently. The years following independence saw massive inroads into many areas. Large caravans of camels and horses bearing Sudanese poachers began to enter the C.A.R. to hunt elephants and rhinos with spears and later with firearms. With the security that the remote savanna affords, bands of poachers could remain in game-rich areas for years at a time, hunting and living completely undisturbed.

The last years of the infamous reign of Jean-Bedel Bokassa saw the formation of a near-monopoly of the trade in ivory. The Emperor had a controlling interest in a society called "La Couronne" which sought to dominate the commerce by impos≠ing harsh penalties on competitors. La Couronne's efforts resulted in more than 260 tons of ivory exports between 1977 and 1978 according to customs officials. The CITES figures indicate that 200 tons were exported in 1978 alone. La Couronne's statistics claimed that less than 1% of C.A.R.'s ivory exports was from Central African elephants and that 79% was Zairean in origin and 20.4% was Sudanese. During this period, observers reported that elephants were being shot by soldiers and large quantities of ivory were regularly transported in military vehicles and aircraft. Professional hunting guides and missionaries noted elephant poaching of near-massacre propor≠tions in some areas. At the time of Bokassa's fall from the throne, the Central African Empire had become the world's largest ivory exporting nation.

Following the collapse of La Couronne, successors to the ivory trade were numerous. The tradition of ivory traffic by wealthy merchants was augmented by certain unscrupulous civil, military and cabinet officials who allegedly supplied poachers with arms and assured them immunity from prosecu≠tion.

In 1982 the Central African Republic again emerged as a major ivory exporter when 150 tons representing the tusks from almost 20,000 elephants were "legally" shipped out of Bangui. Again it was asserted that much of the ivory came from Zaire, but evidence recently uncovered makes this claim dubious. A scheme to forge certificates of origin was uncovered in a village in the centre of the country some 300km along the usual Zaire to Bangui route. This system permitted illegal Central African ivory to become Zairean and thus be shipped from Bangui exempt from Central African laws.

It is recognized that large-scale ivory collecting goes on continuously in the C.A.R. but the amount that filters across or down the Ubangi River is unknown. The difficulty in controlling the trade is compounded by the ease with which ivory or rhino horn can be smuggled across the porous borders and the active co-operation of many authorities.

While reports of the widespread decimation of elephants and rhinos abound, hard numbers are difficult to come by. The over≠whelming majority of the country has never been methodically inventoried including important areas with known high popula≠tions. The Zemongo Reserve in the east near the Sudanese frontier was thought to hold possibly a few northern white rhinos, but in light of the level of poaching in the area, such optimism seems groundless. A member of a governmental mission sent to investigate the area stated that the reserve is completely poached out and that no elephants or rhinos survive.

The eastern C.A.R. once offered excellent big-game hunting along the Chinko River near the "Three Rivers Camp". A group of hunting guides recently made exploratory flights over the once rich sector and report having seen over 400 elephant skeletons and no live elephants. Another guide recalled an area that held many big-tuskers when he opened an access road five years ago. He returned with some clients to find dozens of elephant skeletons and the spent shell cases from Russian AK-47 rounds.

Bull elephant speared by horsemen, June 1984, Parc National Gounda-St. Floris [R.G . Ruggiero]

The northern C.A.R. has fared only slightly better. Sudanese and Chadian horsemen have been hunting in the north in ever-increasing numbers since 1976 and the civil war in Chad has assured the availability of sophisticated automatic weapons at bargain prices. The Barningui-Bangoran National Park was an important rhino refuge where up to several hundred black rhinos were thought to live in 1981. By 1983 estimates placed the surviving rhino population within a 50km radius of the village of Bamingui at 10% of the 1981 level. Much of the

organized poaching in the park appears to come from within the country. One group that was apprehended had over 100 members and its leader was borne around the bush in a sedan chair. Another group was found which was described as consist≠ing of ten teenaged boys each of which carried two Kalashnikov rifles.

The best hope for C.A.R.'s elephants and rhinos lies in the nation's largest national park, Gounda-St. Floris. It covers a sprawling 18,000km^2 and is composed of wooded savanna, open grass savanna and gallery forests. Much of the present area of the park was a hunting and photo-safari domain until 1978 when Bokassa declared the area a national park. Since that time, the newly gazetted park has come under increasing poaching pressure and in 1981 a WWF/IUCN research team was sent to investigate the rhino and elephant situation. Findings show that elephant and rhino poaching has risen to dangerous levels and that the most important refuge for rhinos in the park has been thoroughly poached due to a lack of surveillance. Chadian and Sudanese horsemen are thought to have killed hundreds of elephants mostly by spearing but the use of auto≠matic weapons has also been confirmed.

Viewed in its entirely, the status of the rhino and elephant populations in the C.A.R. is bleak. Corruption, non-compliance with CITES legislation and years of neglect by the international conservation community have all contributed. Although besieged by poachers, a recent change in the administration of the Gounda-St. Floris Park offers some cause for optimism. Wildlife populations are reduced but still healthy and should benefit from plans to augment the meagre staff of ten park guards and tourist facilities. A private corporation has won a long-term contract with significant governmental support **to** develop and protect the park. It is an experimental plan where≠by the complete control of a major African national park has been granted **to** a private concern. Since the viability of the corporation depends to some degree on profitability, the future of the park's wildlife depends on tenuous economic conditions, If the plans to attract foreign tourists are reasonab≠ly successful, the park has a very good chance for survival. But the fate of the rest of C.A.R.'s elephants and rhinos is preca≠rious at best and is at the mercy of the economics dictated by the world trade in ivory and rhino horn. Compliance with the Convention of Washington would be of great help to stem the tide of destruction of Central Africa's troubled elephants.

R.G. Ruggiero
Biologist

Protecting The Black Rhino in Damaraland, Namibia

Introduction

A viable but endangered population of black rhinos *(Diceros bicornis* L.) survives in the very arid country of western Damaraland, bordering the Skeleton Coast Park. The park is unfenced, allowing free movement of game in and out.

The eastern boundary of the Skeleton Coast Park was designed by ruler and pen without consideration for the ecology nor for the effective conservation or protection of game species. Important permanent waterholes were left outside the protec≠tion of the park, some of them as little as three kilometers from the boundary.

Elephant and rhino feeding routes are found deep into the true desert in sand-dune country, and elephants have been seen on the beaches of the cold Atlantic coast.

Black rhinos in Damaraland with food plant in foreground, Euphorbia damarana [B.D. Loutit]

Poaching

When poaching of rhinos and elephants in Damaraland reached a peak in 1981-2, the Namibia Wildlife Trust was formed and field staff were employed in a successful operation to patrol and report to the officials of the Division of Nature Conservation. The NWT was sponsored by the People's Trust for Endangered Species, the Endangered Wildlife Trust, the Foundation to Save Africa's Endangered Wildlife, the Wildlife Society of SWA/Namibia. and local business houses. In April 1984 the control of the project was taken over by the Endangered Wildlife Trust. Present field staff comprise a senior field officer, his assistant and six auxiliary game scouts appointed by Herero headmen, under the supervision of Garth Owen-Smith who is based at the Damaraland headquarters. The camp and radio equipment was donated by Consolidated Diamond Mines (Pty) Ltd.

Rhino numbers are carefully monitored by means of an identikit system compiled by Garth Owen-Smith, Karl Peter Erb, and the staff of the Skeleton Coast Park, assisted by Elias Hambo and Bernard Roman. To date 40 rhinos have been identified, most of which have been photographed. A possible 50-60 still survive in the area. Hind foot spoor size, ear notches, horn shapes, sex and age classes are recorded. The records of track (spoor) sizes have proved valuable in checking if a spoor is missing from a habitual drinking place or home range. The area is immediately searched on foot in case poaching may have taken place.

Geographical Distribution

The larger portion of the rhino population is resident north of the veterinary control fence which bisects western Damara≠land from east to west.

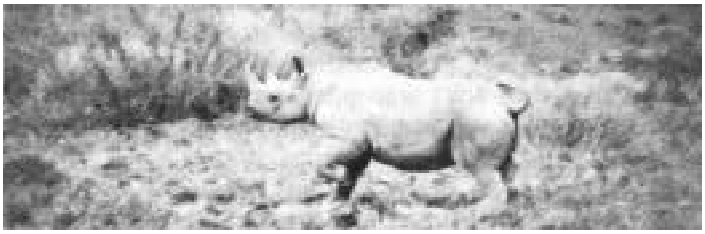
This has unfortunately left a number of individuals isolated in the immediate vicinity of the fence. One of these is a breed≠ing cow with a calf. A young lone cow was recently 'herded' by Land-Rover from south of the fence to join the northern popu≠lation inside the Skeleton Coast Park.

If funds were available it would be advisable to move the remaining live individuals living close to the fence to join the larger population in the north-west.

An isolated population survives much further south near the Ugab river. This part of Damaraland is scenically specta≠cular. Vast plains dotted with granite boulder islands and dominated by towering mountain fortresses are the home of the southernmost population in Namibia. In dry times the black rhinos traverse extremely rugged terrain to waterholes far from their feeding grounds.

A study of their means of survival and nutritional needs under these stressful conditions has been initiated through a grant to cover fuel costs from the People's Trust for Endan≠gered Species. At present our private Land-Rover is being used and funds are needed to purchase a vehicle to continue the study and patrol the area, which is vulnerable to poaching. Although no rhinos have been found poached in the past four years, recently a number of mountain zebras *(Equus hartmannae),* kudus *(Traglaphus strepsiceros)* and ostriches *(Struthio camelus)* have been snared with disc snares. Game numbers have increased favourably since the study and monitor≠ing has taken place. The population of rhinos is small but heal thy, consisting of:

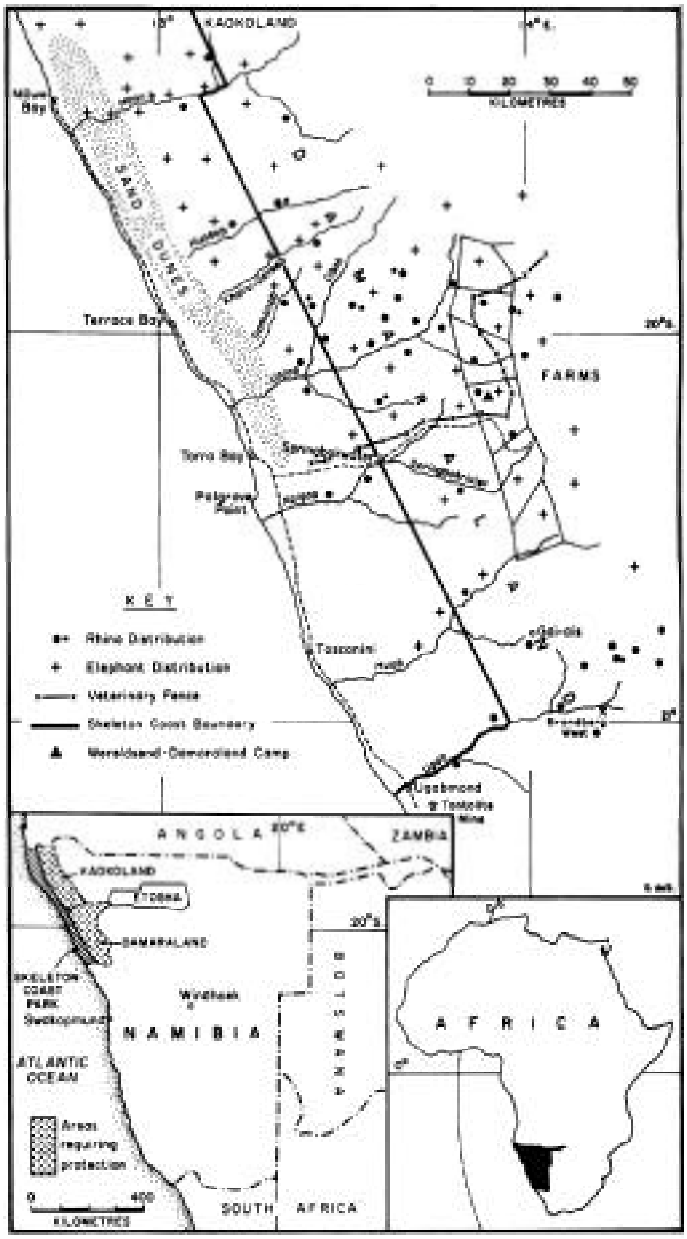
2 ♂ adults 2 ♀ adults	2 of unknown sex
1 ♀ sub-adult 1 ♂ calf	2 or more others
[6 individuals photographed]	[4+ in extreme desert]



Black rhino cow running over rocky terrain in Damaraland [B.D. Loutit]

The aridity of the terrain suggests that the black rhinos here would occupy much larger home ranges than in other parts of Africa. The condition of the rhinos appears to be consistently good and recruitment rates are gcod. This applies to rhinos in general in Damaraland and those last few surviving in Kaokoand.

Black rhino calf feeding on Welwitschia mirabilis *seed cones in Damaraland* [B.D. Loutit]



Damaraland, Namibia

Conclusion

The vital point which must be recognized is that the rhinos should be conserved and protected within this habitat. The habitat is secure, it is not threatened by agriculture, mining nor human overpopulation, the climate is harsh and the terrain is rugged. Development would be minimal and should be carefully planned. There is no sound reason to allow any further destruc≠tion of game **to**

take place.

Both the black rhino and the African elephant of Damara≠land and Kaokoland should be conserved within these unique conditions. To achieve success in this, additional patrol vehicles and another member of staff are critical. The final objective is to achieve a fully acceptable status of proclamation for the people and wildlife in the area. Until this is achieved the onus remains with the NGOs to continue their vigilance and monitor≠ing of game movements.

Blythe Loutit
Botanist, Namibia

Monitoring Elephant and Rhino Trends in Kenya

Activities of the Kenya Rangeland Ecological Monitoring Unit (KREMU)

Baseline information on the populations and distributions of the African elephant *(Loxodonta africana)* and the black rhino≠ceros *(Diceros bicornis)* was obtained during KREMU's 1977 and 1978 aerial surveys of all pastoral rangelands in Kenya. Population trends were determined by comparing population estimates for 1977 and 1978 for the entire rangelands and also comparing these values with results from 1980 surveys in southern Kenya, and 1981 survey results from northern Kenya. The 1983 surveys have just been analysed and the results can be seen in the table.

The aerial surveys were conducted along straightline transects in which the two rear-seat observers counted all animals observed within a strip of land 112 m wide on each side of the aircraft while the Cessna 185 aircraft flew at 91 m (300 ft) above ground level at a speed of 150 kph. Transects were spaced 10 km apart in 1977 (2.2% sampling intensity) and 5 km apart in 1978 (4.4% sampling intensity). During 1980 and 1981 surveys were conducted with two Partenavia aircraft. The 1980 strip width was 125 m on each side of the aircraft (5.0% sampl≠ing intensity), while in 1981 northern Kenya surveys, the strip width was 200 m, giving a sampling intensity of 8.0%.

The 1977 and 1978 surveys of southern Kenya were con≠ducted during the wet (January-May) season while the 1980 surveys were during the dry (July-October) season. The northern Kenya surveys in 1977 and 1978 were dry (August-October) season while the 1981 surveys were wet (February-April) season. This provided useful information on the distribu≠tions of animals during both wet and dry seasons.

Minimum and maximum populations of elephants for all of Kenya were 64,800-97,600 in 1977 compared to 49,300-77,000 in 1978 and 39,700-55,000 in 1980-81 . The 1978 population was *73.5%* of that in 1977 showing a significant decline in the population in one year. The ratios of live to dead elephants decreased from 80:20 in 1977, 67:33 in 1978 and to *58:42* in 1980-81, providing further evidence of declining population. All except 5,000-10,000 of these elephants were on the 500,000 km^2 pastoral rangelands with most occurring in the south-central, east-central-coastal and south-eastern regions especially in the Hola, Ijara, Tsavo, Lamu, Mtito Andei and Jipe eco-units. Their numbers were also relatively high in the Laikipia, Meru and Mara eco-units.

The 5,000-10,000 present in the Agricultural Zone were found mainly in the Aberdare and Mt. Kenya National Parks (2,000 in each), Mt. Elgon and the Mau Forest.

Within the southern Kenya rangelands, the elephant popula≠tion declined by 42.3% from 52,000 in 1977 to 30,000 in 1980. About 50% of the southern Kenya population occurred in the south-east eco-region. Populations in each of the south-east and the east-central-coastal eco-regions declined by about 8,000 elephants between 1977 and 1980. The reduction was especially noticeable in the Lamu eco-unit. The elephant population incre≠ased by 26.5% from 7,343 in 1977 to 9,286 in 1981 within the northern Kenya rangelands. About 69% of the entire northern Kenya population was in north-central eco-region C. In the northern Rift Valley eco-region A, an increase of 67.6% between 1977 and 1981 was observed, but a decrease was noticed in the north Turkana eco-unit. In the northern Volcanics, eco-region B, a decrease was noticeable, and more so in the Chalbi eco-unit where no sightings were made during the 1978 and 1981 surveys.

The north-east eco-region D was not surveyed in 1981 due to security reasons, but Meru and Garissa eco-units were included in the 1980 southern Kenya surveys.

Major differences in seasonal distributions of both elephants and rhinoceros are shown in the KREMU 1981 report.

Maximum populations of rhinoceroses were 3,636 in 1977, 1,468 in 1978 and 1,l00 in 1980-81 for the entire rangelands of Kenya. Another 300 animals existed in portions of the Agricul≠tural Zone such as in the Aberdares.

For the entire rangelands, the rhinoceros population declined 60% during the one-year • period of 1977 to 1978 while in southern Kenya the population declined a further 35.9% between 1978 and 1980. The greatest reduction occurred in the south-east eco-region, especially the Tsavo, Mtito Andei and Jipe eco-units.

The 1980—81 rhinoceros population throughout Kenya was probably about 1400 animals.

The distribution of rhinos continued to decline in southern Kenya; they were observed in eight eco-units in 1977, seven in 1978 and only four in 1980. None was observed during the northern Kenya surveys in 1981.

The very low and declining rhinoceros population and its shrinking distribution presents a grave situation that warrants increased action to arrest and reverse this trend especially in Tsavo, Mtito Andei, Jipe, Hola and Meru eco-units. The down≠ward trend in elephant numbers has slowed-up between 1978 and 1980-81, and it is not as alarming as for rhinos but it is still critical enough to warrant increased conservation measures.

KREMU should continue to monitor the populations and distributions of elephants and rhinos throughout the Kenya rangelands on a periodic basis, for example once every three years. For the smaller, major ranges of these species, more detailed sampling is required, e.g. a sampling intensity of 25-30% once every five years.

District
J.G.Stelfox
J .W. Kufwafwa
W.K.Ottichilo

Table 1) Summary KREMU's elephant and rhino population estimates by district (1977-1983).

	1977		1978		1980-81		1983	
District	Elephant	Rhino	Elephant	Rhino	Elephant	Rhino	Elephant	Rhino
Baringo	0	0	nd	nd	142	0	nd	nd
Garissa	611	44	7673	0	nd	nd	3661	0
Isiolo	228	0	1722	0	nd	nd	nd	nd
Kajiado	484	0	76	47	646	0	655	0
Kilifi	1586	0	25	0	338	0	72	0
Kitui	2671	233	4134	0	3698	160	699	0
Kwale	0	0	0	0	nd	nd	224	0
Laikipia	3524	0	2577	0	1786	0	nd	nd
Lamu	4916	0	1909	39	3535	41	2118	0
Mandera	612	0	342	0	nd	nd	nd	nd
Marsabit	1685	0	112	0	231	0	nd	nd
Narok	1174	136	2668	218	2274	0	2474	0
Samburu	1702	0	nd	nd	935	0	nd	nd
Taita/Taveta	13324	981	17552	234	12898	91	12291	76
Tana River	9483	252	3565	0	5745	119	1340	0
Turukana	1361	0	nd	nd	1156	0	nd	nd
Wajir	0	0	93	0	nd	nd	nd	nd
West Pokot	0	0	nd	nd	192	0	nd	nd
Total	43979	1646	42448	538	33576	411	23534	76

1 Estimates extracted from: Peden, 0 (1984) Livestock and wildlife population inventories by district in Kenya (1977-1983). KREMU Technical Report Number 102.
2. Animals residing in high elevation mountain parks am not included In this table, which explains any differences in national totals given in text.
3. Totals do not necessarily include all animals from all districts because not all districts were surveyed each year. ("nd" indicates no data wares available.)

Black Rhinos in Captivity

Management of Black Rhinos at London Zoo

In a relatively confined area in an urban zoo, our rhinos are managed intensively. Four adult animals and a calf occupy the four inside dens and the single paddock of 60m x 20m. Inside and out; they are on public view, but we also have one other indoor den where animals can be shut away out of sight. The three different compatible groupings of animals – two whites, two blacks, and an odd black – take turns in having access to the outside paddock.

A dry moat surrounds the paddock; it has a shallow (320) slope on the inside, and in consequence the rhinos walk up and down the slope with ease, and spend a lot of time walking along in the moat and being visible at very close range, but from above. Indoors, the dry moats are too steep for rhinos to go up or down. There have been occasional cases of animals falling into the moat; and being retrieved only with difficulty. There≠fore the indoor dens used by the black rhinos now have bars to prevent the loss of calves through falls into the moat.

The black rhinos are fed mainly on clover hay and pelletted horse food, with carrot and potato, and browse material as available. They always have access to water.

The animals are put out into the paddock in all weathers. They are encouraged to go in or out as required by the promise of food on the other side. The-outside paddock also provides opportunities for exercise, wallowing in a mud pool, and scratching on a variety of different objects. The indoor areas are kept at a comfortable temperature of about 1 8 There are very few problems in persuading animals to go out or come in, once they know the routine. Keepers go into the enclosures with most of the animals, and thus can inspect, scrub, and if necessary treat them.

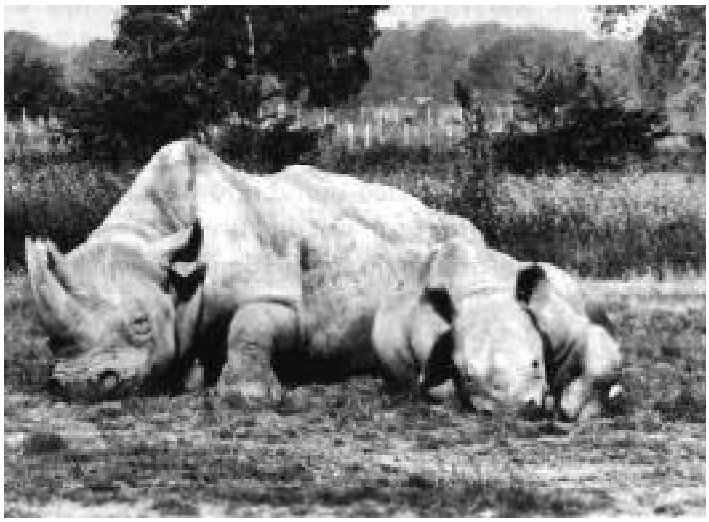
Male and female become familiar with one another through bars before they are first put together. Oestrus is detected by observing increased restlessness and aggressiveness by the female, and greater interest in her by the male. The two sexes are run together until the pregnant female becomes too aggressive towards the male, usually around half-way through pregnancy.

After a birth, female and calf are kept shut in alone together for about a week before being allowed out into the paddock. The calf continues to suckle until we separate it from the mother, which we now aim to do at 15-20 months old. During and after the enforced weaning, in order to reduce stress it is kept in a den adjoining that of its mother. We expect to send it away when about 21/2 years old, keeping only the breeding pair.

The World's Captive Population of Black Rhinos

Despite considerable breeding successes, and despite improve≠ments in the captive husbandry of black rhinos, the species in captivity is in a very precarious state. There are four particularly disturbing aspects.

1. The data provided by the International Studbook Keeper and by the International Zoo Yearbook show clearly that the captive black rhinos population has been declining steeply since the last import from the wild in 1976.
   Births in captivity have not been enough to compensate for the deaths
2. There have certainly been great improvements in husbandry and management of black rhinos in recent years. However, it is disturbing that this has not produced as great an improvement in breeding as one would expect. Since captive breeding got under way around 1958.64, there has been no significant increase in the rhino birth rate. The average figure is ten young per 100 females each year and is far lower than it should be. Obviously, given an average three-year intercalving interval, and perhaps six years to reach maturity, we cannot expect the re≠productive rate to be higher than about 25 calves per 100 females per year, but we are nowhere near that figure yet.
3. Juvenile mortality is unacceptably high. This is disturbing both because it is still so little understood and because it results in greater wastage of time and effort than if the mortality took place around birth; then at least the inter≠calving interval would probably be appreciably shorter.
4. It is possible that the sex ratio of calves born is under≠going shifts from 50:50. Certainly the overall sex ratio of al calves born is almost 50:50, but there are suggestions that over the past few years the proportion of female calves has dropped. The drop may prove not to be statisti≠cally significant. We must hope it is a chance fluctuation; otherwise the captive rhino population faces dire problems.



Black rhino in Whipsenade Park Zoo, U.K. [H.B. Hansen]

There are three main remedies we must adopt in working for an improvement in the status of the black rhinos in captivity. First, we must ensure that all potentially reproductive animals, particularly all females, are enabled to breed. The co-operative management arrangements in Britain show how this can some≠times be done, given the will. Second, juvenile mortality must be reduced; examination and analysis of more and better post mortem reports should show the way to go in achieving this. And third, efforts should be made to reduce the inter-calving interval, provided this can be done without detriment to the previous calf; in principle it should be possible, because wild rhinos manage it. We ought to be able to do as well as they can. At present we cannot, and it is urgent that we succeed in doing so.

Brian Bertram
Curator of Mammals, London Zoo

News in Brief

RHINOS IN TEXAS

Five black rhinos which were bought from the Natal Parks Board, South Africa, were transported to Texas in March 1984 (See *Newsletter 3).* Three of these were taken by Game Coin to a ranch outside Brownsville. Their oldest female died reportedly from a tick disease acquired in South Africa. All three rhinos were found with ticks carried from South Africa and the ranch is under quarantine for a year. The remaining pair has been observed mating and the female is suspected to be pregnant.

The two rhinos received by the African Fund for Endangered Wildlife (AFEW) were brought to a ranch near Fort Worth. They proved to be immature which has set the breeding programme back for a year. These rhinos were checked for ticks, but in this case none was found.

In both cases the rhinos are being kept in secure paddocks since they must be kept under observation in case they become sick.

As Game Coin's intentions regarding its acquisition of more rhinos are at present uncertain, AFEW plans to ship more of its own. It hopes to take mature animals, three females and one male from South Africa or Zimbabwe. Shipment to the States should take place next August.

Rick Anderson
Vice President, AFEW

IUCN PROJECT UNDERWAY IN GARAMBA, ZAIRE

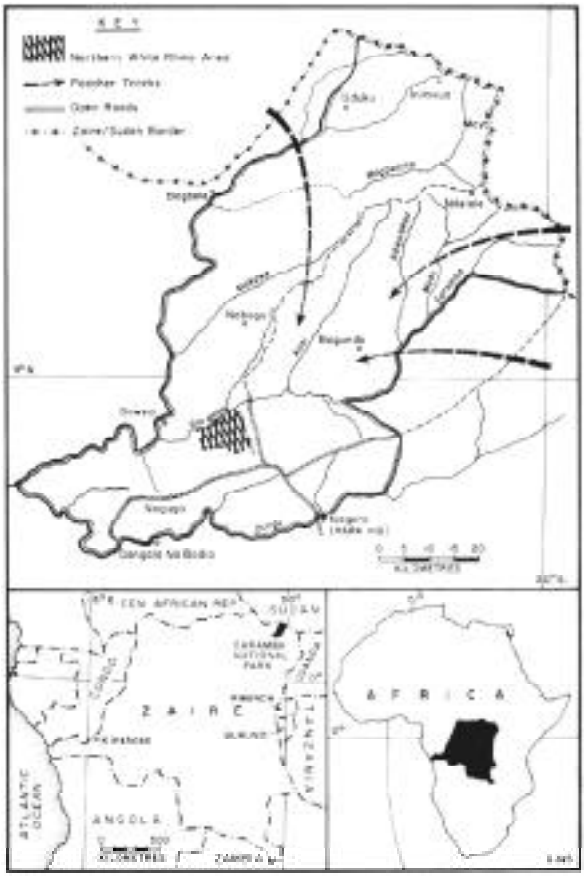
Since the brief report in the last *Newsletter* two more northern white rhinos have been found, bringing the total number of positively identified animals in Garamba to 13.

Also since the last publication, we now know that five rhinos have been poached since last year's survey. Park staff know about one, the other cases came to light after two poachers were arrested, who admitted to killing four rhinos, selling the horn locally for 1,4000 Zaires (about $35).

Patrols are now going out into the park, and at least six poachers have been apprehended carrying automatic weapons. We feel as though we are now getting results. The rhino population, however, has declined some 30% in one year, and if we take a 10% decline over the next two years as deciding the end point before translocation, we will be too late. By the time we get down to catching the rhinos we might lose several more.

The recovery of the southern white rhinos was originally believed to be from about ten animals, but Brooks says, "Less than 100 survived in Zululand by 1900" (EWT's Pilanesberg Rhino Workshop Report February''84). Therefore we cannot use this as evidence of a white rhino population recovering from such small numbers as we are dealing with. We also face many more logistical problems. The habitat is long grass reach≠ing five metres in places at the end of the rains, and the park is extremely difficult to administer. In the whole 5000 km^2 area there is only about 150 kms of passable road. On many occasions we cannot enter the park because of the difficulties involved in crossing the river (see map). There are two perennial rivers and this one is negotiated by ferry. The park has been totally neglected for 24 years since independence and no vehicles have crossed the Garamba River since then.

As the map shows, Garamba National Park juts into the Sudan. Any park on an international boundary faces added problems. There is easy access for Sudanese poachers and three well defined poachers tracks have been seen from the air. Illegal hunters can quickly escape across the border if they are detected before the Anti Poaching Unit has time to stop them.



Garamba National Park, Zaire

What is in the best interest of the few remaining northern white rhinos? The decision lies with the Zairean authorities, but the conservation advisers should speak with one voice. It is not good if one group recommends captive breeding whilst another group says survival in the wild is possible. If, as I hope, captive breeding is decided upon, preparations for capture, which will take a year (in order to build gates, pens, roads, river crossings and airstrips) should be started immediately. Plans are further complicated by the fact that capture can only take place between February and June.

I would finally like **to** point out that the project aims at rehabilitating Garamba and rhino conservation is part and parcel of that effort. To concentrate all efforts and funds on rhino conservation alone makes poor sense. What would there be to show for such a project? Possibly fewer rhinos anyway? They may be declining due to causes other than poaching. We would also be at square one with the same non-functional infrastruc≠ture. Garamba is an incredible park in many other ways and was nominated a world heritage site for more than just one reason.

Charles Mackie
Project Adviser IUCN Garamba Rehabilitation Project

ELEPHANT AND RHINO POPULATION TRENDS IN SELOUS, TANZANIA

The first aerial surveys of the Selous Game Reserve, made on behalf of the Wildlife Division, took place in the wet and dry seasons of 1976, and covered a census zone of some 73,000 km^2. Later counts were made in 1979 along the Rufiji river by Ecosystems Ltd, covering a 6,354 **km^2** zone, and in 1981 in the north-east Selous by Borner, covering a 19,550 km^2 zone. Both the later counts were contained within the original 1976 census area. All counts used the same methods of counting and analysis (Norton-Griffiths, '78 Counting Animals) with similar aircraft, speeds, counting heights and strip widths. Trends can be elicited by reanalysing the earlier results to conform with the later census zones.

Methods

Uncorrected estimates and variances of all the large mammals were obtained from reports of the later counts.

Estimates and variances were calculated from the original 1976 data for each of the later census zones, and wet and dry season estimates were merged. Uncorrected estimates were used for comparison, since different correction factors had been used by the various parties.

The 1976 estimates were then compared with the 1979 and 1981 estimates and differences in population estimates were tested for significance with a D Test (Norton-Griffiths, 1978).

Results

The results are presented in the tables below. Where the D value is greater than 1.96 the estimates are significantly differ≠ent at the 5% level, and the percentage difference has been entered.

It will be noted that in the Rufiji area, eland and giraffe both showed significant increases between 1976 and 1979, while the only animals to show significant decreases were elephants (d **=** 2.02) which were 30% lower, and rhinos (d **=** 2.56) which were 49% lower.

Table 1 – RUFIJI

	1976	1979	D value	%Diff.
Buffalo	21151	19917	.21	
Eland	655	1957	4.45	+199
Elephant	14417	10081	2.02	—30
Dead Elephant	767			
Giraffe	134	572	6.52	+327
Hippo	6292	8783	1.9	
Rhino	571	290	2.56	–≠49
Waterbuck	2032	1700	.64	
Wildebeest	20608	17131	.66	
Zebra	7778	6781	.73	

Table 2 – NE SELOUS

	1976	1981	D value	%Change
Buffalo	28788	37649	.7	
Eland	2862	4575	1.08	
Elephant	29026	22589	1.71	—22
Dead Elephant	1326			
Giraffe	123	1385	2.87	+1026
Hippo	5354	3320	1.42	
Rhino	1173	298	4.18	—75
Waterbuck	2644	1459	1.33	
Wildebeest	42009	42364	0.3	
Zebra	24909	18076	1.6	

In north-east Selous there was once again a significant increase between 1976 and 1981 of giraffe, but the elephant estimate although 22% lower was not statistically significant (d = 1.71). Rhinos on the other hand showed a highly signifi≠cant and drastic decrease of 75% in five years (d **=** 4.1 8).

Discussion

The reanalysis of the 1976 results modifies previous conclu≠sions about elephant and rhino trends in the Selous. Borner ('83 Selous Census), by extrapolating from his census zone to the whole Selous, concluded that the elephant population of the Selous remained at about the same level between 1976 and 1981. Unfortunately, the reanalysis does not support this conclusion. His sample area, lying in the north–east of the Reserve was a high density area in 1976 relative to the rest of the Selous and it is invalid to extrapolate the 1981 results from a portion of the whole 1976 census zone.

Borner also throws doubt on any serious decrease of rhino, and quotes hunters and Wildlife Division personnel who claimed that rhino poaching was only occasional and had not reached an alarming level. The reanalysis shows that the negative trend of rhinos was higher than Banner estimated.

In fact the rate of decline of rhinos is consistent both in Rufiji and north-east Selous, lying almost on a straight line.

If these trends have continued, rhinos by 1984 may have suffered a severe reduction in the Selous. Unfortunately, rhino and elephant poachers are often the same people and even when rhinos become scarce, the poachers may be sustained by taking elephants as their staple prey and rhinos only when the oppor≠tunity occurs. There must be grave doubts as to the current status of rhinos in the Selous.

Douglas-Hamilton

SOUTHERN SUDAN ELEPHANTS STILL SUFFER

Ivory poaching is still very much alive in southern Sudan and became particularly intense between 1982 and 1984. Illegal hunting has increased in western Equatoria, eastern Equatonia and also the Upper Nile Province and parts of Bahr≠el-Gazal Province. The wildlife is in jeopardy where rebels of the Anyanya movement are operating. Rebel groups totaling more than 1,000 people walk long distances and kill elephants whenever they come across them. Ivory is used as currency **to** buy automatic weapons and it has generally become the currency for personal monetary advancement in Sudan.

According to Watson et al (1976) elephants occurred throughout the southern Sudan. Their range covered about 650,000 km^2. Ivory poaching and uncontrolled hunting has steadily driven the elephant range down. Today their area extends only 500,000 km^2, representing a decline of about 23% within eight years.

If the decline in elephant numbers is not stopped and if the Sudanese government does not make a real effort to prevent the trade in ivory, there may be no elephants left in Sudan by the year 2000.

Günter Merz
Lecturer in Wildlife Management, University of Juba

REFERENCE

Watson, R M , Thackway, R M , Tippett, C I , and Scholes, V A D (1976) Sudan National Livestock Census and Resource Inventory (Typescript, 20 Vols)

JAPANESE IVORY TRADERS CO-OPERATE

In August 1984 under the auspices of the NYZS and the IUCN African Elephant and Rhino Specialist Group, Esmond Bradley Martin went to Japan for the purpose of discussing certain irregularities in the importation of raw ivory into Japan. He first had meetings with the Tokyo Ivory Arts and Crafts Association, the largest group of ivory traders and carvers in the country. The main discussions concerned Japan's imports of raw ivory from Burma, Burundi and Zaire.

Although Japan has signed and ratified CITES, it has continued to import raw ivory from Burma despite the fact that commercial trade in all Asian ivory is prohibited by CITES since the Asian elephant is on Appendix 1. Martin met one trader in Tokyo who was importing Asian ivory from Rangoon in 1983 and 1984. After some debate, this trader agreed to stop all future imports of Burmese ivory. The Association then declared that its members would not import any Asian elephant ivory whatsoever.

The CITES Secretariat in Switzerland has requested member states not to import any ivory from Burundi. That country has only one elephant but exports ivory as its own produce. Most of this comes from Tanzania, Zambia and Zaire and often leaves these countries illegally. The Tokyo Association will stop all future imports of Burundi ivory.

The CITES Secretariat has also instructed member states not to import Zaire ivory directly from Zaire without consulting the CITES Secretariat, as there have been few legal exports directly from this country for the last few years. The Tokyo Association agreed to be more careful concerning imports of raw ivory from Zaire.

The Tokyo Association expressed extreme concern about the illegal killing of elephants in Africa. Members stated that wide-scale poaching is detrimental not only to their own Assoc≠iation, but also to governments in Africa. The Association wishes to obtain a steady supply of raw ivory for many years to come , and it is in its own interest that certain conservation measures are adopted.

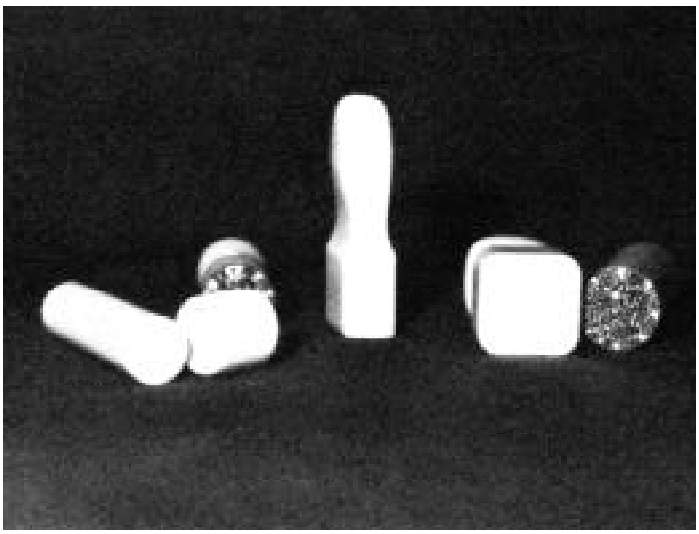
After Martin's meetings with the Tokyo Ivory Arts and Crafts Association, he flew to Osaka to meet with members of the Osaka Ivory Manufacturers Association to explain to them the problems of the international ivory trade. Members of the Osaka Association also showed concern with the illegal move≠ments of ivory. In 1983 the Tokyo and the Osaka Associations demonstrated their commitment in conserving the African elephant by donating $10,000 for a study of the ivory carving industries of southern Africa in order to ascertain how much ivory was going into the local carving and manufacturing indus≠tries. This new information has shown that an additional 25 tonnes or so of raw ivory is consumed within southern Africa, which had not been previously documented. This information will contribute to a more rational policy towards overall ivory management plans. Both Japanese Associations have agreed to support financially further studies on the international ivory trade.

The main problem in Japan has been that the local CITES management authority has not implemented the CITES regulations strictly on the importation of raw ivory into the country. The discussions held by Martin with these two Associations which import most of Japan's raw ivory made it clear to the ivory traders that there were certain irregularities which in the near future would have to be tackled. Fortunately, there was general agreement on these points. Martin also had a meeting with the local CITES management officers who agreed that there were some problems with their implementation of various CITES directives on ivory.

Several months after Martin's visit, a CITES officer went to Japan and pointed out to the management authorities their non-compliance with certain CITES regulations. Soon after≠wards, Prince Philip, when he was visiting Japan, held discus≠sions with senior members of the Japanese government and also requested that the authorities implement CITES correctly.

Due to these external pressures we have heard as this *News≠letter* was going to press that the Japanese government has agreed to implement CITES in a stricter fashion.

Lucy Vigne and
Esmond Bradley Martin



Japanese ivory seals [Esmond Bradley Martin]

CITES IN BRUSSELS

The 24 Parties of CITES from Africa attending the CITES Seminar in Brussels in June 1984 drew up a resolution on the trade in raw African ivory. They resolved to call upon the Management Authorities in all African states that are party to CITES to set annual quotas of the number of tusks to be expor≠ted by the party as raw ivory in any calendar year and to notify the Secretariat of CITES of this quota by December 31st of the preceding year. Also they will endeavour to persuade non-party states to undertake similar actions.

Rowan Martin, an ecologist from the Department of National Parks and Wildlife Management in Zimbabwe is now on two months leave as a CITES Consultant helping to assist in setting these quotas.

FOURTH AERSG MEETING

Discussions went well at the AERSG meeting in Gaborone Botswana, 22-23 September 1984 with 14 individuals par≠taking and a further six observers. It was a good opportunity to exchange ideas with members of southern Africa, but unfortunate that a number of members from other parts of Africa were unable to attend for financial reasons.

The future recommendations for AERSG made at the meeting will be reviewed and reported by the new Chairman in the next *Newsletter* in June 1985.

LETTERS TO THE EDITOR

Comments on: Why do Elephants Destroy Woodland? **H. Jachmnn and R.H.V. Bell in: AERSG** *Newsletter,* No. **3 (June 1984: 9-10)**

Jachmann and Bell's article on elephant-woodland inter≠actions may stimulate discussion of this central issue of elephant management, but as a contribution to elephant biology and ecosystem dynamics, it only perpetuates a common but unrealistic viewpoint.

The authors use the term "feeding strategy" to mean husbandry of their food resources by populations of elephants; "adaptive" if populations use trees wisely for long-term survival,""maladaptive" if they appear to be destructive. However, it is at the level of individual nutrition and survival where much of natural selection acts, and individual elephants directly benefit from felling trees. Elephants are primarily grazers when circumstances allow, but in savanna dry seasons or droughts, elephants must feed on woody plants **to** stay alive. The amount of herbivory which trees can tolerate and the rate at which they grow and reproduce will depend on local soil and rainfall conditions. At the same time, individual elephants cannot alter their immediate metabolic and survival requirements to track changing growth rates of woody plant populations, particularly where plant productivity is seasonally low or highly variable. Elephant populations may be in (fortuitous? short-term?) equilibrium with woodlands where local conditions favour that outcome of the interaction between trophic levels. However, elephant and tree population dynamics may show cyclic or irregular fluctuations in many other eco≠systems across the diversity of habitats in the African continent and have probably done so for millennia.

The authors' hypothesis that'the present-day savanna elephants are a "maladapted minority" receives little support from their evidence. There are a number of problems with their argument, but unfortunately there is limited space to discuss them here. Their most contentious suggestion is that long-term, stable elephant-woodland equilibria should be the general rule in elephant evolution and ecology. This view has more likely arisen from the philosophical bias of the authors against dynamic change in ecosystem structure than from objective study of plant-herbivore interactions. Should we really be trying to show why "maladapted" elephants "destroy" woodlands? Or should researchers and managers attempt to understand and predict the kind of changes which occur in complex African ecosystems under the influence of natural events and man-made disturbances?

Keith Lindsay
Amboseli Elephant Research Project

While the destructive feeding of bush elephants in relation to browse may indeed sometimes *appear* to be maladaptive, it is unlikely that this is because they are recent emigrÈs from the. forest. On the contrary, most students of elephant evolution agree that the trends of increasing development of trunk, teeth, and body size culminating in the mammoth and the surviving elephant species, all are linked to increasing adaptation to grass feeding, and this *includes* the forest elephants.

All modern elephants, including savanna elephants, browse to a greater on lesser extent. There are at least two very good reasons for this that should not be overlooked in debates on

elephant-woodland interactions. Firstly, there are places and times (e.g. during droughts) when elephants would simply die if they were unable to browse as well as (on instead of) graze. Browsing has an obvious and very basic survival value to an animal that requires such prodigious amounts of herbage, especially in semi-arid habitats.

Secondly, mammals with a grass-dominated diet are faced with problems of obtaining a sufficiently wide variety of amino acids (and other nutrients) **to** sustain bodily functions and processes. This is particularly true of animals like the elephant that possess a hind-gut, or caecal fermentation chamber situated posterior to the small intestine. There is good evidence to support this hypothesis but a lack of space to discuss it here.

It is probably for these sorts of reasons that elephants, both African and Asian, attain their highest ecological densities in habitats with a mosaic of forest and grassland. Elephants — including so-called forest elephants———are not actually forest animals, being no better adapted to dense forests than they are to open savannas. This is not only because such forests contain little grass, but probably also because the vast majority of the browse available in primary forests is unsuitable for dietary optimization purposes. Elephants are in fact a classic forest-≠edge, ecotone species, and it is very important **to** bear this in mind when considering the adaptiveness or otherwise of des≠tructive browsing across the range of habitats in which elephants are found.

My interpretation is that the elephants causing the classic management problems as to modification of the habitat are not so much a maladapted minority, as the unfortunate ones that have got caught in areas where long-term stable elephant-woodland equilibria are not and probably never were, pos≠sible.

Robert Olivier
IUCN Asian Elephant Specialist Group

Elephant in Zimbabwe [R. Martin]

The objective of the AERSG *Newsletter* is to offer to members of the group and those who share its concerns brief factual articles containing points of information and topical interest relevant to elephant and rhino conservation.
Contributors are described at the foot of their articles only if non-members of AERSG.
Readers are reminded that material published in the *Newsletter* does not necessarily reflect the views of AERSG.
We will welcome articles, no longer than 1,500 words, for *Newsletter* **No.** *5* We will publish suitable black-and-white photographs and graphics and may edit some articles. The deadline is 6 May 1985.

Lucy Vigne
Editor

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