

TANZANIA RHINO CONSERVATION PROJECT

Interim report to the
TANZANIA RHINO WORKSHOP
Arusha, May 1993

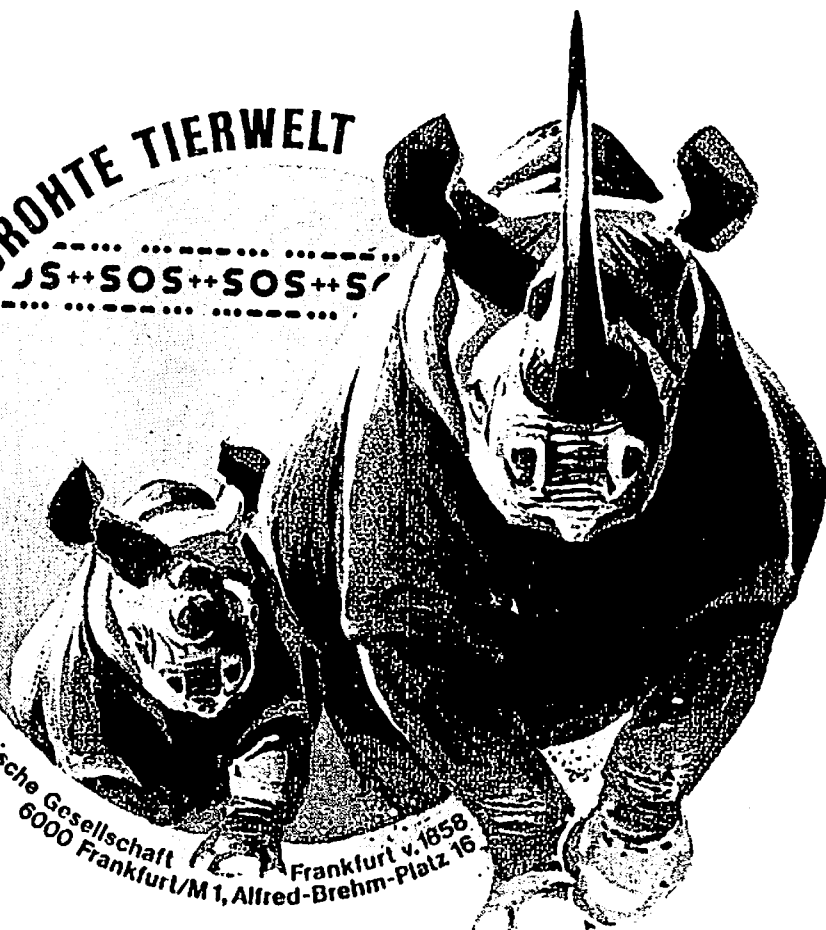
**Ministry of Tourism, Natural Resources and Environment
Wildlife Division
with
Frankfurt Zoological Society**



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TANZANIA RHINO CONSERVATION PROJECT

INTERIM REPORT

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Definitions used throughout this report are:-

"rhino"	the Black Rhinoceros (<i>Diceros bicornis</i>) of which Tanzania has two sub-species, <i>D. b. michaeli</i> and <i>D. b. minor</i> .
"Wildlife Division"	the Wildlife Division of the Ministry of Tourism, Natural Resources and Environment of the United Republic of Tanzania.
"Project"	the Tanzania Rhino Conservation Project, a joint project between the Wildlife Division and Frankfurt Zoological Society.
"TANAPA"	Tanzania National Parks, a parastatal organisation which administers Tanzania's 12 National Parks, totalling some 41,000 sq. kms.
"NCAA"	the Ngorongoro Conservation Area Authority, a parastatal organisation which administers the Ngorongoro Conservation Area.
"TWCM"	Tanzania Wildlife Conservation Monitoring, a joint project between the Serengeti Wildlife Research Institute, the Wildlife Division, TANAPA, NCAA and Frankfurt Zoological Society.
"NEMP"	Ngorongoro Ecological Monitoring Programme, a joint project between NCAA and Wildlife Conservation International, a division of the New York Zoological Society.
"FZS"	Frankfurt Zoological Society.
"AWF"	African Wildlife Foundation.
"IUCN"	International Union for the Conservation of Nature.
"WWF"	World Wide Fund for Nature.
"giz"	Gesellschaft fuer Technische Zusammenarbeit of the Government of Germany.

1. INTRODUCTION

The early explorers in East Africa saw scores of rhinos, day after day, (Guggisberg, 1966) and in the early part of this century rhinos were still regarded as a pest in many parts of Tanzania. However, the ease with which rhinos could be killed, the idea that it was a great sporting feat and the price commanded by rhino horn rapidly reduced numbers throughout East Africa. So much so, that as early as the 1920s the experienced hunter W.A. Dugmore wrote:

"Unless *very stringent* laws are made for the rhino's protection, it is safe to predict their early extermination, except possibly in the forest country where they still live more or less unmolested. In any event, the sale and export of rhino horns should be strictly prohibited. As long as these command high prices the animals will be shot."
(Dugmore, 1925)

Although numbers continued to be much depleted by hunters, the species was still regarded as common in most parts of Tanzania in the 1940s and 1950s particularly in West Lake Region, Maasailand and Mbululand in northwest and north-central Tanzania (Tanganyika Handbook, 1958).

It was in the 1970s that the price of rhino horn started to climb dramatically, mainly driven by an exploding market in North Yemen, where the wholesale price of rhino horn rose from \$35 per kilo in 1970 to over \$500 per kilo in 1979 (Bradley Martin, 1979). At the same time the domestic economy in Tanzania slowly faltered, making the country one of the poorest nations in the world by the mid 1980s. With the country's economy and infrastructure collapsing, the resources that could be allocated to the protection of Tanzania's 240'000 sq. kms. of National Parks, Game Reserves, Conservation Area and Forest Reserves were completely inadequate. These factors contributed to an unprecedented poaching wave which first hit the rhino populations of Tanzania's northern protected areas in the mid 1970's (Borner, 1981). It quickly spread southwards to the large rhino strongholds of the Greater Ruaha ecosystem in central Tanzania (Barnes and Douglas-Hamilton, 1986) and then to the Selous Game Reserve in the south (Borner and Severre 1986). By 1988 Tanzania's rhino population was nearly exterminated.

Faced with the threat of the first large mammal species to vanish from Tanzania, the Rhino Conservation Committee of the Ministry of Natural Resources and Tourism was convened in 1988 to discuss ways to save Tanzania's remaining rhino from extinction. Several options, including *in situ* protection, translocation, dehorning and sanctuaries were discussed. It was resolved that the main rhino conservation policy should remain *in situ* conservation and an appeal was made to the international community which resulted in increased donor input into the rhino areas, mainly the Selous Game Reserve, where a major effort of the German Government (gtz) was combined with contributions from NGOs (IUCN/WWF, AWF and FZS). In addition to the general policy of *in situ* conservation, the Rhino Conservation Committee recommended following Kenya's lead of rounding up the scattered remnant population into secure sanctuaries. Ngorongoro Crater, Rubondo Island and an enclosure in the Selous were the proposed sanctuary sites. Faith Foundation of London was approached for funding (an estimated UK Pounds 400'000) and FZS was requested to organise and manage the project with the Wildlife Division. The Rhino Conservation Committee was appointed as the project's steering body.

The original rhino conservation project was to start by carrying out an emergency status survey of the country's rhino population with the immediate aim of translocation into sanctuaries. However, three subsequent factors considerably altered the situation and led to a re-appraisal of the rhino conservation project soon after it started in 1989.

The first was the launch in June 1989 of a major nation-wide crackdown by Government forces on ivory and rhino horn poachers, dealers and traders, known as Operation Uhai. This campaign was conducted for nearly two years and involved over 2000 men from the army, the police and the Wildlife Division, resulting in large numbers of arrests and the confiscation of illegal weapons and trophies. The second was the decision by CITES in October 1989 to ban the international trade in elephant products. The third has been the gradual recovery of the Tanzanian economy and the increase in tourism which has generated more resources for protected areas.

These three factors contributed to the sharp decline in the poaching of elephants and rhinos and reduced the pressure for a hastily planned rhino translocation programme, for which the Faith Foundation was in any case unable to raise the necessary funds. Consequently, the aims of the

rhino conservation project were re-assessed by the steering committee and later summarised as follows: "The Tanzania Rhino Conservation Project has as its primary objective the assembly of baseline data on rhinos in Tanzania with a view to developing a management strategy for the rehabilitation of our rhino population." (Mlay, 1992).

This report is an interim summary of the Project's first phase to assemble baseline data on the remaining rhino populations in Tanzania.

2. METHODS

2.1. INTRODUCTION

The principal factors protecting Tanzania's remaining rhinos are their remote and inaccessible locations, their tendency to hide in dense vegetation and their increasingly shy and nocturnal habits. If the poachers have failed to find them, it is evident that the search for the few remaining rhinos in a vast country with huge tracts of wild land is very much like the proverbial search for the needle in the haystack.

The main objective of this first stage of the Project is to document the presence of rhinos in a given area. First attempts have been made in the Selous Game Reserve to estimate minimum rhino numbers by measuring tracks. Such more detailed research will receive priority only when the main population remnants have been located.

2.2. QUESTIONNAIRE AND INTERVIEWS

As a first step, the Wildlife Division sent a questionnaire to all Regional Game Officers, Game Reserve Project Leaders, National Park Wardens and to the Chief Conservator of Ngorongoro in April 1991 (a copy of the questionnaire form is given in the appendix). Copies were also distributed to other potential sources of information, such as hunting companies. By June 1991, a majority of answers were received and formed the basis for planning the ground survey by enabling the Project to grade rhino habitat as High, Medium or Low Priority for more intensive survey work by foot.

It was obvious that the impersonal nature of the questionnaire form was not entirely suitable to solicit information on such a sensitive subject as rhinos. In order to fill some of the gaps on the questionnaires and to try to get more information, most of the potential rhino areas were visited and a large number of interviews were carried out with the local Wildlife Division staff. These interviews have in recent months been extended to include other researchers, professional hunters, former poachers and staff from tour operators. When carrying out the interviews, information on present poaching pressure and on general management problems is also collected. This part of the Project is ongoing.

2.3. COLLATION OF AVAILABLE INFORMATION

Information has been gathered from published papers and unpublished reports. Up to date background information on potential rhino areas is being provided by TWCM and by the Planning Unit of the Wildlife Division. In the Selous Game Reserve a wealth of information has been provided by the WWF Selous Elephant and Rhino Project (Stronach pers. comm, 1991) and by the Selous Conservation Programme of gtz (Baldus pers. comm, 1991.)

2.4. SELECTION OF SURVEY SITES

The vast area in which rhino might occur and the limited time available for ground surveys made systematic or random sampling techniques inappropriate. The following criteria were therefore adopted to select survey sites within and outside protected areas:

- areas where suitable water, cover, food and isolation for rhinos existed and where rhinos or their signs had been reported since 1989; and
- areas where healthy rhino populations had been reported within the previous 15 years, even if there were no reports since 1989.

Surveys on foot have been carried out in several locations within the following Game Reserves and National Parks, identified by the questionnaire and interviews as being High or Medium Priority Areas:-

- Selous Game Reserve (east of the Rufiji River)
- Rungwa/Kizigo Game Reserves
- Burigi/Biharamulo Game Reserves
- Mkomazi Game Reserve
- Tarangire National Park
- Rubondo Island National Park
- Lake Manyara National Park
- Kilimanjaro National Park and Forest Reserve
- Arusha National Park

Survey areas which have been identified as High or Medium Priority Areas but which have not yet been visited by the Project team are:-

- Selous Game Reserve ,west of the Rufiji River
- Lake Rukwa/Rungwa River area
- Moyowosi/Kigosi Game Reserves
- Itigi Thickets, Tabora and Singida districts
- Serengeti National Park

Fig. 1. National Parks and Game Reserves in Tanzania.

(High and Medium Priority Areas are shaded)



2.5. SURVEY PERSONNEL

In the Selous Game Reserve, Laurie led one survey team with two permanent staff and several temporary local staff. Since September 1992, Chisanyo and Heyworth have led two independent survey teams in the other survey sites, with two permanent staff each. Officers and rangers from the Wildlife Division and TANAPA join the Project team when working in their respective areas.

2.6. GROUND SURVEY WORK

The survey teams operate from one or a series of camps, spending two to six days in each place carrying out foot surveys from the camps or from nearby points reached by vehicle. Either one survey-sortie of 5 to 8 hours or two of 3 to 4 hours are carried out per day. Survey routes frequently follow animal paths, particularly in forest, thicket and thick bush country. The routes are planned to cover as much suitable rhino habitat as possible. In more open terrain the survey team fans out to maximise coverage of ground looking for rhino sign. If both teams operate in the same area and rhino sign is found by one team, the other team will verify the finding.

When possible, Global Positioning System (GPS) location points are recorded with all rhino signs (footprints, dungpiles and scrapes, actual sightings), as well as camp positions and survey route points.

2.7. AERIAL SURVEYS

With rhinos ranging over wide areas, keeping to thick cover and adopting more nocturnal habits, the method of aerial surveys to locate rhinos was ruled out. Very few rhinos have been seen either inside or outside transect in censuses conducted in the Selous, Moyowosi or other High or Medium Priority Areas since 1987 (K. Campbell, pers. comm., 1993). However, aerial surveys have been applied during the Project to assess the habitat and to plan foot surveys accordingly. Laurie also used aerial surveys to assess the terrain around the sectors in the Selous which he had surveyed, in order to estimate how much of the suitable habitat had been covered on foot.

3. PRESENT INFORMATION ON THE STATUS OF RHINO IN TANZANIA

3.1. SELOUS GAME RESERVE

3.1.1. General Information

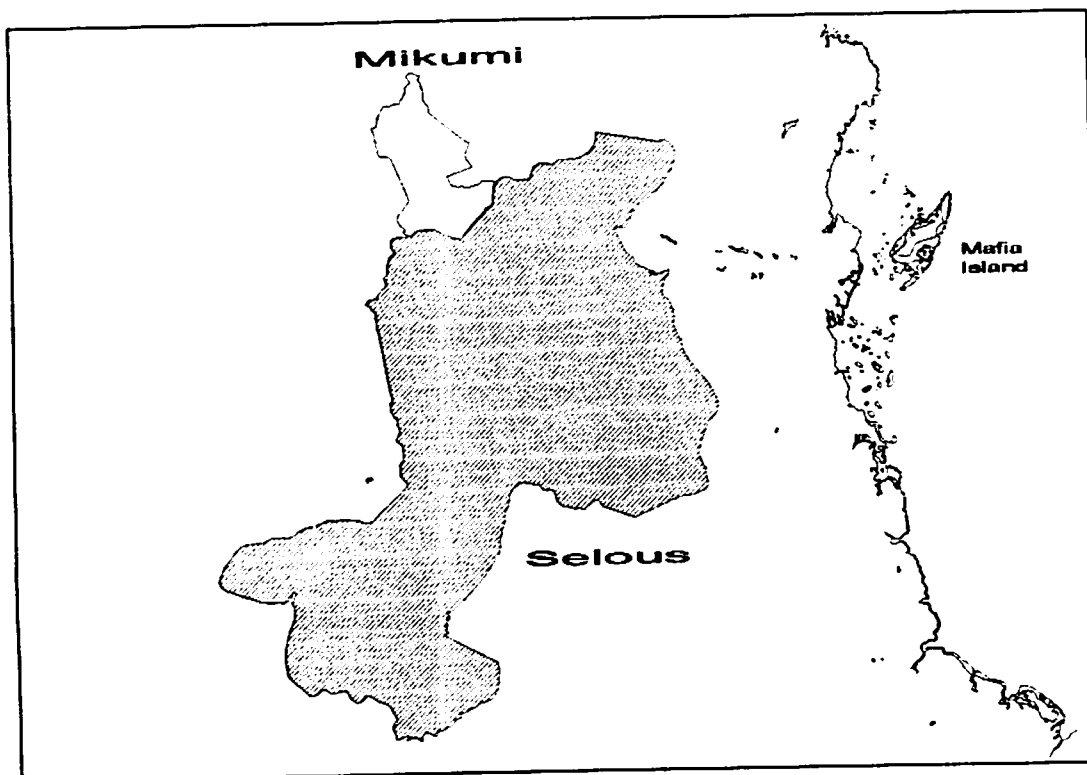
Location: South eastern Tanzania in Coast, Lindi, Mtwara and Ruvuma regions.

Area: Game Reserve 50'000 sq. kms., ecosystem 78'000 sq.kms. (including Mikumi National Park of 3'200 sq. kms. on the northwest border of the Selous).

Vegetation: The eastern sector is mainly *Terminalia spinosa* wooded grassland, the rest is mainly deciduous miombo woodland with *Brachystegia*, *Julbernardia globiflora*, *Pterocarpus angolensis* and *Combretum* species predominant.

Administration: Wildlife Division, National Reserve.

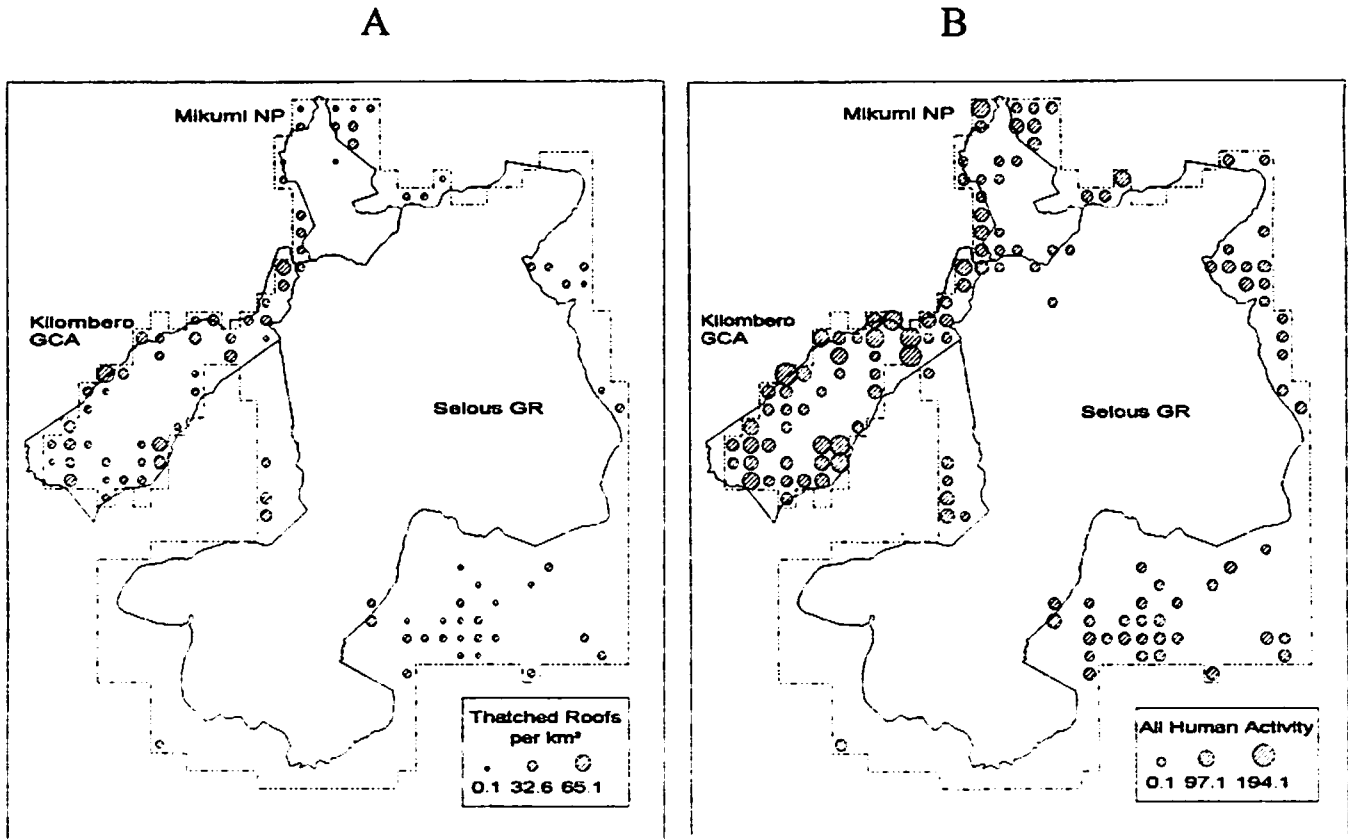
Fig. 2. The Selous Game Reserve and Mikumi National Park.



Human disturbance/poaching pressure: Human settlements close to the Reserve's boundaries are most abundant in the north and northwest, and poaching for meat is still common in the peripheries of the Game Reserve.

Fig. 3. A. Settlement (roofs). B. All human activities.

Source: 1991 Census, Selous Game Reserve, TWCM, 1992.



Since Operation Uhai and the CITES elephant trading ban, trophy poaching has been greatly reduced and the elephant population seems to have stabilised. However, this was only after a decade of rampant poaching throughout the ecosystem had vastly reduced Selous' elephant population, as shown in Figure 4.

Fig. 4. Elephant population trends, Selous Game Reserve.
A. Population estimates. B. Rates of decline.

Source: Recent Trends in Tanzanian Elephant Populations: 1987-1992, TWCM.

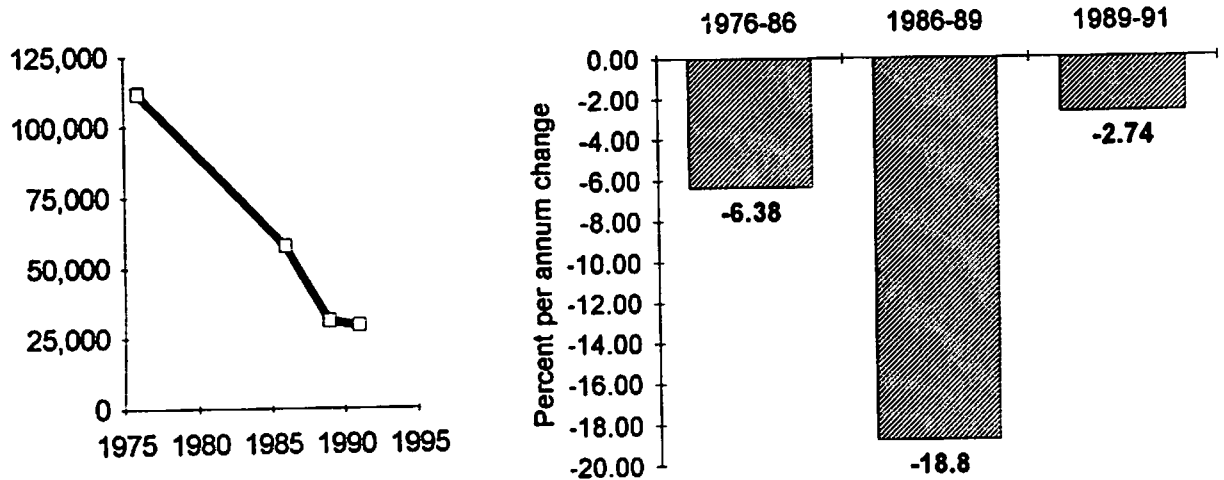
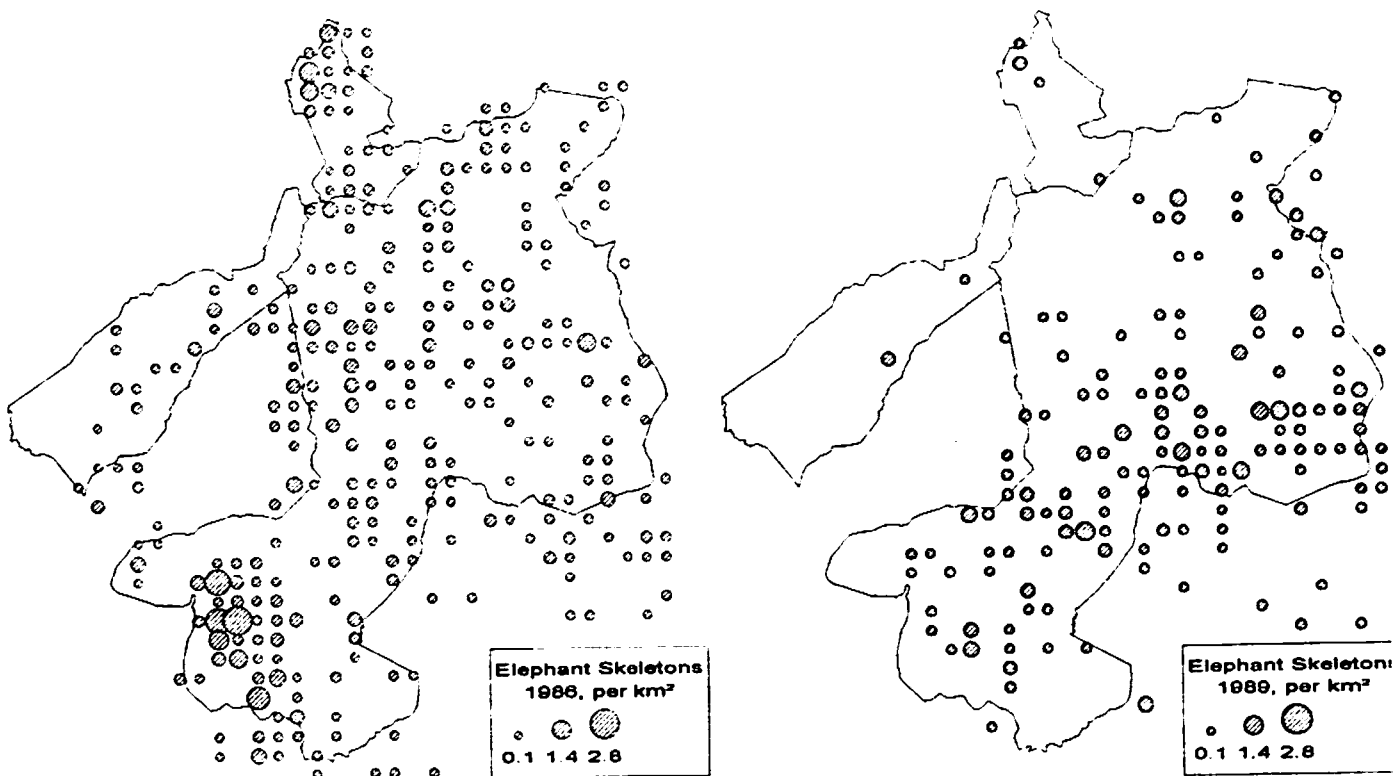


Figure 5 illustrates the widespread nature of elephant poaching in the Selous, which originated from the western strongholds of poachers and rapidly spread to the better patrolled eastern sector (Stephenson, 1989).

Fig. 5. Distribution of elephant skeletons observed during dry season surveys, 1986 and 1989. *Source, TWCM database.*



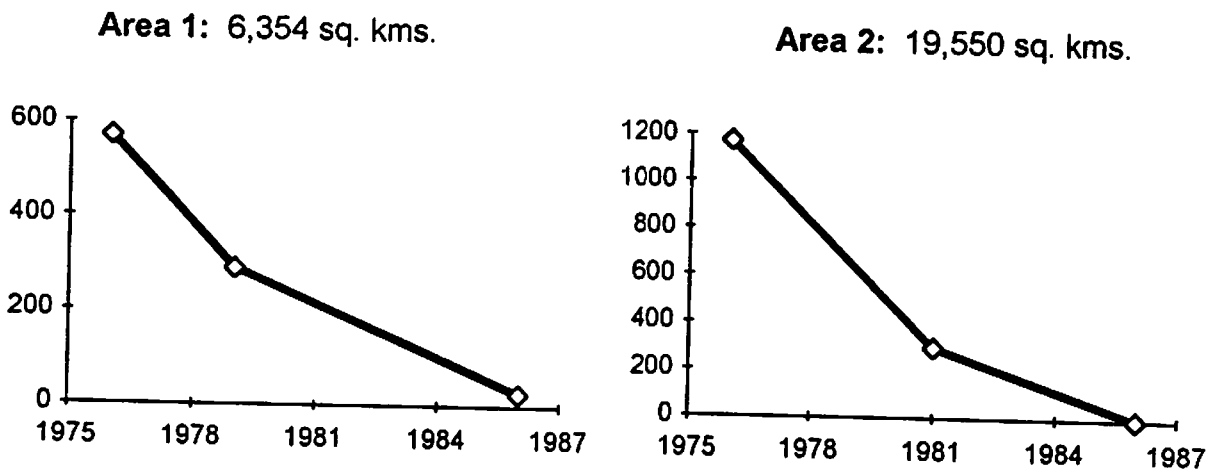
The Selous management presently reports only very rare cases of elephant poaching and the rhino surveyors found no evidence of elephant or rhino poaching, although one recent poachers' camp was recorded in a rhino area.

3.1.2. History of Rhinos

The Selous Game Reserve was for many years believed to be the largest stronghold for the rhino in Africa. Aerial surveys estimated the population at 2500 individuals in 1976 (Douglas Hamilton, 1976), on an uncorrected basis; however, using a correction factor of 2.55 worked out in the northern Selous (Borner et al, 1981), the 1976 Selous population would have been estimated at around 6000 animals. Subsequent surveys indicated a steep decline in the rhino population in sample areas in north-east Selous:

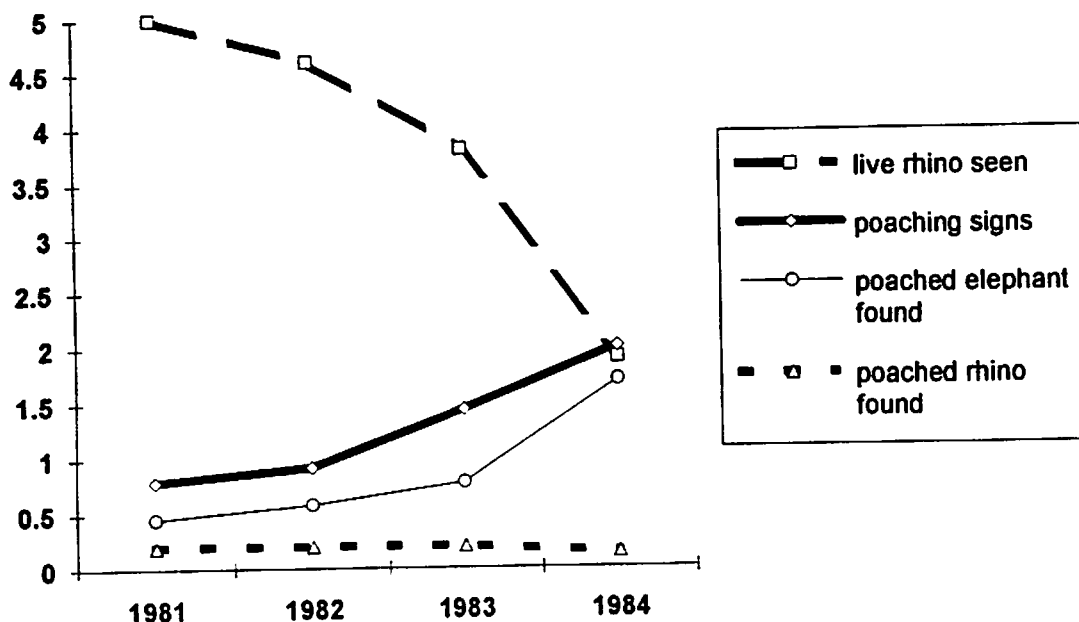
Fig. 6. Northeast Selous: comparison of rhino estimates.

Source: TWCM database.



Ground investigations indicated that the rhino poaching wave hit the Selous from the late 1970s, after the more accessible rhino populations of Kenya and northern Tanzania had virtually been wiped out. By the early 1980s, numbers of rhinos seen by professional hunters and Wildlife Division staff were in sharp decline, as shown in Figure 7 (Borner and Severre, 1986).

Fig. 7. Recalled observations of rhinos and of poaching signs per 21-day safari. *Source: Borner & Severre, 1986.*



3.1.3. Results of Rhino Survey

A five person survey team worked within the Selous ecosystem between July and November 1991. The rhino surveyors walked 1'354 kms. covering about 3'000 sq.kms., at a sampling density of 0.45 km. of walking per 1 sq. km. of terrain. This area was divided into 18 sectors, each assigned a code letter for security purposes. Signs of rhino (187 dung piles, of which 89 were less than one month old, and 100 sets of footprints) were found in eight of these 18 sectors, and there were reliable reports of footprints in 1991 from a further two sectors. Tracks of calves were found in five sectors and reported from one other sector. Four rhinos were actually seen during the survey, all in the same sector, and there are reliable reports of a further 8 individuals that were sighted in three sectors in 1991. The rhinos discovered during the survey work appear to be in three different places separated by extensive areas of unoccupied habitat. During the dry season they might in effect be split into three populations, which may have interchanges of individuals during the wet season.

Although not a priority at this stage of the Project, hind foot measurements were taken where possible, on the basis of which absolute

minimum population densities were worked out in the three main areas. It should be noted that such a method always produces an underestimate in surveys of large mammals. **There is not enough information available to use these densities for an attempt to estimate the total rhino population of the Selous.**

The western part of the Selous Game Reserve (west of Luwegu River and south of Ruaha River) remains to be surveyed. There are recent reports of rhinos in this area from at least two places.

In conclusion, from the work of this survey, from work done by Stronach of WWF and from information gathered by the Selous Game Reserve staff, it is clear that the Selous Game Reserve still harbours several breeding populations of rhinos. Estimating numbers is not yet possible, but the data available indicate that the population has been drastically reduced in the last 15 years. As the population has been reduced very rapidly over a short period of time relative to the rhinos' generation time, it is likely that the remaining populations still retain sufficient genetic diversity to avoid the problems of inbreeding. The surviving rhinos are still at risk from poachers but there is no evidence that any rhino poaching has taken place recently.

3.2. RUNGWA/KIZIGO GAME RESERVES

3.2.1. General Information

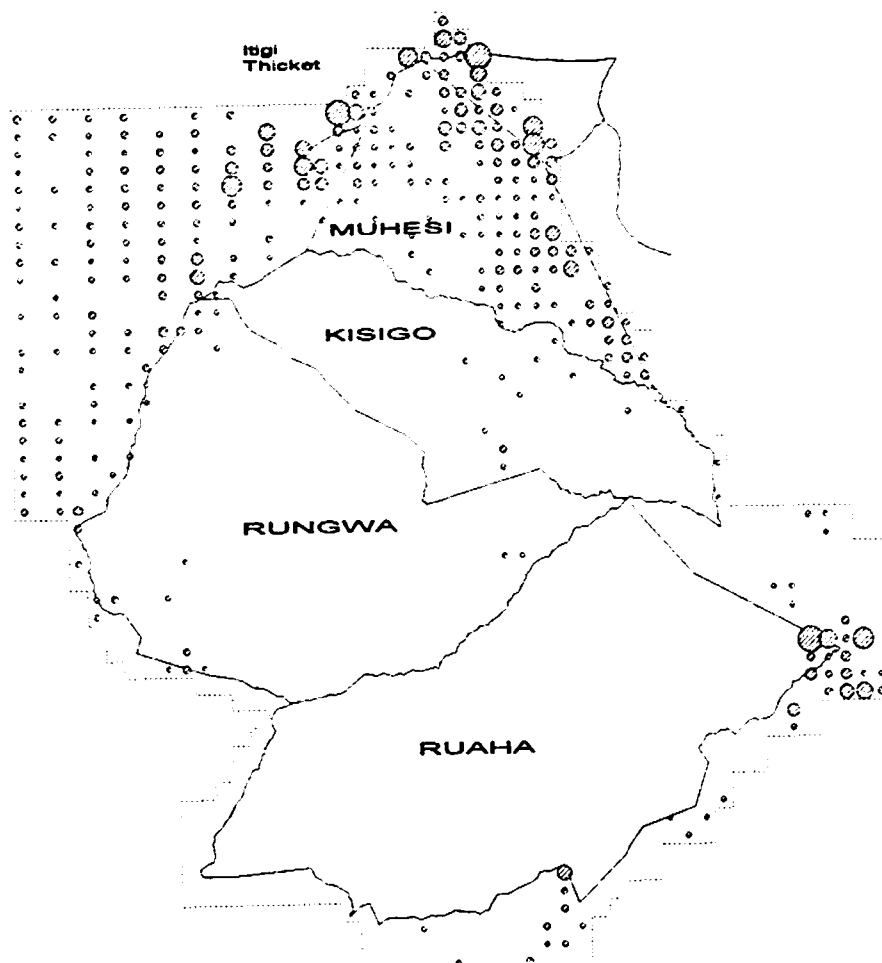
Location: Central Tanzania in Singida Region.

Area: Rungwa (9'000 sq.kms.) is contiguous to the north with Kizigo (4'000 sq.kms.) and to the south with Ruaha National Park (12'950 sq.kms.). The recently gazetted Muhesi Game Reserve (2'200 sq.kms.) is to the north of Kizigo, but its boundaries have not yet been demarcated.

Vegetation: Mostly miombo woodland, with *Acacia - Commiphora* woodland in the south and east.

Administration: Wildlife Division, National Project.

Fig. 8. The Greater Ruaha Area, showing distribution and extent of all human activity, 1993. *Source: TWCM database.*

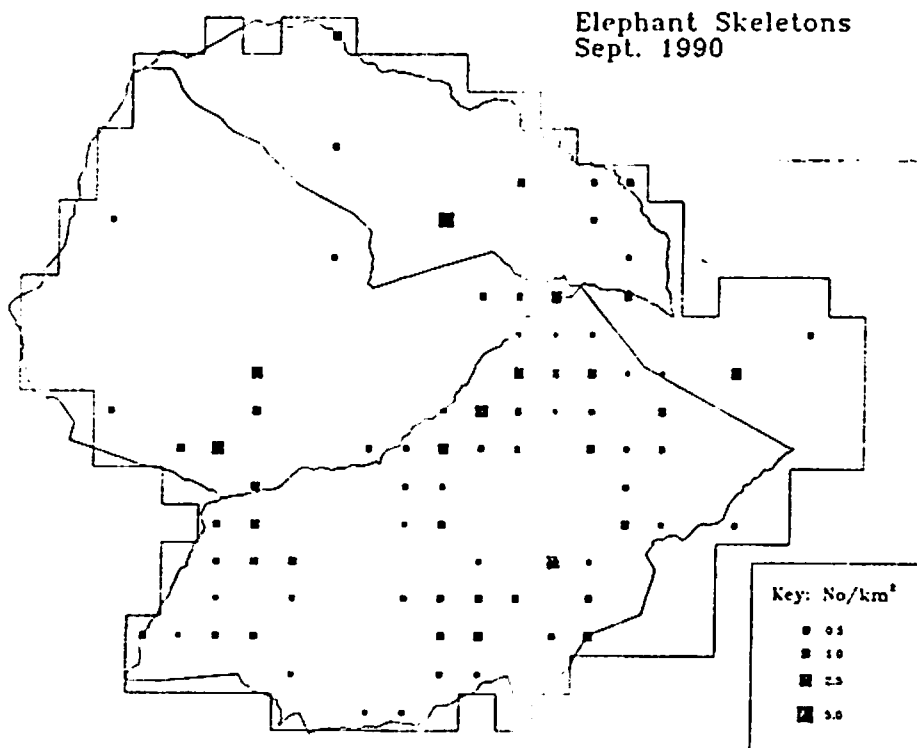


Human disturbance/poaching pressure: Widespread meat poaching, timber cutting and honey-collecting with resulting fires are major problems. Agricultural encroachment in the southeast, and illegal mining activity to the northeast of the ecosystem present further management problems.

The Greater Ruaha area of which Rungwa/Kizigo comprises nearly one half, is home to the second largest elephant population in Tanzania after the Selous (TWCM, 1992), much reduced during the 1980s by poaching. Figure 9 shows how widespread the elephant poaching has been.

Fig. 9. Distribution of elephant skeletons, Greater Ruaha Area.

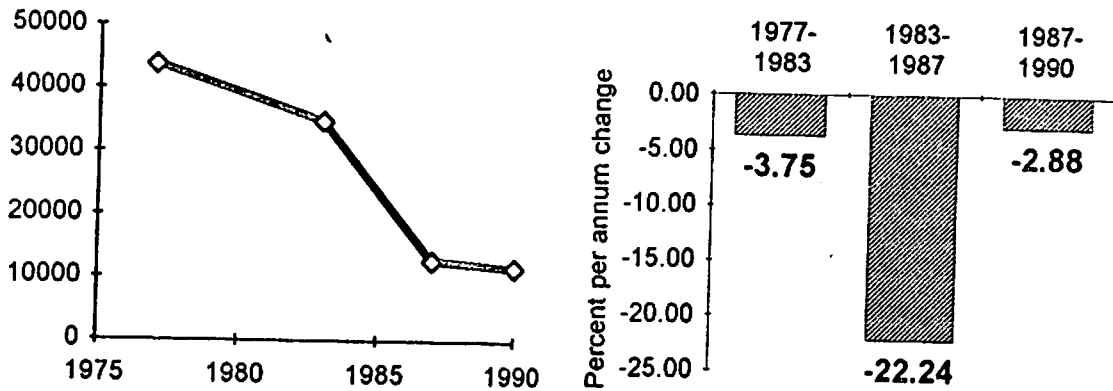
Source: Survey Report, Greater Ruaha Area, 1990, TWCM



Census information (Figure 10) shows that elephant poaching was at its height between 1983 and 1987, by which time rhino were already very scarce.

Fig. 10. Elephant population trends for the Greater Ruaha Area.
 A. Dry season population estimates. B. rates of decline.

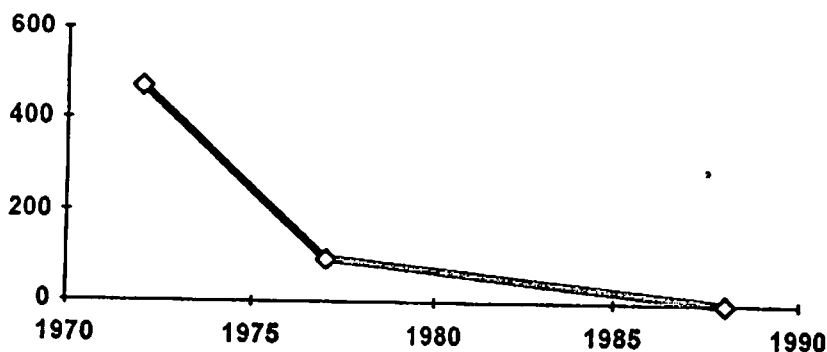
Source: TWCM database.



3.2.2. History of Rhinos

The Greater Ruaha ecosystem had a significant rhino population, although specific historic data is scarce. A sample count of large herbivores in Ruaha National Park between 1972 and 1973, just as serious commercial rhino poaching was hitting Tanzania, gave an estimate of 471 rhino for the Park (Norton-Griffiths, 1975). An aerial census of the Park in 1977 estimated only 94 animals, a decline of 80% in five years, which could only be attributed to the heavy poaching in the Park (Barnes and Douglas-Hamilton, 1982). No rhino have been seen in the Park since 1987.

Fig. 11. Population estimates of rhino in Ruaha National Park from sample aerial surveys, 1972 - 1988.



Barnes and Douglas-Hamilton's 1977 aerial census estimated a population of 371 rhino in Rungwa and Kizigo Game Reserves (and a further 31 rhino in Game Controlled Areas to the east and southeast of Ruaha National Park). Of the rhino seen, most were in the miombo woodland in the more remote western half of the Reserves. By the early 1980s, sightings in Rungwa/Kizigo were becoming rare, although signs continue to have been found by reserve staff and professional hunters.

3.2.3. Results of Rhino Survey

From August to mid October 1992, 45 survey sorties were made totalling some 650 kms on foot in various areas of Rungwa/Kizigo, concentrating in the western half where the 1977 census had located most rhinos. Four sets of tracks were found in one area but no conclusions could be made on whether they were from the same or different animals. No recent signs of elephant or rhino poaching were encountered. A recent report has been received of a poacher caught with horns from a rhino allegedly killed in the Itigi Thickets, a large area of primeval thicket to the north of the Greater Ruaha area, which has yet to be surveyed.

In conclusion, the survey work has established that isolated animals exist, though no evidence of breeding rhinos has been found. Large areas of suitable habitat extend beyond the Reserves' boundaries up to Itigi Thickets to the north and Lake Rukwa to the west, both areas which have yet to be surveyed and which have produced authoritative recent reports of rhino. The recent capture of a rhino poacher is in one sense encouraging given the known difficulty of seeing rhinos and of capturing poachers.

3.3. BURIGI/BIHARAMULO GAME RESERVES

3.3.1. General Information

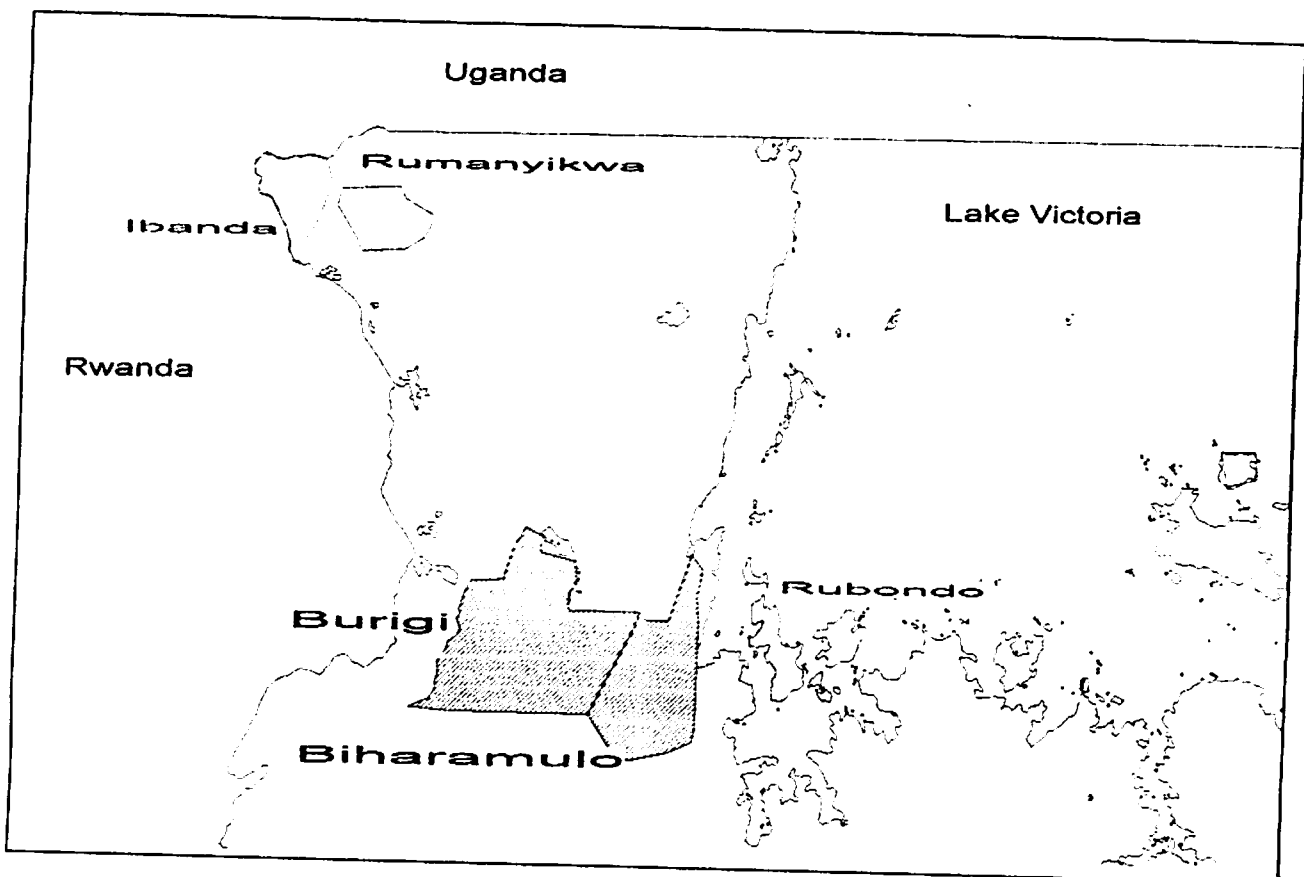
Location: Northwest Tanzania in West Lake Region.

Area: Burigi Game Reserve (2'200 sq.kms.) is contiguous to Biharamulo Game Reserve (1'300 sq. kms.) to the east.

Vegetation: *Acacia-Combretum* type wooded grassland predominates in Burigi, which also has extensive swamp and patches of riverine forest. Miombo woodland predominates in Biharamulo.

Administration: Burigi is a National Project administered by the Wildlife Division. Biharamulo will be administered under the same National Project effective July 1993; at present it is administered by the Bukoba Regional Game Office.

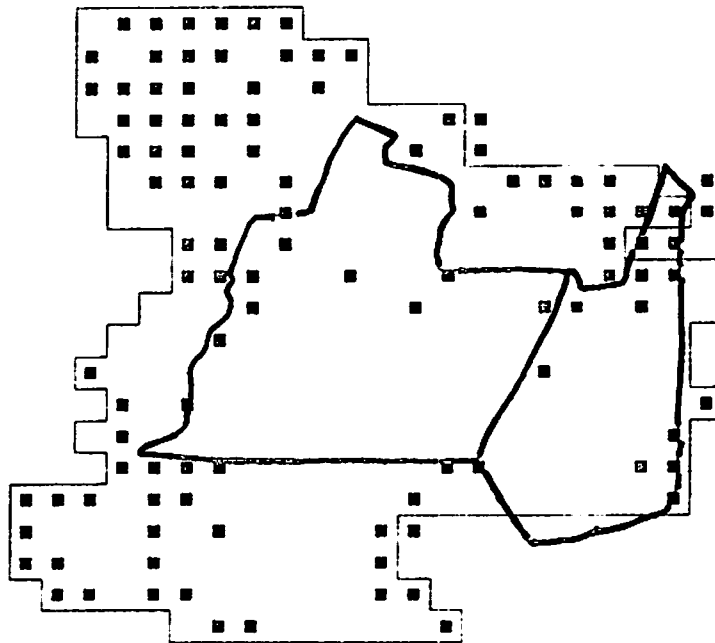
Fig. 12. Burigi and Biharamulo Game Reserves.



Human disturbance/poaching pressure: Human activity is all around the Reserves except to the south (corridor area with Moyowosi/Kigosi Game Reserves). Poaching for meat is rampant, as is illegal fishing on Lake Burigi. Charcoal burning, lumbering and agriculture take place in Biharamulo.

Fig. 13. Distribution of all human activity, Burigi-Biharamulo, 1990.

Source: TWCM database



Apart from local poachers, West Lake Region suffered heavily from elephant and rhino poaching from the late 1970s arising from instability in Uganda, and later from civil strife in Rwanda and Burundi. The elephant population declined from an estimated 617 in 1981 (Borner, 1982) to 71 in 1990 (TWCM, 1990), indicating the levels of poaching in the area during the 1980s. In 1992 there was one case of elephant poaching by a Biharamulo ranger who was caught in Burigi. Otherwise there has been no known recent trophy poaching.

3.3.2. History of rhinos

West Lake Region was well known for its former rhino density, being one of three areas in Tanzania in the 1950s noted for its heavy concentrations of rhino (Tanganyika Handbook, 1958). Burigi/Biharamulo was surveyed in 1973 and 1974 using ground census (Biharamulo) and an aerial survey (Burigi), on the basis of which a maximum population of 1'500 rhino for the Reserves was estimated (Rodgers et al., 1977).

By 1980, rhinos were much rarer and clearly under heavy poaching pressure (Borner, 1982). In February 1980, three rhino were seen during an aerial survey and a one week ground survey in western Burigi in August 1980 revealed the signs (tracks, scrapes and faeces) of 10 individuals including a mother and calf, and one rhino was seen (Borner, 1982). Borner could not estimate the exact status then of rhinos in the Reserve but believed that rhinos survived around Lake Burigi, between the Ruiza and Kayazi valleys, and south of the Reserve.

With war and instability in nearby Uganda and Rwanda during the 1980s, the status of rhino continued to deteriorate. By the mid 1980s, rhinos had been wiped out completely in Rumanyika Game Reserve (800 sq. kms.) north of Burigi/Biharamulo which was gazetted in 1974 principally because of its high concentration of rhinos.

3.3.3. Results of Rhino Survey

13 surveys from four camps and totalling some 145 kms. by foot were carried out during three separate field trips from December 1992 to February 1993. Two old dungpiles (single) and two sets of tracks were found in one survey area. A third dung sample was recovered from the house of a captured meat poacher, who had found it in the same survey area in August 1992. No signs of calves were found. A third footprint was found where a rhino had been reported crossing the Biharamulo - Bukoba road between the two Reserves in December 1992.

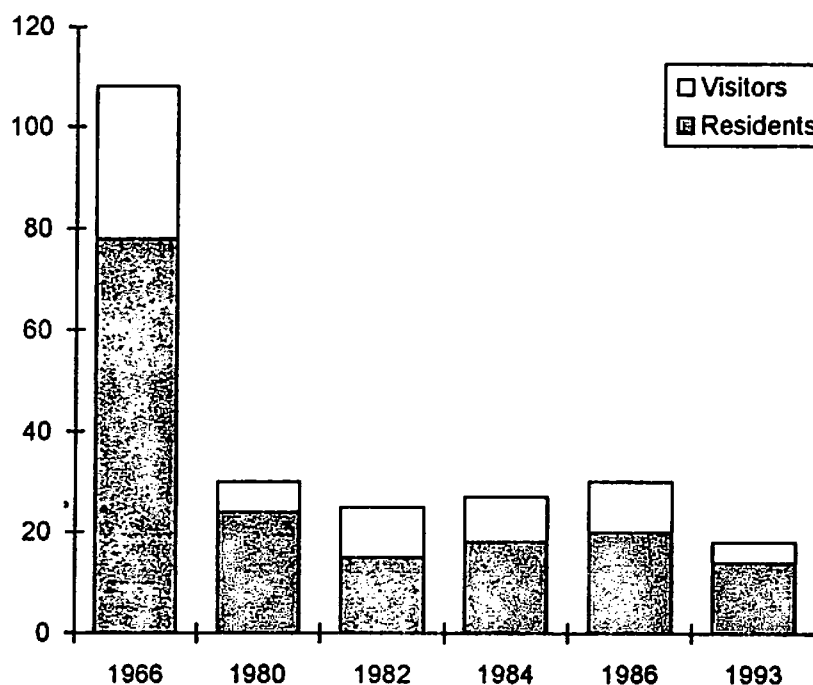
A poacher who was recruited to act as the survey guide reported seeing a group of six rhinos together (2 adults, 2 sub-adults and 2 juveniles) in October 1992, which broke cover near the poacher when alarmed by a distant professional hunter's vehicle. The circumstances were later corroborated in interviews with the professional hunter and his

Human disturbance/poaching pressure: The NCA is home to over 25,000 maasai and 140,000 cattle within its 8300 sq.kms. Management problems concerning illegal firewood collection, agricultural activities and control of cattle-borne disease are the inevitable result of such population pressure. Meat poaching and trophy poaching is rare, however, and there has been no poaching of a rhino on the Crater floor since 1988 (S. Makacha, pers. comm., 1993). The main and increasing threat is from heavily armed Somali bands. On two occasions in the last six months, such bands have been intercepted, resulting in one NCA ranger being wounded and two being killed in armed exchanges.

3.4.2. History of Rhinos

During colonial times, hunting parties and farmers on the Crater floor and in the surrounding area encountered large numbers of rhino (Fosbrooke, 1972). Before the advent of commercial poaching, research by Goddard from 1964-1966 identified a total of 108 rhino on the Crater floor. Fosbrooke estimated that only about three rhinos were poached annually in the Crater, all speared by Maasai; in 1978, the estimate was over 25, mostly shot by non-Maasai poachers (Ole Sayalel, pers. comm., 1979), by which time the wave of rhino poaching which hit northern Tanzania from 1972 was drawing to a close (Borner; 1981).

Fig 15. Estimated rhino population numbers on the Crater floor.



Historical data on other rhino populations of the NCA is patchy. From 1964-1966 Goddard identified a separate population of 70 rhino in the area of Olduvai Gorge (440 sq. kms.); however, by 1980 this population had been completely wiped out (Mary Leakey, pers. comm., 1980). The area of Maswa and Ndutu used to have large numbers of rhino, but during a year's survey work to October 1979, only 7 rhino were seen in this area (all in Ndutu) and the carcasses of 45 rhino were found (Makacha et al., 1982).

3.4.3. Present Status of Rhinos

No survey work has yet been carried out in the NCA by the Project team. The presence of a breeding population is well known, and the present population on the Crater floor of ~~14~~ resident rhinos comprises 4 18 adult males, 2 immature male, 2 male calf, 7 adult females and 3 female calves. In addition, the Ngorongoro Highland Forest area is believed still to retain rhino, estimated to number 15-20, some of which are visitors to the Crater floor (S. Makacha, pers. comm., 1993). The difficulty of carrying out monitoring work in the thick forest vegetation means that there are no reliable historic or present data on the poaching, numbers or range of this population.

Poaching appears to have been contained over the last five years. However, well armed Somali bands are an increasing source of concern, stretching the current information network and anti-poaching resources of NCA to the limit. A lesser concern is that there is no recent knowledge on the possible predation of rhino calves in the Crater; the number of lions on the Crater floor has probably at least doubled since Goddard witnessed a lion attack on a rhino and calf in 1965.

Apart from the population on Rubondo Island (see 3.5. below), the Ngorongoro population is the only viable population of *D. b. michaeli* left in Tanzania.

accompanying askari, although they did not actually see the rhinos. A less reliable report of a group of rhinos crossing the Rwanda Highway to the south of Burigi suggests that Moyowosi Game Reserve to the south comprises part of the rhinos' range. Moyowosi Game Reserve has produced authoritative recent reports of rhinos from local Wildlife Division staff and aerial census, but has not yet been surveyed.

In conclusion, the survey work showed that rhinos still inhabit or at least range over the Burigi/Biharamulo Game Reserves, in very small numbers and they may be breeding. They may move to and from Moyowosi through an uninhabited corridor area, presently unprotected. These are probably the last rhinos in West Lake Region, a former stronghold of rhino up until the mid 1970s, since when poaching has all but wiped them out. Although there is no trophy poaching at present, these rhinos remain vulnerable to the snares and muzzle-loaders of the numerous meat poachers throughout Burigi/Biharamulo, where present staffing and funding levels are totally inadequate to combat poaching.

3.4. NGORONGORO CONSERVATION AREA

3.4.1. General Information

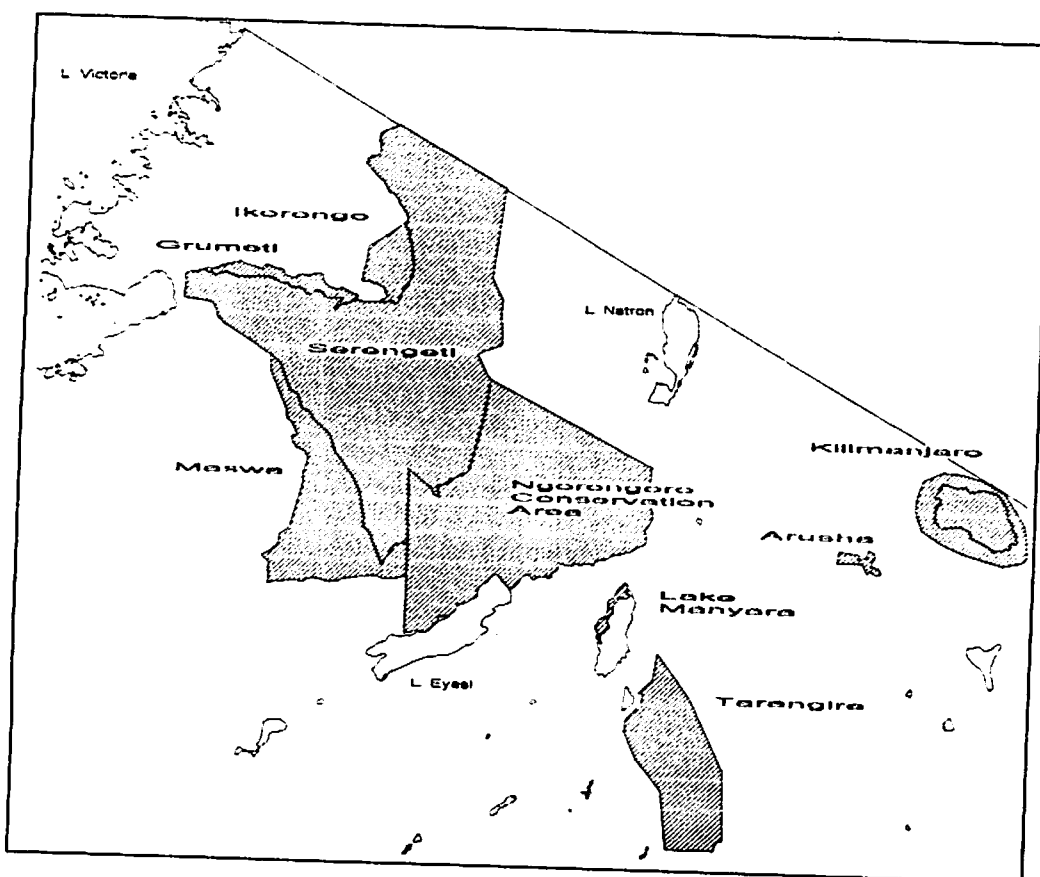
Location: Northern Tanzania in Arusha Region.

Area: The Ngorongoro Conservation Area (NCA) covers 8'300 sq. kms. including the 260 sq. kms. floor of Ngorongoro Crater. It is contiguous to the north and west with the Serengeti National Park (13'000 sq. kms.) and Maswa Game Reserve (2'700 sq. kms.).

Vegetation: Variable climate and altitude (1'300m to 3'648m) have resulted in several distinct habitats from grass plains to montane forest. The Ngorongoro Crater is mostly open grass plain with streams and swamps, a soda lake and two small forested areas (*Acacia xanthophloea* predominant).

Administration: The NCA is a multiple use management area, unique in Tanzania, administered by a parastatal body, the NCAA.

Fig. 14. Ngorongoro Conservation Area and neighbouring protected areas.



3.5. RUBONDO ISLAND NATIONAL PARK

3.5.1. General Information

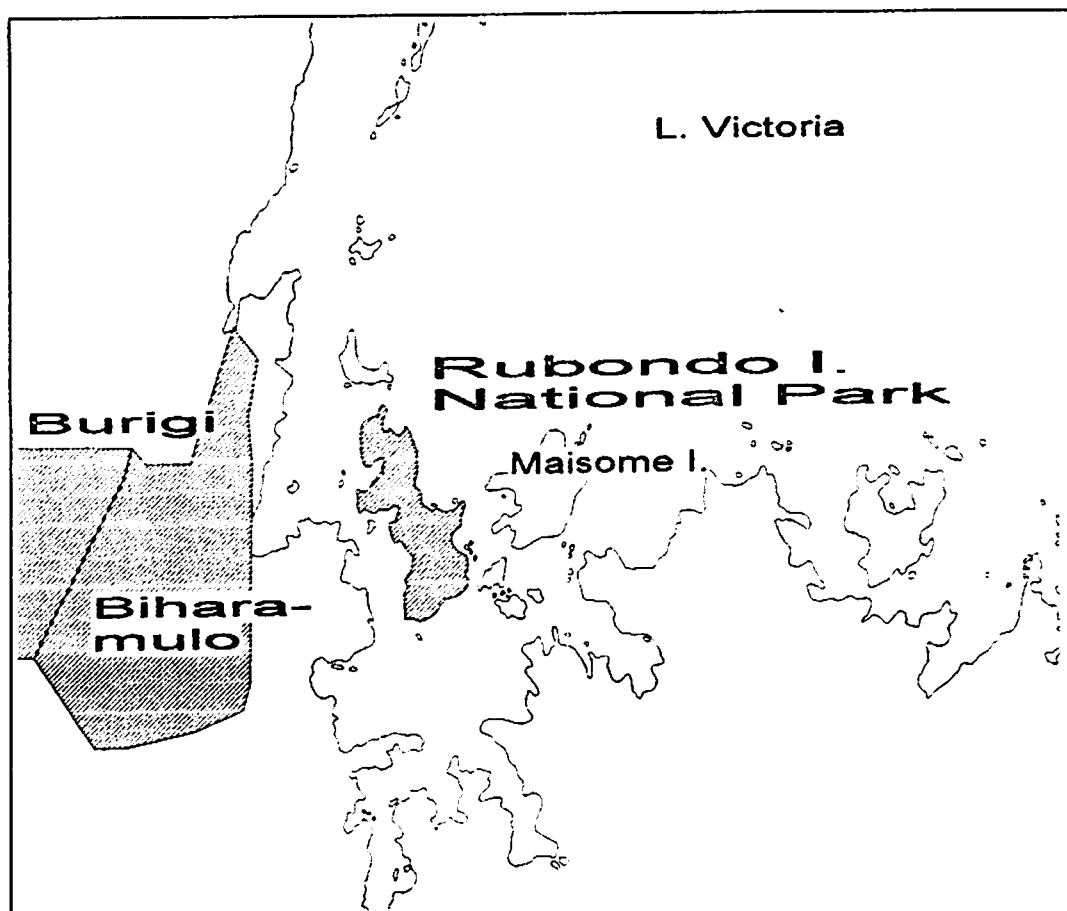
Location: An island in southwest Lake Victoria.

Area: 460 sq.kms., of which some 260 sq.kms. is dry land.

Vegetation: 90% is evergreen forest, with areas of woodland and wooded grassland on more exposed slopes.

Administration: TANAPA.

Fig. 16. Rubondo Island National Park.



Human disturbance/poaching pressure: There is continuous pressure from illegal fishing, from the nearby villages on the western shore of Lake Victoria and neighbouring islands. In addition, poaching for meat (bushbuck and sitatunga) is common.

The dense forest vegetation provides good cover for the rhinos but makes monitoring of trophy poaching very difficult. In the late 1970s, five rhino carcasses, including 2 calves, were found (Borner, 1981). In May 1992, a rhino was poached by a former ranger who was captured but the trophies were not recovered (Chief Park Warden, pers. comm. 1993).

3.5.2. History of Rhinos

From 1963 to 1965 a total of 16 rhinos (*D. b. michaeli*) were translocated to Rubondo Island, where rhinos are not indigenous. A number of other species were introduced, including elephant, chimpanzees, giraffe and roan antelope. There are no predators on the Island.

In the late 1970s, an unknown number were poached probably by an ex-game warden and five carcasses were found. In 1980, the population was estimated at around 30 animals on the basis of direct observation and track measurements (Borner, 1981). In 1989, six rhinos were seen during an attempt at counting the Rubondo rhinos using over one hundred Pasiansi Ranger Training Institute students.

3.5.3. Present Status of Rhinos

The Project spent only a short time on Rubondo in February 1993. 11 foot surveys totalling some 125 kms. were carried out. Five dung piles and three sets of tracks were found. No signs of calves were found. The most recent reliable report of breeding activity is of a sighting from the air of a mother and calf in 1990 (M. Borner, pers. comm., 1993).

Presently available survey data is insufficient to give a clear picture of the rhinos' status. It can only be concluded that rhinos are present and probably still breeding.

3.6. OTHER LOCATIONS IN NORTHERN TANZANIA

3.6.1. General Information

Locations	Area (sq. kms.)
Serengeti N.P.	13,000
Tarangire N.P.	2,600
Lake Manyara N.P.	120
Arusha N.P.	137
Kilimanjaro N.P. and F.R.	1,650
Mkomazi G.R.	3,480

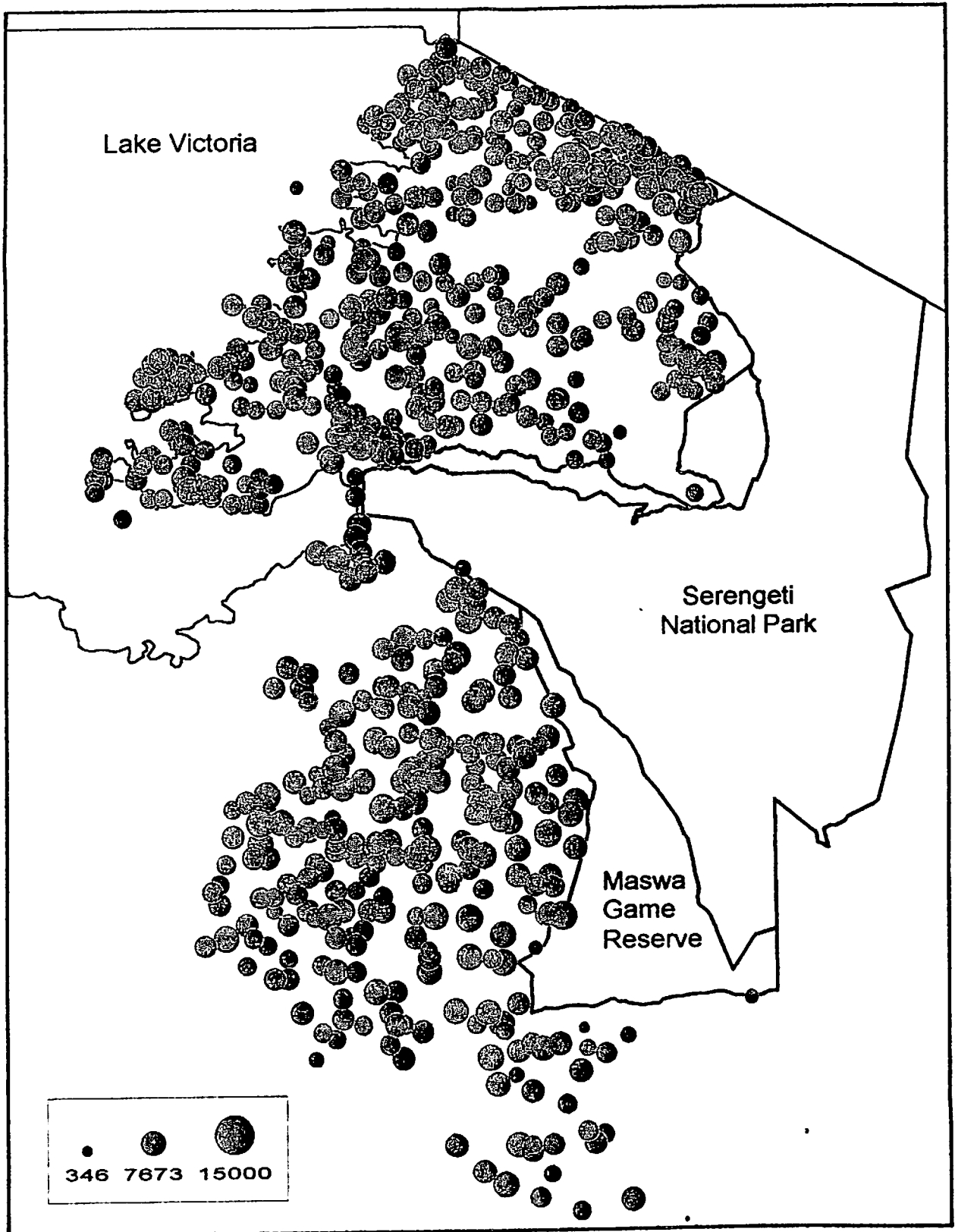
Vegetation: Serengeti, Tarangire, Lake Manyara and Arusha have large proportions of wooded or bushed grassland with *Acacia* and *Combretum* species predominating. Arusha and Kilimanjaro have evergreen montane forest on the slopes of Mt. Meru and Mt. Kilimanjaro. Mkomazi consists mostly of bushland, thicket and semi-desert shrubland with *Acacia* and *Commiphora* species predominant.

Human disturbance/poaching pressure: Better infrastructure in northern Tanzania and a higher population density has meant that even the larger of these protected areas are subject to considerable population pressure. The smaller areas of Arusha, Kilimanjaro and Lake Manyara National Parks are almost or entirely isolated by agriculturalists and/or pastoralists.

Operation Uhai and the CITES elephant trading ban have done much to curb meat and trophy poaching, and the northern Parks have also benefited from increased tourism and consequently upgraded investment in infrastructure and anti-poaching activity. However, meat poaching continues to be a problem particularly along the western borders of the Serengeti. This is perhaps inevitable, given the intense population pressure in that area (see Fig. 17). The only known poaching of elephant since 1990 took place just outside the southern borders of Tarangire in 1992.

Fig. 17. Distribution of human population in eight Districts on the western borders of the Serengeti ecosystem.

Source: TWCM database and 1988 National Census data



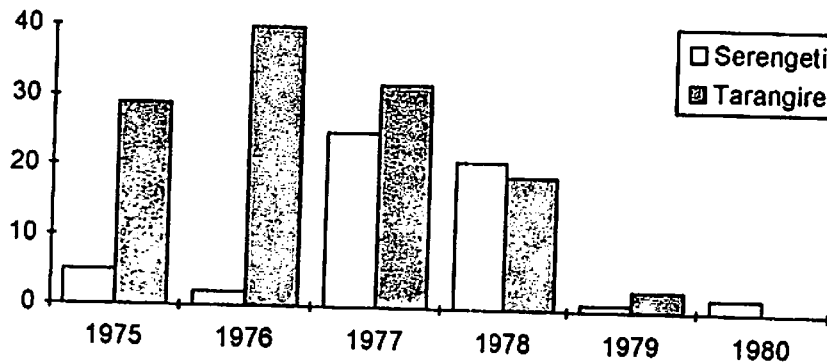
3.6.2. History of Rhinos

All these protected areas are in Maasailand and Mbululand, two of the three areas in Tanzania known to have the highest concentrations of rhino up until the 1950s (Tanganyika Handbook, 1958). The following estimates give some indication of the numbers of rhinos just as the wave of poaching hit northern Tanzania in the early 1970s:-

Locality	Land Size (sq. kms.)	Estimate	Date	Source
Serengeti	13,000	700	1974	Frame, 1980
Tarangire	2,600	250	1974	Mweka Wildlife College, 1974
Mkomazi	3,480	150-250	1968	Goddard, 1969
L. Manyara	120	35-40	1975	Mwalyosi, 1979

Rhino poaching started to cause a precipitous decline in numbers in northern Tanzania from 1975, as indicated by the numbers of carcasses of poached rhinos found in Serengeti and Tarangire:-

Fig. 18. Number of poached rhino carcasses found in Serengeti and Tarangire.



Source: Borner, 1981.

Anti-poaching efforts in both areas varied little from 1975 to 1980, so the sharp fall in the number of carcasses found from 1979 reflects not less poaching but the drastic decline in the rhino population (Borner, 1981).

3.6.3. Results of Rhino Survey

Questionnaires to Park and Reserve staff and follow-up interviews with staff, other researchers and tourist drivers indicated that rhino or rhino sign had been seen in all these areas up until 1990, except for Mkomazi where sign was last seen in 1988. From November 1992 to March 1993, surveys on foot were carried out in all locations except the Serengeti:-

Locality	Land size (sq. kms.)	No. of foot surveys	Estimated distance on foot (kms.)	Survey density (km/1 sq. km.)
Tarangire	2,600	8	115	0.04
L. Manyara	120	7	45	0.38
Arusha	137	7	65	0.47
Kilimanjaro	1,650	5	80	0.05
Mkomazi	3,480	5	60	0.02

Note: Survey density is calculated as kilometres walked per one square kilometre of protected area.

No signs or recent authoritative reports of sightings of rhino or their sign were found in any of Mkomazi Game Reserve, or Lake Manyara, Kilimanjaro or Arusha National Parks. Authoritative reports of the sighting of one individual rhino and of one group of three rhino in Tarangire in August 1992 suggest that a tiny and scattered population remains, though no signs were found on foot survey. Reports of signs of isolated individuals in the Serengeti indicate a similar rhino situation in this Park. No survey work has been carried out in the Serengeti. With the exception of these isolated (and probably non-viable) individuals in Serengeti and Tarangire, rhinos seem extinct in these locations.

3.7. RHINO AREAS TO BE SURVEYED

Recent authoritative reports on rhino presence have been received from the following areas:

- Moyowosi/Kigosi Game Reserves
- Itigi thickets, Tabora and Singida regions
- Selous ecosystem, South and West
- Lake Rukwa area, Chunya District
- Serengeti National Park

None has yet been surveyed by the Project.

4. SUMMARY AND CONCLUSIONS

Figures 19 and 20 summarise the foot survey work and the data collected.

D. b. michaeli survives in viable numbers only in Ngorongoro and possibly on Rubondo Island. Elsewhere in its former range in northern Tanzania only small and probably non-viable remnants survive in Serengeti and Tarangire.

D. b. minor appears to survive in several viable populations in the Selous ecosystem. Not enough information is available to estimate numbers or predict ranging patterns. Isolated *D. b. minor* remnants survive in the Greater Ruaha ecosystem, in the Moyowosi Game Reserve, in the Burigi Game Reserve and possibly in the Itigi Thickets and Lake Rukwa area. The viability of these populations is unknown.

Although the pressure on the rhino populations from poachers has been reduced in the last few years, the threat remains for all remaining rhino populations, as was demonstrated by a recent case of poaching on Rubondo. The support for and morale of the ranger forces have greatly increased but they remain still very thinly spread in the larger protected areas (Fig. 21). In addition, most of these forces are still insufficiently equipped.

The Project has produced basic data on the presence/absence of rhinos in most protected areas. However, this data is insufficient to justify an active, rhino-specific management strategy for Tanzania. In the absence of an immediate threat to the rhino population and without the necessary information for active management available, the Project concludes that for the time being Tanzania should adhere to the already declared policy of *in situ* conservation and focus attention on rebuilding the general protection of all areas where rhinos still occur.

Fig. 19. Kilometres walked on survey per 10 sq. kms. of surveyed areas.

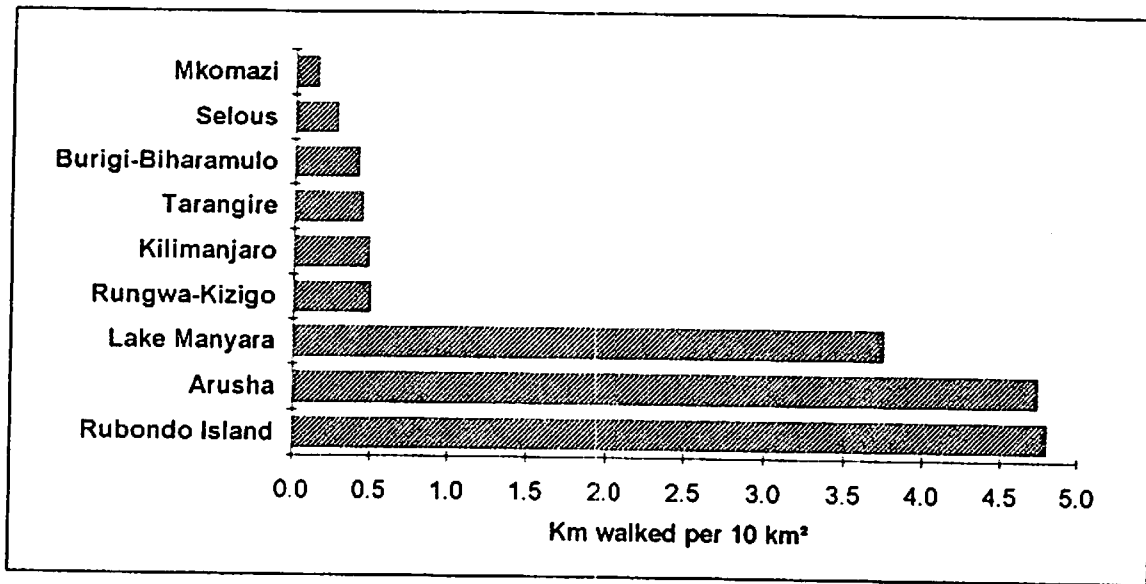


Fig. 20. Signs of Rhino encountered per 20 kms. walked on survey.

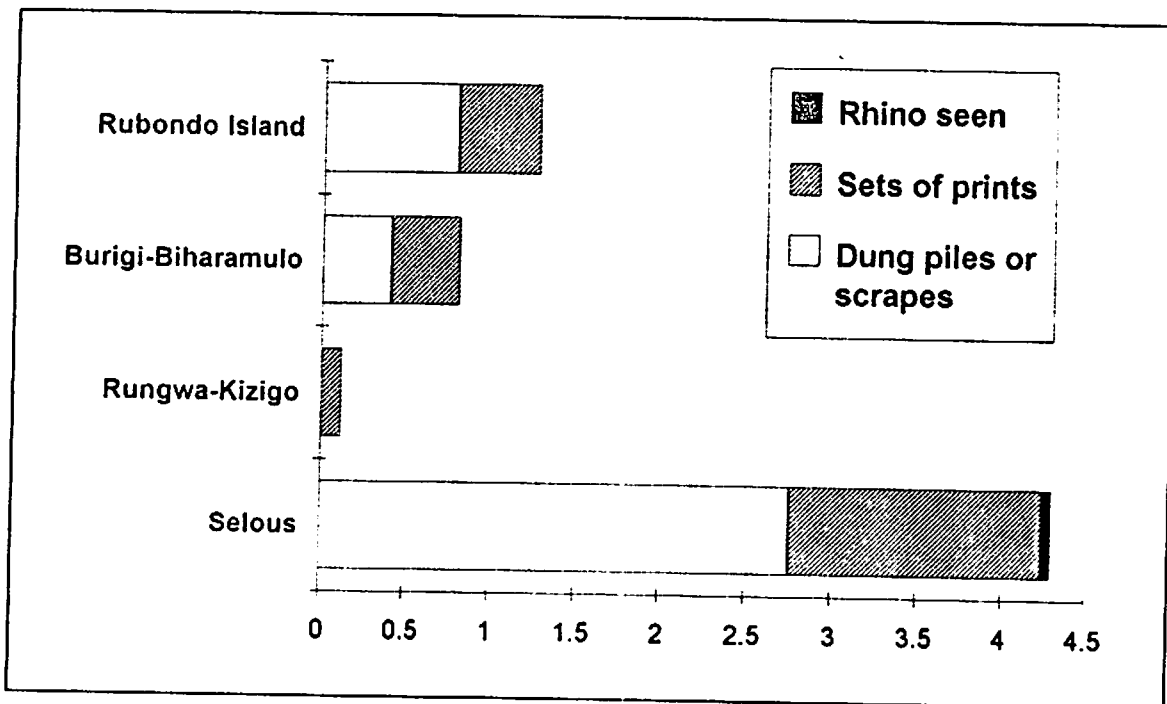
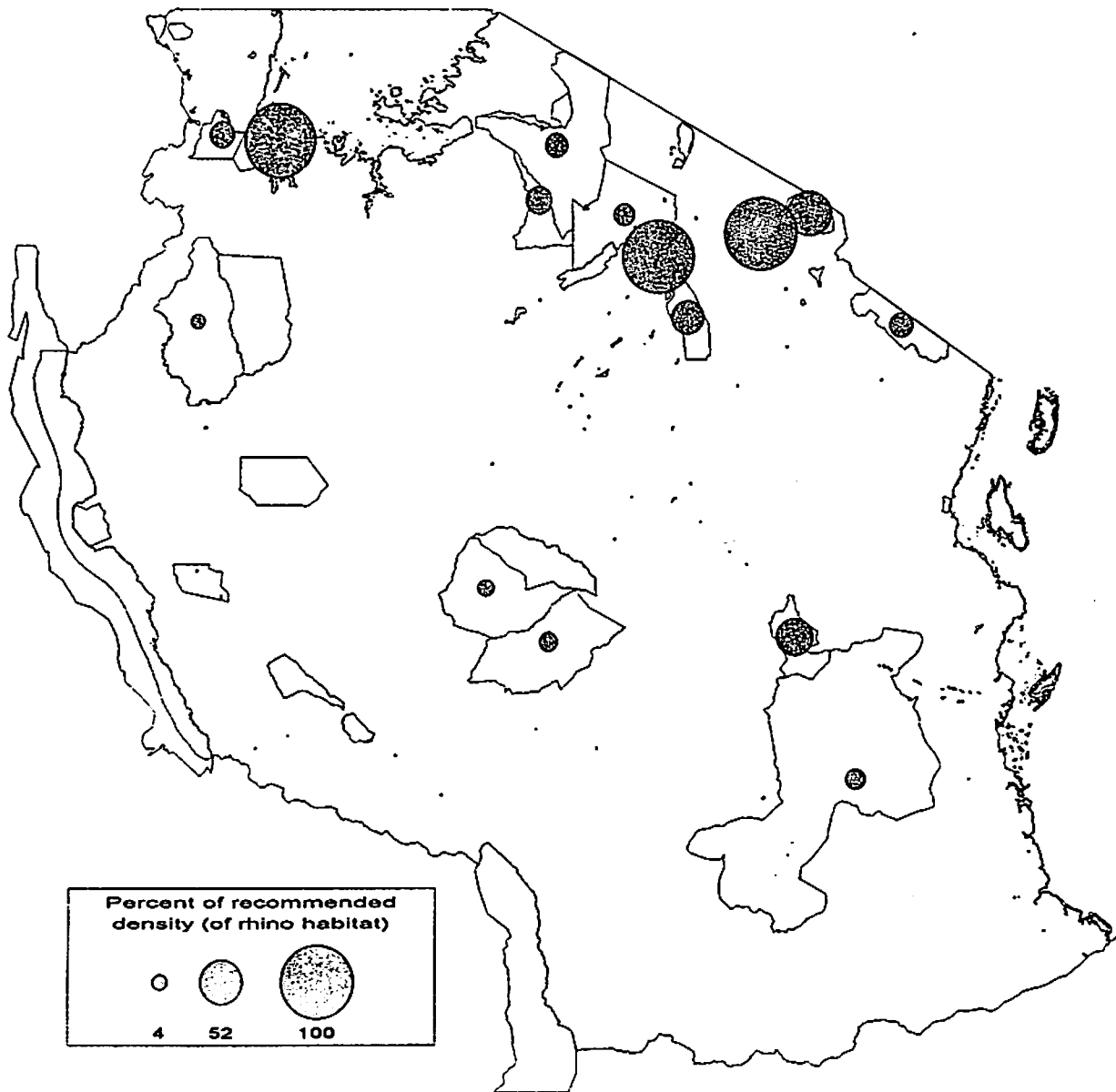


Fig. 21. Density of Rangers in Protected Areas in Tanzania, expressed relative to the recommended density of 1 ranger per 20 sq. kms. of rhino habitat (Bell and Clarke, 1986).



5. ACKNOWLEDGEMENTS

On behalf of the Wildlife Division and the Frankfurt Zoological Society, the Project leaders would particularly like to thank the Faith Foundation who provided all initial equipment: Landrover of Great Britain who donated the survey vehicles; BP Tanzania who donated diesel for the Selous survey; and British Airways who have donated free flights and free excess baggage.

The Project's work in the Selous was greatly assisted by the following people and organisations:-

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Dr. Nigel Leader-Williams of the African Wildlife Foundation assisted in collating and assessing the information from the questionnaires and follow-up interviews.

Survey work (in locations other than the Selous) has been greatly assisted by Ranger Safaris, Northern Hunting Enterprises, Robin Hurt Safaris, Ndutu Safari Lodge, Ngorongoro Crater Lodge, Tarangire Safari Lodge, NCAA, TANAPA and Ker & Downey.

The production of this report would not have been possible in the short time available without the great assistance of Dr. Ken Campbell (TWCM), Emanuel Severre, Sarah Tham and Grace Galinoma.

The Project leaders gratefully acknowledge the contributions of all of the above, on behalf of the Wildlife Division and the Frankfurt Zoological Society.

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APPENDIX I

OPTIONS FOR RHINO CONSERVATION: DISCUSSION PAPERS

The following is a list of different options available for rhino conservation in Tanzania. The main aim of this list is to give a basis for discussions, not to provide a complete list of options or advantages and disadvantages of those options.

Given the present state of information it is the opinion of the Rhino Project / FZS that the policy of *in situ* protection should receive the highest priority in future rhino conservation strategies for Tanzania.

1. *In situ*, ecosystem conservation

Pro

Does not only benefit rhino, but all species in ecosystem.

Cost effective vs. other options.

Does not require detailed information on rhino population.

Avoids drawing attention to rhinos' whereabouts.

Data from survey is at present insufficient to justify any other expedient (e.g. dehorning, translocation, etc.)

Management plans are ready to be acted on, or already in progress (e.g. Selous Conservation Programme).

Provides most scope for benefit to and involvement of local people.

Attractive for donors' support (rhino as flagship for ecosystem protection, e.g. Garamba National Park, Zaire).

In situ conservation, *inter alia*, has been successful in containing trophy poaching in several areas in Tanzania and elsewhere.

Contra

Needs high level of financial/manpower input to protect rhino.

Lack of publicity impact for attracting funding.

Failure of prioritising and protecting rhinos efficiently.

Difficult to measure success/failure relating to status of rhino.

2(a) Translocation and fenced Sanctuaries - general

Pros

Successfully done in Kenya and southern Africa.

High profile, therefore good funding potential.

Very rhino-specific.

Success/failure can be measured over time.

Boost for research and for tourism.

Large number of potential sites.

Potential to save isolated rhinos, which have no value any more for the population.

Contra

Expensive infrastructure

Expensive to spot and translocate, especially in the context of the vast and inaccessible terrain, where the remaining rhinos occur in Tanzania.

Doubtful benefit to ecosystem, and possible harm caused by using up resources and attention.

Depletion of ecosystem by removal of a key species.

Reduction of donor potential for ecosystem protection.

No relevant private sector in Tanzania, which has been an essential ingredient in success of sanctuary schemes in Kenya and Southern Africa.

Risks of death during capture, translocation or re-introduction.

D. b. michaeli/minor sub-species possible problems.

Northern tourist route has accessible rhinos in Ngorongoro, so a sanctuary is unlikely to boost tourism significantly.

2 (b) Translocation from outside country to Tanzanian sanctuary

Pros

Rhinos are available.

Avoids depleting existing stocks.

High impact/profile, increases funding potential.

Contra

Expense.

Leaves Tanzania's isolated rhinos to their fate.

High responsibility to and possible negative feedback on interstate relationships.

2(c) Translocation from within Tanzania

Pro

Makes use of unviable populations.

High profile, thus good funding potential.

Contra

Expense.

Insufficient knowledge on viability of wild populations left in situ.

Diminishes ecosystem from which rhinos are taken.

Diminishes chances of natural regeneration.

Inaccessibility of isolated individuals in Tanzania.

2(d) Natural Sanctuaries (Ngorongoro Crater and/or Rubondo)

Pro

- Low expense (no fencing) on infrastructure.
- General improvement of security benefits ecosystem.
- Ease of research and monitoring in Ngorongoro.
- Only possible sanctuaries with rhino in situ, so protection must be working. (Tourism, dense cover etc.)
- Improvement of genetic diversity for long-term viability.
- Rubondo has no predators.

Contra

- Only *D.b.michaeli* can be introduced if subspecies are to be kept separate.
- Problems of introducing rhino to areas where there are resident rhino.
- Lack of knowledge of current status of Rubondo and Ngorongoro populations.
- Rhino not indigenous to Rubondo.
- Rhinos easily emigrate from Ngorongoro.
- Current security needs improvement at Ngorongoro and Rubondo.
- Rubondo has no dispersal potential and poor access.

2(e) Fenced Sanctuaries (Manyara, Mkomazi, Serengeti, Arusha, Tarangire)

Pro

- Dispersal potential.
- Former rhino density and good habitat.
- Security much improved.
- High profile and boost to tourism.
- Good access.

Contra

- High infrastructure costs.
- Security risks (all locations easily accessible and operation has high profile).
- Veterinary considerations.
- Sites exclusive to *D.b. michaeli*.
- Fencing problems in an area where elephants occur.

3. Dehorning of Ngorongoro rhinos

Pros

Small, discrete population could be dehorned.

Very rhino-specific and not too expensive.

Contra

No protection vs. predators.

Possible inter - and intra species problems.

Current poaching situation is not sufficiently desperate.

Philosophical/tourist impact.

Lack of conclusive evidence that dehorning programmes are working.

Forest rhinos could not be dehorned, therefore reduced value of operation to discourage poaching and increased risk for inter - species problems.

4. Continuation of status survey and population monitoring

Pro

Current data insufficient to support final decisions on translocation vs. protection *in situ*, etc.

Flexible and economical, and complements *in situ* protection work.

Essential to build up rhino data over time to provide trends on movement, numbers, poaching, recruitment, etc.

Generates information on poaching, and on other endangered species (e.g. wild dogs) etc.

Contra

Logistical difficulties of finding such a rare animal.

Survey results to date have produced clear enough priorities to act upon for the time being.

Danger of drawing attention to location of rhinos, hitherto protected by anonymity.

High expense for low output of results.

5. Heavily patrolled Selous sanctuaries (unfenced)

Pro

Rhino specific.

High profile, funding capability.

Ecosystem (limited) value.

Supported by rhino-specific expert work (Bell & Clarke, Albon, Leader-Williams et al.).

Contra

Insufficient supporting infrastructure.

Necessitates remote ranger posts, which are hardship postings fostering poor morale and potential poaching.

Failure of high ranger density to protect rhinos efficiently elsewhere in Tanzania (Lake Manyara, Arusha National Park, Rubondo Island).

Exposes locations of rhino, hitherto protected by anonymity.

Data on numbers and ranging insufficient to demarcate sanctuary areas accurately.

Implied neglect of rhinos living or ranging outside sanctuary areas.

Expense of necessary infrastructure and accompanying disturbance of habitat.

Not proven to be successful in any similar location.

Equivalent patrolling effort could be carried out by mobile/airborne patrols operating from existing (or improved) reserve infrastructure.

6. Para-military rhino patrol force in the Selous

Pro

- Rhino specific, funding capability.
- Flexible, could be used in other rhino areas.
- Consistent with current Selous management programme.
- Ecosystem/anti-poaching benefit.
- Rhino monitoring/research resource.

Contra

- Need to reveal rhino locations to more people.
- Rhino area too large for blanket supervision.
- Necessitates expensive infrastructure (helicopters, aircraft and airstrips, special training, leadership, weapons and allowances).
- Existing anti-poaching capability insufficient to sustain or justify such an expensive force.
- Not justified by current level or type of poaching.

7. Para-military rhino patrol force in Ngorongoro

Pro

- All pro points as for Selous rhino patrol force, noted above.
- Rhino locations already known, and the areas are relatively small (c.f. Selous).
- Targets main and increasing threat to Ngorongoro rhinos, currently posed by well-armed Somali gangs.
- Rhino specific and economical.
- Embryo force and infrastructure already in place.

Contra

- Restrictions to act outside NCAA against intruders.
- Needs intelligence network and increased radio supervision amongst surrounding maasai areas.
- Needs vehicles, plus training, leadership, weapons, etc.

APPENDIX II QUESTIONNAIRE FORM

Name of Informant:
Position:
Address:
.....

Which area are you referring to?:

Region: District:
Game Reserve National Park:
Conservation Area: Others:

When were rhinos last reported in the area?

Year:

Are there still rhinos in the area?

Yes: No: Perhaps:

If 'yes' list details overleaf for all records since January 1990.

.....
.....

Are there recent (since Jan 1990) records of poaching?

.....
.....

Are there recent records of calves?

.....
.....

In your opinion are numbers of rhinos increasing or decreasing?

.....
.....

What is your estimate of the population size in the area?

Adult males: Adult females: Calves: Total:

Is this estimate based on individuals identified by

..... sight
..... footprints
..... rough guess?

Any other information (attach map if possible):

LIST ALL REPORTS OF RHINOS SINCE JANUARY 1990

(Continue on separate sheet if necessary)
 Sheets should be returned to: A. Chisanyo, Wildlife Division, P. O. Box 1994, Dar es Salaam, Tanzania.

DATE	SIGHTING (S) or TRACKS (T) ?	PLACE NAME	GEOGRAPHICAL COORDINATES	NUMBER AGE & SEX			HABITAT TYPE
				NO	AGE <small>Adult or calf?</small>	SEX	