ZIMBABWE BLACK RHINO CONSERVATION STRATEGY

MINISTRY OF ENVIRONMENT AND TOURISM

ZIMBABWE

BLACK RHINO CONSERVATION STRATEGY

January 1992

DEPARTMENT OF NATIONAL PARKS AND WILD LIFE MANAGEMENT

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CONTENTS

LIST OF TABLES

Maps of the Intensive Protection Zones appear at the end of Annex 4

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ZIMBABWE

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PREAMBLE

1. Zimbabwe is acknowledged to have the largest surviving numbers of black rhino in the world - approximately 2 000 animals.

2. Zimbabwe recognises that the species is endangered with extinction. The continental population has declined from some 65 000 in 1970 to the present low figure of less than 4 000. Numbers in the black rhino's former range outside Zimbabwe have been reduced below the threshold at which wild populations are considered secure genetically and demographically. It is doubtful if the total number of black rhino remaining in the rest of Africa exceeds 1 500 animals.

3. Zimbabwe has taken the lead over the past five years in attempting to halt the drastic decline of black rhino in Africa. Its decisive and aggressive stance has given the country a high international profile in conservation and has drawn attention to the grave situation facing the black rhino.

4. Extreme measures have been taken since 1984 to counter the threat to rhino. These include:

   i) Commitments to rhino survival at the highest political level.

   ii) Two significant revisions of legislation which introduced high penalties for illegal hunting and provided indemnity for persons engaged in wildlife protection.

   iii) An intensification of law enforcement effort by government with the granting of increased staff and budgets.

   iv) The taking of over one hundred and fifty human lives so far in confrontations with illegal hunters.

5. Government has already taken steps to improve the probability of survival of the species through translocation of rhino to other parts of the Parks and Wild Life Estate, to certain safer localities in the centre of the country and to scientifically-managed captive breeding centres elsewhere in the world.

6. Government has also initiated an enlightened programme of decentralisation under which rural communities administer, manage and benefit from wildlife in their immediate areas. It sees the support of local peoples as a vital component in its rhino conservation strategy.

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7. The Zimbabwe **Department of National Parks and Wild Life Management** has the conservation responsibility, both to the nation and to the international community, of ensuring the survival of the black rhino.

8. At the same time, the Department is aware that the rhino population has suffered heavy losses due to illegal hunting since 1984 (over 1 000 animals) and, despite a major effort in law enforcement in the past five years, there is no sign of cessation of illegal hunting and a high risk that the population will continue to decline.

9. It is now apparent that illegal hunting of black rhino is general throughout the country. Poachers are entering along the entire northern border of Zimbabwe, and through sectors of the eastern, southern and western borders. The inception of illegal hunting by a few Zimbabwe citizens is aggravating the situation.

10. The Department accepts the principle that illegal hunting is an ever-present threat to wildlife which cannot be eradicated but which can only be reduced by effective law enforcement. The degree of reduction is directly related to the law enforcement effort.

11. The Department draws attention to the fact that successful protection of rhino populations in the wild requires a minimum density of law enforcement staff and a minimum recurrent expenditure to support those staff. These levels have been established through research in Zimbabwe and elsewhere, and are defined in this document.

12. Given the recent developments, the distribution of rhino within Zimbabwe cannot be considered optimal in terms of threats to individual rhino populations and in terms of available men and money to conserve them.

13. Taking into account the present distribution of rhino and the reality of a possible further decline in numbers, this conservation strategy is designed to increase the probability of survival of the greatest number of black rhino in Zimbabwe.

14. Zimbabwe has always placed its emphasis on the conservation of viable wild rhino populations in the Parks and Wild Life Estate. Large wild populations are the major reservoir of the genetic diversity of black rhino and, if they are permanently destroyed, it will be extremely difficult to restore them through captive breeding programmes or translocation from other areas.

15. At the same time, the Department recognises that it has the opportunity now, while numbers of black rhino are still significant, to put into place the necessary components of a "fall-back position" should the decline of rhino continue.

16. Zimbabwe supports all efforts to reduce the illegal trade in rhino horn but believes that legal trade conducted by Government can be used to enhance the conservation of the species.

17. Given the gravity of the situation, Zimbabwe will allow no considerations other than the best technical recommendations and the funds available for conservation to influence its conservation strategy for black rhino.

GOAL

TO CONSERVE THE BLACK RHINO

This ultimate goal requires no elaboration. The present status and trends of black rhino populations on the African continent and within Zimbabwe do not allow unnecessary constraints.

OBJECTIVES

The ultimate goal may be achieved solely through emphasis on conserving wild populations, but there are considerable risks in banking all efforts on such a strategy. While numbers of rhino are still significant it would appear wiser to adopt a strategy of "minimum regret" which takes into account the eventuality of a continued decline in numbers.

Such a strategy entails securing the full sequence of "fall-back" positions before being forced to adopt them in a crisis situation. This involves tackling four main objectives simultaneously. Each objective deals with an alternative option for holding and managing black rhino. The order in which the objectives are arranged reflects their desirability in a conservation context.

OBJECTIVE 1: TO CONSERVE VIABLE POPULATIONS OF BLACK RHINO IN THE PARKS AND WILD LIFE ESTATE.

1.1 DEFINITIONS AND CONSTRAINTS

1.1.1 A Minimum Viable Population of interbreeding animals for long-term genetic fitness should be larger than 1000 animals (ANNEX 1). As a subpopulation falls below this number, further evolutionary adaptation through natural selection becomes unlikely. Hence the ideal is to build up freely-breeding populations in sufficiently large areas to at least 1 000 individuals (preferably 2 000).

1.1.2 No single region in Zimbabwe now contains a breeding population of this size (ANNEX 2), although several have that potential (Zambezi Valley, Sebungwe, Matabeleland North and the South-east Lowveld).

1.1.3 The total population within the Parks and Wild Life Estate exceeds a Minimum Viable Population provided it is managed as a Metapopulation which consists of several Subpopulations (ANNEX 1).

1.1.4 For purposes of decision-taking, the following definitions will apply to Subpopulations:

i) **Large Wild Populations** will consist of 200 or more animals. Such populations will not at this stage require management to conserve genetic variability.

ii) **Intermediate Wild Populations** will be those whose size lies between 100-200 animals. In order to counter the loss of genetic variability, one or two effective breeders should be added to such populations every 10-15 years.

iii) **Small Wild Populations** are discrete populations less than 100 animals. These will require more intensive management to counter excessive inbreeding.

1.1.5 Recently established Breeding Nuclei outside the Parks and Wild Life Estate will be described by the same definitions. They will be managed in conjunction with subpopulations in the Parks and Wild Life Estate as part of the overall Zimbabwe Metapopulation.

1.1.6 For successful protection of rhino populations in the wild the staff density should generally be higher than one man/50sq.km. Under the levels of pressure which Zimbabwe is experiencing at the moment, one man/20sq.km may be the minimum requirement.

1.1.7 The minimum level of recurrent expenditure required to support one man/50sq.km is US$200/sq.km and this rises to US$400/sq.km in the case of one man/20sq.km. This expenditure includes salaries and refers to 1989 costs (ANNEX 3).

1.1.8 Anti-poaching units must be adequately equipped to detect and combat heavily armed illegal hunters using quasi-military tactics. Such equipment is expensive and staff require training in its use.

1.2 IMPLEMENTATION

1.2.1 The present levels of staff and funding available to the Department fall below those stated in criteria 1.1.6 and 1.1.7 above. The Department will continue to approach the Treasury for the required budget (ANNEX 3) to achieve the first objective, but will base its strategy on the assumption that such a budget will not be available.

1.2.2 The Department will adopt the following strategy:

i) Staff will be redeployed in the existing rhino range to ensure a minimum coverage in all areas of 1 man/50sq.km.

ii) A limited area will be designated within the Parks & Wild Life Estate where effort will be intensified to protect certain Large and Intermediate Wild Populations. Staff densities in this area will be a minimum of 1 man/25sq.km.

iii) This special area will initially comprise eight separate zones in different parts of the Parks and Wild Life Estate, each of which is greater than 1 000 sq.km. and contains more than 100 rhino. Each zone contains areas of optimal rhino habitat in order to reduce the overall area which requires intensive protection. These areas will be designated **INTENSIVE PROTECTION ZONES** (ANNEX 4).

iv) Outside Intensive Protection Zones, certain translocations of rhino will take place to improve the viability of subpopulations and increase the probability of adequate protection (ANNEX 5).

1.2.3 The Department will monitor rhino population numbers throughout the Parks & Wild Life Estate (ANNEX 6). Various levels of population will be used as "trigger points" at which management decisions become operative under conditions of decline:

i) Effort will be focussed on Large and Intermediate Wild Populations. Populations which have fallen to the level of Small Wild Populations will be translocated in their entirety and the Intensive Protection Zone deproclaimed.

ii) Intensive Protection Zones will not be used as a source from which to translocate animals for building up other populations while their numbers are below carrying capacity;

iii) Following the deproclamation of any Intensive Protection Zone, the <u>additional</u> staff which were protecting that zone will be redeployed to increase staff densities in the remaining Intensive Protection Zones.

1.2.4 The Department will implement a standard system of monitoring law enforcement effort and the degree of illegal activity (ANNEX 7).

1.2.5 Rhino populations in the communal lands adjacent to the Parks and Wild Life Estate present a special problem. All of them fall into the category of Small Wild Populations and, according to the above principles, should be translocated in their entirety to safer areas. However, such a move could have very negative effects on the current initiatives being taken by rural communities to manage their own wildlife. A possible approach is discussed in ANNEX 8.

OBJECTIVE 2: TO DEVELOP TRANSLOCATED BREEDING NUCLEI ELSEWHERE IN ZIMBABWE AND TO MAINTAIN THEIR GENETIC VARIABILITY.

Breeding Nuclei are translocated populations of rhino held under semi-extensive conditions as defined in ANNEX 1. The status of existing Breeding Nuclei is given in ANNEX 2 (Table 2 -2). In order to ensure that Breeding Nuclei can be developed into populations which are genetically and demographically viable for the next hundred years, the following conditions will be observed:

2.1 Each nucleus will be established in an area with carrying capacity for over 100 rhinos. This will permit Intermediate Wild Populations to be established ultimately, requiring less intensive management than Small Wild Populations (1.1.4). Breeding nuclei will be treated as Small Wild Populations until they reach 100 animals.

2.2 The minimum number of Founder Animals (ANNEX 1) within each nucleus will be 40.

2.3 Each nucleus will be managed as a Subpopulation of the total Metapopulation in Zimbabwe (1.1.5) with controlled exchange of breeding animals between the subpopulations.

2.4 The selected areas for Breeding Nuclei will be in the Parks and Wild Life Estate (other than where Large and Intermediate Wild Populations are located) and in certain commercial farming areas.

2.5 The Department will select areas for Breeding Nuclei which satisfy the following criteria:

i) The areas will be located at least 50km from the border of the country and preferably more than 100km.

ii) The areas adjacent to any property or protected area on which black rhino are to be held should be "friendly" territory. If a rhino escapes from the selected area it should not be necessary to recapture it as a matter of urgency.

iii) Because few individual properties are sufficiently large to hold 100 rhinos, preference will be given to consolidated blocks of farms all of whom are willing to accept rhino, or small protected areas in the Parks and Wild Life Estate in combination with adjacent farms.

iv) In certain cases, rhino may be placed within a smaller area as an interim holding measure, or for controlled breeding and research programmes.

2.6 All custodians of Breeding Nuclei will be required to be members of an Association, linked to the Department of National Parks and Wild Life Management, whose objectives will be to:

i) Establish minimum standards of protection for their areas;

ii) Establish a statistical data base of all rhino in Breeding Nuclei for management purposes;

iii) Co-operate in the management of Subpopulations (Small Wild Populations) to maintain genetic diversity;

iv) Manage Breeding Nuclei according to the best available technical information. To this end, close liaison will be maintained with the Captive Breeding Specialist Group of the International Union for the Conservation of Nature and Natural Resources (IUCN), and the American Association of Zoological Parks and Aquariums (AAZPA).

2.7 Breeding Nuclei may only be established or added to from populations falling into the following categories:

i) Large Wild Populations at their carrying capacity;

ii) Populations which have declined below 100 animals and are regarded as seriously threatened;

iii) Translocated groups which are too small to satisfy the criteria laid down for Breeding Nuclei;

iv) Surplus animals from other Breeding Nuclei which have reached their carrying capacity;

v) Animals selected as desirable to prevent inbreeding.

2.8 The proposed programme of translocation of rhino into breeding nuclei is given in ANNEX 5.

2.9 Additional introductions to small Breeding Nuclei will be closely monitored to observe if they are subject to aggressive behaviour by the resident animals. If necessary to prevent mortality, they would be moved.

2.10 No animals will be captured and translocated from designated Breeding Nuclei during their period of establishment other than to satisfy the requirements of 2.7 v) or to protect the life of a threatened individual.

2.11 If the Department decides that any particular Breeding Nucleus is threatened due to an escalation of illegal activity or is not being adequately managed and protected, it will take whatever measures it deems necessary to secure the survival of the population.

OBJECTIVE 3: TO DEVELOP ONE OR MORE CAPTIVE BREEDING CENTRES IN ZIMBABWE

Captive breeding implies individuals or small groups of rhinos being held in relatively small areas (a few hectares) where they can be afforded maximum protection and can be intensively managed for breeding purposes. The entire food requirement has to be supplied from outside the centre.

Zimbabwe has established a major in-situ captive breeding centre at Boulton Atlantica and there is a small private facility at Chipangali Wildlife Orphanage.

3.1 The centre will be run by the Department of National Parks and Wild Life Management.

3.2 Further centres may be established in the country under government or private management in the coming years.

3.3 The captive breeding centre provides at present for 16 rhino and it is intended to increase this to a maximum capacity of 24 rhino at full development.

3.4 The primary purpose of the centre will be for intensive breeding of black rhino.

3.5 An important secondary objective of the government centre will be to provide a research facility to examine the following topics:

i) Requirements for capture, confinement and translocation;

ii) Reproduction;

iii) Disease.

A fuller discussion of the research programme to be conducted at the captive breeding centre appears in ANNEX 9.

3.6 The centre will also be used as a temporary holding facility for rhino in transit within Zimbabwe or rhino which are to be exported under the ex-situ captive breeding programme.

3.7 Rhino in captive breeding centres will be managed as subpopulations in conjunction with Small Wild Populations in Zimbabwe and will be integrated into the international ex-situ captive breeding programme for black rhino.

3.8 All captive breeding centres in Zimbabwe will meet the highest zoological standards for care and maintenance of animals in captivity.

3.9 The Department will seek advice and assistance from the Captive Breeding Specialist Group of the IUCN in order to meet these standards and to optimise management.

3.10 The Department recognises that the present cost of holding rhino under captive breeding conditions is approximately US$10 000 per rhino per year at the rates applicable in 1992.

3.11 All rhino held in the centre will have their horns removed as a matter of routine both to protect them against damage in the bomas and to remove incentives for illegal killing. Rhino held temporarily in the centre before onward movement to breeding nuclei or ex-situ captive breeding programmes will be treated similarly.

3.12 The Zimbabwe Government will seek to trade legally in these horns to help meet the running costs of the captive breeding centre.

OBJECTIVE 4: TO CONTINUE TO SUPPORT THE INTERNATIONAL EX-SITU CAPTIVE BREEDING PROGRAMME.

It is recognised that ex-situ captive breeding is a "back-up" to in-situ conservation. Proponents of the international programme for captive breeding do not in any way view this form of rhino propagation as a substitute for conservation of wild populations. Rather it is seen as the final form of insurance against the ultimate loss of a species.

The international captive breeding programme recognises four separate sub-species (or races) of black rhino:

i) The south-western population in Namibia;

ii) The southern-central populations extending from Natal through Zimbabwe and Zambia into southern Tanzania (Diceros bicornis minor);

iii) The eastern populations in Kenya and northern Tanzania; and

iv) The northern-western populations extending from the horn of Africa to the Central African Republic and Cameroon.

It has been agreed by the Captive Breeding Specialist Group that, until evidence is presented to the contrary, it would be wisest to pursue separate captive breeding programmes for each of the above groups to preserve their genetic diversity.

At this stage, only the eastern populations are adequately represented by sufficient founder animals in zoos outside Africa. The minimum number of founder animals recommended for each of the above groups is 20 animals, but a larger number (up to 50) would be preferable to ensure adequate genetic diversity. As of January 1992, 14 founder animals of the southern-central group are represented in the captive breeding programme.

4.1 Zimbabwe recognises that the the ex-situ captive breeding programme for black rhinoceros is designed to complement efforts to conserve rhinos in-situ in Africa.

4.2 Zimbabwe understands that, at considerable cost to the zoo community, provisions have been made for breeding a captive population of up to 150 black rhinoceros (of all the above races).

4.3 Zimbabwe feels strongly that the ex-situ captive breeding programme should be coordinated under the IUCN Captive Breeding Specialist Group and carried out under the auspices of reputable regional zoological associations and scientific institutions. Government will be most reluctant to release rhino from Zimbabwe except to a technically sound programme.

4.4 Zimbabwe has contributed 14 animals since 1982 to the ex-situ captive breeding programme (excluding a donation of 4 animals to North Korea, 2 to Yugoslavia and 6 to Swaziland).

4.5 Zimbabwe will continue to support the provision of Diceros bicornis minor founder animals to the ex-situ captive breeding programme until there are adequate numbers of southern-central rhino for a high probability of successful propagation in the long-term.

4.6 Zimbabwe is aware, however, that other countries could contribute to the provision of these founder animals and that, in pursuance of a policy of translocating the least viable and most vulnerable animals, there is a strong case for Diceros bicornis minor founder animals to be drawn from other parts of the region.

4.7 Zimbabwe will relate its own captive breeding programme to the ex-situ propagation effort and manage in-situ captive animals as a subpopulation within the global metapopulation (para 3.7).

4.8 Zimbabwe is optimistic that it will succeed in its own conservation effort and that it will never be necessary to seek the return of black rhino to re-establish a population which has become extinct. However, Zimbabwe is confident that, in this unlikely eventuality, it will be able to rely upon the international zoo community to honour its obligations in this respect.

ADMINISTRATION, EXECUTION AND FUNDING

This strategy has been approved by the Parks and Wild Life Board, the Minister of Natural Resources and Tourism and the Cabinet of the Government of Zimbabwe.

The administration and execution of the conservation strategy will be carried out by the Department of National Parks and Wild Life Management within the Ministry of Natural Resources and Tourism.

Recognising its responsibility to the nation at large, the Department may, in consultation with the Parks and Wild Life Board, elect to form a Technical Committee for appraisal of the status of rhino conservation in the coming years. Should it be deemed advisable, persons outside Government may be co-opted to serve on this committee.

Because the confrontation with illegal hunters has now escalated to the level of armed warfare, the staff of the Department are already organised on military lines to combat the guerilla incursions into Zimbabwe. For the Department to continue to execute its functions effectively, it is essential that the Director be permitted to exercise strict discipline amongst staff and not be hampered by lengthy procedures in ensuring that misconduct is swiftly handled. At the same time, the Director should be permitted to introduce incentive schemes for staff in the field if this is likely to improve law enforcement.

The Department is aware that investigative and intelligence work is essential to complement field law enforcement. Good intelligence work may be more cost-effective in achieving arrests and convictions than field patrols (Bell 1990). It is important that investigative work is closely integrated with the field effort.

Through its CAMPFIRE programme in the communal lands, the Department is receiving support from rural peoples in the rhino conservation effort. Information on illegal hunters and incursions into Zimbabwe is being passed to field officers and there have been several cases of citizen arrests recently. It is important that the necessary indemnities for rural citizens engaged on law enforcement work are in place if these people are to be fully effective in the rhino campaign.

It is also essential that the Department receives the full support of the police and the military forces of Zimbabwe in its assigned task.

Zimbabwe is now enjoying excellent cooperation regionally, in particular with Zambia and Botswana, in following up illegal incursions into the country and trafficking in rhino horn.

The Department sees the recurrent expenditure necessary to carry out this strategy as a matter which will have to be resolved between itself and the Treasury. The required budget for protection of all rhino in the Parks and Wild Life Estate is contained in ANNEX 3. Should this budget not be forthcoming, the Department will tailor its strategy to the amount allocated by Treasury (section 1.2.2) and inevitably this will involve a reduction in the range available to black rhino on state land.

Given that the Department is operating under a system of Intensive Protection Zones (ANNEX 4), the budget requirements, over and above recurrent expenditure provided by the Treasury, are outlined in ANNEX 10. It is hoped that external donors may be forthcoming to assist in the capital aspects of the programme.

THE FUTURE

The strategy outlined in this document is to a large extent conventional. It is the expected reaction of any responsible conservation agency when faced with the sort of crisis which presently confronts the black rhinoceros. The reaction is to intensify law enforcement and to prepare emergency measures to remove rhino from vulnerable areas.

The strategy may work. The fact that Zimbabwe still has a large rhino population is a tribute to its dedicated law enforcement staff and the government commitment to conservation.

There is little doubt that the situation is critically poised at the moment. The current rate of loss of rhino to illegal hunting is closely balanced by annual recruitment to the population. Statistics from 1984-1991 indicate that the total loss to illegal hunting probably exceeds the sustainable yield from rhino populations. If anything, the recent intensification of illegal hunting outside the Zambezi Valley foreshadows further declines in the future.

It would require very little to tip the scales in either direction. A major government investment supporting the law enforcement effort could significantly improve matters. Any further deterioration in the budget allocated to the Department is likely to destroy morale and precipitate a rapid escalation in illegal hunting.

The Department views the problem primarily as one of recurrent expenditure. The threshold levels of staff and funding for successful law enforcement are clearly defined in this document and they far exceed any possible contributions which can be realistically expected from well-meaning local or external donors.

To conserve the effective range of black rhino on State Land in Zimbabwe requires an annual departmental budget of the order of US$20 million (approximately double the current budget). The total contribution from all donor sources has never amounted to US$1 million in any year since the inception of the present crisis. Moreover donor funding is generally in the form of capital assistance and has no influence on operational costs. The problem will have to be solved within government.

The costs of conserving black rhino in the wild (roughly double the normal law enforcement costs) must inevitably be viewed by the managers of government funds as a large non-productive investment. Even if the Department is successful in its conservation efforts it is difficult to see what tangible benefits will arise to convince the investors that the exercise was worthwhile. The argument that it has been done for the sake of conservation is not enough: the treasurer can justifiably argue that this type of conservation is a bottomless pit and that existing grants are the full and final measure of the extent to which public monies can be diverted from other productive uses.

There is a growing mood amongst southern African conservationists that the time has come to take a good hard look at the options for conserving the rhino (Nduku and Martin, 1991). There is an undeniable economic value attached to black rhino which might well be used to conserve the species while numbers are still significant.

Zimbabwe has always resisted any form of exploitation of black rhino largely to indicate solidarity with other African countries where the species has been endangered and to comply with the Appendix I status of the species under the Convention for International Trade in Endangered Species of Flora and Fauna (CITES).

These considerations have become less important. Most of the countries which Zimbabwe supported in their struggle to retain rhino have now lost their wild populations and over 90% of the rhino in Africa are now in Namibia, South Africa and Zimbabwe. All of these countries share similar conservation philosophies and have a demonstrated right to dictate future policies for rhino conservation.

A world trade ban on rhino horn has been in place under CITES for 14 years but has had no noticeable effect on the decline of the species. Black rhino appear to be valuable only to the illegal hunter.

The protectionist approach is contrary to the conservation philosophy of Zimbabwe. When crocodiles were endangered 20 years ago, Zimbabwe embarked on a vigorous programme of crocodile farming which not only restored the species to abundance but also resulted in a sustainable multi-million dollar industry. It seems that the successful conservation lessons of the past are ignored with each new species crisis.

Options which offer themselves as a sustainable source of income are:

i) **Re-opening the legal trade in rhino horn:** Many southern African countries are now holding large legal stocks of horn which could contribute significant funds to rhino conservation. With the inception of dehorning programmes for white rhino and certain black rhino subpopulations, these stocks are being augmented significantly. Namibia, South Africa and Zimbabwe have submitted proposals to CITES to have their rhino populations placed on Appendix II of CITES in order to sell their very large stocks of rhino horn.

ii) **Farming rhino for their horn:** This would involve removing horns painlessly under captive conditions without killing animals. The horns regrow and provide a sustainable income. Indications are that, as a land use, returns might be as high as US$50/ha which should be compared with cattle farming at approximately US$5/ha.

iii) **Permitting a small quota of animals for sport hunting:** The potential trophy fee for a black rhino may be as high as US$250 000. The CAMPFIRE Association has approached the Department for a trial quota of rhino in communal lands, arguing that the best option to conserve the species is to attach a high commercial value to it. The use of this income could have a major impact on communal land conservation.

iv) **Sale of live rhino:** Rhino are likely to command very high prices from individuals and organisations seeking to restock the species in areas where it has become extinct. Rhino could be sold competitively (and sustainably) within the southern African region to prospective purchasers who have satisfied the Government that they are able to maintain and protect such rhino adequately. This option may also be appropriate for threatened rhino in communal lands (ANNEX 8).

These options may be repugnant to many conservationists. However, the situation may have reached the stage where moral and ethical preferences are secondary to the larger issue of species extinction. Removal of the present constraints which are actually acting against survival of the species could provide the turning point in black rhino conservation.

ANNEX 1

DEFINITIONS

The following definitions are those that will be used in the implementation of the Zimbabwe Conservation Strategy for Black Rhino. Scientists may disagree amongst themselves about the values assigned to each type of population listed and will certainly add numerous qualifying statements to each definition. This is accepted. However, for the purposes of implementation of a strategy it is essential to have numerical thresholds which simplify decision taking.

The majority of these definitions arise from a consensus of opinion at a major workshop held in Cincinnati in October 1986 to discuss conservation problems facing the black rhino. In particular, two papers presented at this workshop (Foose 1986, Lacy 1986) have influenced the definitions of population sizes and management considerations presented in this appendix.

Populations

Within a population or subpopulation all rhino are able to breed freely with others in the same area.

Population size	Defined as:	Genetic Management for next 100 years
1 000 +	Minimum Viable Population	--- Nil ---
200 - 1 000	Large Wild Population	--- Nil ---
100 - 200	Intermediate Wild Population or: Fully developed Breeding Nucleus	Move in at least one effective breeder every 10 years.
less than 100	Small Wild Population or: Breeding Nucleus	Manage intensively as part of a Metapopulation

Minimum Viable Population (MVP):

This is the minimum population of animals which will preserve a given amount of the genetic diversity of the species over a defined period and which is large enough to overcome demographic factors tending to make the population extinct (Maruska 1987).

The MVP is critically linked to the concept of the Net Effective Population (Ne). For Large Wild Populations the MVP is required to be larger than in managed subpopulations because of the greater proportion of individuals which do not contribute to breeding.

It is important to understand that there is no guaranteed minimum population size which will ensure that extinction cannot occur due to loss of genetic diversity and stochastic demographic effects. The matter is purely probabilistic and the general rule is the larger the population the better (Lacy 1987). However, with a population of several thousand animals the gains in survival probability obtained by introducing additional animals to the population become increasingly marginal.

The entire Zimbabwe population is large enough to constitute a Minimum Viable Population. However, because the population is subdivided into a number of subpopulations which are physically separated from one another it does not satisfy the criterion of all individuals being able to breed freely within the population. In order to achieve the desirable genetic status of a MVP it is necessary that the subpopulations be managed as part of a Metapopulation.

Metapopulation

A metapopulation is made up of two or more discrete subpopulations. Through periodic translocations of animals between the subpopulations the requirements for exchange of genetic material can be met. By managing a number of subpopulations as a metapopulation, the desirable effects of a much larger population can be achieved.

Net Effective Population

This is the number of effective breeding individuals in a population and is generally far smaller than the actual population size. Loss of genetic diversity for any given total population depends on the breeding relationships between individuals. Animals which do not breed, uneven sex ratios and certain animals producing more offspring than others can all contribute to an effective breeding population which is smaller than the total number of animals.

For wild populations of black rhino the ratio of Ne/MVP may be as poor as 0.25. More intensively managed captive breeding populations may produce ratios greater than 0.5.

Large Wild Population

This refers to populations greater than 200 animals and is purely a definition within the context of this conservation strategy. Within the Parks and Wild Life Estate such populations exist in the Zambezi Valley, Chirisa Safari Area, Chizarira National Park and Hwange National Park.

Intermediate Wild Population

These are populations lying between 100 and 200 animals. They are, in a sense, to be viewed critically. An increase to over 200 animals would indicate that they are "safe" and require no management for genetic reasons: a decline to below 100 animals would indicate they should be removed in their entirety from their present location.

To maintain genetic variability in such populations at least one effective breeder should be moved into the population from elsewhere every 10 years.

The only semi-isolated population falling into this category at present is in Matusadona National Park.

Small Wild Population

This term includes populations of less than 100 animals, both within the Parks and Wild Life Estate and in the newly formed Breeding Nuclei. Such populations require semi-intensive management with frequent exchange of breeding animals.

Any Small Wild Population in the Parks and Wild Life Estate which is in a state of decline is regarded as non-viable under the conditions of this conservation strategy and should be translocated to increase other Small Wild Populations.

Isolated and semi-isolated populations in this condition are in Gonarezhou National Park, Chete Safari Area, northern Gokwe, Binga and Dande Communal Lands. These communal lands form a special category which is discussed in ANNEX 8.

Breeding Nucleus

A Breeding Nucleus is a particular category of Small Wild Populations consisting of a group of rhino translocated to a relatively secure area of suitable habitat and adequate size to carry at least 100 rhinos.

Breeding Nuclei require fairly intensive management while their numbers are less than 100 to ensure that population growth is not limited by factors such as unbalanced sex ratios, inadequate breeding contact or excessive dominance.

Breeding Nuclei have been established in the Midlands, Masvingo and Matabeleland South provinces.

Founder animals for Breeding Nuclei are dicussed in the next definition.

Founder Population

Founders are animals taken from wild populations to establish Breeding Nuclei or Captive Populations. As a general principle, the larger the number of founders, the more rapidly the objectives of establishing Intermediate Wild Populations are likely to be realised.

Each Breeding Nucleus should be made up of no less than 40 founder animals in order to establish an adequate genetic foundation. Rapid population growth is required to conserve this genetic variability.

ANNEX 2

BLACK RHINO POPULATION ESTIMATES

December 1989

(see update notes for 1992 at end of Annex)

The estimation of rhino numbers is difficult. During research carried out in the Zambezi Valley in 1988 we were unable to achieve confidence limits better than ± 50% or correction factors for the numbers of rhino missed by observers. Air surveys were carried out in all parts of the Parks and Wild Life Estate with black rhino during 1989 and these have been used in deriving the estimates presented in this Annex. However, in several cases the survey results have been rejected where counting conditions were extremely poor or where ground knowledge indicated clearly that the estimates were worthless.

Where the 1989 air survey results have been used in this report, the following approach has been adopted:

- A correction factor of 1.5 has been used for estimates derived from helicopters flying block counts to account for animals missed by observers;

- A correction factor of 2 has been applied for estimates derived from fixed wing aircraft flying line transects because of the higher speed and greater height above the ground;

- Final corrected estimates have been reduced by 40% in several cases to ensure that, given the wide confidence intervals, the figures are unlikely to be an overestimate.

- Estimates have been rounded to the nearest 50 animals for numbers greater than 100, and to the nearest 10 animals for numbers under 100.

Population estimates are shown in Tables 2 - 1 and 2 - 2 attached to this Annex. The following notes apply to the individual area estimates.

Doma Safari Area (50)

It was not possible to conduct a helicopter count in Doma for financial reasons, and the fixed wing aircraft count was considered inadequate in this extremely broken terrain. The estimate is based on an assumed density of 1 rhino/20 sq.km.

Dande Safari Area (20)

The estimate is based on line transects, corrected and rounded.

Chewore Safari Area (300)

The estimate is a combination of both block counts and line transects, each appropriately corrected, with a reduction of 10% for animals outside the Chewore boundaries. No 40% reduction was made because the numbers counted were substantial.

Sapi Safari Area (50)

The estimate includes 34 animals from the Chewore strata (the 10% referred to above) and a few animals seen on the Sapi line transects.

Mana Pools National Park (100)

The survey estimate was rejected because of extremely dense vegetation in the key rhino habitats and the figure given is based on a crude density of about 1 rhino/20 sq.km. Ground knowledge indicates high numbers in the escarpment and foothills.

Urungwe Safari Area (150)

The estimate is a combination of both block counts and line transects, each appropriately corrected, with no 40% reduction.

Charara Safari Area (200)

The estimate is based on block counts with an allowance for the unsampled area south of the game fence.

Dande Communal Land (30)

No survey was carried out. The estimate is based on known rhino along the Angwa River and along the boundary with Chewore and Doma Safari Areas.

Mukwichi Communal Land (30)

No survey. Estimate based on hunters' reports.

Matusadona National Park (150)

Low count obtained on current survey, including areas where rhino density is known to be high. Survey rejected, but estimate reduced from previous figure of 200 in partial acknowledgement of survey.

Chizarira National Park (300)

Survey result very high (496) based on line transects with correction factor of 2. Result reduced by 40%.

Chirisa Safari Area (200)

Survey result very high (280) based on line transects with correction factor of 2. Result reduced by 40% and rounded up.

Chete Safari Area (70)

Survey result (114) based on line transects with correction factor of 2. Result reduced by 40% and rounded up.

Sijarira Forest Area (20)

Estimate based on field sightings from Forestry Commission.

Omay Communal Land (40)

The estimate is from line transects, appropriately corrected, with no 40% reduction.

Binga Communal Land (20)

No survey. Estimate based on field reports.

Northern Gokwe Communal Land (10)

Low numbers reported on Omay and Chizarira National Park boundaries.

Hwange National Park/Deka Safari Area (200 - 1989 revised estimate)

Estimate based on: a) population of 48 introduced in 1962-63;
b) translocation of additional 79 into area 1984-1987;
c) computation of increase for individual cohorts @ 5%;
d) illegal hunting loss of 50.

Matetsi Complex (20)

Small population in extreme north-west corner of Zimbabwe, plus a few animals in south of area (bordering onto Deka Safari Area). Eight animals were introduced in 1985/86.

Matobo National Park (6)

Known population translocated into area.

Gonarezhou National Park (10)

No rhino seen on air survey in August 1989 and illegal hunting known to have been severe. A few animals have been sighted recently in the field.

Commercial farms (162)

Numbers as detailed in Table 2 - 2 in this Annex which is based on du Toit (1989c) with updates.

In both Tables in this Annex preliminary estimates of carrying capacity for rhino are based on an arbitrary density of 0.2 rhino/sq.km. Carrying capacities for rhino in various parts of Zimbabwe may vary considerably from this figure but generally we expect the limit to be between 0.1-0.3 rhino/sq.km. Brooks (1989) has used similar levels for South African populations.

In practice, carrying capacities would be determined by adaptive management and close monitoring of populations. In any given area, once rhino numbers stop increasing and recruitment to the population balances natural mortality and dispersion, it may be assumed that ecological carrying capacity has been reached.

TABLE 2 - 1: ESTIMATED BLACK RHINO NUMBERS IN ZIMBABWE (1989)

Assumed Carrying capacity: - Parks land: 0.2 /sq.km
- Communal Lands: 0.1 /sq.km

	AREA sq.km	BLACK RHINO Numbers	CARRYING CAPACITY Numbers
ZAMBEZI VALLEY			
Parks & Wild Life Estate			
Doma Safari Area	945	50	189
Dande Safari Area	523	20	105
Chewore Safari Area	3,390	300	678
Sapi Safari Area	1,180	50	236
Mana Pools National Park	2,196	100	439
Urungwe Safari Area	2,870	150	574
Charara Safari Area	1,694	200	339
Subtotal	12,798	870	2,560
Communal Lands			
Dande Communal Land	3,000	30	300
Mukwichi Communal Land	2,000	30	200
Subtotal	5,000	60	500
TOTAL	17,798	930	3,060
SEBUNGWE			
Parks & Wild Life Estate			
Matusadona National Park	1,407	150	281
Chizarira National Park	1,910	300	382
Chirisa Safari Area	1,713	200	343
Chete Safari Area	1,081	70	216
(Sijarira Forest Area)	200	20	40
Subtotal	6,311	740	1,262
Communal Lands			
Omay Communal Land	2,700	40	270
Binga District	5,000	20	500
Northern Gokwe District	3,000	10	300
Subtotal	10,700	70	1,070
TOTAL	17,011	810	2,332
HWANGE NAT. PARK + DEKA SA	15,161	250	3,032
MATETSI COMPLEX	4,407	20	881
MATOBO NATIONAL PARK	436	6	87
GONAREZHOU NATIONAL PARK	5,207	10	1,041
COMMERCIAL FARMS Table2-2	13,125	162	2,625
ZIMBABWE TOTAL	73,145	2,188	13,059

ANNEX 3

REQUIRED BUDGET AND STAFF FOR

FULL PROTECTION OF BLACK RHINO ON STATE LAND

The key constraint to adequate protection of state land with wildlife is the number of men per square kilometre engaged on law enforcement. A hard lesson that has been learnt over the period 1984-1991 in Zimbabwe is that, despite an intensive anti-poaching campaign in which both staff and poachers have been killed, there has been no deterrent to the number of large commercial gangs entering the Parks and Wild Life Estate to kill black rhino. Each year from 1984-1988 there were approximately 50 armed incursions into the Zambezi Valley and this number has escalated to approximately 100 in each of the past 3 years. In 1988 illegal hunting spread from the Zambezi Valley to the entire north of Zimbabwe and from 1988-1991 there have been, on average, approximately 150 incursions into Zimbabwe every year - or roughly one incursion every 2-3 days of the year.

Bell and Clarke (1986) have referred to the need for one man/20sq.km in areas where black rhino are to be protected. Departmental research during 1988 (Martin 1991) clearly demonstrated that the key factor determining the number of rhino illegally killed was the time taken to detect the presence of poachers in the Parks and Wild Life Estate. Poachers kill few rhino after they have been detected and detection relies to a large extent on the intensity of field patrols. With one man/20sq.km the time taken to detect poachers should be shortened to less than 24 hours and the growth rate of the rhino population should change from a negative value to about +5% per annum (the maximum growth rate of rhino populations is 7-8% p.a.).

The present density of active game scouts (1 man/100sq.km) is far too low to contain the problem. The fact that the problem is being contained at all is a tribute to the dedication of a relatively small number of men covering far too great an area. However, it is unlikely that the present level of effort can be continued much longer: indiviuals have been forced to respond beyond the normal call of duty and there is evidence that the enthusiasm is flagging.

Government already has a very large investment in the Parks and Wild Life Estate. The total capital that has gone into development and the accumulated total of all past recurrent expenditure adds up to well in excess of a quarter of a billion dollars since 1960. If the state is to continue to secure its effective ownership of its wildlife resource, it is essential that it increases it annual recurrent budget to meet the escalating threat of illegal hunting.

There are further strong arguments for an increased investment in wildlife at this stage of Zimbabwe's development:

- The issue is not solely the protection of black rhino: ultimately all wildlife on state land is at stake. Failure to win the present battle implies that the state will be unable to prevent illegal hunting of all species in the Parks and Wild Life Estate.

- Wildlife appears to be the most appropriate and most profitable land use for marginal lands such as the Parks and Wild Life Estate;

- International attention is presently focussed on the performance of the government wildlife agency in Zimbabwe as a result of the recent world publicity surrounding the ivory trade. Zimbabwe's law enforcement capability is under intensive international scrutiny.

- At a meeting of the SADCC Ministers of Agriculture and Natural Resources in Lesotho in November 1989, a resolution was adopted calling on all member states to place increased emphasis on the protection and management of their wildlife resources.

In the attachments to this Annex (Tables 3-1 and 3-2) the total cost per square kilometre of Parks and Wild Life Estate in which black rhino occur has been calculated, assuming a game scout density of one man/20sq.km. Black rhino are found in some 44 000 sq.km of state land (95% of the Parks and Wild Life Estate). The cost takes into account supporting staff, transport and subsistence, incidental expenses and funds for management, research and conservation. The cost amounts to Z$866/sq.km or US$381/sq.km. Earlier work by Cumming, Martin and Taylor (1984), Parker (1989) and Leader-Williams (1989) confirms that this figure is realistic.

These costs were calculated in 1989 when the Zimbabwe dollar was considerably stronger in the currency market than it is today. However, final figures have also been given in US$ and it is considered that the estimates remain substantially unchanged in this currency.

The required budget to achieve the desired level of protection for areas with black rhino is approximately **US$20 million per annum** (50 000sq.km @ US$400/sq.km). This budget needs to be increased by about 20% to take into account the remainder of the Parks and Wild Life Estate without rhino, and to provide for fisheries, training, interpretation and extension which are not included in the calculations.

Numbers of game scouts will need to be increased to about 2 200 from their present level of 1 300. This implies an increase in numbers of officers and administrative support staff (given in the attachment). It would be important to ensure that the new staff are deployed in a manner providing the required level of protection in each part of the Estate.

The budget is reasonably balanced in so far as the ratio of salaries to total budget is 54% (salaries make up about 75% of the present budget).

The necessary capital budget associated with the staff increase has not been calculated, except for an indication of the requirement for vehicles and aircraft. The key result of any staff increase would be a requirement for staff housing and this could be crudely put at about 1000 x 10 000 = $10 million. This could be reduced by providing prefabricated junior staff housing which is movable. Capital items might be obtained through external donor assistance.

This conservation strategy works on a principle of fall-back options. The first step in the strategy is to approach the Treasury for the ideal budget to achieve the unmodified objective of protecting all rhino in the wild. Should this budget be unrealisable, the automatic implication is that the Department will move to the next step in its strategy (ANNEX 4).

TABLE 3 - 1: RECURRENT EXPENDITURE REQUIRED ON STATE LAND WITH BLACK RHINO

Area with black rhino .... 43,531 sq.km Field staff: 3,743
Game scout density: 1 man/ 20 sq.km TOTAL STAFF: 3,949

A. SALARIES	Salary Z$	Ratio	Number	COST/ SQ.KM	Staff req'd	TOTAL BUDGET Z$x1000
Management						
Scout I/II	4,272	1.000		213.60	2177	9,298
Senior scouts	5,808	0.067		19.36	145	843
General Hands	3,192	0.500		79.80	1088	3,474
Rangers	12,000	0.050		30.00	109	1,306
Senior Rangers	14,000	0.030		21.00	65	914
Wardens, Curators	17,638	0.025		22.05	54	960
Provincial Wardens	21,468		9	4.44	9	193
Chief Warden	27,042		2	1.24	2	54
Assistant Director	29,142		3	2.01	3	87
Deputy Director	33,008		1	0.76	1	33
Director	40,021		1	0.92	1	40
Research		Area/man				
Ecologists	21,000	1,000	sq.km	21.00	44	914
Research Technicians	14,000	1,000	sq.km	14.00	44	609
Chief Ecologist	27,042		1	0.62	1	27
Administration		/staff				
Typists	8,000	0.020		13.78	75	600
Typing Supervisor	13,646		2	0.63	2	27
Clerks	6,432	0.025		13.89	94	605
Senior Clerk	10,218	0.200	/Clerk	4.46	19	194
Executive Officers	13,736	0.500	/S.C.	3.16	10	137
Senior Exec. Officers	16,164	0.250	/EO	1.11	3	48
Principal Exec Officers	19,136	0.660	/SEO	0.88	2	38
Chief Exec Officer	24,611		1	0.57	1	25

B. TRANSPORT & SUBSISTENCE	Area sq.km	Cost/km	Km/m		Vehicles required	
Transport:						
1 4wd Vehicle per	1,000	1.43	1,000	17.16	44	747
1 5ton Truck per	2,000	0.79	1,000	4.74	22	206
1 2wd Pickup per	2,000	0.53	1,000	3.18	22	138
Aircraft:						
Fixed wing surveys	200	hrs/yr @	200	0.92	1	40
Helicopter surveys	75	hrs/yr @	1,000	1.72	2	75
Fixed wing logistical	250	hrs/yr @	200	1.15		50
Supercub operational	250	hrs/yr @	100	0.57		25
Helicopter operational	1,500	hrs/yr @	1,000	34.46		1,500
Subsistence:						
Field patrols (scouts)	15	days/m	11.00	105.60		4,597
Other staff	3	days/m	20.00	23.50		1,023

C. INCIDENTAL EXPENSES	Bid	Fraction			
Uniforms: cost/man	250			21.49	936
Maintenance office equip	50,000	0.95		1.09	48
Office & miscellaneous	50,000	0.95		1.09	48
Communications (PTC)	370,000	0.95		8.07	352
Printing & stationery	50,000	0.95		1.09	48
Water,light etc.	900,000	0.95		19.64	855

D. MGMT,RESEARCH,CONSERVATION	Bid	Fraction		
Consumable stores	1,000,000	0.95	32.21	1,402
Game Products	600,000	0.95	19.33	841
Casual labour	350,000	0.95	11.27	491
Maintenance: equipt	1,000,000	0.95	32.21	1,402
Game water supplies	500,000	0.95	16.11	701
Roads	1,000,000	0.95	32.21	1,402
Soil & Water	250,000	0.95	8.05	351
			------	------
TOTAL COST / SQUARE KILOMETRE			Z$ 866.16	37,705
			US$ 381.11	16,590

BUDGET EXTENDED TO ENTIRE PARKS & WILDLIFE ESTATE ..... Z$ 39,689

TABLE 3 - 2: AREAS OF PARKS AND WILD LIFE ESTATE WITH BLACK RHINO

	AREA sq.km	TOTAL sq.km
ZAMBEZI VALLEY		
Doma Safari Area	945	
Dande Safari Area	523	
Chewore Safari Area	3,390	
Sapi Safari Area	1,180	
Mana Pools National Park	2,196	
Urungwe Safari Area	2,870	
Charara Safari Area	1,694	12,798
SEBUNGWE		
Matusadona National Park	1,407	
Chizarira National Park	1,910	
Chirisa Safari Area	1,713	
Chete Safari Area	1,081	6,111
MATABELELAND NORTH		
Hwange National Park	14,620	
Zambezi National Park	560	
Kazuma Pan National Park	313	
Deka Safari Area	531	
Matetsi Safari Area	2,955	18,979
MATOBO NATIONAL PARK	436	436
GONAREZHOU NATIONAL PARK	5,207	5,207

TOTAL		43,531

ANNEX 4

INTENSIVE PROTECTION ZONES

Staff organisation and system of operation

1. This system will come into operation if the budget and staffing requirement outlined in ANNEX 3 is not forthcoming.

2. This is the Department's plan to realise the first objective of the Strategy - the conservation of large wild populations.

3. It is recognised that for successful protection of black rhino the critical factor is the time taken to detect incursions of illegal hunters. From research carried out by the Department and the work of others, it appears that the intensity of field coverage should be about 1 man/20sq.km.

4. This assumes that each field scout is able to carry out 15 days normal patrolling per month.

5. It is further assumed that scouts can be accommodated in the designated areas as required by the plan. This will give rise to a need for housing which can be rapidly constructed on site but which can be dismantled and erected elsewhere if needed.

6. The first component of the plan is to ensure that all areas in the Parks and Wild Life Estate have a minimum ground coverage of scouts. Apart from rhino, illegal hunting of other species has to be prevented.

   - **Scouts will be deployed throughout the Estate at one man/50 sq.km.** The total number of scouts required for this in the areas containing black rhino (43 531 sq.km) is 870.

7. The second component of the plan is the creation of **Intensive Protection Zones** with additional staff for increased protection:

   - **The total area designated as Intensive Protection Zones (IPZs) amounts to approximately 10 000 sq.km.**

   - **Each IPZ is designed to protect an Intermediate or Large Wild Population greater than 100 animals.** The present populations in each IPZ are well in excess of this threshold.

   - **Eight IPZs are shown in the maps attached to this Annex.** Six of these are approximately 1 000 sq.km and two are approximately 2 000 sq.km. The IPZs of 2 000 sq.km. are intended to protect a minimum population of 200 animals. Although at this stage the actual areas exceed the nominally stated areas in Table 4 - 1, it is envisaged that very soon after the start of the programme boundaries would be redefined to take account of better information.

   - **Additional staff will be deployed in these areas at a nominal density of 1 man/50 sq.km. Combined with the basic staff coverage defined in para 6, this implies a starting density for IPZs of approximately 1 man/25 sq.km.** 200 additional staff are required. Staff deployment in the IPZs and remainder of the Parks and Wild Life Estate is given in Table 4 - 1.

8. Rhino populations in each IPZ will be closely monitored (ANNEX 6). Since the plan relies critically on a knowledge of the numbers of rhino in each IPZ for decision-taking, it is envisaged that a major component of the conservation strategy should lie in monitoring.

9. The third component of the plan is that, if the rhino population in any IPZ falls below a certain level, the entire population in that IPZ will be translocated elsewhere and the additional staff which were protecting it will be equally redistributed among the remaining IPZs.

   - **If the rhino population in any IPZ of 1 000 sq.km falls below 100 animals, the entire population will be translocated elsewhere.**

   - **If the population in IPZs greater than 1 000 sq.km falls below a pro rata number (e.g. 150 animals in the case of an IPZ of 1500 sq.km), the IPZ may be redefined to 1 000 sq.km and only those animals falling outside the new IPZ will be relocated.**

   - **The additional staff in any IPZ which is deproclaimed as above will be redistributed to strengthen protection in the other IPZs.**

10. A detailed scenario of decline is shown in Table 4 - 2 in this Annex. As the number of rhino in any particular IPZ drops below the defined threshold for that area, the rhino are translocated, the IPZ is deproclaimed, and additional staff are released to protect the remaining IPZs. With each relocation of staff, the law enforcement effort is increased in the remaining IPZs, with each man being responsible for a smaller and smaller area. The effects of redistributing staff among IPZs is summarized below:

No. of effective IPZs:	10	9	8	7	6	5	4	3	2	1
Sq.km per man :	25	24	22	20	19	17	14	12	8	5

11. With the law enforcement effort in the IPZs increasing as each IPZ is lost, it is to be expected that a balance will be reached at some point before the number of IPZs reaches zero. There is an important experimental aspect to the plan: it will define the intensity of law enforcement effort which is necessary for conservation of large wild populations of black rhino.

12. A fourth component of the plan is, in addition to the staff requirements defined above, to have a small corps of mobile anti-poaching units which can be deployed rapidly to assist staff anywhere in the country who have detected poachers. The prime function of this corps will be to deal with poachers rather than to detect them. **This Reserve Unit has been provisionally set at 100 men.**

13. The detailed staff requirements for this plan are shown in the attachment to this Annex and summarised below:

Scouts for basic coverage throughout the Estate	870
Additional scouts for Intensive Protection Zones	200
Reserve mobile anti-poaching units	100
TOTAL	1 170

14. The present complement of Scout I/IIs and Senior Scouts in the Department is approximately 1 300. It is recognised that a large number of these are on Administrative and General duties and there may be difficulty in depleting this component to meet the law enforcement requirement. The solution may lie in a careful combination of the following actions:

- A reduction in the number of scouts on Administrative and General duties, with the balance being transferred to field operations.

- An increase in the number of officer-led patrols so that Rangers and Senior Rangers can be counted as part of the field complement required to implement the plan.

- The inclusion of some general hands in the field patrolling system in order to achieve desired numbers.

- Volunteers from outside government could be considered to augment the numbers of additional men in IPZs.

15. This plan will only succeed if the following conditions are met:

- **The staff requirements are fully satisfied;**

- **Monitoring of rhino numbers is successfully achieved;**

- **Law enforcement is fully monitored (ANNEX 7);**

- **Decisions are taken promptly to deproclaim IPZs when rhino numbers fall below the designated thresholds;**

- **Housing and transport needs are met;**

- **Adequate annual budgets are provided;**

- **Full discipline is maintained.**

- **Field staff are backed up in their effort by effective intelligence and investigative work to deal with the wider problem of trafficking in rhino horn.**

16. Each IPZ would have its own complement of field officers (Rangers and Senior Rangers) who have full control of the scouts deployed in the area. Except perhaps in cases where the IPZ comprises the full extent of the Park (e.g. Chizarira, Matusadona), the Warden for the area would not generally direct anti-poaching operations in the IPZs because of the other general duties required of him. Staff would, however, fall under the Warden on administrative matters.

17. An overall Operations Coordinator would control the law enforcement in IPZs throughout the country.

18. It is recommended that each IPZ should have one full-time researcher permanently attached to the field staff in the area. The functions of this person would be to estimate rhino numbers in close cooperation with field patrols (ANNEX 6), to assist initially in the monitoring of law enforcement effort and illegal activity (ANNEX 7) and to establish a permanent system of monitoring which will be implemented by field staff.

19. A full-time Research Coordinator, who should be a member of government staff, would be appointed to oversee researchers in the IPZs and report on the implementation of this plan. The individual concerned would have no other government duties. He would be required to maintain close liaison with the Operations Coordinator.

TABLE 4 -1: DISTRIBUTION OF STAFF IN AREAS WITH BLACK RHINO

Base level staff density: 1 man to 50 sq.km.
Staff density, extra men: 1 man to 50 sq.km.

ZAMBEZI VALLEY	AREA sq.km	BASIC STAFF	IPZ STAFF	TOTAL STAFF	GRAND TOTAL
Doma Safari Area	945	19		19	
Dande Safari Area	523	10		10	
Chewore Safari Area	3,390	68	40	108	
Sapi Safari Area	1,180	24		24	
Mana Pools National Park	2,196	44	20	64	
Urungwe Safari Area	2,870	57	10	67	
Charara Safari Area	1,694	34	10	44	336
SEBUNGWE					
Matusadona National Park	1,407	28	20	48	
Chizarira National Park	1,910	38	40	78	
Chirisa Safari Area	1,713	34	20	54	
Chete Safari Area	1,081	22		22	202
MATABELELAND NORTH					
Hwange National Park	14,620	292	20	312	
Zambezi National Park	560	11		11	
Kazuma Pan National Park	313	6		6	
Deka Safari Area	531	11	20	31	
Matetsi Safari Area	2,955	59		59	419
MATOBO NATIONAL PARK	436	9		9	9
GONAREZHOU NATIONAL PARK	5,207	104		104	104
RESERVE MOBILE UNIT			100	100	100
TOTALS	43,531	870	300	1,170	1,170

INTENSIVE PROTECTION ZONES	NOMINAL AREA sq.km	IPZ STAFF Nos
Chewore North	1,000	20
Chewore South	1,000	20
Mana Pools Escarpment	1,000	20
Urungwe/Charara	1,000	20
Matusadona NP	1,000	20
Chizarira NP	2,000	40
Chirisa SA	1,000	20
Hwange NP + Deka SA (part)	2,000	40

TABLE 4 - 2a:
EFFECTS OF REDISTRIBUTION OF EXTRA STAFF UNDER A SCENARIO OF DECLINE

SCENARIO AT START

	INTENSIVE PROTECTION ZONES	IPZ AREA sq.km	BASIC STAFF Nos	EXTRA STAFF Nos	TOTAL STAFF Nos	SQ.KM /MAN
1	Chewore North	1,000	20	20	40	25.0
2	Chewore South	1,000	20	20	40	25.0
3	Mana Pools Escarpment	1,000	20	20	40	25.0
4	Urungwe/Charara	1,000	20	20	40	25.0
5	Matusadona NP (part area)	1,000	20	20	40	25.0
6	Chizarira NP	2,000	40	40	80	25.0
7	Chirisa SA (part area)	1,000	20	20	40	25.0
8	Hwange NP +Deka SA (part)	2,000	40	40	80	25.0
	SUBTOTALS	10,000	200	200	400	

SCENARIO AFTER 1 IPZ ELIMINATED

2	Chewore South	1,000	20	22	42	23.8
3	Mana Pools Escarpment	1,000	20	22	42	23.8
4	Urungwe/Charara	1,000	20	22	42	23.8
5	Matusadona NP (part area)	1,000	20	22	42	23.8
6	Chizarira NP	2,000	40	44	84	23.8
7	Chirisa SA (part area)	1,000	20	22	42	23.8
8	Hwange NP +Deka SA (part)	2,000	40	44	84	23.8
	SUBTOTALS	9,000	180	198	378	

SCENARIO AFTER 2 IPZs ELIMINATED

3	Mana Pools Escarpment	1,000	20	25	45	22.2
4	Urungwe/Charara	1,000	20	25	45	22.2
5	Matusadona NP (part area)	1,000	20	25	45	22.2
6	Chizarira NP	2,000	40	50	90	22.2
7	Chirisa SA (part area)	1,000	20	25	45	22.2
8	Hwange NP +Deka SA (part)	2,000	40	50	90	22.2
	SUBTOTALS	8,000	160	200	360	

SCENARIO AFTER 3 IPZs ELIMINATED

4	Urungwe/Charara	1,000	20	29	49	20.4
5	Matusadona NP (part area)	1,000	20	29	49	20.4
6	Chizarira NP	2,000	40	57	97	20.6
7	Chirisa SA (part area)	1,000	20	29	49	20.4
8	Hwange NP +Deka SA (part)	2,000	40	57	97	20.6
	SUBTOTALS	7,000	140	201	341	

(see next page)

TABLE 4 - 2b:
SCENARIO AFTER 4 IPZs ELIMINATED

5 Matusadona NP (part area)	1,000	20	33	53	18.9
6 Chizarira NP	2,000	40	67	107	18.7
7 Chirisa SA (part area)	1,000	20	33	53	18.9
8 Hwange NP +Deka SA (part)	2,000	40	67	107	18.7
SUBTOTALS	6,000	120	200	320	

SCENARIO AFTER 5 IPZs ELIMINATED

6 Chizarira NP	2,000	40	80	120	16.7
7 Chirisa SA (part area)	1,000	20	40	60	16.7
8 Hwange NP +Deka SA (part)	2,000	40	80	120	16.7
SUBTOTALS	5,000	100	200	300	

SCENARIO AFTER 6 IPZs ELIMINATED (Chizarira reduced to 1,000 sq.km)

6 Chizarira NP	1,000	20	50	70	14.3
7 Chirisa SA (part area)	1,000	20	50	70	14.3
8 Hwange NP +Deka SA (part)	2,000	40	100	140	14.3
SUBTOTALS	4,000	80	200	280	

SCENARIO AFTER 7 IPZs ELIMINATED

7 Chirisa SA (part area)	1,000	20	67	87	11.5
8 Hwange NP +Deka SA (part)	2,000	40	133	173	11.6
SUBTOTALS	3,000	60	200	260	

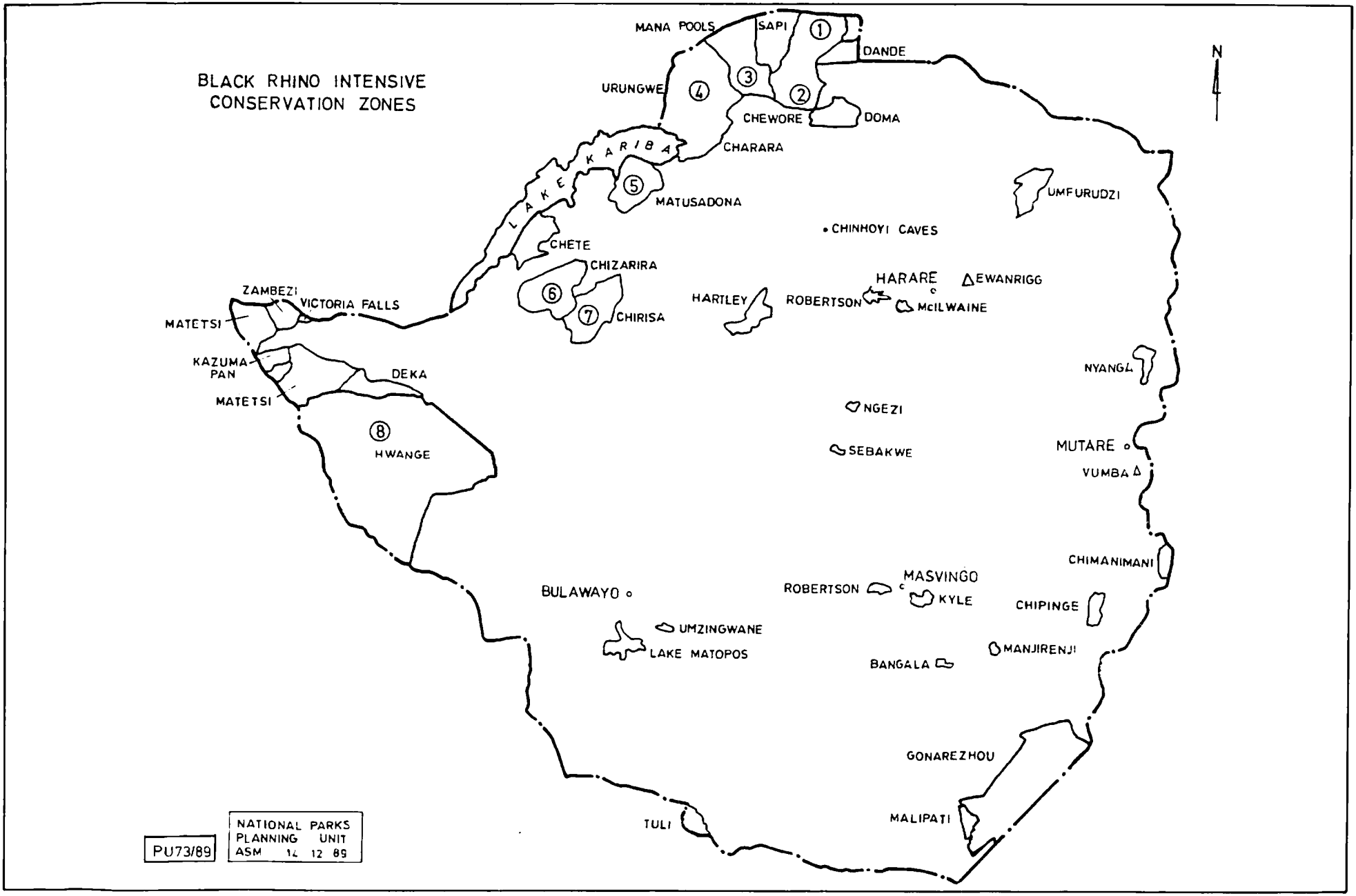
SCENARIO AFTER 8 IPZs ELIMINATED

8 Hwange NP +Deka SA (part)	2,000	40	200	240	8.3

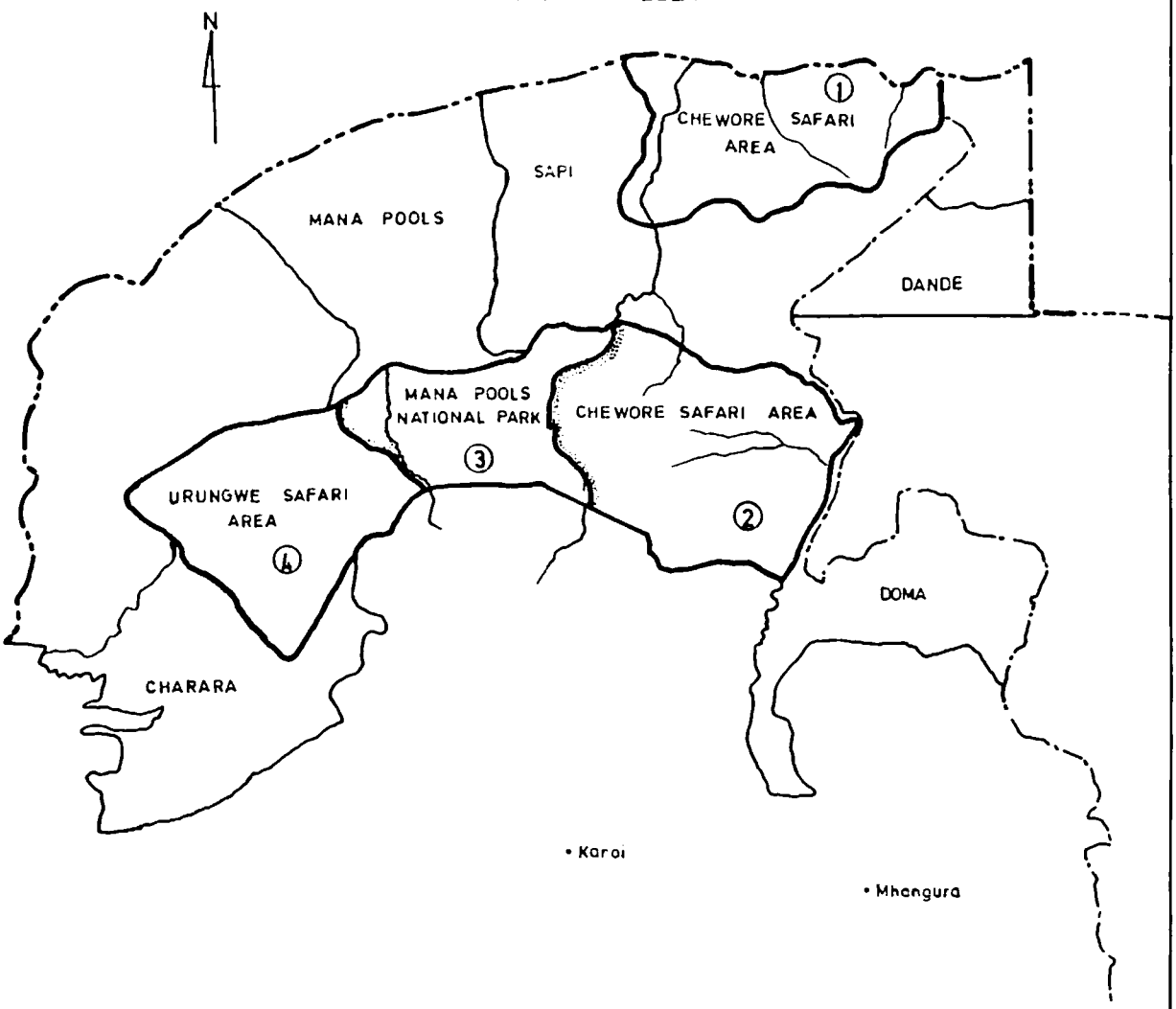
SCENARIO AFTER 9 IPZs ELIMINATED (IPZ reduced to 1,000 sq.km.)

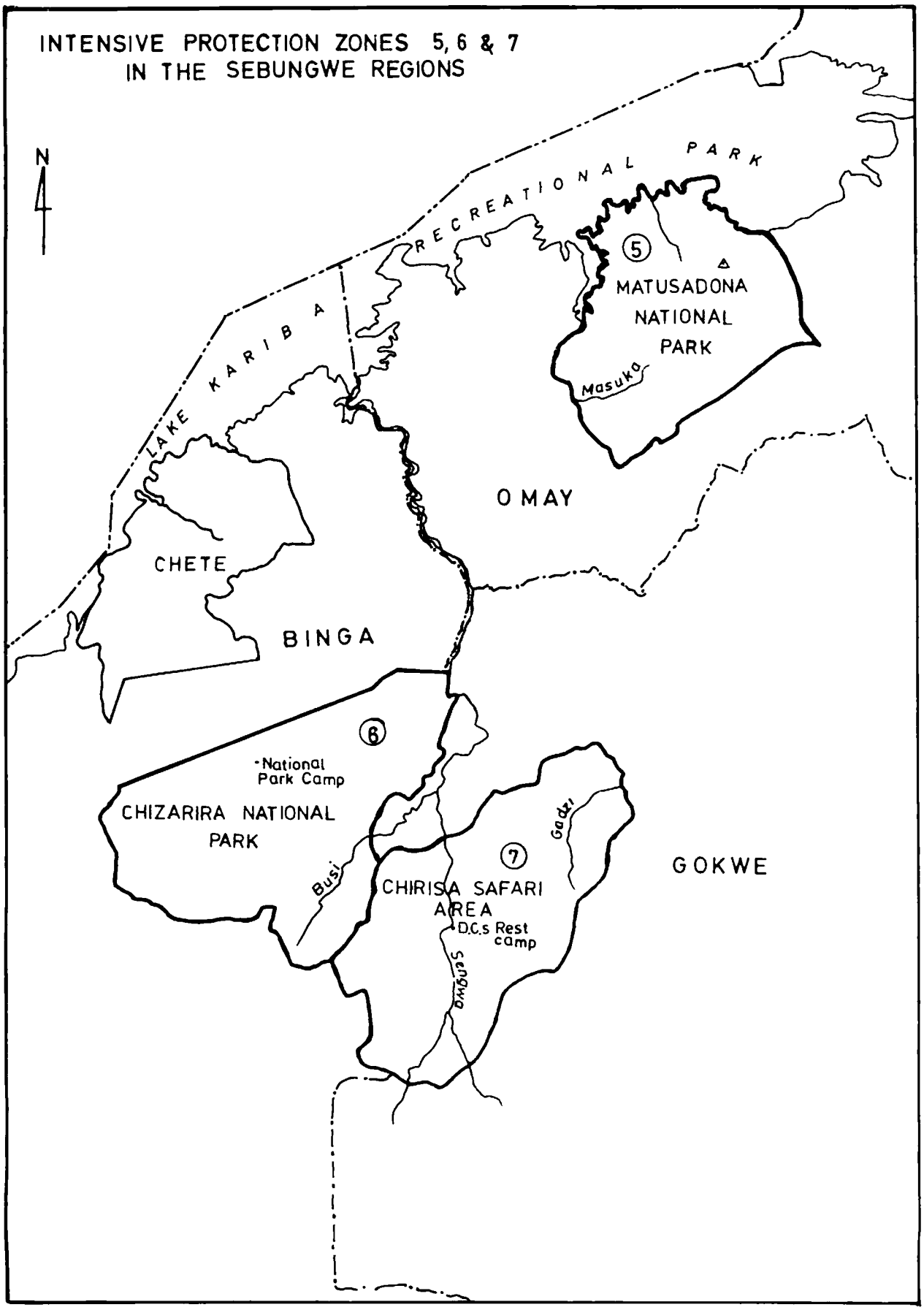
8 Hwange NP +Deka SA (part)	1,000	20	200	220	4.5

****

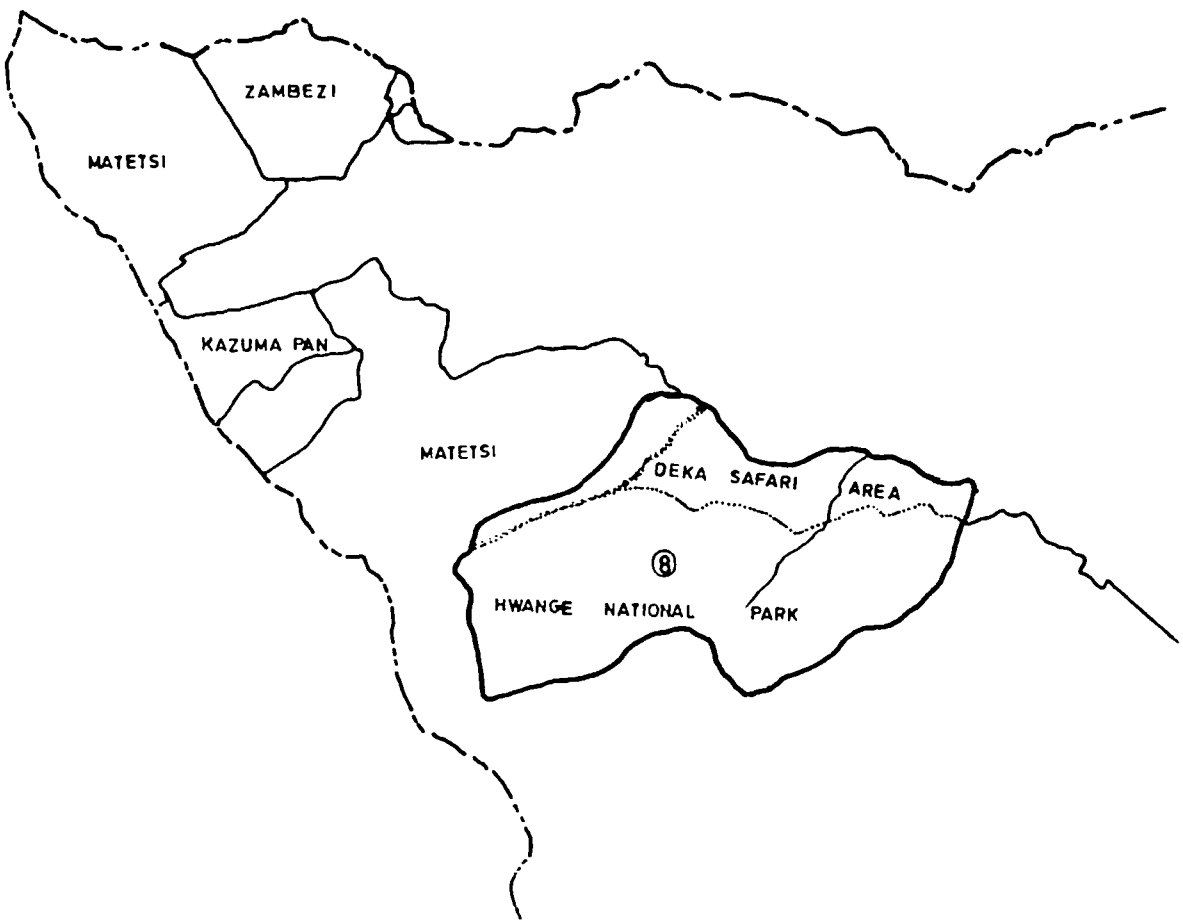

BLACK RHINO INTENSIVE
CONSERVATION ZONES
N
MANA POOLS
SAPI
DANDE
URUNGWE
CHEWORE
DOMA
CHARARA
LAKE KARIBA
MATUSADONA
UMFURUDZI
CHINHOYI CAVES
CHETE
CHIZARIRA
CHIRISA
HARARE
EWANRIGG
HARTLEY
ROBERTSON
McILWAINE
ZAMBEZI
VICTORIA FALLS
MATETSI
KAZUMA PAN
DEKA
MATETSI
NYANGA
NGEZI
HWANGE
SEBAKWE
MUTARE
VUMBA
CHIMANIMANI
MASVINGO
BULAWAYO
ROBERTSON
KYLE
CHIPINGE
UMZINGWANE
LAKE MATOPOS
MANJIRENJI
BANGALA
GONAREZHOU
MALIPATI
TULI
PU73/89
NATIONAL PARKS
PLANNING UNIT
ASM 14 12 89

INTENSIVE PROTECTION ZONES 1 – 4
ZAMBEZI VALLEY




INTENSIVE PROTECTION ZONES 5, 6 & 7
IN THE SEBUNGWE REGIONS
N
RECREATIONAL PARK
LAKE KARIBA
5
MATUSADONA
NATIONAL
PARK
Masuko
OMAY
CHETE
BINGA
6
National
Park Camp
CHIZARIRA NATIONAL
PARK
Busi
7
Gadzi
CHIRISA SAFARI
AREA
D.C.s Rest
camp
Sengwa
GOKWE

INTENSIVE PROTECTION ZONE 8
MATABELELAND NORTH PROVINCE



ANNEX 5

PROGRAMME OF TRANSLOCATION

1992 - 1993

The establishment of Intensive Protection Zones (Annex 4) implies the translocation of rhino outside those zones wherever they are vulnerable to illegal hunting. Only in the IPZs is the level of law enforcement considered adequate to counter all possible threats to rhino survival.

In Table 5 - 1 in this Annex the number of rhino estimated to lie within the designated Intensive Protection Zones and the Breeding Nuclei is about 1500, leaving some 500 outside of these areas. We stress that both the population estimates and the proportion considered to lie within the IPZs have very wide confidence limits. However, the programme is designed on the principles of adaptive management whereby, during the course of implementation, the knowledge of rhino numbers will improve rapidly. The importance of detailed surveys in each of the IPZs cannot be overstated.

It is obviously impractical to consider the removal of all the animals outside the IPZs at once and therefore the translocation programme is designed to begin with the most vulnerable areas. It may also transpire as the programme progresses that the full programme of translocation is unnecessary. As our knowledge of rhino numbers improves and as law enforcement effort is increased, there is the strong possibility of a reduction in the extent of illegal hunting which may stabilise the present dynamic situation well before 700 animals are relocated.

The first table in this Annex deals with the areas from which rhino need to be removed as a priority and the second deals with the areas into which they should be released. The broad strategy of the programme takes into account the following factors:

- The maximum number of rhino which it is practical to move in any one year is about 100;

- Rhino which are on the periphery of the three main regions - the Zambezi Valley, the Sebungwe and Matabeleland North - receive a high priority in the programme.

- Small isolated non-viable populations under extreme threat are the highest priority for translocation.

PART I - CAPTURE PROGRAMME

Doma Safari Area (50)

The area is not included in an IPZ but no animals are scheduled to be removed in 1992 since the poaching threat is less than elsewhere. However, the situation will be closely monitored.

Dande Safari Area (20) **PRIORITY #1**

This area lies outside IPZ #1 and is extremely vulnerable to incursions from both Zambia and Mozambique. It is the eastern extremity of the rhino range in Zimbabwe. The entire population (20) is scheduled to be removed in 1992 and 1993. The area will continue to be repopulated from Chewore and, if illegal hunting remains high, there may be a need in the future for occasional translocations.

Chewore Safari Area (300) **PRIORITY #3**

Most of the Chewore population is contained within IPZ #1 & IPZ #2. No animals are planned for removal in 1992 but, depending on the escalation of illegal hunting during 1992 and improved knowledge of rhino distribution and numbers, some of the animals outside the IPZs may be removed in 1993.

Sapi Safari Area (50)

Some 20 of the Sapi population are estimated to lie within IPZ #1. There are no plans to uplift the balance in the first two years of the programme as they lie within the main body of the Zambezi Valley, the numbers are small and few incursions are currently taking place in this area.

Mana Pools National Park (100)

Most of the rhino population lies within IPZ #3 in the escarpment. There are no immediate plans to uplift the remaining animals for the same reasons given for Sapi and because they are relatively well protected by their proximity to the main tourist area. An improved estimate for the rhino population in IPZ #3 is a priority.

Urungwe Safari Area (150)

IPZ #3 and IPZ #4 extend into Urungwe and contain about 50 animals. There are no immediate plans to remove the balance of the animals.

Charara Safari Area (200) **PRIORITY #8**

Most of the Charara population is contained within IPZ #4. The rhino in the extreme south of the area bordering onto Urungwe Communal Land are vulnerable and it is planned to begin moving these in 1993.

Dande Communal Land (30) **PRIORITY #2**

As for Dande Safari Area, these rhino are extremely vulnerable. Because they fall within a Communal Land the provisions of Annex 8 will apply. It is intended to move some animals in 1992 and 1993 and to review the situation each year.

Mukwichi Communal Land (30)

The threat to rhino in Mukwichi is less than other communal lands because of the attitude of the residents and the extremely broken country. It is planned to translocate some animals in 1993.

Matusadona National Park (150)

The entire Park is an Intensive Protection Zone and there are no plans to capture animals in 1992. The IPZ might be extended to include part or all of the adjacent Omay Communal Land under joint management and protection, if the Nyaminyami Wildlife Trust were agreeable to undertake a similar level of law enforcement in the communal land with local manpower.

Chizarira National Park (300)

The same applies as for Matusadona. Ultimately it would be desirable for the IPZ to extend into the adjacent Binga and Gokwe Communal Lands when their wildlife management programmes are further developed.

Chirisa Safari Area (200)

The same applies as for Matusadona. However, the remaining rhino adjacent to Chirisa in northern Gokwe Communal Land are few and would probably be better translocated in the immediate future.

Chete Safari Area (70)

This population was subject to heavy illegal hunting pressure (over 40 animals in 1988-89) but has suffered few losses since 1990. Approximately 50 animals were translocated from Chete in 1990-91 and further captures are not planned in the immediate future.

Sijarira Forest Area (20) **PRIORITY #7**

Attempts were made in 1991 to translocate some rhino from Sijarira but in the short time available the capture team was unable to locate any. However it is known that there are resident and migratory animals in the area and it is intended to attempt a capture again in 1992. This capture could be synchronised with the proposed captures in the adjacent communal land.

Omay Communal Land (40) **PRIORITY #6**

The Omay rhino population is contiguous with Matusadona National Park and there have been several rhino killed recently. A limited capture is provided for as a matter of priority in 1992 coupled with the other provisions of ANNEX 8.

Binga Communal Land (20) **PRIORITY #5**

The threat to the low density population in Binga is relatively high and it is planned to make a start on removing some of these animals in 1992, as for Omay. The current CAMPFIRE initiative in this area may lead to the suspension of the translocation in the future.

Northern Gokwe Communal Land (10) **PRIORITY #4**

The population of stragglers in this area is non-viable and should be removed as soon as possible. Possible exceptions are rhino adjacent to Chizarira in the newly designated Nenyunga wildlife management scheme.

Hwange National Park/Deka Safari Area (200)

Some animals may need to be captured in 1993 outside the IPZ.

Matetsi Complex (20)

The small population in the extreme north-west corner needs to be removed. Because of the other priorities in this programme, no capture is planned in Matabeleland North until 1993.

Matobo National Park (6)

This population is relatively secure. It will require management to prevent inbreeding in the future.

Gonarezhou National Park (10)

With the restoration of a working law enforcement system in Gonarezhou the time may be appropriate to begin reintroductions to the Park.

The above capture programme entails about 55 animals in 1992 and 70 animals in 1993. The situation will be reviewed at the end of each year, but it should be noted that there will still remain about 400 animals outside IPZs at the end of 1993 given that the above targets are fully met.

It is important to note that the programme does not take into account the possibility that the entire population of any one IPZ might need to be translocated in 1993 if the numbers in the area should fall below the designated threshold. Should this occur the entire programme of capture would be revised and intensified to cope with this contingency.

The programme also does not take into account any possible change of tactics in conserving black rhino, such as dehorning animals in certain strategic areas. It is probably advisable to maintain a flexible approach to the entire programme based on the illegal hunting situation, resources available for law enforcement and decisions by the Minister based on the advantages of the various options.

PART II - RELEASE PROGRAMME

The animals captured in 1992 would mostly be released into existing breeding nuclei to ensure adequate founder populations and to optimise age and sex ratios.

For conservation of genetic diversity a founder population of at least 40 animals is recommended for each breeding nucleus. In this strategy it is proposed to base the founder population on approximately half of the carrying capacity of the breeding nucleus concerned or 100 animals - whichever is the lower number. Carrying capacities in Table 5 - 2 have been arbitrarily set at 1 rhino/5sq.km. In practice carrying capacity would be determined by monitoring the population build-up (page 27). If this is done, it should take approximately 10 years for the numbers in each nucleus to increase up to the carrying capacity. It is recognised, however, that there are possible difficulties in adding to founder populations and careful monitoring of antagonistic behaviour towards new introductions will be necessary.

At the time of writing this strategy, four significant breeding nuclei exist. Several properties in the Midlands have combined areas to provide for significant numbers of rhino and a major commitment has been made by commercial farmers in the South-east Lowveld and West Nicholson/Beit Bridge area in forming "conservancies". These consist of large consolidated blocks of private properties which are suitable for perimeter fencing with significant carrying capacities for black rhino. The Lonely Mine area is the fourth nucleus, but is slightly smaller than the stipulated minimum size (Section 2.1, main text). The possibility exists that additional conservancies may be formed in the Gwaai River area and Buffalo Range area in the near future.

Of all the potential areas to establish breeding nuclei, the Department's first choice would be for the smaller Safari Areas located well within the borders of the country (Umfurudzi, Hartley "A" and Chipinge). These areas have ideal habitat and are of a manageable size for protection. If the Department's budget and manpower were adequate these would be treated as the highest priority. However, in keeping with the rationale of this conservation strategy, there is little point in the Department designating Intensive Protection Zones in the existing rhino range - which has come about because of the inadequate budget - only to expend scarce resources elsewhere in the Parks and Wild Life Estate in establishing new rhino populations.

The following release programme for black rhino is based on the current status of conservancies and is matched to the capture programme.

A CATEGORY BREEDING NUCLEI

Midlands

The properties currently carrying rhino in this area are Iwaba Ranch, Chinyika Ranch, Mazuri Ranch, Pavlova, Twin Springs Ranch, Bushy Park, Rhodesdale Estate and Borrowdale. The potential exists for the inclusion of several other large private ranches (Mananzwa, Marvann, Pitscottie, Circle G, Moreena, Journey's End), the newly acquired ARDA properties (Doreen's Pride, Elephant Hill Ranch, Kelvin Grove, Diamond Aye, Wanganella), Ngezi and Sebakwe Recreational Areas and possibly the Resettlement Scheme on Manyoni Estates. It would be necessary to ensure that there is no fence separating Sebakwe Recreational Area from the commercial farms to the north in order to include it in the conservancy. No formal commitment has yet been made by this group of properties as in the case of the Save and West Nicholson Conservancies.

An adequate founder population already exists in this area (54 animals) and because the carrying capacity of the area now appears considerably lower than originally thought, no further rhino should be introduced until a number of intervening fences have been removed and the conservancy is better developed. There is a need to capture several stragglers in this area which have moved onto Central Estates and other properties.

Save Conservancy **PRIORITY #3**

A large group of properties forming the Save Intensive Conservation Area (west of the Save River, between the Devure and Mkwasine Rivers) made a formal commitment on October 16, 1989 to form a major conservancy for black rhino and other endangered species. The properties involved are Matendere, Mapari, Msaizi, Devuli, Angus, Humani, Masapas, Levanga, Senuko (2 & 3), Mukazi River, Mukwazi, Hammond, ARDA Estates (Mkwasine Central Extension) and Mkwasine. The total area is 3 300 sq.km with an estimated carrying capacity for 660 rhino. The conservancy is at an advanced stage of organisation under the Beit Trust/WWF assistance programme. The present number of rhino in the area is 23.

It is proposed to move a 20 rhino into the conservancy in 1992 and 10 in the following year.

West Nicholson/Beit Bridge Conservancy **PRIORITY #2**

The properties included in this conservancy are Towla, Driehoek, Makado, Swallowfork, Highway, Crystal Springs, Reata, Tamba, Tshabezi, Jonsyl, Janee, Chipizi, Mkashi, Rocky Glen, Lynwood, Dwala, Inhlaba, and possibly Doddieburn and Manyale Ranches. The total area is approximately 3 000sq.km with an estimated carrying capacity for 600 rhino. The conservancy is at an advanced stage of organisation under the Beit Trust/WWF programme. The present number of rhino in the area is 16.

It is proposed to move 20 rhino into the conservancy in 1992 and 10 in the following year. Several stragglers (3 or 4) need to be recaptured from outside the area and relocated into the conservancy.

Lonely Mine **PRIORITY #4**

This area ajacent to the Gwampa Forest has a poptential carrying capacity of about 60 rhino with present numbers standing at 16. It is not yet fully organised as a conservancy but will receive attention under the Beit Trust/WWF programme in 1992. Provision has been made to introduce a further 5 rhino in 1993.

B CATEGORY BREEDING NUCLEI (Areas requiring further commitments)

Buffalo Range area

If Buffalo Range combines with Ruware, Mungwesi and Chipimbi the potential exists for a conservancy of over 1 100 sq.km. Until such a commitment is made there are no plans to translocate further rhino into the area (present number is 8).

Gwaai River

Eight rhino were translocated into the area in 1986/87 and some have since dispersed into the adjacent forest areas. The area is contiguous with Hwange National Park and there appears to be little point in adding further rhino to the complex. However, if consolidated plans were advanced by the private property owners and Forestry Commission for a well-protected conservancy the matter could be reconsidered.

C CATEGORY: POTENTIAL BREEDING NUCLEI

As stated in the preamble to this section, the following Safari Areas in the Parks and Wild Life Estate are the Department's highest priorities for establishing breeding nuclei. As soon as overall budgets and manpower for black rhino conservation are adequate, these areas would be preferentially developed.

Gonarezhou National Park

The security and law enforcement capability in the Park has improved considerably and it may be feasible to begin restoring the original population which was largely hunted out in 1987-88. Provision has been made to introduce 25 animals in 1993.

Umfurúdzi Safari Area

This area would make an excellent rhino sanctuary. There are extremely promising developments in the area with the adjacent UMP communal lands wildlife programme, and security is improving. An introduction of rhino has been planned for 1993.

Hartley A Safari Area, Umfuli Recreational Area and adjacent lands

A major wildlife area (1 000 sq.km) is in the process of development at present comprising Parks and Wild Life Estate, commercial farms, resettlement areas and communal lands. Provided the development progresses satisfactorily, the area should be able to receive rhino in 1993.

Chipinge Safari Area

Ten rhino were introduced to the area in 1989 and it is thought that 8 have survived, although some have moved onto adjacent properties. The area has a low carrying capacity for rhino and periodic water shortages. If the Department can increase manpower in the area and strike up good relationships with adjacent communal lands and commercial farms, the area could become part of a larger viable breeding nucleus for black rhino in conjunction with the Save conservancy. The area is contiguous with Devuli Ranch which is one of the properties in the Save Conservancy.

Matobos National Park (Wildernes area)

This area has 6 subadult rhino at present and the carrying capacity of the area does not allow for many more. It will be managed as a subpopulation under the national breding nuclei programme.

D CATEGORY: CAPTIVE BREEDING/NURSERY AREAS

Ruwanzi Ranch

This farm in the Karoi area does not have the potential to form a major breeding nucleus unless adjacent properties also participate. It is useful as a holding area for rhino from the Zambezi Valley and as a nursery for orphaned young rhino. The owners have cooperated with the Department when assistance has been required during the course of large translocations.

It is proposed to leave the present rhino (12) on the property for the time being, pending developments. If nothing changes, it will be necessary either to manage the population intensively to prevent inbreeding or to translocate all the animals to a larger breeding nucleus.

Imire Ranch

Like Ruwanzi, there is no potential to establish a breeding nucleus in this area. Its only function is as a nursery for orphaned rhino. No immediate plans are being made to relocate the present young rhino (7), but the same provisions apply as for Ruwanzi.

Mhondoro Park

This farm is currently holding 2 young rhino. They should probably be moved to a more viable breeding nucleus within the next few years.

Chipangali Wildlife Orphanage

The Minister of Natural Resources has given approval for Chipangali to act as a captive breeding centre for black rhino. The proposed government captive breeding centre will have priority for development but it is in keeping with Objective 3 of this strategy that private captive breeding centres may be established in Zimbabwe. Chipangali is somewhat remotely located from the two government veterinarians appointed to the captive breeding programme and from the key facilities provided by the government and University Veterinary Research Laboratories. The centre has four black rhino at present and will receive further animals as and when facilities are developed and the requirements of the government captive breeding centre are satisfied.

Pamuzinda Safari Lodge

Two subadult males are presently held here and one should be moved to an area where it can contribute to breeding and a female should be introduced in its place. Pamuzinda will require intensive management as its carrying capacity is probably no more than 3 animals.

National Parks Captive Breeding Centre **PRIORITY #1**

This facility has now been established at Boulton Atlantica which is ideal because of its proximity to Harare and the convenience as a holding area for translocations elsewhere in Zimbabwe or overseas. The details of the captive breeding centre are given in Annex 9.

The Centre will be holding animals which are to be exported under the ex-situ captive breeding programme in March 1992, after which it will receive as a priority a permananent population from the 1992 and 1993 captures (see also Annex 8).

E CATEGORY: AREAS TO BE DISCONTINUED

Marula (Stokestown Ranch)

The 3 rhino on this property are not considered a viable, well-protected group and should be translocated as a matter of priority.

TABLE 5 - 1: **BLACK RHINO TRANSLOCATION PROGRAMME - CAPTURE**

	RHINO Nos	IPZ #	IPZ Nos	REM. Nos	CAPTURE 1992	CAPTURE 1993	NUMBERS Left
ZAMBEZI VALLEY							
Doma Safari Area	50	-	-	50			50
Dande Safari Area	20	-	-	20	10	10	0
Chewore Safari Area	300	1	100				
		2	130	70	10	10	50
Sapi Safari Area	50	1	20	30			30
Mana Pools National Park	100	3	80	20			20
Urungwe Safari Area	150	3	30				
		4	20	100			100
Charara Safari Area	200	4	100	100		20	80
Dande Communal Land	30	-	-	30	10	10	10
Mukwichi Communal Land	30	-	-	30		10	20
SEBUNGWE							
Matusadona National Park	150	5	150	0			0
Chizarira National Park	300	6	300	0			0
Chirisa Safari Area	200	7	200	0			0
Chete Safari Area	70	-	-	70			70
Sijarira Forest Area	20	-	-	20	5		15
Omay Communal Land	40	-	-	40	5		35
Binga District	20	-	-	20	5		15
Northern Gokwe District	10	-	-	10	5		5
MATABELELAND NORTH							
Hwange NP + Deka SA	200	8	180	20		10	10
Matetsi Complex	20	8	10	10		10	0
Gonarezhou National Park	10	*	-	10			10
Matobo National Park	6	*	-	6			6
Commercial Farms (Annex 5a)	150	*	147	3	3		0
TOTALS	**2126**		**1467**	**659**	**53**	**80**	**526**

* These areas would effectively be treated as IPZs

1989 estimates are used above, corrected for Hwange National Park and Commercial Farms. The 1992 estimates are slightly lower (see Annex 2).

TABLE 5 - 2: BLACK RHINO TRANSLOCATION PROGRAMME - RELEASE

Assumed carrying capacity ..... 0.20 /sq.km.

BREEDING NUCLEI	AREA sq.km	RHINO Nos	MAX Nos	*Fp Nos	Req'd Nos	1992 Nos	1993 Nos	Rem. Nos
"A" Category								
1. MIDLANDS	700	54	100	50	0	0	0	0
2. SAVE CONSERVANCY	3,300	23	660	100	77	20	10	47
3. W. NICHOLSON CONSERV.	3,000	18	600	100	82	20	10	52
4. LONELY MINE	300	14	60	30	16	0	5	11
"B" Category								
5. BUFFALO RANGE AREA	650	8	130	65	57	0	5	52
"C" Category								
6. Gonarezhou NP	5,207	10	500	100	90	0	25	65
7. Umfurudzi Safari Area	760	0	152	76	76	0	10	66
8. Hartley "A" Complex	1,000	0	200	100	100	0	10	90
9. Chipinge Safari Area	261	8	20	10	2	0	2	0
"D" Category								
10. Ruwanzi Ranch	70	12	28	14	2	0	0	2
11. Imire Ranch	24	7	10	5	0	0	0	0
12. Mhondoro Park	8	2	3	2	0	0	0	0
13. Chipangali	1	4	10	10	6	0	0	6
14. Pamuzinda	10	2	2	2	0	0	0	0
15. NP Captive Breeding	2	0	20	20	20	16	3	0
"E" Category								
16. Marula (Stokestown)	12	3	0	0	0	-3	0	0
TOTALS	**15,309**	**165**	**2,495**	**684**	**528**	**53**	**80**	**391**

*Fp = Founder population

Categories

A - Major established breeding nuclei to be supported as top priority.
B - Existing breeding nuclei requiring certain commitments at present.
C - Potential major nuclei given government/private funding.
D - Holding areas for nursery/captive breeding purposes.
E - Areas from which rhino should be removed.

ANNEX 6

MONITORING OF RHINO NUMBERS

This Conservation Strategy depends critically on a knowledge of rhino numbers within the designated Intensive Protection Zones. The redefinition of IPZ boundaries once the programme is under way will require accurate population estimates and a knowledge of rhino distribution. Decisions to relocate entire rhino populations will depend upon whether numbers fall below designated thresholds in IPZs. Assessment of the performance of rhino in Breeding Nuclei will also require accurate monitoring of births, deaths and dispersal.

The available techniques for assessing rhino numbers are limited to aerial surveys and ground counts. Experience with air surveys, both within Zimbabwe and elsewhere, suggests that it is difficult to obtain accurate and precise estimates from conventional sample surveys both with fixed wing aircraft and helicopters (du Toit 1989b). Problems arise with dense vegetation, small group sizes, the animals' response to the aircraft and the speed and altitude at which the search is conducted. Helicopters are considerably better than fixed wing aircraft but are also expensive.

In limited areas, ground counts can be very accurate. In Damaraland and Etosha National Park in Namibia a detailed individual recognition file for each rhino has been built up over a number of years. du Toit (1989b) found that indiviual rhinos could be recognised from careful analysis of spoor records, but it would require a full-time researcher to obtain results. One option under this strategy is to assign a researcher to each IPZ (approximately 1 000 sq.km) with the task of assembling a detailed record of all rhino in the area, in close coordination with the field staff engaged on routine patrols. However, the costs of full-time researchers are also high.

In the Attachments to this annex, costs are compared for two helicopter surveys of each IPZ annually with the costs of placing a researcher in each of the 8 IPZs under an overall a research co-ordinator. The cost of a 5 year field research programme at Z$4 million (including capital outlays) is slightly less than a 5 year helicopter survey programme which would be about Z$5 million annually.

In the long run, the placement of researchers in each IPZ has greater benefits than determining numbers of rhino by helicopter survey. The accuracy should be greater and the research should provide a more intimate knowledge of the population. In addition the researchers would undertake the monitoring of law enforcement effort and illegal activity (Annex 7). By integrating the research effort fully with the law enforcement effort it is to be expected that additional benefits would flow.

It is recommended that, while the rhino data base is being established in the first and second years of the programme, an annual helicopter survey of the IPZs should be carried out in addition to ground monitoring. This will provide an independent check and, conversely, the ground survey should provide correction factors for rhino counting from the helicopter.

Rhino numbers in the Breeding Nuclei are being monitored by a full-time researcher with the responsibility of recording all births, deaths and dispersion in these new populations. The researcher is also responsible for the establishment of "conservancies" in the major breeding nuclei. The researcher has been seconded to the Department by WWF and is supported on funds from the Beit Trust.

Annex 6: Attachment 1

COSTS OF A FULL RESEARCH TEAM FOR INTENSIVE PROTECTION ZONES

(All figures in Zimbabwe dollars)

1.	One researcher in each IPZ: 8 x $40 000 annual salary	320 000
2.	One full-time research coordinator @ Z$50 000	50 000
3.	4WD Vehicles: 9 x $70 000 (external prices)	630 000
4.	Mileage costs: 2 000 km/m x 12m x 9 vehicles x $1/km	216 000
5.	Computing equipment, binoculars etc. per IPZ: $10 000 x 9 .	90 000
6.	Field accommodation: 8 tents, camp furniture etc x $10 000	80 000
7.	Accommodation for co-ordinator in Harare: 12 x $1 000	12 000
	Subtotal	1 398 000
	Contingency	102 000
	TOTAL	**1 500 000**

The above would constitute initial capital outlay and recurrent expenditure for the first year of operations. In subsequent years, recurrent expenditure would reduce to approximately Z$0.6 million.

The total cost of a 5 year programme of research connected with the IPZs would therefore be approximately Z$4 million (US$0,8 million).

Annex 6: Attachment 2

COSTS OF INTENSIVE HELICOPTER AIR SURVEY OF IPZs ANNUALLY

In order to improve accuracy, reduce confidence limits and obtain good distributional data, a sampling intensity of 50% is considered in the following costing.

Total area to be sampled	10 000 sq.km.
Sampled area (50% sample)	5 000 sq.km.
Rate of coverage (including positioning time) ...	20 sq.km/hour
Total survey time	250 hours
Cost per survey: 250 hrs x Z$2 000/hr	Z$500 000
Cost for two surveys per annum	Z$1 000 000
Cost for five year programme	Z$5 000 000

ANNEX 7

MONITORING OF ILLEGAL ACTIVITY AND LAW ENFORCEMENT EFFORT

Bell (1986, pp319-350) discusses the essential elements required for effective analysis of the relationship between effort expended on law enforcement and the degree of illegal activity in a protected area. As part of a study supported by WWF, du Toit (1989a) developed the basic concepts of this system for application in the Zambezi Valley, Zimbabwe.

Law enforcement in African conservation areas relies largely upon field patrols covering the ground effectively. It is accepted that illegal hunting can never be eliminated - even where poachers are killed in an effort to deter others. The extent of illegal activity is directly related to the effort expended in attempting to counteract it. Research carried out by the Department in 1988 indicated that the key factor influencing the rate of loss of rhino was the time taken to detect the presence of poachers, which in turn is related to the intensity of patrolling.

The method outlined by Bell consists of:

- Measuring law enforcement effort through a system of patrol reporting which records the total time spent by patrols in the various parts of the protected area;

- Measuring illegal activity through reports of all major and minor offenses broken down into standard categories; and

- Relating the illegal activity to the degree of law enforcement using standardised units of time and area.

The process is similar to the catch/effort analysis performed in fisheries. As effort is increased in the early stages of a fishery it can be expected that the catch of fish will increase. In a law enforcement situation, as effort is increased more and more illegal activity will be detected. At some point, when law enforcement is beginning to have an effect, it is to be expected that increasing effort will lead to a reduced level of illegal activity. The fisheries parallel is when increased effort leads to reduced catches. Only by monitoring the process will it be possible to detect the point at which law enforcement is containing the threat to wildlife.

It is important that the patrol reporting system is simple and easy to implement. The primary object of patrols is to act as a deterrent for illegal activity, not to generate large quantities of data for other uses. A secondary object is to provide data on animal abundance. Rather than use extensive, complicated patrol reporting forms, it is more effective for patrol leaders to compile good narrative reports which are then discussed in a careful debriefing session with the officers who will finally be responsible for transferring the data to maps and to a computer for analysis. Each patrol report is prefaced by a simple summary sheet detailing the staff who carried out the patrol, the dates and the locality of operation.

In the initial stages of implementing this conservation strategy it should be part of the responsibilities of the researcher in each IPZ (see proposal in Annex 6) to assist in debriefing and to carry out the data analysis required. This liaison will also play an important role in the researchers' other task of counting the numbers of rhino in the area. The overall coordinator for research would be responsible for standardising the system throughout the IPZs and for synthesizing the combined data from all areas for presentation at a national level.

Law enforcement effort should be measured in terms of the number of times a particular gridsquare is visited. du Toit (1989a) recommended 5 x 5 km squares for use in the Zambezi Valley on the basis that errors in location would be few at this scale. However, in the Intensive Protection Zones it may be possible to work with 1 x 1 km squares.

Bell stresses the importance of separating clearly the time wasted in positioning patrols from the time spent on effective patrolling. It will be important to take this aspect into account in Zimbabwe operations as it is one measure of the effectiveness of helicopter deployment.

It will also be necessary to include a measure of time spent in static observation posts as another type of contribution to law enforcement effort. du Toit suggests this should be done by relating the area under surveillance from any given observation post to the typical area covered by mobile patrols in the same period. Of particular interest will be the relative effectiveness of static observation posts compared to mobile patrols in recording illegal activity.

In measuring illegal activity, it is important to separate major offenses from minor offenses. The killing of key animal species such as black rhino and elephant are more serious offences than subsistence poaching for meat or gathering wild honey. As the main purpose of introducing this system is to monitor rhino poaching, it will probably be adequate to compile an index based on a limited list of major offenses which includes carcases found, gunshots heard, and armed groups detected.

The analysis of data provides considerable information of value to the officer in charge of law enforcement in each IPZ and at a national level. The patrol data on its own is a measure of relative performance by different patrol groups and by all groups over a period of time. It can be used to ensure that patrol effort is spread more evenly and more effectively over the protected area. When it is related to the index of illegal activity, it provides information on patterns of illegal hunting and changes taking place.

The monitoring of law enforcement effort should be extended to include investigative work which is essential to back up field patrolling. In a recent report, Bell (1990) concludes that one day of good investigative work produces the equivalent of 28 days of patrolling in terms of the numbers of convictions of illegal resource users.

The importance of this monitoring cannot be overstated. Quoting from Bell (1986):

> "Law enforcement is one of the major branches of wildlife management in African conservation areas. The monitoring system described here provides a means whereby the actual performance of this branch of management can be evaluated and, if necessary, modified or adjusted. Such forms of management are based on the assumption that certain techniques and methods are effective: the monitoring system described here provides a means by which these assumptions can be tested and, if necessary, replaced or improved.
>
> This role as a means of evaluating the performance of a major branch of wildlife management should be seen in the wider context of the concept of adaptive management. .... The monitoring system is regarded as an integral component of an agency operating by adaptive management in all its branches. The roles of research, management and monitoring are not seen as conflicting but interlocking. Equally, the techniques involved in the actual execution, the recording, the analysis and the evaluation of a particular branch of management are seen as part of a body of professional expertise that should be built into the agency, starting at the level of training curricula, reinforced by in-service training and formalised by the administrative structure.
>
> We argue that only in this way will conservation agencies reach the level of professionalized self-correction that will allow them to conserve Africa's wildlife resources in an efficient and responsive manner."

ANNEX 8

STRATEGY FOR COMMUNAL LAND RHINO POPULATIONS

The Department is sensitive to the fact that all Communal Lands in Zimbabwe which contain wild populations of black rhino have recently been granted the authority to manage their own wildlife. The granting of this "Appropriate Authority" status has been done in recognition of the fact that the communities in these areas have chosen to adopt wildlife management as a major form of land use.

It could well be seen as an act of mistrust if government were to act with a heavy hand in removing their remaining rhino without full prior consultation. At the same time, the crisis of rhino survival has reached the stage where government would be shirking its duties if it followed any course other than the best technical option for the species survival.

At this stage, communal land wildlife programmes have to be regarded as experimental, without any guarantee that adequate safeguards exist for protection of black rhino. There is no data to suggest that the rate of loss of rhino in communal lands is significantly different from that in state protected areas and therefore there is no basis to foreclose the unique possibility of establishing successful conservation programmes for rhino in the wild outside of protected areas in Africa.

Recent developments in the communal lands wildlife management programmes have resulted in the formation of the CAMPFIRE Association which is a producer organisation representing those District Councils which have the Authority to manage their own wildlife. This Association recently (July 1991) approached the Department with a request that rhino in communal lands should be able to realise a commercial value if they are to survive in the long term. The Association requested licences for sport hunting of a small quota of black rhino by foreign clients on an experimental basis in four communal lands. Their request was referred to the Parks and Wild Life Board who have asked for further information regarding the value of rhino in various markets before adopting a position on the issue. The Board is mindful of the wildlife policy for Zimbabwe which advocates a high economic value for wildlife coupled with the rights of landholders to benefit directly from their conservation efforts.

The proposal by the CAMPFIRE Association included an offer to provide the nucleus of animals for the Government's new captive breeding centre for black rhino with specific interest in obtaining the progeny of the captive breeding programme for restocking communal lands. The proposal further outlined the specific manner in which the returns from rhino management would be re-invested in the conservation of the species.

In view of this proposal, it is recommended that the interim strategy adopted with respect to communal land rhino populations is as follows:

a) Although no communal land rhino populations are large enough to satisfy the criteria for Large Wild Populations, there is no immediate justification for attempting to relocate these animals. Because all the communal lands with black rhino abut onto the Parks and Wild Life Estate, their populations cannot be considered as isolated entities.

b) Until the Parks and Wild Life Board have taken a position on the question of exploitation of rhino in communal lands, no capture and translocation should be carried out unless it is at the request of the District Council concerned.

c) The provision of animals for the national captive breeding programme (OBJECTIVE 3) should be accepted if the overall proposal is recommended to the Minister by the Board.

d) Communal lands should be encouraged to pursue options which attach a commercial value to black rhino without killing them in the short term (e.g. non-consumptive tourism or dehorning programmes which have the dual objective of commercial sale of rhino horn [this is contingent on the outcome of the Zimbabwe proposals to CITES in 1992] and the protection of rhino from illegal hunters).

ANNEX 9

NATIONAL CAPTIVE BREEDING CENTRE FOR BLACK RHINO

RESEARCH PROGRAMME

The proposed captive breeding centre for black rhino in Zimbabwe is to serve two main purposes. Apart from its nominal function of propagating black rhino, a key requirement is the investigation of factors affecting rhino survival in the course of capture, confinement and translocation.

The captive breeding component of the Centre will be conducted in close liaison with the IUCN Captive Breeding Specialist Group and the regional zoo organisations throughout the world which are participating in the ex-situ captive breeding programme for black rhino. The rhinos in the Centre will be treated as part of the ex-situ captive breeding programme, whereby rhinos may be exchanged with or sent to other zoos in the world. At the same time, the Centre will play a role in the management of small populations in Zimbabwe with rhino exchanges taking place with other subpopulations when required.

Capture and translocation of black rhinos in the Zambezi Valley has been associated with relatively high mortality. From 1986-89 the overall loss of rhinos has been 13% which is unacceptable. Research carried out during 1988/89 has identified areas where improvements can be made and several management recommendations have been implemented to reduce mortalities. In the more recent captures mortality has been zero.

Due to problems related to capture, confinement and translocation of the black rhino in Zimbabwe (Kock et al. 1989a, 1989b and 1989c) and medical problems relating to the keeping of this species in captivity worldwide (Maruska et al. 1986), there is a need to consolidate veterinary medical research carried out on wild and translocated populations of black rhino in Zimbabwe. There is a need to improve survival in a captive environment and newly created breeding nuclei in Zimbabwe should produce progeny at a maximum rate.

A. RESEARCH ON CAPTURE, CONFINEMENT AND TRANSLOCATION

The components of this research will consist of the following:

- stress associated with capture and translocation;

- effects of long-term confinement and causes of mortality;

- monitoring of health status in captivity, including haematological and biochemical parameters (Kock et al. 1989b), vitamin levels (particularly vitamin E), and trace minerals (particularly selenium);

- investigations into nutrition, including weight monitoring, food intake, comparisons of different food types and combinations, and any medical problems related to nutrition;

Numerous data were collected during the 1988/89 capture season relating the effects of capture, confinement and translocation on the health, well-being and survival of the black rhino (Kock et al. 1989a, 1989c). Between 1986-89 mortalities were highest in female rhinos, and particulary in pregnant animals. Baseline biological data have been established (Kock et al. 1989b) which are invaluable in determining deviations from normal health. A great deal has still to be learned about prolonged confinement, maintenance of body condition and food intake.

The founder rhinos at the Centre would be closely followed from capture, during transport, during the initial boma period and then during extended captivity. Biological data accumulated during these stages will be useful in assessing the rhinos' health during the adaptation period and will provide baseline information for later nutritional and reproductive studies. Any mortalities would be thoroughly investigated with a retrospective evaluation of data collected.

B. REPRODUCTIVE COMPONENT

This research will focus on topics related to fecundity of rhino:

- continuing research on blood hormonal levels related to pregnancy and the normal oestrus cycle;

- collaborative research with the AAZPA and the Zoological Society of London into the reproductive physiology of black rhino, including monitoring of urinary reproductive hormone levels associated with oestrus and pregnancy;

- behavioural research related to oestrus, mating and pregnancy;

- research of veterinary medical problems associated with reproduction.

Priorities will need to be identified among the above topics to avoid overlap with external research. Considerable work has been carried out in the U.S.A. and Europe on the reproductive physiology of black rhino. However, there are many contraints to this type of research in zoos abroad that would not be present in a research programme in Zimbabwe.

Data have already been collected in Zimbabwe on vaginal cytology associated with reproductive status, and hormonal levels associated with pregnancy in wild black rhino. The research programme should be designed in such a way that adult female rhinos are monitored on a weekly basis, with the collection of blood and urine samples. Female rhinos can be tamed and trained to accept this sampling and the opportunity to explore chemical sedation and tranquilisation methods can be incorporated into the programme.

In the event of successful reproduction, research could be carried out into the nutritional requirements of the neonate and medical problems encountered.

PHYSICAL DETAILS OF THE CENTRE

Location:

The Centre is located close to Harare at Boulton Atlantica Research Station which gives the following advantages:

- close collaboration with the Faculties of Veterinary Science and Medicine at the University of Zimbabwe and the Government Veterinary Research Laboratory with sophisticated laboratory facilities;
- liason with National Parks Head Office;
- international communications;
- access to drugs, chemicals and food supplies;
- experienced manpower for maintenance of the facility.

Design:

Holding facilities for rhinos kept in captivity are based on those developed for the capture and translocation programmes with the following modifications:

- larger bomas, of the order of a quarter hectare;
- development of housing areas within each boma;
- development of a centralised examination, restraint and loading area, with access between all bomas;
- installation of weighing facilities.

Numbers of rhino

Animals will be moved to the research facility as part of an ongoing capture and translocation programme. Initially, six animals would comprise the research nucleus with two males (adult and subadult), and four females (two adults, two subadults). The three subadults could be housed together for the initial period of captivity.

Depending on the success of the initial nucleus of animals in adapting to captivity and remaining in good health, additional animals may be added in subsequent years up to a maximum of twenty.

BUDGET

Capital items

The initial cost of construction of the centre was Z$150,000. This amount does not include the construction of two large "recreational" paddocks, custom-built steel gates for controlling the movement of rhinos within the centre and weighbridge facilities which have yet to be installed and which will probably entail an additional Z$100,000.

Recurrent expenditure (at full development)

Rhino feeding: 20 @ Z$40 000 each	800 000
Veterinary care @ Z$5 000 each	100 000
Miscellaneous drugs etc.	100 000
**TOTAL ..... **	**1 000 000**

All rhino in the captive breeding programme and any others which are temporarily housed in the centre will have their horns removed as a routine treatment to prevent self-injury in confinement. It is hoped that, to a large extent, the operating costs of the centre can be met by legal trade in these horns (Zimbabwe has placed proposals for trade in rhino horn before the 1992 Meeting of the Parties to CITES in Japan).

ANNEX 10

BUDGET FOR EXTERNAL FUNDING

The budget given in Annex 3 was for the Treasury of the Government of Zimbabwe to consider if it intended to fund adequate law enforcement over the present 45 000 sq.km of the Parks and Wild Life Estate. This budget was entirely annual recurrent expenditure set at a level which would support field staff at the minimum density required to protect rhino. It did not include capital expenditure although some broad references were made regarding the level of staff housing, vehicles and equipment which would be required. Some of these capital items are included in this annex.

The budget discussed in this annex is based on the assumption that Treasury will be unable to provide the budget of Annex 3 and that the Department will be forced to adopt the provisions of Section 2.1.1. (main text). This is a strategy based on no further increases in staff or operating budget. It involves designating certain Intensive Protection Zones which receive additional protection with existing manpower and removing the remaining rhino outside these zones.

The items presented in this budget are those which are not expected to be forthcoming from the Treasury, but which external and local donors might support. Table 10 - 1 gives a budget for some capital items and certain aspects of recurrent expenditure where shortfalls are likely to occur. The budget in Table 10 - 1 was produced in 1989 when the exchange rate for the Zimbabwe dollar was approximately US$1=Z$3: since then the Zimbabwe dollar has weakened to US$1=Z$5. The budget has not been altered although the requirement for certain items may have been satisfied in the interim.

The assigned priorities take into account some items already partly funded and should not be taken to reflect exactly the priorities in a conservation context. Individual budget items are justified briefly below and notes are included where prices are likely to have altered substantially since 1989.

CAPITAL ITEMS (All prices in Zimbabwe dollars)

1. Housing

a) **Intensive Protection Zones (PRIORITY #1):** The manpower which will be deployed as extra staff to the Intensive Protection Zones is 200. They will require housing, probably within the designated zones. It is not envisaged that this would be permanent housing: rather it is should be of a prefabricated type which can be moved if necessary. It is estimated that Z$10 000 per man should be adequate for such a purpose. This is the **highest priority** in the budget: without it the entire strategy will not be realisable.

b) **Remainder of the Estate (PRIORITY #13):** This strategy envisages a general increase in the number of staff allocated to the larger, remote protected areas. Inevitably this will require more staff housing - particularly in the junior staff category.

[1992 note: the cost of prefabricated housing has risen to about Z$40,000 per unit]

2. Vehicles

The Department is desperately short of vehicles in all areas. It would be important for all vehicles acquired to be incorporated into the Department fleet rather than the national government fleet.

a) **Four-wheel drive vehicles (PRIORITY #6):** The number of vehicles here is based on a distribution of 1 vehicle to every 1 000 sq.km of the Parks and Wild Life Estate (45) with a deduction for 15 vehicles presently operating.

b) **5-tonne trucks (PRIORITY #7):** These are needed throughout the Estate for both personnel and load carrying. The calculation is based on one truck to 2 000 sq.km less the few presently operating vehicles.

a) **Two-wheel drive pick-ups (PRIORITY #18):** Many of the present journeys undertaken by four-wheel drive vehicles at a over $1/km could be undertaken by two-wheel drive pick-up trucks running at half the operating cost.

[1992 note: the costs of vehicles have escalated to roughly double the figure in Table 10 - 1]

3. Capture equipment

a) **20-tonne truck (PRIORITY #14):** The proposed strategy involves the movement of large numbers of rhino every year. At present the Department is forced to hire large long-range transport vehicles commercially at very high rates. The acquisition of its own truck suitable for moving up to ten rhino at once would reduce translocation costs.

[1992 note: the cost of such a vehicle would now be about Z$500 000]

b) **General capture equipment (PRIORITY #12):** Equipment envisaged includes dart guns, drugs, boma construction materials, wire ropes, winches, tools and other workshop items.

4. Helicopters **(PRIORITY #2)**

Experience from the past three years of anti-poaching operations has shown that helicopters are vital for numerous aspects of law enforcement work, particularly staff deployment. Illegal hunting is now taking place in three main regions of Zimbabwe (the Zambesi Valley, the Sebungwe and Matabeleland North) and logistically they cannot be served by less than 3 helicopters.

[1992 note: The International Black Rhino Foundation is likely to provide two helicopters together with spares and operating expenses (one in 1992 and one in 1993). This donation will have a significant effect on rhino survival].

5. Field equipment

a) **Special surveillance equipment (PRIORITY #5):** A large number of the recent successes in anti-poaching have been attributable to the detection of poachers with sophisticated surveillance equipment. These items are extremely expensive (over $100 000 per unit).

b) **General field equipment (PRIORITY #9):** There is an ongoing need for provision of packs, tents, water-bottles, mosquito nets and a number of other equipment items for the scouts on patrols. To a large extent this could be regarded as recurrent expenditure because the equipment receives harsh treatment and requires frequent replacement. The sum proposed annually ($250 000) is equivalent to $167 per scout per annum.

c) **VHF radios (PRIORITY #11):** The Department has established an excellent VHF communication system for anti-poaching work throughout most of the Parks and Wild Life Estate. Funds are required to add additional radios to the system and to complete installations in a few remaining areas.

6. Captive Breeding Centre **(PRIORITY #15)**

The estimated capital costs are given in ANNEX 9 and have been rounded up here.

[The Centre has now been built but still requires a number of additional items and will soon incur significant recurrent expenditure as detailed in ANNEX 9]

7. Breeding Nuclei **(PRIORITY #17)**

A proposal has been prepared by du Toit (1989c) for external assistance mainly to one large conservancy in the south-east lowveld area of Zimbabwe. The assistance consists of loans for electric fencing, the appointment of a wildlife manager, costs of setting up anti-poaching forces, and provisions for research. Whilst the Department would require several modifications to the original document, in principle it is not opposed to external support for breeding nuclei since these are part of its strategy and the animals belong to the nation.

The costs prepared by du Toit have been increased in this budget to take into account the formation of an additional large conservancy in Matabeleland South and some assistance to other established breeding nuclei.

[1992 note: Funds amounting to one million pounds stirling have been obtained from the Beit Trust in England for this purpose and are being presently administered through WWF. The budget item is still included as there are increasing developmental requirements in the newly formed conservancies for black rhino and it is likely that the smaller state protected areas in Category "C" in Annex 5 will receive black rhino in 1993.]

OPERATIONAL COSTS

8. Vehicles **(PRIORITY #19,20,21)**

In the normal course of events, government would assume all recurrent expenditure for donated vehicles. However, the present allocations have been insufficient to meet operational needs and this item has been inserted in the budget as partial support which is reduced to zero over the 6 year programme. The assumptions are that each vehicle would normally cover about 2 000 km on field duties in each month. The assistance sought is for half of this amount and only in respect of the donated vehicles.

9. Helicopters

a) Normal duties **(PRIORITY #3):** The Department has no historical allocation under this heading from the Treasury and it is unlikely to receive any special provisions in the immediate future. Based on the past few years of running a helicopter on WWF funding in the Zambezi Valley, it is expected that approximately 50 hours will be required for each helicopter each month.

b) Annual air survey of black rhino **(PRIORITY #10):** The case for a helicopter survey for black rhino was presented in Annex 6. The provision is for 250 hours for an intensive survey confined to the IPZs.

[1992 note: some of these costs will be met by the International Black Rhino Foundation]

10. Research **(PRIORITY #4)**

In Annex 6 it was argued that, in order for the strategy based on IPZs to work, there is strong justification for a researcher to be based in each IPZ. Each researcher would build up a detailed record of numbers of rhinos from ground sightings and implement a system of monitoring law enforcement effort and illegal activity. It is envisaged that these researchers would be fully integrated into the staff system in each IPZ. An overall coordinator is proposed to supervise the 8 researchers. The research team envisaged would consist partly of government ecologists and partly of suitably qualified individuals from anywhere in the world. The detailed budget for this proposal is given in Annex 6.

[1992 note: the 5 year programme cost is now Z$4 million (Annex 6)]

11. Rhino Capture and translocation **(PRIORITY #8)**

This strategy envisage up to 100 animals being moved annually for at least the next 4-6 years. From costings of previous rhino translocation exercises, it requires about $10 000 for each animal captured and moved. These costs would be reduce if the Department is successful in acquiring its own helicopter and large capture vehicle.

12. Captive Breeding Centre **(PRIORITY #16)**

The maintenance costs for each rhino are approximately US$10 000 per year (page 12). The budget assumes that the centre would have a full complement of 20 rhino in 1993.

It might appear that the total figure of Z$38 million (US$17 million) is excessive. The amount is spread over 6 years with the highest annual requirement being Z$12 million. The capital and recurrent components are approximately equal.

The amount is perhaps not so great when viewed in the context of the present Zimbabwe government expenditure. At present, Zimbabwe devotes over Z$30 million annually to the protection of its wildlife resource and most of this can be attributed to protection of rhino. This amount is recurrent expenditure and does not take into account capital inputs which are normally several million annually. The level of expenditure indicates a high government commitment to conservation. The sum of external assistance sought here amounts to about one-sixth of the expected government contribution over the 6 year period.

The assistance sought is also small when it is seen in the light of the potential disappearance of black rhino as a species. In Zimbabwe, it is 1% of the defence budget, or half of the amount spent recently to acquire one new aircraft for the national airline. Internationally, it probably amounts to less than the cost of one inter-continental ballistic missile. In a world context, it is a very small sum to pay to avoid the extinction of one of the largest mammals on earth.

TABLE 10 - 1: PRIORITISED BUDGET FOR POSSIBLE EXTERNAL FUNDING

All amounts in thousands of Zimbabwe dollars. P = Priority

	CAPITAL ITEMS	1990	1991	1992	1993	1994	1995	TOTAL	P
1.	Housing:								
	IPZs: 200 men @ 10	1,000	1,000					2,000	1
	Other: 400 houses @ 15 .	1,000	1,000	1,000	1,000	1,000	1,000	6,000	13
2.	Vehicles:								
	30 4WD @ 33	500	500					1,000	6
	15 5-ton @ 50	500	250					750	7
	10 2WD pickups @ 25	150	100					250	18
3.	Capture Equipment:								
	20-ton truck @ 200	200						300	14
	General equipment	50	50	50	50	50	50	300	12
4.	Helicopters: 3 @ 1,000	2,000	1,000					3,000	2
5.	Field Equipment:								
	Surveillance equipment:	500	200	100				800	5
	Tents, packs etc.	250	250	250	250	250	250	1,500	9
	VHF Radios	200	200	100				500	11
6.	Captive Breeding Centre	150	100	50				300	15
7.	Breeding Nuclei	1,000	750	500	250			2,500	17
	SUBTOTAL	7,500	5,400	2,050	1,550	1,300	1,300	19,200	
	OPERATIONAL COSTS								
8.	Vehicles								
	4wd: 12000km/yr x 30 @ 1	350	300	250	200	150	100	1,350	19
	5ton:12000km/yr x 15 @.8	150	120	90	60	30		450	20
	2wd: 12000km/yr x 10 @.5	50	40	30	20	10		150	21
9.	Helicopters:								
	3 x 50hrs/m x 12 x 1000	1,800	1,500	1,200	900	600	300	6,300	3
	Survey (Annex 6)	250	250	250	250	250	250	1,500	10
10.	Research (Annex 6):	1,000	500	500	500	500		3,000	4
11.	Capture								
	100rhino/pa @ 10,000ea	1,000	1,000	800	600	400	200	4,000	8
12.	Captive Breeding Centre	100	300	300	300	300	300	1,600	16
	SUBTOTAL	4,700	4,010	3,420	2,830	2,240	1,150	18,350	
	TOTAL	12,200	9,410	5,470	4,380	3,540	2,450	37,550	

REFERENCES

R.H.V. Bell (1986). Monitoring of Illegal Activity and Law Enforcement in African Conservation Areas. **Conservation and Wildlife Management in Africa,** (eds. R.H.V. Bell and E. McShane-Caluzi), Peace Corps, Washington): pp319-351.

R.H.V. Bell and J.E. Clarke (1986). Funding and Financial Control, **Conservation and Wildlife Management in Africa,** (eds. R.H.V. Bell and E. McShane-Caluzi), Peace Corps, Washington): pp545-555.

R.H.V. Bell (1990). Law enforcement report - Luangwa Valley. LIRDP occasional report, Chipata, Zambia.

P.M. Brooks (1989) Ed. **Conservation Plan for the Black Rhinoceros Diceros bicornis in South Africa, the TBVC states and SWA/Namibia.** Natal Parks Board, Pietermaritzburg, South Africa.

D.H.M. Cumming, R.B. Martin and R.D. Taylor (1984). Questionnaire survey on the management and conservation of elephants and rhinos, **The Status and Conservation of Africa's Elephants and Rhinos,** (eds. D.H.M. Cumming and P. Jackson), IUCN, Gland: pp 46-62.

R.F. du Toit (1989a). Suggested patrol reporting system for Operation Stronghold. Report prepared by the WWF Zambezi Rhino Project, August 1989. World Wide Fund for Nature, Gland, Switzerland.

R.F. du Toit (1989b). Investigations into methodology for monitoring black rhino populations in Zimbabwe. Report prepared by the WWF Zambezi Rhino Project, August 1989. World Wide Fund for Nature, Gland, Switzerland.

R.F. du Toit (1989c). Zimbabwe Rhino Conservancy Project. Proposal for assistance from the Beit Trust, 7 Nov 1989. World Wide Fund for Nature, Gland, Switzerland.

T.J. Foose (1987). Long term management of small rhino poplations. In: **Proceeedings of African Rhino Workshop,** Cincinnati, October 1986. Eds. R.F. du Toit, T.J. Foose and D.H.M. Cumming. Special Issue, Pachyderm (9): 13-15.

M.D. Kock, M. la Grange and R. du Toit (1989a). Chemical immobilisation of free-ranging black rhinoceros Diceros bicornis in Zimbabwe using combinations of Etorphine (M99), Fentanyl and Xylazine. J.Zool.Wildl.Med. Submitted 1989.

M.D. Kock, R. du Toit, D. Morton, N.D. Kock and B. Paul (1989b). Baseline biological data collected from chemically immobilised free-ranging black rhinoceros Diceros bicornis in Zimbabwe. J.Zool.Wildl.Med. Submitted 1989.

M.D. Kock, R. du Toit, N.D. Kock, D. Morton, C. Foggin and M. la Grange (1989c). Effects of capture and translocation on biological parameters in free-ranging black rhinoceros Diceros bicornis in Zimbabwe: evaluation at capture, following transport, after boma confinement, and documentation of survival following translocation. J.Zool.Wildl.Med. Submitted 1989.

R.C. Lacy (1987). Loss of genetic diversity from managed populations: interacting effects of drift, mutation, immigration, selection, and population subdivision. Conservation Biology 1(2): pp143-158.

R.C. Lacy (1987). Further genetic and demographic analvses of small rhino poplations. In: **Proceeedings of African Rhino Workshop,** Cincinnati, October 1986. Eds. R.F. du Toit, T.J. Foose and D.H.M. Cumming. Special Issue, Pachyderm (9): 16-19.

N. Leader-Williams (1989). Luangwa Rhinos: "Big is best, small is feasible", **Pachyderm** 12: pp 27-28.

R.B. Martin, G.C. Craig, D.H.M. Cumming, K.M. Dunham, D.St.C. Gibson, R.F. du Toit, E.F. Robertson, C.S. Swanepoel and R.D. Taylor (1988 in preparation). A simulation model of the black rhino population in the Zambezi Valley, Zimbabwe, with particular emphasis on illegal hunting. Department of National Parks and Wild Life Management.

R.B. Martin (1991). Rhino population dynamics, illegal hunting and law enforcement in the Lower Zambezi Valley, Zimbabwe. In: **Proceedings of an International Rhino Conference**, San Diego, California, May 1991. Ed. O. Ryder. (In press).

E.J. Maruska, B.L. Dresser and B.D. Barden (1986) Eds. **Black Rhinoceros International Management Survey.** American Association of Zoological Parks and Aquariums Species Survival Plan. 95pp.

E.J. Maruska (1987) Ed. **SSP Masterplan for Black Rhinoceros, November 1987.** AAZPA, Cincinnati Zoo.

W.K. Nduku and R.B. Martin (1991). Development of the Zimbabwe National Conservation Strategy for Black Rhinoceros. In: **Proceedings of an International Rhino Conference**, San Diego, California, May 1991. Ed. O. Ryder. (In press).

I.S.C. Parker (1989). **The Ivory Trade 1979-1987.** Consultant report to the CITES Secretariat, Lausanne.