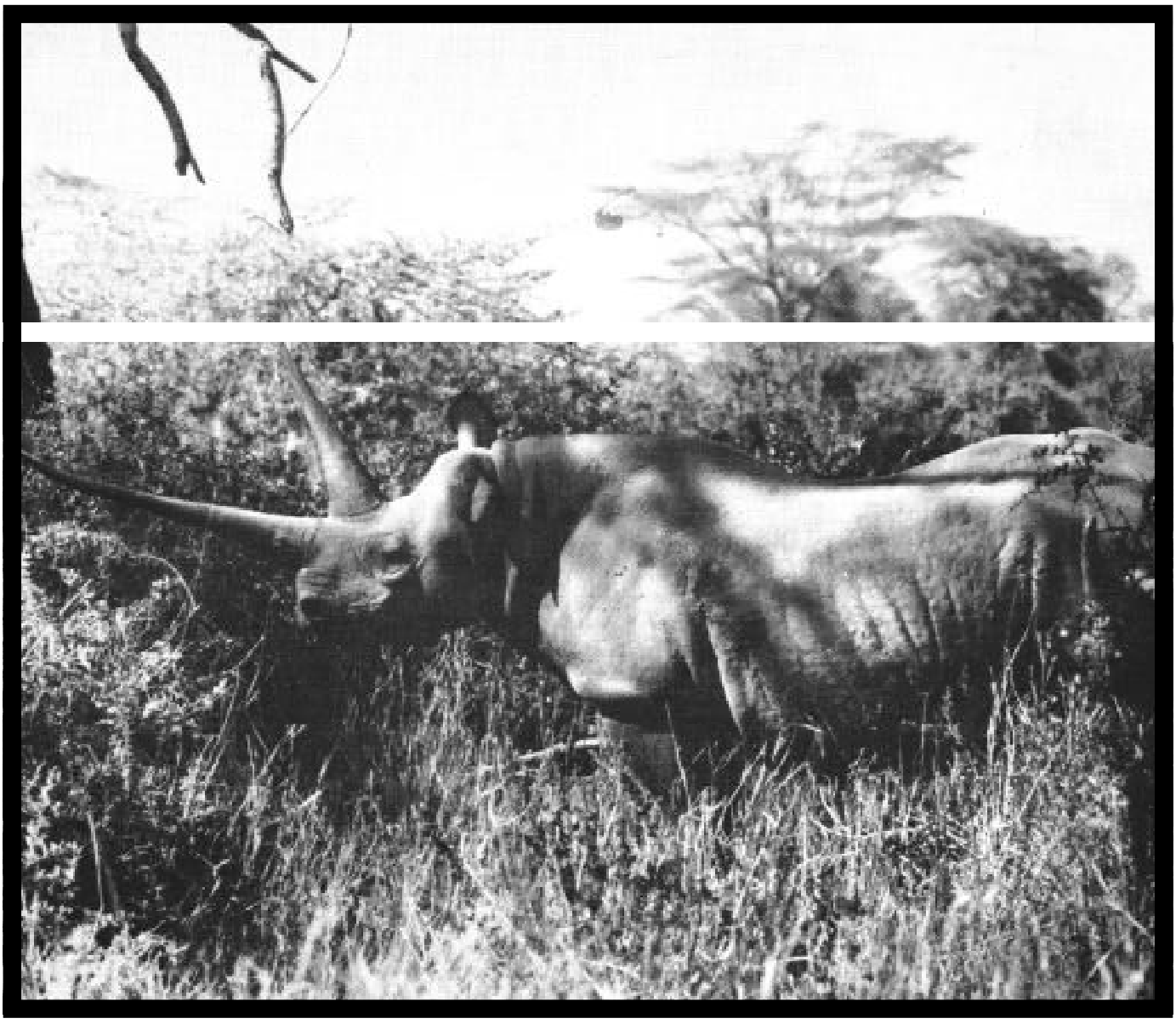
AFRICAN ELEPHANT & RHINO GROUP NEWSLETTER



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SPECIAL SURVIVAL COMMISSION

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Animal Research and Conservation Centre

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Chairman' s Report

ELEPHANT AND RHINO SURVEYS AND SOME ACTION

A little over a year ago, IUCN formed the African Elephant and Rhino Specialist Group. The great urgency to do something about the gravely endangered rhinos, the need to review the status of elephants, rhinos and the trade in their products, requests to collaborate with zoos in preparing guidelines for captive propagation of rhinos on private lands, and a dozen other necessities, have confronted AERSG with an awkward dilemma: what projects should it take on, and how far should it go to ensure that projects are implemented?

I can best illustrate the dilemma by describing what we set out to accomplish a year ago, what we learned about the status of rhinos and elephants, and what moved us to greater involvement in the follow-up than we intended.

One of our primary goals was to ensure that the conservation priorities drawn up by the 1981 Wankie meeting were addressed by the international conservation bodies. The critically endangered northern white rhino topped the list, yet still too little was known about the remnant populations to be sure if Garamba National Park, the area favoured by the Wankie meeting, was a viable proposition. Because IUCN lacked a project representative at that stage, AERSG collaborated closely with them in dispatching a survey team, headed by Kes Hillman, to see what could immediately be done in Garamba. Hillman's rapid survey showed that Garamba's white rhino population was in the low tens, far fewer than we anticipated. AERSG subsequently assisted in launching a status survey, headed once again by Hillman, which looked at northern whites in adjacent Sudan and, in conjunction with Marcus Borner of Frankfurt Zoological Society, conducted a detailed aerial and ground survey of Garamba. The situation in Sudan proved beyond hope. The field evidence showed that the animals were probably extinct in Shambe, which held 400 in the mid 1970s, and that elsewhere the prospects were equally bleak. In Garamba, aided by IZCN (Institute Zairois pour la Conservation de la Nature). Hillman and Borner showed that no more than 15 to 20 rhinos remained. At the meeting held in Harare during April, AERSG felt the situation so critical that the safest bet was to move them into captivity and carefully breed up stocks prior to eventual reintroduction to the wild once conditions improved. Contingency plans were drawn up should this recommendation receive the approval of the IZCN and prove feasible. Meanwhile, IUCN, in collaboration with WWF and FZS, went ahead with plans to help IZCN revamp the poorly equipped park and train personnel. The project, not yet underway, will protect this important ecosystem which was given high priority by the Wankie meeting. Though it will give added protection to the northern white rhino, it does not give it the priority management attention it urgently requires. In discussions with Mankoto ma Mbaelele, Scientific and Technical Director of IZCN, he made it clear that Zaire was committed to conserving white rhinos in Garamba. Nonetheless, he recognized the futility of trying to protect rhinos against all odds and suggested that Zaire would consider a defined end-point should field efforts prove hopeless. Provided this guarantee is made and convincing management proposals are drawn up, AERSG will add support to renewed efforts to raise funds. Both the urgency and lack of direct international support for the northern white rhino led to a greater involvement than AERSG intended.

Further participation resulted from yet other activities AERSG initiated. In September last year we placed high priority on conducting new Africa-wide surveys of elephants and rhinos to update the earlier status reports conducted by Iain Douglas Hamilton and Kes Hillman. We also commissioned a simultaneous study by the Wildlife Trade Monitoring Unit (WTMU) to update ivory trade statistics so that we could access recent trends and the significance for African elephant populations. By April this year Chris Huxley presented AERSG with a summary report which corroborated another independent study undertaken by Ian Parker and Esmond Bradley Martin, and reliable field information. It will still be some time before the results are complete, but the various sources of information paint a broad pattern and pin-point critical problem areas for both elephants and rhinos.

There has been a crescent of heavy poaching extending from Somalia, through northern Kenya, South Sudan, CAR, Chad, northern Zaire, and probably the Congo Republic. By contrast the situation in southern Africa has remained stable, or improved in certain areas of South Africa, Botswana, Mozambique and Zimbabwe. East Africa shows a mixed picture with some improvements for Uganda and Kenya elephants, and further losses in Tanzania's rhino population. There is still a great deal of uncertainty over the numerous, fragmented populations of elephants in West Africa.

Once the ivory trade statistics were in, it became clear that the grave concern expressed by many observers in Sudan over the slaughter of elephants and rhinos was more than justified. Prior to the mid 70s Sudan's ivory exports were inconsequential in world terms, but by 1981 they exceeded a quarter of Africa's total. Large, heavily armed gangs from northern Sudan regularly headed south and poached elephants and rhinos, and were also reported killing animals well into CAR and Zaire. Much of the ivory exported by Sudan clearly came from both these countries, and possibly elsewhere.

Ivory exports from Africa declined from nearly a 1000 tons in 1976 to 681 tons in 1979 and have held steady since, despite a falling price. However, far from reflecting a stable offtake of elephants, a sharp drop in mean tusk weights from 10.11 kg. in 1979 to 6.21 kg. in 1982 shows that increasing numbers of elephants of progressively younger age were being killed. The average number of elephants represented in the ivory records rose 40% between the late 70s and early 80s, from around 45,000 to 65,000. There is every indication that the change resulted almost entirely from elephants killed in the northern crescent of their distribution, and that they were here becoming heavily overexploited. From tentative calculations Tom Pilgram and I have done (Working paper: "Information about individual elephants from individual tusks", briefly summarised in this newsletter), this could mean that the proportion of females killed by poachers in the region has doubled from 25% to 50%, thus severely reducing the future reproductive potential of elephants. The widespread use of automatic weapons has made poaching far easier than it ever was, and possible for the hunter to slaughter entire herds where bolt-action rifles previously necessitated selective shooting of the largest tuskers before the herd fled.

The sharp decline in mean tusk weights has not pleased ivory carvers in Japan and Hong Kong, which between them account for over 80% of Africa's exports. Ivory carvers, who much prefer heavier tusks and pay more per kilo to obtain them, have expressed growing concern at the flood of small tusks. If both conservationist and ivory carver are concerned by low tusk weights, who benefits? The answer is probably the poacher and middleman, though we can't yet be sure. With so many automatic weapons now available, the task of killing elephants is comparatively easy and requires no special skills. As a result there are many more people able to make a little money on the side by poaching. With such strong competition even the specialised ivory poacher is forced to make up for falling prices by increasing his killing rate. The rush of new entrants, for whom any money is a bonus, is forcing more and poorer ivory onto the market than it would normally absorb. As a result, the costs and risks are now so low, and the response to falling prices so muted and slow, that normal market constraints on over-production are inadequate to curb the killing before it is too late for many elephant populations.

The scale of slaughter and the widespread concern amongst both conservationists and international ivory traders alike prompted AERSG to take emergency action. Earlier in the year we circulated the evidence and encouraged the U.S. State Department, amongst others, to urge the Sudanese government to take action. We followed on with an international press campaign which received wide coverage and helped precipitate action. Finally, Sudan made it known that all raw ivory exports would be banned from December 31st. This will not, of course, stop the poaching overnight. Carved ivory, which will not be covered by the ban, provides a loophole for exports. A new lobby is underway urging President Numiery to ban carved ivory exports too. What the ban will do is give reassurance to wildlife officials in Sudan that the government condemns elephant poaching. We have already received reports that more arrests are being made and that more ivory consignments have been impounded than in previous years.

These examples give some idea of the dilemma we face in reviewing the status of elephants and rhinos and in identifying priorities for immediate action. There are other pressures on AERSG to participate more directly, as for example, in initiating an ivory council which would provide policy and technical guidance to the traders associations on how to balance elephant conservation and sustainable ivory production. However, the voluntary nature of the Group made it obvious from the outset that it could not involve itself too deeply in conservation action. We saw our role as a purely technical, advisory body, which would monitor the status of elephants and rhinos in Africa and the threats to their survival, and which would define both the long-term conservation priorities and urgent areas for action by IUCN, governments, and other conservation bodies. Despite our intentions to play an impartial, advisory role, circumstances have dictated we become increasingly active. The urgency of specific issues, the frequent lack of international conservation action on them, and the expectations that AERSG should fill the vacuum, have all helped nudge us slightly more centre-stage. To become too involved in conservation action would be to lose the valuable perspective we offer, yet to maintain practiced indifference when the species we champion are threatened and lack due attention, would be to relinquish our deep concern for elephants and rhinos. So, while we intend to maintain our primary role as watchdog and advisor, we may have to stray a little more than we would like into areas that require urgent action. Limited time and finances will ensure our active endeavours concentrate on the few most pressing and important issues.

I now want to move on to consider two issues connected with the ivory trade that we are giving some thought to. The first concerns carved Ivory. Ivory, whether carved or raw, a whole tusk or a tiny bead, requires a licence to move within and between CITES member countries. The purpose of all this paper work is, of course, to conserve the elephant by regulating and monitoring the movement of ivory. Whether CITES legislation is effective depends on a number of things, including how efficiently permits are issued and scrutinized. On this score there is a real danger of licensing and customs officials being swamped by the countless permits that accompany every bead, bangle or button. If their task becomes too onerous, effective control will collapse. One possibility of overcoming this bureaucratic nightmare is to focus attention on raw and carved ivory consignments, and to exempt the individual small items a tourist buys on holiday. Large consignments, especially of raw ivory, pose more of a threat to elephants than small trinkets, are easier and cheaper to license, and are decidedly simpler for customs officials to watch out for. We have recently conducted a survey amongst AERSG members to find out whether there is any consensus on the matter. Most who responded felt that small, carved pieces, should be exempt from licensing. We may recommend to CITES that licences should be waived for all carved items under, say, 1 kilogram. If so we will link the recommended waiver to calls for tighter controls on commercial consignments, including all raw ivory, and perhaps all carved consignments over, say, 10 kilograms. Which brings me onto the second and more worrying point we are giving some thought to.

I have already mentioned the large ivory shipments leaving Sudan and the implications for the elephant in its northern range. Because CITES documents exist for the bulk of ivory moving on the world market, we can hardly claim that the convention does conserve elephants by preventing overhunting within member countries. The elephant blitz in Sudan, where ivory is legally exported, is a case in point. How then can we tighten up controls? One proposal, put forward by the European Environment Bureau (EEB), would have the European Economic Community (EEC) ban all ivory imports. In doing so the EEC would almost certainly alienate most African nations, who would view the ban as a denial of rights to natural resources, and who could claim that Europe was not willing to explore trade and surveillance mechanisms to penalise countries abusing the spirit of CITES. Furthermore, because more than three quarters of the world's ivory imports enter Hong Kong and Japan, a unilateral European ban would be totally ineffective in halting Sudanese-style poaching. EEB further proposes that export quotas be set for each country, but because we are uncertain of how many elephants each country has, how can we set fair or effective quotas? Presuming CITES member countries are dedicated to its principles of conserving threatened and endangered species, how can they still benefit economically from elephants, which most African countries wish to do? Ironically, these countries could both conserve and exploit their elephants far more efficiently; Sudan could earn far more revenue, perhaps threefold or greater, if its

elephants were selectively hunted, rather than randomly poached.

We are presently working on three interrelated topics which could bring some degree of stability to the ivory trade, and, in turn, to elephant populations. First, we are preparing models to show how much more ivory would result from selective hunting, rather than indiscriminate slaughter, of a national herd. Bigger animals carry larger tusks and large tusks are worth more per kilo than small, because ivory carvers prefer them. Selection for older animals, especially males, would undoubtedly be the most profitable alternative for exporting nations.

By legislating minimum, average tusk weights on export and import consignments of commercial ivory, we could ensure such selectivity and, more importantly, conserve the reproductive capacity of elephant populations. The minimum weight requirement is a "safety-net", widely used in fisheries management, which could prevent overharvesting, even though we are not sure of how many elephants there are. Finally, we need some way to define trade and conservation standardsa Ian Parker's earlier suggestion of an ivory council involving trade'associations seem to offer good possibilities, especially if it were modelled after the International Whaling Commission. We are now exploring the prospects to see whether an ivory council could realistically, within CITES legislation, and under the security of responsible conservation bodies, provide the best forum to regulate trade in the interests of ivory traders, carvers and conservationists.

Zimbabwe has an admirable conservation record. In this newsletter we highlight three projects to show how its success in wildlife planning and conservation depends on detailed research and monitoring.

David Western

Zimbabwe Completes Tenth Year of Elephant Radiotracking

The Department of National Parks and Wildlife Management in Zimbabwe has just completed their annual re-collaring programme for elephant in the Sebungwe Region. Some 30 elephants whose radio collars were over two years old (2 years and 4 months, to be precise) were located by radio-tracking using a Supercub, darted from a Zimbabwe Airforce Alouette Ill helicopter, and fitted with new radio collars which will last until 1985. The operation lasted three days, with about 10 elephants being collared each day. To save on flying hours, the helicopter is used only for firing the tranquillising dart and for transporting the radio-collar team to the darted animal. The fixed-wing aircraft does all locating work, watches the darted animal until the drug takes effect, and checks that the animal recovers after treatment with the antidote.

All tagged elephant in the Sebungwe are on a two-year replacement cycle of radio collars. In 1984 a different cohort of about 30 animals will be due for new collars. This is a long term programme with known study animals dating as far back as 1973. Indeed, the first animal darted in this recent operation was a cow named "TV", who was first fitted with an experimental collar in 1973, and filmed for the television programme "Untamed Africa" produced by John Hanks. She is currently carrying her fifth radio collar.

Apart from the major issues arising from the different projects in the Sebungwe, there is a wealth of interesting minor information which comes from examining the immobilised animals repeatedly over many years. For example:

(i) Animals rapidly replace broken tusks. On 8 occasions we have noted that a tusk a foot or more shorter than the intact tusk will grow to be equal in length to the other tusk within two years.

(ii) Three years ago we began punching the ivory of each animal at the lip-line. The punch marks move down the tusk with growth, and we are now using these as a means of measuring the rate of growth of the tusks at the lip-line.

(iii) We notice that our measurements of shoulder height using Law's technique vary by as much as + 5 cms on successive occasions. As most of the animals are mature females it is unlikely that they are growing or shrinking and we are forced to conclude that the measurement is affected by the recumbent posture of the animal.

Figure 1. Young bull elephant with radiocollar and identification notches cut in collar.

(iv) The teeth of each animal are checked and an attempt is made to identify the molars and describe the number of cusps in wear. Whilst this is wildly erratic in the majority of cases, it has however been of interest where very old animals have been encountered. We have been able to measure accurately the length of the molar and note the time until death. This will be an ongoing study with the cohort.

(v) Lactational status varies with the population sub-unit. Elephant in the Sengwa Wildlife Research Area are almost invariably lactating: out of some 200 females immobilised over the past 12 years, only one or two have ever been found without milk. In contrast, perhaps half of the adult female elephant in the unprotected communal lands of the Sebungwe have been found not lactating. This suggests that the unprotected animals are breeding less frequently.

Radio-tracking has been used for a number of projects in the Sebungwe Region. Originally started by David

Figure 2. Fitting a radiocollar to an elephant. Author in left foreground.

Cumming in 1968 during a study of warthog, it has been applied to lion, kudu, impala, buffalo and black rhino. Experimental work on elephant transmitters began in 1971, and by 1977 collars were lasting up to two years and giving adequate ranges especially, 10 km ground-to-ground, 30 km with base-station masts, and 50 km plus from an aircraft.

From 1975 to 1979 the radio-collars at Sengwa were used in a detailed study of elephant movements, home range and group associations. In 1980-82 major culling operations were carried out in Sengwa and Chirisa, and the radio collars were used to monitor the immediate response to culling, and are still being used to detect the long term changes in home range which may arise from the population reduction. All the current elephant projects in the Sebungwe arise from population management problems, and are described briefly below:

(i) **The Total Tagged Population of Sengwa** (Craig, Coulson, Gibson, Martin). The Sengwa Wildlife Research Area population was estimated at about 600 animals prior to the culling operation in 1980. After the removal of some 400 elephants in 1980, local air surveys still showed in excess of 400 remaining. Whether this was due to an original underestimate, or to immigration during the cull, was unresolved. However, the strategy used in 1981 was to tag a number of study herds totaling some 250 animals, and remove all untagged groups. After a further 400 had been removed the SWRA was left with the present situation where all herds are tagged with at least one collar, and we now have a cohort suitable for answering long term questions of population dynamics and spatial organisation.

(ii) **Seasonal Movement in and out of Chirisa Safari Area** (Craig, Coulson, Gibson, Martin). As mentioned above, immigration may have been a factor confusing the outcome of the Sengwa population reduction. In 1981 six elephant herds were tagged inside the boundary of Chirisa Safari Area, and six in the surrounding Gokwe Communal Land, with a view to monitoring movement in and out of the protected area. This project has been running for two years, and is tending to show that none of the Chirisa herds ever leave the Safari Area, while the herds in the Communal lands seldom seek sanctuary in Chirisa.

(iii) **Home ranges in Chizarira National Park** (Mackie). As a logical extension to the work in SWRA and Chirisa, 8 cow herds were tagged in the eastern and southern parts of Chizarira in 1981 to establish home ranges. This population appears to be more or less discrete, and the project will be allowed to wind down in 1983.

(iv) **Seasonal movement in and out of Matusadona**

on similar basis to (ii) above, and is covered in a separate article by Russell Taylor in this newsletter.

Elsewhere in Zimbabwe, radio-tracking of elephant is being used in the following projects:

(i) Hwange National Park: Some 30 odd collars are being used to examine the intensity of habitat occupation around artificial watering points, and movement to and from Botswana on the western boundary of the Park. (Conybeare, Monks)

(ii) Gona Re Zhou National Park: A study of male elephant (10 collars) was initiated in 1982 to examine the role of elephant carrying large ivory versus large-bodied males and other males in breeding success. (Sharpe)

(iii) Mana Pools National Park: 12 collars are being used to monitor movements of animals from the Zambesi Valley flood plain to the Escarpment. This is a management study arising from the need to identify the sub-populations causing woodland damage in the Escarpment area. So far the study has shown little traffic between the Zambesi River and the high ground, leading us to believe that separate populations occupy the two habitats. (Dunham)

Other large mammals being studied are buffalo in the Zambesi Valley (12 collars-Swanepoel), and black rhino in the Gona Re Zhou *(5* collars-Sharpe). In total about 140 animals are being tracked in Zimbabwe with the largest group being the Sebungwe elephant (70 collars). This is made possible by advanced technology frequency synthesised receivers with 128 channels. These receivers are specially adapted for radio tracking, possessing an input sensitivity ten times higher than most competing equipment, and front-end attenuation for range determination.

Recently we have supplied equipment outside Zimbabwe for elephant and rhino studies in the Luangwa Valley, Zambia (Dale Lewis and Nigel Leader Williams), elephant in the Kasungu National Park, Malawi (Hugo Jachmann, Richard Bell) and cattle in Botswana (Nick Abel, ILCA).

R.B. Martin
National Parks & Wildlife Management
Zimbabwe

Seasonal Movement of Elephant in and around Matusadona National Park, Kariba

National Park (Taylor). This project was started in 1981

Matusadona National Park on the southern shores of Lake Kariba is one of a number of protected wildlife areas set amidst communal land in the northern Sebungwe region of Zimbabwe. In terms of the Park policy which seeks, *inter alla,* to conserve representative woodland habitats, it has been necessary to manage the elephant population in Matusadona. Management action thus far, achieved largely through culling, has been confined mainly to the valley area of the Park, where physical barriers, namely Lake Kariba and the Zambezi escarpment, limit elephant movement and dispersal. In the highlands of the Park, above the escarpment, there are no barriers to movement southward (Fig. 1). Nevertheless elephant destruction of woodland habitats in the highlands, compounded by the effects of uncontrolled wild fires, requires that some form of management action be taken.

It had been apparent for some time that the elephant popu0lation in the Matusadona highlands was not necessarily resident but that elephant moved in and out seasonally. This was evident from the seasonal distribution data of elephant in the northern Sebungwe, gathered during aerial surveys. The very large discrepancy in wet and dry season elephant numbers in the highlands confirmed that there was a wet season dispersal. However, little was known about the nature of this dispersal. Moreover, elephant are a valuable resource in the surrounding communal land where both financial and protein benefits accrue to the local community through commercial safari hunting and an annual offtake of crop-raiding elephant. Large scale culling operations within the highlands of the Park could possibly damage the resource, limiting the availability of elephant in the communal land. Worse perhaps, management action could create a vacuum into which elephant would continue to move, without solving the habitat problems in the Park and simultaneously draining the communal land of a valuable resource.

The choice of management options clearly depended on understanding better the nature of seasonal movement in and out of Matusadona. With this objective in mind, twelve elephant cows were radio collared in June 1982. A Piper Super Club and an Airforce of Zimbabwe Alouette Ill helicopter were used to locate and immobilise elephant cows, preferably herd matriarchs in family units. Each cow was fitted with a collar supporting a radio transmitter encased in glass fibre, built by R.B. Martin at the Sengwa Wildlife Research Institute. Six elephants were collared in the Matusadona escarpment and highlands and six to the south and west of the Park's southern boundary. Since the collaring operation there have been regular tracking flights using a Super Cub, usually at two-weekly intervals. Each collared elephant, with its own transmitter frequency, is located using a receiver carried in the aircraft, the locality marked on a map and notes made on herd size and structure. Of the twelve elephant originally collared, eleven have been regularly located. One elephant was "lost" shortly after collaring, probably due to transmitter failure, so that only three fixes on its movement were obtained. A second elephant was accidentally shot by a safari operator, but the collar was replaced shortly afterwards on another elephant. Of a possible total 168 resightings (14 tracking flights x 12 elephants) 125 resightings have been made, a success rate of 74%.

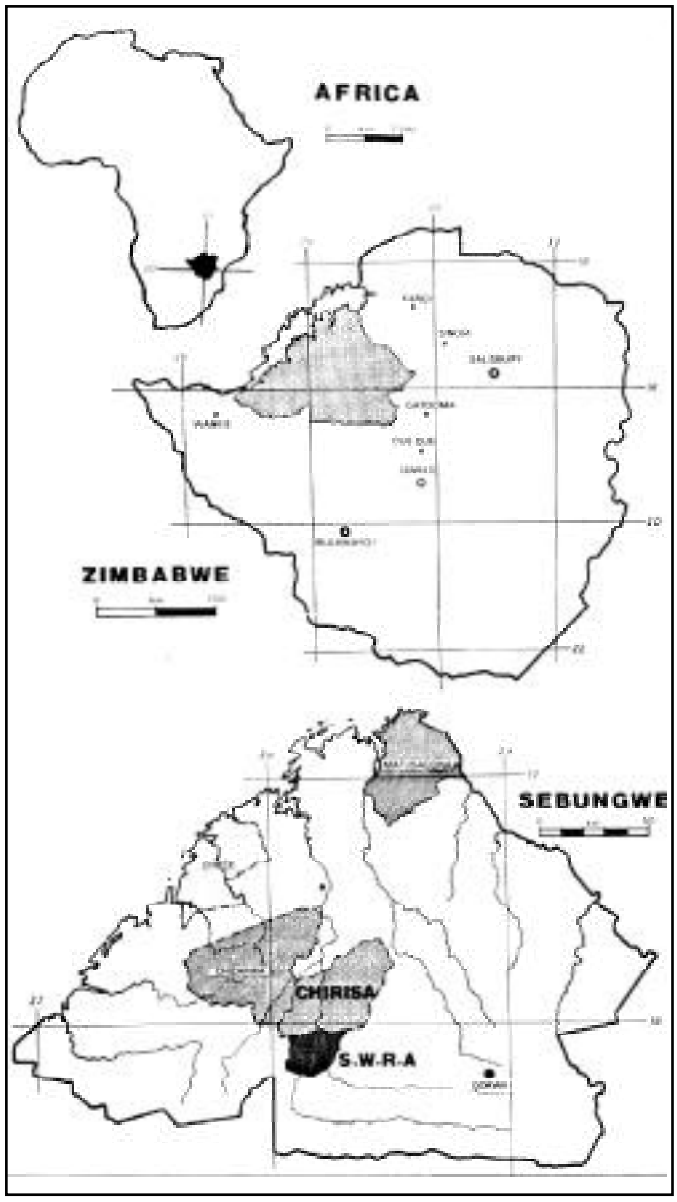

Figure 3

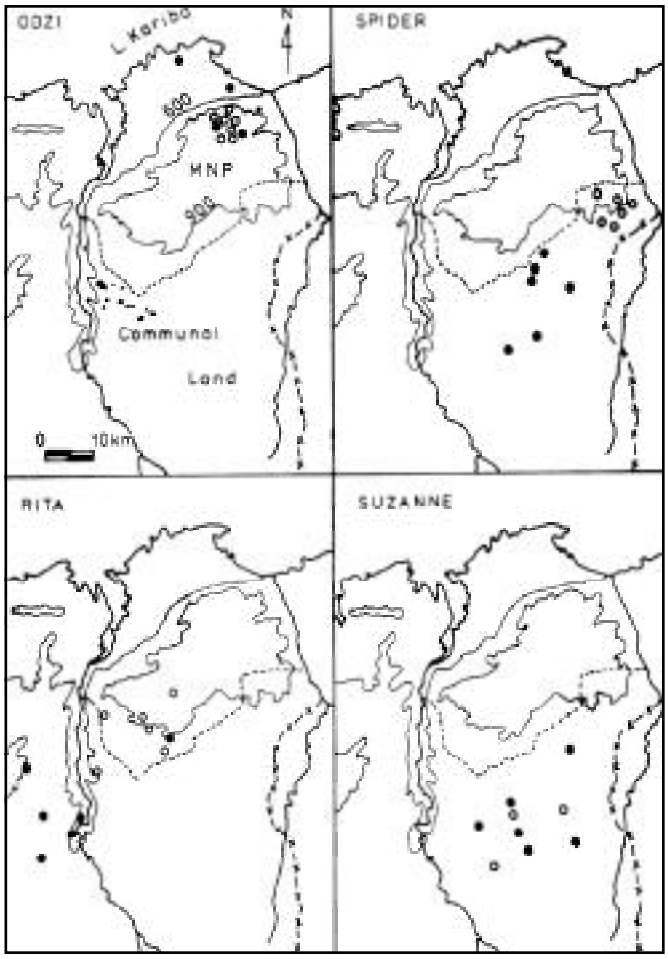

Fig. 4. Wet and dry season sightings of four radio-collared elephant In and around Matusadona National Park, June 1982 —May 1983. (•) *Wet and (o) dry season sightings; (–x–) game fence;* (–) *Park boundary; (600) altitude, m asl; (⁓) rivers and lakeshore.*

Figure 4 shows the wet and dry season sightings for four of the twelve elephants and illustrates the range of results that have been obtained to date. These can be briefly summarised as follows:

1. Three groupings are discernible:
   (i) Northern (escarpment) elephant which do not move out of the Park at all, e.g. Odzi. There are a total of four such elephant with collars.
   (ii) Southern (highlands) elephant which move both in and out of the Park e.g. Rita, of which there are again four animals with collars.
   (iii) Communal land elephant which appear to live and move entirely outside the Park, namely Spider and Suzanne. If the elephant "lost" early in the project is included, the four remaining collared elephant constitute this group.
2. All elephants move greater distances during the wet season in comparison to their movement in the dry season. This would also suggest that wet season ranges are larger than the dry season range; however, the data are still inadequate for reliable home range measurements.
3. Elephant in the communal land, including some of those that spend a portion of their time in the Park, appear to have much larger ranges than do those who are always in the Park. Compare Odzi with Rita and Suzanne.
4. Some elephants have distinctly separate wet and dry season ranges, e.g. Rita and Spider. These elephants occupy the highlands in and adjacent to Matusadona during the dry season, moving to the lower lying areas during the rains.
5. Apart from a brief excursion to the Matusadona lakeshore by Odzi during the wet season, there has been no other movement northwards over the Zambezi escarpment into the valley. Most movement appears to take place in a south-west/north-east orientation which is also the geo-physical orientation of the land surface.
6. Elephant that live in both the Park and communal land, as well as just communal land elephant, are associated with crop raiding. Rita was in the vicinity of Negande in the west at a time when this village was being subjected to crop raiding. Magda (not illustrated), who was collared in the Park, had one of her colleagues shot dead next to her on control work following a crop-raiding foray at Sainpakaruma to the south of Matusadona. I found Magda and her group of 13 two days later no more than four kilometres away from the scene of the incident. Although she could easily have fled to the safety of the Park she had not done so. There were

Figure 5. Southern White Rhino.

Rhino Rescue in Southern Zimbabwe

the end of the 1983 dry season.

One of the threatened rhino populations, first thought to number 25 animals, was located on the Humani and Lone Star ranches in the south-eastern corner of the country, close to the Gonarezhou National Park. While browsers such as kudu and eland will probably survive, thousands of grazers including zebra, wildebeest and impala and possibly some of the white rhino have already died.

When it became apparent, early in 1983, that Southern Zimbabwe was facing a severe wildlife crisis, plans for the capture of several valuable species were made by the Zimbabwean Department of National Parks in conjunction with the ranches involved.

The Department and the ranches targeted sable antelope, Lichtenstein's hartebeest, and the remaining white rhino for capture and captive feeding until they can be re-released hopefully by next March.

Two National Parks capture teams moved into the area in June. While one team concentrated on the threatened antelopes, the other successfully located and caught 17 white rhino, using darts loaded with M99 and administering the 50-50 antidote after the animals had been transported to the pens on Lone Star ranch. Six have since died from a combination of stress and extreme poverty. The remaining 11 have adjusted to a diet of sugarcane tops supplied by neighbouring sugar estates. While the second team continue with the antelope capture, the rhino unit, led by the Department's Management Unit Warden Clem Coetsee, moved a couple of hundred miles west to Doddieburn, a former ranch that is now State Land.

Here, a further 22 white rhino are thought to be threatened by the drought and are being captured and penned. Three are destined for Algeria, together with a number of cheetah. Five will be moved on to other ranches where grazing is still available; and the rest will be released into the 5200-square-mile Hwange National Park.

The rescue operations have depended heavily on public support. The ranches in the south-east launched a "Save our Sable" fund which has so far raised some Z$15,000 to pay for the captive feeding of the antelopes and white rhino; and the Bulawayo branch of the Wildlife Society has been instrumental in obtaining crates, feed and other essential items to help with the capture on the Doddieburn ranch. Possible further developments include the establishment of a nationwide fund to help finance any future rescue operations that may be needed. Zimbabwe experiences a ten-year drought cycle and the situation could well deteriorate further next year. Local conservationist agencies are now seeking around Z$150,000 to finance the capture and transport equipment that may be needed to avert a full-scale wildlife disaster if the 1983-84 rains fail to materialise.

Dick Pitman

Reports Confirm Northern White Rhino Close to Extinction

The final reports are now in and as previously indicated by Kes Hillman, very few Northern White rhinos remain now in the wild. The total world population is probably less than 100, possibly considerably less. At least 13-20, possibly more are at Garamba National Park in Zaire. One or 2 remain at Murchison Falls National Park in Uganda.

In Southern Sudan, some almost certainly still remain in the Shambe area, particularly in the north west, but at a very low density. There may be some in Southern National Park, but again at a very low density and severely threatened by next season's poaching. A few individuals probably still remain in the Meshra area, but with little or no future possibilities there.

There may still be a population, possibly even a reasonable one, in the Golongossa hunting reserve in western C.A.R., but this must be further investigated.

There may well be other relict populations scattered around, but we know of nothing substantial. There could especially be further hopes in C.A.R., but none of these countries are easy places to search for or find rhinos. There are believed to be 17 in captivity, the largest group being at Dvur Kralove in Czechoslovakia.

It is suggested that the priority actions are:

1. Conservation action first and foremost for the rhinos in Garamba in the context of re-development of functional conservation in the Park and of other aspects of the ecosystem, with close monitoring on the progress of such, and contingency plans. (see Robert Malpas' article)
2. The''intermediate' aid to Shambe and further aid to anti-poaching and/or rhino capture in Sudan as seen fit.
3. Negotiation of the possibility of catching some rhinos in Sudan for temporary improved protection.
4. Negotiation of the possibilities of forming a second breeding nucleus by amalgamating singletons and others with no future.
5. Investigation of the situation in C.A.R.
6. Consideration of aid for the group at Dvur Kralove if required.

AERSG are still concerned that there be guaranteed plans for captive breeding should *in situ* conservation efforts fail.

Elephants Hit by African Arms Race

Recent Factors Affecting Elephant Populations

Recent reports from the field present a mixed picture of elephant status:

- A massacre of elephants has been reported in the Sudan, with an estimated 12,000 killed per year.
- An aerial survey in Garamba National Park, Zaire, has shown that the elephant population has dropped by 64% in six years.
- Zimbabwe's national elephant estimate has increased from around 30,000 to 40,000 and a record cull is planned to control the elephants' population growth, and bring money to the people.
- Elephant poaching has broken out in the Kruger National Park and 137 elephants have been shot by poachers armed with Kalashnikov rifles, in a formerly inviolate sanctuary.
- Ranchers have complained of too many elephants in the Laikipia ranching area in Kenya. Numbers have swelled immensely in the last 10 years, although in the country at large the national elephant population fell by more than half between 1970 and 1977.
  In Ruaha National Park, Tanzania, elephants have increased at a rate of 12% per annum from 1973 to 1977 and pose a danger to the baobab trees.

With reports coming in like this, the general public may be forgiven for feeling a little confused about the real elephant situation in Africa today, Can elephants be overpopulated, and at the same time seriously endangered by poaching? Experts disagree among themselves as to the importance of the ivory trade versus the effects of human population growth.

Because of the danger of polarization of views, there is a need for an overview. Now as more reports come in, and in order to stimulate thought and discussion, I have plotted an index of some of the principal factors affecting elephants, showing the rates of change. These factors include the price of ivory, world inflation, human population growth, and two measures of the arms race: arms imports and men in the armed forces. The by-product of the arms race is poachers armed with automatic weapons.

The ivory price index from 1960 to 1978 in Figure 6 is derived from ivory prices of the leading importing countries, mainly Japan and Hong Kong. The inflation index is for the GDP of the OECD 24 leading industrialized nations including most large ivory importers, and is derived from figures supplied by Morgan Grenfell Bank. Data on the arms race (Figure 7) have been summarised in East Africa from US Arms Control and Disarmament Agency statistics.

It is argued here that the elephant situation in the sixties was radically altered by two main factors: an increase it he price of ivory on the world market, itself a by-product of inflation; and an increase in the availability of automatic weapons in the hands of poachers, a by-product of the arms race, wars and civil strife. East Africa is used as an example here, but the problem is continent wide.

THE 1960's SCENARIO

In the 1960's, the main problem of elephants in East Africa was one of overcrowding within the National Parks, with woodland destruction. Elephant densities were thought to have increased through the alienation of their range as an expanding human population put more land under cultivation around the protected areas. Classic examples were the Murchison Falls National Park in Uganda and the Tsavo National Park in Kenya, but many more abounded. In the sixties, the ivory price kept broadly in line with the rate of inflation for the first eight years. There was only a slight rise in the ivory price from 1960 to 1966, at which point it exceeded inflation by a factor of 1.27, but then dropped back to match inflation by 1968. The arms race had hardly begun.

THE 1970's SCENARIO

In the 1970's the scenario for elephants changed dramatically. The ivory price increased, and African countries entered an explosive arms race, accompanied by civil disturbances, wars, and guerilla campaigns. The importance of these latter aspects on elephant population dynamics has perhaps been hitherto u underestimated.

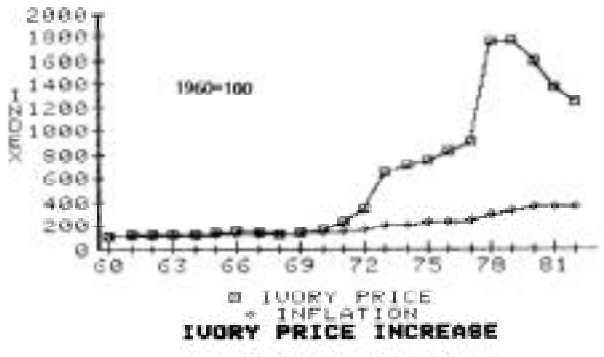

Figure 6

Ivory price

From 1969 to 1978 the ivory price climbed rapidly from $ 5.77 to $ 74.42, at which point it exceeded inflation by a factor of 5.9. Since then it has dropped to $ 52.8 in 1982, but the ivory price index in 1982 still exceeded the inflation index, by a factor of 3.5.

It follows that the price incentives to obtain and sell ivory throughout the seventies up to the present have increased by a similar factor, especially in African countries with an acute shortage of foreign exchange and rapid inflation (Kenya 11%, Zaire 30%, Uganda 28%). Of all the factors considered here the ivory price has increased the most.

The Arms Race

In the decade 1971-1980 Africa registered the largest average annual rate of increase in arms imports as compared to the other regions of the world; a low volume of $ 500 million in 1971 contrasts with a volume of $ 4.5 billion in arms imports in 1980. Military expenditure in Africa during the same period increased on average at a rate of 6.66% annually, in real terms adjusted for inflation. Although these increases do not refer directly to automatic rifles there is no doubt that these rifles were part of the modernization process and multiplied accordingly.

In Eastern Africa, Somalia armed in the early 70's in preparation for the Ogaden war, and the Ethiopians armed in response. Uganda armed at the same time under Am in, Tanzania armed in response, and Kenya followed suit. Sudan also armed in response to Libyan interference.

Armed forces in the region increased as follows:

	1971	1980
Ethiopia	45,000	240,000
Kenya	7,000	16,000
Somalia	20,000	54,000
Sudan	35,000	68,000
Tanzania	20,000	57,000
Uganda	14,000	6,000
	141,000	441,000

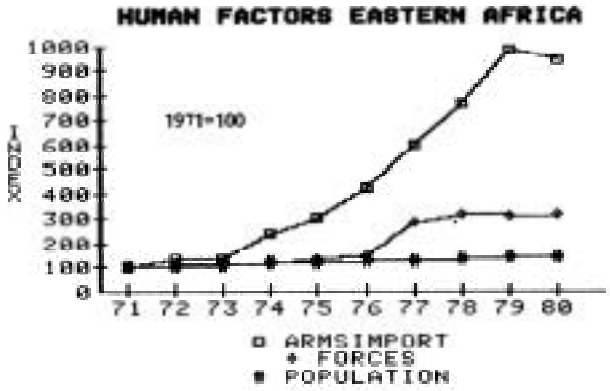

Figure 7

It would be reasonable to assume that the number of automatic rifles is closely related to the number of personnel in the armed services. During the decade there has been a more than threefold increase in the number of men serving in the armed forces in the region.

The next step to explain is how the arms get into the hands of poachers. In some countries, for example Uganda and Sudan, elements of the military themselves were the main poachers, whom the lightly armed and outnumbered Park Rangers were powerless to oppose. In others, weapons were lost, stolen, taken from defeated soldiers, looted from armouries, issued to people's militias, channelled secretly to guerilla movements, or simply traded by soldiers for money or goods.

Proliferation was also increased by wars and civil strife. For example as Amin's power weakened, the Matheniko clan of the Karamajong tribe attacked and overwhelmed the police barracks at Moroto. In this raid they looted the armoury and carried off 12,500 automatic rifles, 1.5 million rounds of ammunition, and numerous rocket propelled grenades and other munitions. The Jieh clan also participated in this haul.

The Matheniko and the Jieh clans then attacked other clans and accumulated stolen cattle. The market for these cattle and the loose guns spread, When one tribe acquired new weapons the others were under pressure to keep up or suffer defeat So a chain reaction of weapon acquisition was set off. From the Karamajong in Uganda the Toposa acquired rifles and took them to Sudan, the Turkana brought rifles to Kenya. The Pokot acquired them too as they were traded through the tribes. These nomadic peoples, transferred overnight from spears, bows and arrows to automatic weapons.

In 1979 retreating troops of Amin were eager to abandon their weapons and uniforms in order to avoid capture and execution. Where they could they sold their guns to villagers. The result was that the price of an automatic rifle dropped to a very low level. Their retreat back to West Nile Province, from where most of them came, lay through the Murchison Falls National Park. Hundreds of rifles came into the hands of local people in that area, and they began to poach.

Further in the east of the region a similar scenario unfolded. In the sixties and seventies the Somalis built up their army with the policy of extending their boundaries to include the Somali communities living in Ethiopia, French Somaliland and Northern Kenya. Somali "shifta" were responsible from 1970 to 1975 for reducing elephant populations along the Tana River and in the Lamu Garissa region of Kenya.

In the 1977 Ogaden war, a trail developed across Northern Kenya in the Mandera area, used by Somali insurgents on their way to and from the Ogaden. Inevitably some of these guerillas, who were probably not well disciplined, deserted or sold or lent their arms to others. The spin-off was that more loose guns wound up in the hands of the nomads.

It was not until this point that elephant poaching in Somalia itself got under way. Formerly, it had been reported that poaching had been virtually eliminated in the country. Then, Hassan Sheikh Omar of the Wildlife Department, wrote that elephant poaching had suddenly increased with the easy availability of automatic weapons, associated with the war between the Western Somalia Liberation Front and Ethiopia. In the five years previous to 1981, he estimated that over one half of the elephants of the country had been killed, and that in many areas this proportion had been surpassed. There were places, he said, where only one tenth of the elephants recently present now survived, and where the anti-poaching unit had found groups of up to 80 dead elephants lying where they had been fired upon.

To the south of the region, in Tanzania, loose guns have also increased. I found a group of 8 dead elephants in the Tarangire National Park on an aerial survey in 1977, indicating that automatic weapons had probably been used to kill them. In 1980 a survey made in the Arusha region revealed large areas where the only elephants to be seen were dead. In 1981 Tanzanian troops returned from Uganda, a country where the only law in force was the rule of the gun. When they came home some soldiers brought problems of ill discipline, of looting civilians, and of "losing" guns. Recently, unquantitative reports of widespread elephant killing have come from Southern Tanzania, but await confirmation by aerial survey. The next Tanzanian elephant population which arc candidates for collapse arc those living in proximity to poachers armed with automatic rifles.

At the end of the Sudanese civil war in 1972 many of the Southern Sudanese "Anyanya" guerillas were recruited into the army where they were issued with automatic weapons. With the recent civil disturbances in Sudan an anarchical situation exists in which elements of the army, government officials, ex "Anyanyas", and gangs of well-armed horse mounted Arabs have been involved in a free for all, which appears to have decimated every elephant population living in the south.

Although the examples have dealt with the East African region the problem is general within the elephant ranges

of Africa. Automatic rifles have been used to poach elephants in many other national parks: in Niokola Koba in Senegal, in Zakouma in Chad, in Garamba in Zaire, in Bamangui-Bangoran in CAR, in the Luangwa Valley in Zambia, in Wankie in Zimbabwe, in Chobe in Botswana and in the Kruger in South Africa, to name just a few.

Human Population Increase

Human population increase presents the most important long-term issue, through the expansion of agriculture or other intensive land management practices into the elephant range. This may be more rapid than population increase per se. The trend towards urbanization slows down the rate of human increase in the rural areas where the elephant's range is found, but nevertheless is expected to increase by 50% by the year 2000, and will inevitably compete with elephants for space. The rate of increase selected for the graph in Figure 7 is 4%, currently achieved by Kenya, with the fastest growth rate.

Recent elephant decreases, however, have not taken place in areas of high human population density, but in the rural areas of low human population density. Current levels of ivory production cannot therefore be ascribed to the immediate effects of the human population increase, such as competition for land or resources.

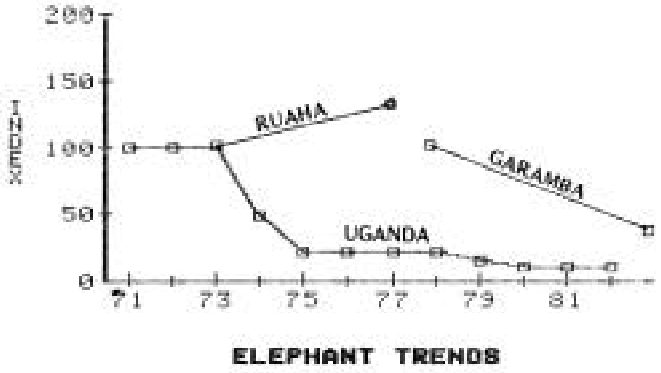

Figure 8

ELEPHANT TRENDS

I have selected only three elephant populations for the graph in Figure & those of the combined Uganda National Parks, and of Ruaha and Garamba National Parks.

The effects of automatic weapons on Uganda's elephants is probably the best documented case history of a catastrophic population collapse caused solely by poaching for ivory. Ironically it was here that it was first demonstrated in the mid sixties by culling teams that mass killing of elephants could be safely and efficiently accomplished using standard NATO automatic weapons. Likewise for the poachers, automatic weapons with their high rate of fire offered the possibility of more effective mass killing. Recent trends have been summarized in the previous newsletter, and have been documented from 1973 to 1976 in the scientific papers of Eltringham and Malpas. The lowest point was reached in all three national Parks in 1980, and recorded in the WWF Aerial Survey, at approximately one tenth of the 1971 level. Since then, through equipping the rangers with firepower to match that of the poachers and supporting them with an adequate aid programme, the elephant situation has stabilized. Large numbers of automatic rifles continue to be recovered from poachers, especially around the Murchison Falls National Park.

Ruaha is an example of an elephant build up within a park by those factors outlined in the scenario for the 1960's. Southern Tanzania's elephants remained relatively unaffected by the effect of ivory poaching at least until the mid 1970's. Within the Ruaha National Park they built up by 8% per year between 1973 and the 1977 censuses. Barnes attributes this to external human pressures as well as "natural increase", Whether Ruaha has continued to remain immune to the general trend caused by the ivory trade can be resolved by further monitoring. Qualitative reports suggest that there has been a massive increase in elephant poaching in recent years.

Census data of scientific validity are few and far between, and often have followed in the wake of what have been called "unconfirmed reports and speculation"', For example in 1973 hunters alleged massive decreases in the northern districts of Kenya. These were not confirmed by aerial survey until 1977; in 1979 numerous allegations were made of "'elephant massacres" in the north of Zaire, not confirmed until Borner and Hillman made an aerial survey in Garamba in 1983 and found a 64% decrease; in Sudan elephant massacres were reported in the period 1980 to 1982, and these still have not been confirmed widely apart from one survey in Shambe, where high carcass ratios indicated heavy elephant mortality. The protected areas are usually the last to suffer declines. When heavy poaching begins elephant numbers usually increase within the National Parks, as in Ruaha. By the time a collapse is recorded within a park the worst has already happened long ago in the rest of the country.

CONCLUS IONS

In our overview of the factors affecting elephants we can consider their relative rates of change. The ivory price has increased twelve times between 1960 and 1982, whereas inflation has only increased by 3.5. In the decade of 1971 to 1980 arms imports in the East African region increased by 9 times and armed forces by 3 times, whereas human population only increased by 50% in the country of most rapid growth, Kenya.

From the Tsavo and Uganda Parks examples, we know that the apparently secure state, where elephants arc said to be overpopulated, is often fragile and illusory. In the face of automatic weapons, and with the high incentives provided by the high ivory price, a population of "safe" elephants can be brought to the edge of extinction within a few years.

The elephant situation in Africa as a whole contains a few islands of protected elephant populations where "overcrowding" may still be a problem. Otherwise, elephants, like many people in Africa, face an unstable and turbulent future.

I. Douglas-Hamilton

Mali's Elephants Suffer in Drought

Mali and Mauritania boast the continent's most north-westerly elephant populations, which survive as tiny remnants in marginal habitats bordering the Sahara. Of these, by far the largest (and the only one with any long-term survival prospects) is the population of about 600 that, apart from a brief spell in Upper Volta during the rainy season, ranges most of the year in an area of Mali known as the Gourma (see map). Their annual movements are believed by some observers to approach 800 km, which if substantiated would be easily the longest elephant migration recorded. The Gourma elephants are thus of considerable scientific interest, and their study is of value to elephant conservation and management elsewhere in Africa.

In 1959 the Government of Mali declared a 12,000 km^2 Elephant Reserve in the Gourma. The only relevant management prescription was the banning of all elephant hunting which was allowed elsewhere on licence at the time. Since Mali's total hunting ban of 1978, however, the management status of the reserve had become no different to its surrounds. Subsequently, international concern for the Gourma elephants has been expressed. For example, in 1980 an IUCN/ UNEP Technical Meeting issued a resolution calling on the Government of Mali to protect the Gourma elephants. In 1981, political and government action in relation to the Gourma elephants was one of the highest priority recommendations of the Wankie meeting of the IUCN African Elephant and Rhino Specialist Groups.

Although poaching of Gourma elephants by urban Maliens used to be of concern, poaching is not currently believed to pose a significant threat, although some, reputedly organised out of Upper Volta, does occur and the animals are rumoured to be relatively hard hit during their sojourn in that country. According to an Ouagadougou-based FAO wildlife expert, however, elephant poaching in Upper Volta is negligible. Nevertheless, it is generally agreed that given present levels of law-enforcement capability, and the current state of the ivory market in terms of supply and demand, poaching of the Gourma elephants will become increasingly serious within Mali as access to the area improves, although there is little evidence of this yet. At present the extremely limited availability in the Gourma of late dry season surface water poses a threat, which may have accounted for up to 40 deaths this year. In the long-term however, plans to develop greatly the area's livestock potential pose the most serious threats to the Gourma elephants.

The elephants currently share their 33,000 km^2 range with some 379,000 cattle, sheep, goats, donkeys and camels, as well as over 100,000 Tamasheq (Taureg) and Pheul (Fulani) pastoralists. The area is characterised by a single peak monsoonal rainfall regime in which a short summer rainy season (June to September) is sharply contrasted with a long dry season. Mean annual rainfall in the elephant range varies from about 550 mm in the south to 300 mm in the north. The herbaceous and woody components of the vegetation are dominated by annual grasses and deciduous species (from genera such as *Combretum* and *Acacia* respectively). For much of the year elephants are apparently heavily dependent on browse. There are no permanent rivers in the elephant range and for several years now some shallow lakes associated with the Niger's seasonal inundation zone have remained dry.

Thus, as the dry season progresses the elephants fall back on the few remaining sources of surface water of which there will be only one or two in a bad year.

Although livestock and men have access to wells and bore-holes also, these too arc few in number, and it is generally agreed that the overall scarcity of dry season water is responsible for the grazing potential of the Gourma being greatly under-utilized. The development of the Gourma as an important livestock range through provision of more and better distributed dry season water has, therefore, been a long-cherished ideal of the government and with help from the World Bank and others this, and the consequent transformation of the area's ecology, is about to be realized.

One of the traditionally important elephant concentration areas in times of acute water shortage is a water hole known as Banzena. By March 1983, Banzena was the only source of surface water in the western Gourma and hosted several hundred elephants. In mid-April an early rain fell to the east and north of Banzena, causing the elephants to disperse. Evidently the rains were ineffective and the elephants found little water in the dispersal area, save that which could be taken from small wells dug by the local people in dried-up lake beds. The competition between man and elephant at such sites was considerable —many wells were destroyed, elephants got stuck in wells where some died, and at least one man was killed by an elephant. Elephants were reported dying of thirst over a large area. By early May, Banzena held only mud and dead and dying elephants.

On 13th May 1983, UNEP received an urgent telex from the Ministry of Foreign Affairs and International Cooperation in Mali outlining the situation, which was expected to worsen during June, and appealing for assistance. In response I was sent to Mali from 6th to 17th July 1983, in order to give a full report to UNEP on the situation and to recommend appropriate action to thc Government.

I concluded that despite an apparent excess of supply over demand in the gross primary production of the ecosystem, the size of the elephant population may be close to its effective elephant carrying capacity. While there is evidence that the animals arc well adapted to the constraints of the ecosystem, it is doubtful they could adapt very much further. The scarcity of dry season surface water, and the seasonal overexploitation of its immediate surrounds, are probably the underlying factors regulating the elephant population, not infrequently through the medium of drought related mortality. If present conditions persist or deteriorate, the vulnerability of the population to extinction will increase yearly.

In the short-term, proposed water development in the Gourma should sharply reduce the incidence of drought related mortality. In the long-term however, if there is no corresponding control in livestock numbers, the situation could soon revert once more, though with considerably less room for elephants. Developments affecting the traditional dry season concentration areas and crisis refugia of the elephants are especially significant. Any permanent displacement from such habitats would have an extremely adverse impace on the elephants.

Figure 9. Map of Mali showing the Gourma (striped area) and the National Park: La B ouck de B aoule (stippled area).

Unless appropriate integrated management of the elephant range is carried out, the future of the species in the Gourma looks extremely bleak. The long-term objectives of such management would be to maintain or increase the existing elephant population, while simultaneously increasing existing levels of livestock productivity in a sustainable manner. The approach can be justified on grounds of the local and international importance of the elephants, development of the nation's protected areas, tourism, employment, restoration of wildlife, sustainable livestock production, and sensitization of the Government and the public to conservation.

I recommend that the existing Elephant Reserve be redefined as a multiple use area (IUCN category 3) covering the majority of the Gourma elephant range and that within this, one or more sanctuaries (IUCN category 4) be established in critical habitats. Thus the elephant range can be divided into zones subject to varying intensities of management, each of which can be given legal definition under the provisions of existing legislation. An associated planning programme, culminating in a written management plan, is desirable.

Pending such a programme, two measures are urgently needed. The first is control (by the Direction Nationale des Eaux et Forets (DNEF) over what is probably the area most critical to elephants, namely Banzena water hole and its surrounds. Here, a very productive bore-hole which was recently sunk threatens elephant access in the future. The second is the deployment of DNEF agents throughout the elephant range to enforce the law.

Rob Oliver

South Africa Celebrates Rhino Successes

Black Rhinos in Natal and South Africa

At a time when the black rhinoceros is under extreme pressure and declining rapidly over much of its range in Africa, t is encouraging to know that in Natal the reverse situation is found. This Province, lying along the north-eastern seaboard of South Africa, contains the active nucleus of the black rhinoceros population south of the Limpopo River. Since 1962, the Natal Parks, Game and Fish Preservation Board has provided rhinos from certain of the Zulu land reserves for re-introduction into other conservation areas within the former range of the species.

The importance of Natal's rhino was highlighted by Peter Hitchins in 1975 by his statement that ot the 439 black rhinos in the Republic 400 occurred in Natal. While not very significant at that time in terms of the total population in Africa, the continuing decline of the species elsewhere has focussed attention on this population and its role in providing excess animals for conservation.

The current population in Natal stands at about 420, distributed between the Hluhluwe-Umfolozi (±300), Mkuzi (±60) and Ndumu Game Reserves (±30), and Itala (±25) and Weenen Nature Reserves (4). Apart from the newly-established populations in Itala and Weenen, the remainder have remained fairly stable over the last 10 to 15 years.

The three major Zululand Reserves of Hluhluwe-Umfolozi, Mkuzi and Ndumu have provided the individuals for translocation over the years. Most have come from HluhluweUmfolozi, and t is here that the black rhino population has been most intensively studied.

A game count in 1961 produced a population estimate of 300 for Hluhluwe, with densities ranging from 0.6 to 1.7 rhinos/km^2. The same year a population crash occurred in the north-eastern area of the reserve with 46 animals dying over a four month period. These events were reported by Peter Hitchins who also found that numbers continued to decline in Hluhluwe during the dry cycle of the late 1960s, so that by 1972 the estimate was 199. Over the same period numbers increased to about 129 in Umfolozi. The overall density in 1972 of 0.36 rhinos/km^2 for Hluhluwe-Umfolozi was still far higher than found elsewhere in Africa. e.g. Masai Mara Game Reserve 0.1/km^2, Olduvai Gorge 0.002/km^2 and Ngorongoro Crater 0.004/km^2. The response of the population over this period and the high

Figure 10. Black rhino.

population density suggested that the carrying capacity had been reached, at least in Hluhluwe, and this prompted the translocation of 20 black rhinos to Kruger National Park in 1971.

No further removals took place until 1977 when t was agreed that a further 20 black rhinos could be made available from Hluhluwe over a 5 year period to large conservation areas within the species' former range and where habitat conditions were suitable. In the meantime, we re-assessed the population structure in Hluhluwe and Umfolozi using data from 1975—977 and found that the sex and age ratios were very similar to those reported in 1972 by Peter Hitchins, arid as recorded deaths had decreased we assumed that the population had probably not declined. This assessment was carried out during a high rainfall cycle when black rhinos were unlikely to have been under significant environmental stress, and the removals represented less than the expected rate of increase for Hluhluwe of 5%.

The next dry cycle began in 1977/78, the stocking rates of both grazers and browsers in the reserve were above carrying capacity and the habitat rapidly deteriorated. By 1979 most of the vegetation monitoring sites showed over-utilisation of the browse resources and 5 black rhino deaths were recorded in the late winter in Umfolozi. To pre-empt a population decline such as had occurred in the 1960s, Peter Hitchins and Jeremy Anderson recommended that the black rhino density in Umfolozi should be reduced, and 14 animals were removed in 1980. The dry cycle continued, so in late 1980 Tony Whateley, Jeremy Anderson and I decided to re-sample population structures throughout the area. This was made possible through a donation of helicopter hours by the Endangered Wildlife Trust. A total of 128 rhino, or 37% of the population, were contacted in 19 hours flying. The results were extremely interesting, as the percentages of immature rhino under 3.5 years old in Hluhluwe and Umfolozi (excluding the central corridor) were only 11% and 8% respectively, and no calves under a year were recorded in Umfolozi.

On the basis of this study, it was recommended that the population density of black rhino throughout Hluhluwe-Umfolozi should be depressed by removing 30 animals in 1981, and that thereafter the

'expected' rate of increase each year should be removed. A similar policy was adopted for Mkuzi and Ndumu Game Reserves, so that as from 1982 about 19 black rhino became available annually.

In this way, a total of 135 rhino have been moved from the Zululand Reserves since 1962. Within Natal, the recipients have been Ndumu (15), Itala (23) and Weenen (4); while translocations externally have been limited to Pilanesberg Game Reserve in Bophutatswana (23) and Kruger National Park in the Transvaal (70).

Reports on the performances of the black rhino in the latter two areas are most encouraging. For example, in Kruger Anthony Hall-Martin has reported that they are breeding faster than the parent Hluhluwe-Umfolozi population, this being shown by higher immature (<3.5y): adult female ratios (1.2 versus 0.4) and a higher percentage of calves under one year old (9% versus 5%). This is at a black rhino density of about 0.2/km^2 in Kruger as opposed to 0.36 in Hluhluwe-Umfolozi.

The future for the black rhinoceros in South Africa therefore looks bright, providing adequate protective measures against poaching can be maintained. However, as a precautionary measure, the Natal Parks Board is hoping to send *5* rhinos to a captive breeding project in the USA. The concept is to create a reservoir outside Africa which could be drawn on to re-stock reserves at a later date, particularly if local extinction had occurred.

Martin Brooks

Tusk Measurements Provide Insight into Elephant Population Dynamics

In the first newsletter of the African Elephant and Rhino Specialist Group, we announce a new project, funded by the New York Zoological Society, whose goal was to elaborate the relationship between ivory trade statistics and the status of the elephant populations from which the ivory comes. Ian Parker had made important progress in this area, while pointing out the need for further study. Parker's results are being thoroughly re-examined, and the full extent of their application explored.

The project has two stages, the first looking at how much information can be derived about individual elephants from individual tusks, and the second at how these results can be used to derive information about elephant populations from tusk populations.

The first stage has been completed. Using data from culled elephants provided by Ian Parker, mathematical models have been developed which use tusk measurements to determine sex and age. There were three steps to this. The first was to determine which tusk measurements are thc most reliable. This was done by comparing right and left tusks for the same elephant, recognizing that if one cannot accurately predict one tusk from the other, it would be unwise to attempt to predict anything else.

All tusk measurements are quite reliable. Weight and lip circumference are best, and equally good, followed by total length. It is interesting that two of these measures, length and weight, are of dimensions altered by wear and

breakage. This is a clear indication that tusk wear is remarkably even.

Single-tusked elephants provide a useful test for the importance of wear and breakage, since their one tusk, as their only tool, should be much more affected by the stresses of use. Elephants with just one tusk do tend to have shorter tusks than those with two, but not nearly to thc extent expected. Almost one third actually have longer tusks. This is almost certainly due to a high degree of individual variation.

Though important, individual variation is a minor factor in comparison with sexual dimorphism. Male and female elephants have significantly different tusk sizes and shapes. This allows tusks to be separated by sex, which must be done if estimates of age are to be correct. Because differences resulting from individual variation, sexing of tusks can be done quite accurately.

Lip circumference and length can be used in combination to determine sex at a high level of accuracy. The table below presents the results of a sex of predictions.

Correct female guesses	371
Wrong female guesses	52
Correct male guesses	303
Wrong male guesses	53

A total of 674 guesses of 779, or 86.5% were correct.

Tusk weight can also be used to determine sex, but it is much less accurate. Tusks weighing more than 14 kg are almost certainly from male elephants, but below that weight guesses must be made on a stochastic basis. This reduces the absolute accuracy of any one guess, but for large samples the distribution of guesses should adequately duplicate the actual sex distribution.

Once tusks have been separated by sex, the age of the elephants they came from can be predicted. Age is a much finer prediction than the binary division by sex, and individual variation is a much more important factor. Models for guessing age from tusk dimensions must not only be as accurate as possible, they must also include a clear and explicit evaluation of their accuracy. Therefore, the models provide both a prediction, which is essentially a mean of all possible values, and a variance, which can be used to calculate the range within actual values will vary from predictions.

The accuracy of the models is fairly good. With reasonably large samples, the mean of the actual values will fall within about a five (± 21/2) year range for males, and within an eight (± 4) year range for females. Females are more difficult to age because their rate of tusk growth slows with age while individual variability continues to increase. The ranges may seem a bit wide, but they are really quite reasonable for an animal with a 60 year lifespan.

Given the models presented, a tusk can provide a great deal of information about the elephant it came from. Lip circumference and total length, in combination, can determine sex, and lip circumference or weight can predict age. Sex and age together can be used to construct mortality patterns, which give a clear idea of the elephants killed to supply any ivory consignment which has had basic tusk dimensions recorded.

Mortality patterns are not only useful in themselves, but have great potential for extending our knowledge. They are the product of the interaction of population structure and hunting patterns, and provide a basis for trying to determine the status of elephant populations. The conclusions must be tentative, as a number of assumptions are required, but the possible applications are both varied and important.

Some work has already been done on the mean tusk weights that can be expected from given population structures and hunting patterns. This can be of great help in evaluating a region's hunting policy using lust the mean tusk weight of ivory consignments. Another possibility is to examine the reproductive consequences of given mortality patterns. It is clear that at some level of hunting intensity elephants will be killed faster than they can replace themselves. If this level, and the mortality pattern which signals it, could be worked out through population modeling, situations of population decline could be spotted very quickly.

The most important application combines the previous two. It should be possible to determine hunting patterns which will produce the greatest amount of ivory per elephant. This would be to the advantage of both the ivory trade and the elephants which supply the trade. Achieving that goal will be difficult and complex, but clearly worthwhile.

Sex	Measure	Age	Variance
Male	Circumference(c)	$e(-4.25 + 2.12 \ln c)$	$15.11[\frac{1}{m} + \frac{1}{354} + \frac{(c-25.58)^2}{9205389}]$
Male	Weight(w)	$e(1.76 + .58 \ln w)$	$12.04[\frac{1}{m} + \frac{1}{1116} + \frac{(w-7.42)^2}{81741203}]$
Female	Circumference(c)	$e(-5.24+2.77 \ln c)$	$39.26[\frac{1}{m} + \frac{1}{424} + \frac{(c18.88)^2}{3933555.4}]$
Female	Weight(w)	$e(2.25+.72 \ln w)$	$38.19[\frac{1}{m} + \frac{1}{1399} + \frac{(w-3.37)^2}{12493308}]$

Tom Pilgram
David Western

IUCN Helps Zaire Rehabilitate Garamba

In the last issue of this Newsletter, Dr. Kes Hillman presented a status report on the Northern White rhino in Sudan and Zaire, and drew attention to the precarious status of the sub-species and the need for urgent conservation action. As a result of Dr. Hillman's survey work, t appeared that the only viable population of Northern Whites was to be found in the Garamba National Park in north-east Zaire on the border with Sudan. Here, too, the situation was critical, with just 15-20 rhinos surviving, according to an aerial survey carried out by Dr. Markus Borner of the Frankfurt Zoological Society in conjunction with Dr. Hillman and the Zaire authorities.

A few weeks after the aerial survey in Garamba, AERSG members met in Harare, Zimbabwe on April 13th, and one of the main items on the agenda was Garamba. After lengthy debate, the meeting concluded that the priorities established at the Rhino and Elephant Specialist Groups' meeting at Wankie in 1981 remained unchanged, and that the conservation of the Northern White rhino was still of the highest priority. The Harare meeting viewed the survival of this sub-species as a test-case for the effectiveness of conservation action in Africa, and recommended 3 main courses of action:-

1. that an approach should be made to the Zaire authorities to allow the translocation of a breeding nucleus from Garamba to the United States.
2. that law enforcement capabilities in Garamba should be upgraded, commencing with the immediate posting of an effective law enforcement officer to the Park.
3. that efforts should be made to search for and relocate outlying individuals within the former range of the Northern White rhino.

The meeting considered that translocation of the surviving Northern Whites in Garamba into captivity presented the only viable alternative to save the sub-species at this critical stage. *In situ* action was considered far too risky because of the very low numbers remaining, the concensus being that the rhino population was already well below the threshold level for survival in the wild. The meeting recommended that the American Association of Zoological Parks and Aquaria, AAZPA (which was already drawing up contingency plans for the translocation, reception and management of the White rhinos to the United States in conjunction with AERSG Chairman Dr. David Western), should make a high-level approach to the Zaire's authorities to secure their approval for the operation. In turn, the meeting requested IUCN to initiate field action to rehabilitate Garamba and to search for outlying rhinos.

Others were less certain of the advisibility of translocating the rhinos. The Frankfurt Zoological Society (FZS), whose representative Dr. Markus Borner played a leading role in the Garamba survey, felt that, however desirable, translocation of the rhinos to the US. was unlikely to be a politically viable option. FZS recommended an alternative course of action: captive propogation within Zaire perhaps within Garamba National Park itself with high security protection and expert care.

A third option was put forward by Drs. Kes Hillman and Patrick Rogers (UNDP Chief Technical Advisor to the Zaire Institute for the Conservation of Nature, IZCN). They maintained that conservation of the White rhino *in situ* was not only a viable alternative, but was also the only politically acceptable and ecologically sound approach. In their view, conservation of the Northern Whites was more than just a matter of conserving the gene pool (which indeed could be achieved equally well in a captive situation) but of conserving the sub-species as an integral part of the Garamba ecosystem. In addition, the proponents maintained that conservation of the White rhino *in situ* was essential because of the symbolic nature of the rhino as far as national conservation efforts in Zaire are concerned. It was this option which IZCN appeared to favour most.

Finally, a compromise position was advocated by AERSG Chairman, David Western, whereby an "end-point" for rhino numbers would be established. In this scenario, all concerned parties would agree in advance to a critical minimum number at which all field efforts to save the sub-species would cease and captive propogation ensue. This proposal has been tentatively discussed with IZCN, who are receptive, although no firm agreement has been reached at this stage.

While the discussions on what specific action should be taken to ensure the survival of the rhino continued, IUCN put the wheels in motion to implement AERSG's second recommendation the rehabilitation of Garambawhich no-one denied was an essential step. In June, Mankoto ma Mbaelele, Scientific and Technical Director of IZCN, flew to Nairobi together with Pat Rogers, for discussions on the design and implementation of the rehabilitation programme. A project was drafted and endorsed by IUCN and IZCN. Meanwhile, approaches were made to the World Wildlife Fund, Frankfurt Zoological Society and UNESCO's World Heritage Fund to provide funding for the programme, with positive results. By August, a detailed proposal for a $ 440,000 rehabilitation programme had been drafted and submitted to IZCN and IUCN for approval. WWF, FZS and UNESCO had all agreed to meet their share of the cost of the 3-year programme, and arrangements were underway for the purchase and delivery of equipment and supplies called for in the project document. As a stop-gap emergency measure, WWF/I UCN provided IZCN with urgently needed anti-poaching equipment and supplies in order to safeguard the park until the main rehabilitation programme could begin.

At the time of writing, final approval for the implementation of the full programme has been given by the Zaire authorities and one of the two expatriate positions called for in the project document, that of Technical Specialist, has been filled. The other post, Senior Management Advisor, has yet to be filled, although a decision is expected shortly. Meanwhile, British Leyland have responded to an urgent appeal from WWF and provided 4 Landrovers at cost price for immediate delivery, thus short-cutting the usual lengthy waiting list which would have delayed start-up by several months. Other urgently needed equipment, such as a complete radio network designed by African Wildlife Foundation's Communications Specialist, Howard Wood, is already on its way to Garamba.

The appointment of the Senior Management Advisor and the signing of the Contract arid Project Document between IUCN and IZCN will set the stage for the

implementation of the second of AERSG's Harare recommendations, just 7 months later – no mean feat when one considers the slow turning of bureaucratic wheels. Hopefully, the project will be in full swing before the dry season in Garamba gets well underway, so that a start can be made on re-vamping the anti-poaching operations before the poaching intensifies.

The question still remains: what specific action should be taken to ensure the survival of Garamba's rhinos' thc subject of AERSG's first and priority recommendation? The IZCN/IUCN Rehabilitation Programme is not designed to fulfil this objective and the Project Document clearly states that additional action of some form is necessary if the rhino population is to be saved. What this action should be, and who should carry t out, remains a thorny question, and there is little doubt that the various alternatives will be a topic of lively discussion at the forthcoming AERSG meeting in Nairobi in December.

Robert Malpas

News in Brief

CONSERVATION OF ELEPHANT IN SIERRA LEONE

With only 1.2% of the original forest zone left in Sierra Leone, the decline of endemic fauna is the most dramatic of all the west African coastal countries. A recent survey by Drs. Harold Roth and Gunter Merz, carried out in the country under thc auspices of SLENCA (Sierra Leone Environment and Nature Conservation Association), and with partial funding from WWF/IUCN, has looked at what effect this massive reduction in the habitat has had on the Sierra Leone forest elephant population.

The report shows how agriculture has restricted the elephants to small groups. Only those in Gola East and Gola North Reserves (150 animals, occupying 50,000 ha) have a chance of long-term survival, and only if the present trend of at least 5% population decrease each year is stopped.

The research team considered that a comprehensive long-term management and development plan for thes reserves is now vital. Recommended conservation measures include: marking boundaries, strategically posting game wardens and patrols, establishing a buffer zone, and providing access to visitors. The team felt that controlled rotational forestry in Gola North would be acceptable, so long as a hunting ban is effectively maintained.

Drs. Roth and Merz recommended that Gola West and East be proclaimed a National Park, and Gola North a game reserve. The feasibility of such legislation is, however, uncertain. In recent years, Sierra Leone has experienced a dramatic economic decline, and there is a great need for foreign exchange. Timber is a major source of income for the nation and, with so little forest left which is suitable for logging, it seems unlikely that the government will set aside major logging concessions in Gola West and East for wildlife conservation. The recent development of a major saw mill and logging complex adjacent to Gola, funded by West Germany, will inevitably increase the pressure on these forests still further and is an additional economic argument for proceeding with existing logging plans.

DEMAND FOR EEC IVORY BAN

The European Environmental Bureau (EEB) on 30 June 1983, issued a statement demanding that the EEC propose a regulation banning the import of ivory into the Community, similar to the regulation concerning whale products.

C.A.R. ELEPHANT POPULATION THREATENED BY POACHING

Recent findings from Parc National Gounda St. Floris indicate that if efforts are not made to improve anti-poaching operations, the park's elephant population of about 2,500 could disappear within several years. It is estimated that some 532 elephants were injured or killed during this year alone. The report, compiled by a WWF/IUCN project team working in the park, gives a detailed account of the previous year's poaching activities in Gounda. 32 fresh elephant carcasses, with tusks removed, were found by the research team, predominately in the dry season from March to May. There were spear wounds in the hind quarters and autopsies revealed haemorrhaging by an unknown source of poisoning. Horse tracks leading to camps were sometimes observed.

Besides monitoring the population, other research is being carried out on the elephants. R.G. Ruggiero is carrying out an elephant time budget study. By compiling five to six hundred hours of observations on various individuals, and statistically analysing, a clearer picture of habitat utilization will emerge. Useful dietry information is also collected and the species of plant noted.

In Southern Gounda, K.L. Nelson is investigating the diurnal and seasonal variation in elephant movements. During the cold season (Jan/Feb), groups of 50 gather in the floodplain and are active, except around mid-day. In the hot dry season (March/April), groups of less than 15 rest near the wooded escarpment, moving only at night. Unfortunately, Nelson has also observed that elephants will return to poached areas less than one month after killings have occurred. However, knowledge of their seasonal and diurnal movements will aid in their protection.

BURUNDI HURRIES TO EXPORT IVORY

There is pressure for Burundi to export its ivory to Belgium before January 1st when all EEC countries join CITES. Attempts to get Burundi to sign CITES still proceed.

Burundi has only one elephant (in a zoo) but twelve tonnes of ivory per month are exported. This ivory probably originates from neighbouring countries: Zaire, Tanzania and perhaps as far as Somalia.

PILANESBERG NEW HOME FOR BLACK RHINOS

Eight black rhinos *Diceros bicornis* where successfully translocated from the Umfolozi and Hluhluwe Game Reserve in Zululand to Pilanesberg Game Reserve in Bophuthatswana this year. These eight animals (5 males and 3 females) now bring the total number of black rhinos at Pilanesberg to 21, including two calves which have been born at Pilanesberg.

Special thanks are due to the Natal Parks Board which is subsiding heavily the black rhino introduction programme at Pilanesberg as a conservation measure for the species.

P. Hancock

CITES CONFERENCE IN BOTSWANA

The fourth meeting of the Conference of the parties to the Convention for International Trade of Endangered Species (CITES), was held in Gaborone, Botswana from 19-30 April.

Parties discussed the role of the Central African Republic in the ivory trade. Although all ivory leaving the country had valid export permits, the quantities involved are much greater than could be accounted for by the hunting quota. It seems likely that a lot of ivory may be imported without proper documentation and then re-exported. The Secretariat thought that this situation could apply in other States and asked for suggestions as to possible control measures. None was immediately forthcoming and the matter was referred to the Technical Committee (TEC).

Also discussed was the TEC document on Trade in African Elephant Ivory which addressed the concern of many Parties over the practicability or the usefulness of licensing all trade in worked ivory. Such a process imposes an extremely heavy administrative burden whilst, the Head of WTMU noted, the trade statistics for worked ivory are in any case useless for monitoring purposes. TEC proposed that: the only pieces of ivory that should be controlled in trade would be those weighing more than 1/ 2kg; that, in producing annual reports, Parties should indicate the numbers of substantially whole tusks in shipments and indicate the weights of consignments; and that the controls applying to personal effects (under Article VII para. 3) apply as strictly as possible but only in relation to items of more than 1/2kg. However, India noted (Doc. 4.23.1) that large consignments of very small pieces of worked African ivory were exported from India and might conceal Appendix 1 Asian ivory, so that licensing controls were necessary. India also claimed dependence on other Parties to detect illegal imports of worked Indian ivory in shipments of African ivory but noted t was impossible to tell the difference between them. The TEC proposal was rejected. A draft Resolution was presented by a number of African delegations, recognising the problems of India and proposing a phase-out of ivory trade with India so that, from 1 January 1986, no Party would permit the import of any ivory, worked or unworked, from India. The sponsors of this draft Resolution withdrew it without discussion and another Resolution was adopted (Conf. 4.14) which directed TEC to draw up guidelines for controlling the trade in worked ivory as quickly as possible.

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ZAMBIA ENACTS STRICTER LEGISLATION FOR IVORY AND RHINO POACHING

On 24th December 1982, by an Act of Parliament, Zambia introduced new and tougher penalties to counter the poaching of both elephant and black rhinoceros and the trafficking in their ivory and horns.

The new legislation entitled the National Parks and Wildlife (Amendment) Act, 1982 (Act 32 of 1982) amends the principal National Parks and Wildlife Act as follows:-

(a) For the hunting, wounding, or molesting of any elephant or rhinoceros an offender receives imprisonment, without the option of a fine, for a term not exceeding ten years.

(b) Similarly, the possession of, or selling, buying, importing or exporting of any prescribed trophy (which includes ivory and rhino horn) brings a first offender a fine not exceeding ten thousand kwacha or imprisonment not exceeding ten years or both fine and term of imprisonment, while for a person's second or subsequent such offence, the penalty is imprisonment, without the option of a fine, for not more than ten years.

P.S.M. Berry

PRESIDENT NYERERE LAUNCHES RHINO CAMPAIGN

A nation-wide campaign to save the rhino was launched by H.E. Dr. J.K. Nyerere, President of Tanzania, on 15th June 1983 at the College of African Wildlife Management, Mweka, Moshi at the climax of the College's 20th anniversary celebrations.

The campaign was launched in line with international public awareness on the plight of the black rhinoceros whose number has dwindled drastically in the last decade. By launching the campaign the Government of Tanzania joined forces with other nations as well as other leading conservation organizations in a coordinated emergency effort to save this magnificient species.

The campaign aims at educating the masses on the importance of conservation of rhinos and other species. The methods being applied include distribution of posters, radio programmes, newspaper articles, choir songs, film shows and music hits composed by local jazz bands. In addition, special "khangas" and T-shirts have been printed in an effort to bring the message home.

Mr. F.M.R. Lwezaula
Director of Wildlife

We welcome articles for the next newsletter. Articles should cover points of information, or topical interest, relevant to elephant and rhino conservation, and should be no longer than 1500 words. We will publish suitable black and white photos and graphics and may edit some articles. The deadline for submission to the next newsletter is lune 1st 1984.

Lucy Vigne
Editor

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