

5.3 Developments and funding: 1984-1991

In assessing the merits of the present rhino conservation policy in Kenya it is important to be able to review the amount and effectiveness of funding supplied by donor organisations and NGO's to various rhino projects, particularly for the development of rhino sanctuaries. In 1989 and 1992, all donors and NGO's which had provided substantial funding for rhinoceros conservation in Kenya since the commencement of the Kenya Rhino Project in 1984 were asked to provide full details of the year, destination and amount of funds provided. The results are presented in Table 9, which gives funding totals by each donor/NGO to each conservation area or activity by year from 1984 onwards. Table 10 shows the total funding for by each donor/NGO to each rhino conservation area/activity, and Table 11, the total external funding to each area by year.

Internal funding from WCMD/KWS (e.g. salaries) and from the Wildlife Fund Trustees are not included in these tables. The tables are not intended to provide the reader with a comprehensive account of all funds spent on rhino conservation in Kenya over this period. However, they will serve as useful guides to the additional funds required and raised by donors in order to support both the wildlife authority (WCMD/KWS) and the private sector in developing and maintaining priority rhino conservation projects or activities, which include, but are by no means exclusively, rhino sanctuaries.

A total of just over 100 million Kenya shillings (equivalent to approximately three million pounds sterling) has been raised by donors/NGO's and spent in Kenya over the eight year period 1984-1991. More than half of this amount was spent in the development (including fencing) and maintenance of two KWS rhino sanctuaries, Lake Nakuru NP and Aberdares NP, with the majority of funds raised and spent by two respective dedicated charities, the Rhino Rescue Trust and Rhino Ark. Considerably lower, though significant amounts have been raised and spent on two other KWS sanctuaries (Ngulia, Nairobi NP) and two private land rhino sanctuaries (Lewa Downs, Ol Ari Nyiro). Other important areas receiving funding have been the Masai Mara NR, Matthews range (Ngeng Valley) and the KWS rhino capture unit.

To summarise, the most important developments in KWS National Parks and Reserves and in two private land rhino sanctuaries, funded to the extent and detail shown in Tables 10 and 11, are described in brief below:

National Parks and Reserves

Lake Nakuru NP was developed from 1986 onwards as the first National rhino sanctuary (Jenkins 1985b), including the construction of a 74 km perimeter electric fence, and sub-headquarters offices, stores and accommodation; also fence maintenance posts, holding pens, bridges and development of water supplies from several boreholes. Several vehicles and much assorted equipment, and supplies and funds for recurrent/maintenance needs have been provided, and also funding for the major rhino capture and translocation operation from Solio ranch to Lake Nakuru NP in 1987.

Ngulia rhino sanctuary (Tsavo West NP) was developed from 1985 onwards with the capture of three rhinos near Kibwezi and their eventual translocation into a small 3 km² fenced enclosure. The sanctuary has been extended in three phases to the present area of 65 km², accompanied by the construction of semi-permanent fence maintenance and guard posts, a sub-headquarters, holding pens and a water system fed to three piped tanks supplied from one borehole and a spring. Funds have been provided for equipment and maintenance of the sanctuary fence, water system and vehicles have also been provided, as well as for capture and translocation operations.

Nairobi NP was upgraded to rhino sanctuary status from 1988 onwards with the construction of electric fencing along the northern and western boundaries of the Park, and with the provision of equipment and vehicles for rhino surveillance and fence maintenance.

Aberdares NP was also upgraded to rhino sanctuary status from 1988 with the construction of electric fencing along the boundary of the Salient (Phase I), and the construction of guard posts, a sub-headquarters, bridges and other infrastructure; also with the provision of vehicles and surveillance equipment, and recurrent funds for the operation and maintenance of necessary vehicles and plant. Extension of the fence along the boundary of the Forest Reserve to the north (Phase II) is ongoing.

In **Meru NP**, a small fenced rhino sanctuary was developed and funded by one NGO in 1988, which proved to be a failure due to lack of security (section 5.1.8); all fencing and materials were subsequently removed, and used to extend the fence at the Ngulia rhino sanctuary in 1990.

Vehicles, equipment and salaries for locally employed rhino scouts have been provided from 1986 onwards for the support of successful rhino surveillance and monitoring activities in **Masai Mara NR, Lolita Hills, Matthew Range/Kitchich and Amboseli NP**.

The **Rhino Capture Unit** has been provided with four rehabilitated Isuzu and Bedford lorries, and much necessary equipment and tentage, veterinary supplies for rhino captures, and recurrent costs necessary for construction of holding pens, care of translocated rhinos, and the maintenance of vehicles and equipment.

TABLE 9 FUNDING TO KENYA RHINO CONSERVATION AREAS AND ACTIVITIES BY YEAR AND DONOR/NGO: 1984-1991

All figures in Kenya Shillings

DONOR/NGO	1984	1985	1986	1987	1988	1989	1990	1991	TOTAL
African Fund for Endangered Wildlife (AFEW)									
Lake Nakuru NP			60,000						60,000
Ngeng Valley					86,000	86,000			172,000
African Wildlife Foundation (AWF)									
General			1,500	55,900					57,400
Lake Nakuru NP			112,000	100,000					212,000
Tsavo NP		9,600	9,600	238,820	31,351	305,252	585,511	84,912	1,265,046
David Sheldrick Wildlife Trust (DSWT)									
Aberdares NP					9,484				9,484
General	325,860	38,339	141,660	143,085	280,915		150,000		1,079,859
Lake Nakuru NP		53,521	7,898	20,090	10,369				91,878
Orphan Care					60,000	80,000	90,000	100,000	330,000
Tsavo NP		88,100	8,860	132,455	152,198	126,585	265,200	80,000	853,408
East African Wildlife Society (EAWLS)									
Aberdares NP					594,640		65,900	501,660	1,162,200
Anti-poaching		23,900	91,220	225,280	217,480				557,880
Lake Nakuru NP		55,320	55,800	64,940	23,880	1,100	2,960	141,660	345,660
Meru NP	6,000								6,000
Nairobi NP	25,680	14,100		4,760		108,040			152,580
O1 Ari Nyiro Ranch	223,600	25,260	3,520	144,100		185,000	1,360		582,840
Rhino awareness	145,780	192,220	49,920	88,380	270,160				746,460
Tsavo NP	169,900		22,160	10,000			480,500	986,280	1,668,840
Eden Wildlife Trust (EWT)									
Aberdares NP			32,000	53,632	26,112	508,180	480,000		1,099,924
Amboelli NP							36,000	27,200	63,200
General/Helicopter	480,000	288,000				465,000	120,000	90,000	1,443,000
Loita Hills						72,000	72,000	36,000	180,000
Lewa Downs Ranch					60,800	100,000	100,000	50,000	310,800
Masai Mara NR	70,400	454,400	70,048						594,848
Meru NP				272,640	241,984				514,624
Ngeng Valley	84,480	84,480	84,480	99,840	110,400	304,600	399,500	197,881	1,365,661
Tana river						12,000	12,000	4,000	28,000
Tsavo NP			307,200	240,000	96,000	568,000	135,000	1,688	1,347,888

EDWCE/WHO	1984	1985	1986	1987	1988	1989	1990	1991	TOTAL
Elsa Wild Animal Appeal (EWAA)									
Aberdares NP					89,600	83,175			172,775
Lake Nakuru NP			5,412	10,052		66,540			82,004
Friends of Conservation (FoC)									
Capture Unit						1,600,000	763,572	505,301	2,868,873
Masai Mara NR (+ WWF)		950,000	800,000	810,000	960,000	1,105,000	702,325	721,532	6,048,857
Frankfurt Zoological Society (FZS)									
Lake Nakuru NP			898,426						898,426
Overseas Development Administration (ODA-UK)									
Aberdares NP								5,208,000	5,208,000
General			986,000						986,000
Peoples Trust for Endangered Species (PTES)									
General					1,121,400				1,121,400
Rhino Ark									
Aberdares NP					3,392,000	3,280,000	10,634,819	9,913,580	27,220,399
Rhino Rescue Trust (RRT)									
Aberdares NP					393,750				393,750
Lake Nakuru NP			5,826,953	5,006,470	4,606,855	1,826,586	1,221,649		18,488,513
Tsavo NP						80,000	282,586		362,586
Wildlife Conservation International (WCI-NYZS)									
Aberdares NP						1,000,000			1,000,000
Nairobi NP					2,000,000	350,000	26,612	967,475	3,344,087
Research				380,000	190,000	95,000			665,000
World Wide Fund for Nature (WWF)									
Aberdares NP						900,000	441,526	59,258	1,400,784
General support (USAID)					720,000	2,100,000			2,820,000
Lake Nakuru NP			560,000	527,100	180,000	300,000	38,207	54,212	1,659,519
Lewa Downs Ranch			307,000	860,000	1,300,000	720,000	501,051	673,533	4,361,584
O1 Ari Nyiro Ranch			958,000	1,131,800	1,346,960	1,605,600	19,360	12,901	5,074,621
Zoological Society of London (ZSL)									
General							537,204	186,278	723,482
O1 Ari Nyiro Ranch				98,290	232,082	167,895			498,267
TOTALS	1,533,684	2,279,225	11,401,643	10,719,621	18,806,408	18,203,542	18,166,832	20,605,342	101,700,407

TABLE 11 FUNDING TO KENYA RHINO CONSERVATION AREAS AND ACTIVITIES BY YEAR: 1984-1991

All figures in Kenya Shillings

AREA / ITEM	1984	1985	1986	1987	1988	1989	1990	1991	TOTAL
Aberdare NP			32,000	53,632	4,505,586	5,771,355	11,622,245	15,682,498	37,667,316
Amboseli NP							36,000	27,200	63,200
Anti-poaching		23,900	91,220	225,280	217,480				557,880
Awareness	145,780	192,220	49,920	88,380	270,160				746,460
Capture Unit						1,600,000	763,572	505,301	2,868,873
General	805,860	326,339	1,129,160	198,985	2,122,315	2,565,000	807,204	276,278	8,231,141
Lake Nakuru NP		108,841	7,526,489	5,728,652	4,821,104	2,194,226	1,262,816	195,872	21,838,000
Lewa Downs Ranch			307,000	860,000	1,360,800	820,000	601,051	723,533	4,672,384
Loita Hills						72,000	72,000	36,000	180,000
Maasai Mara NR	70,400	1,404,400	870,048	810,000	960,000	1,105,000	702,325	721,532	6,643,705
Meru NP	6,000			272,640	241,984				520,624
Nairobi NP	25,680	14,100		4,760	2,000,000	458,040	26,612	967,475	3,496,667
Nyng Valley	84,480	84,480	84,480	99,840	196,400	390,600	399,500	197,881	1,537,661
Ol Ari Byiro Ranch	223,600	25,260	961,520	1,374,190	1,579,042	1,958,495	20,720	12,901	6,155,728
Orphan Care					60,000	80,000	90,000	100,000	330,000
Research				380,000	190,000	95,000			665,000
Tana river						12,000	12,000	4,000	28,000
Tsavos NP	169,900	97,700	347,820	621,275	279,549	1,079,837	1,748,797	1,152,880	5,497,768
TOTALS	1,533,684	2,279,225	11,401,643	10,719,621	18,806,408	18,203,542	18,166,832	20,605,342	101,700,407

TABLE 10 FUNDING BY DONORS/NGOs TO KENYA RHINO CONSERVATION AREAS AND ACTIVITIES: 1984-1991

All figures in Kenya Shillings

AREA / DONOR	ASPER	AMV	ENVY	WORLD	SWF	UNDA	UNEP	UNEP	UNEP	UNEP	UNEP	UNEP	UNEP	UNEP	UNEP	TOTAL
Aberdare NP			9,484	1,162,200	1,099,924	172,775			5,208,000		27,220,399	393,750	1,000,000	1,400,784		37,667,316
Amboseli NP					63,200											63,200
Anti-poaching				557,880												557,880
Awareness				746,460												746,460
Capture Unit							2,868,873									2,868,873
General		57,400	1,079,859		1,443,000				986,000	1,121,400				2,820,000	723,482	8,231,141
Lake Nakuru NP	60,000	212,000	91,878	345,660		82,004		898,426				18,488,513		1,659,519		21,838,000
Lewa Downs					310,800									4,361,584		4,672,384
Lolita Hills					180,000											180,000
Maasai Mara NP					594,848		6,048,857									6,643,705
Meru NP				6,000	514,624											520,624
Nairobi NP				152,580									3,344,087			3,496,667
Ngeog Valley	172,000				1,365,661											1,537,661
Ol Ari Nyiro R				582,840										5,074,621	498,267	6,155,728
Orphan Care			330,000													330,000
Research												665,000				665,000
Tana river					28,000											28,000
Yarwo NP		1,265,046	853,408	1,668,840	1,347,888							362,586				5,497,768
TOTALS	232,000	1,534,446	2,364,629	5,222,460	6,947,945	254,778	8,917,730	898,426	6,194,000	1,121,400	27,220,399	19,244,849	5,009,087	15,316,506	1,221,749	101,700,407

Private Land

In the private sector, very large but unknown amounts of money have been spent by the owners of **Solio** and **Oi Jogi** ranches from 1970 onwards in constructing and developing their respective reserves. The financial burden in maintenance and management of these areas since must have been very substantial. Rhino security and monitoring work on **Oi Ari Nyiro** ranch has been supported by the owner with considerable assistance from donors. Large amounts of money have been raised for the complete rhino sanctuary development on **Lewa Downs** ranch, added to the commitment and support for rhino protection provided by the land owners concerned. Finally, a complete rhino sanctuary was developed in 1989 and has been financed and maintained entirely by Lonrho at **Oi Pejeta** ranch.

Effectiveness of funds

To compare with the funding for rhino sanctuaries and developments outlined above, some idea of the relative success of different rhino sanctuary areas in terms of actual tangible results (e.g. increase in rhino numbers) can be gained from Table 12. In each fenced rhino sanctuary which has been stocked with rhinos, the size of the stocking, and numbers of births, deaths, the numbers of rhino supplied to stock other rhino sanctuary, the present total number, and the net increase in rhino numbers are presented.

The longest running sanctuaries, Nairobi NP and Solio have clearly been the most successful, and between them have provided 46 surplus rhinos to stock other areas. The Solio and Nairobi NP rhinos have, respectively, doubled and quadrupled their numbers since stocking, including numbers of rhinos 'harvested'.

The newer rhino sanctuaries have started to show signs of population increase, although the clearest success so far has been Lake Nakuru NP with 10 calves born and only one death. Lewa Downs has produced the same numbers born, but has suffered from seven deaths from fighting and accidents, and has yet to show substantial increase. Ngulia has had relatively poor breeding output so far, which should improve after the completion of stocking. All stocked sanctuaries have shown net gain in numbers with the exception of Oi Pejeta and Meru.

For the largest existing indigenous rhino populations, the rhino sanctuary and/or surveillance projects undertaken during the period have resulted in persistence and increase in rhino populations (e.g. Aberdares NP, Masai Mara NR, Oi Ari Nyiro ranch, Matthews Range, Loita Hills). With the exception of the Masai Mara NR, where improved surveillance has had a remarkably positive effect (increase in numbers from 13 (1985) to 32 (1992)), lack of precision in census and monitoring of rhino numbers, particularly in any earlier years of the project (1984-87) have made it difficult or impossible to confirm population trends in these areas, or to attribute them to the funding and inputs provided, or lack of them.

TABLE 12 BREEDING SUCCESS IN ENCLOSED RHINO SANCTUARIES STOCKED WITH BLACK RHINOS: 1963-1992

Rhino Sanctuary	No. rhinos stocked (founder population)	Start Year of sanctuary	No. Births	No. Deaths	Total Number of rhinos (1992)	No. rhinos supplied to other sanctuaries	Net Increase in rhino numbers (Factor)
Sollo Ranch	23	1970	?	?	66	30	73 (4.2)
Nairobi NP	38	1963	?	?	60	16	38 (2.0)
Lake Nakuru NP	21	1987	10	1	31	1	9 (1.5)
O1 Jogi Ranch	5	1979	10	2	12	1	8 (2.6)
Lewa Downs Ranch	15	1984	10	8	13	4	2 (1.1)
Ngulia (Tsavo West NP)	15	1986	4	2	17	0	2 (1.1)
O1 Pejeta Ranch	14	1989	2	4	11	1	0 (1.0)
TOTAL	129				211	53	132 (2.1)

6.0 RHINO MONITORING AND RESEARCH PROGRAMME

6.1 Rhino population monitoring

Successful management of all black rhino populations, including those managed for maximum sustained breeding output and avoidance of overpopulation, will depend on uninterrupted and detailed population monitoring. A rudimentary system of monitoring of the rhino populations in sanctuaries is already in place, with data and records collected in standard formats (see Annex 5). The objective of all such rhino population monitoring is to obtain the following:

1. Confirmation of the presence and health of individual rhinos.
2. Personal history records of all rhinos.
3. Details of all births and mortalities, and, where possible, matings.
4. Identities of breeding animals.
5. Parenthood of calves.

The following data will be collected to provide this information:

1. Individual identification of all rhinos
 - Photographic records for sightings
 - Individual features: horn shape, ear notches, etc.
 - Ear-notching and ear-tagging (see Hitchins 1989)
 - Identification of rhino sign
 - Track measurements and marks, where possible
2. Ageing of rhinos, especially immatures (see Annex 5)
 - Size against mothers (Hitchins 1970, Emslie *et al* 1993)
 - Track size criteria
3. Daily rhino sightings, providing
 - Confirmation of presence and health of all rhinos
 - Details of all matings, births and mortalities
4. Personal history records of all known rhinos

This information in turn will be used to calculate:

1. Absolute population sizes or estimates in each area, obtained through individual identification and/or regular ground and aerial surveys.

2. Annual population performance indicators (e.g. percentage of calves in the population, cow/calf ratios, sex ratios, calving intervals, group size: as Tables 2 and 7).
3. The recruitment rate to each population.
4. The age structure of each population.
5. The density of rhinos in each area.

The present system of collection, storage and analysis of information is as follows (see Annex 5):

1. ID cards, and photofiles for individual ID of rhinos. All individually known rhinos are given a four-digit ID number (allocation shown in Annex 5).
2. Record books for rhino surveillance teams for patrol records, sightings records, mortalities.
3. Record books used by KWS vets for all mortalities/autopsies. Skulls and lower jaw bones are aged (du Toit 1986; Hitchins 1978) marked, catalogued and stored, and entire skeletons will be collected where possible and deposited with the National Museum of Kenya in Nairobi.
4. Record books and capture data forms used by KWS vets for recording details of all rhino captures and translocations. All immobilised rhinos have body measurements taken, and are aged from wear to the upper tooth row (du Toit 1986).
5. A computer database of all individually known rhinos, including history and breeding records.
6. Spreadsheet analysis of densities, population breeding performance, carrying capacities, management levels and 'harvest' of surplus rhinos to maintain maximum breeding output.

Rhino surveillance personnel in several rhino conservation areas (e.g. Nairobi NP, LNNP, Ngulia RS, Masai Mara NR) collect information from daily vehicle and foot patrols. Most of the black rhino in the protected areas are identifiable from individual features (e.g. horn shape), and individual identification is the basis of all monitored information. All rhinos immobilised for translocation, tagging or treatment will be ear-notched to assist future identification. Training of rhino surveillance officers and rangers will continue in all areas, particularly that of rangers and scouts based on a series of training modules for rhino scouts monitoring black rhino populations in Natal (Sandwith 1990).

Staff in private land rhino areas are required to monitor their rhino populations in order to obtain the minimum information required to identify all individuals, regularly census and establish population trends (section 4.7; Annex 3), and those areas where little or no monitoring is in place will be obliged to provide minimum information and monitoring capability for rhino populations on their land.

Operation of a system which will confirm the presence and health of each known individual rhino in each population within a certain period will be essential in future. The ability of rhino surveillance teams to sight and confirm the above will vary between different areas, due to differences in the terrain to be covered, the density of rhinos, the vegetation cover/habitat and the temperament of the rhinos. Once the absence of any individual exceeds a critical period (termed the Maximum Interval between Sightings (MIS), e.g. 1 month), intensive searching will be carried out for this particular individual first within, and then outside its known normal home range or area. Where appropriate and necessary in rhino areas with high vulnerability or poaching challenge (e.g. Tsavo NP, Lewa Downs), security units should be deployed.

MIS's for individually known rhinos should apply in the following conservation areas:

Nairobi NP	2 weeks (plains/gorges habitat)
	1 month (forest habitat)
Lake Nakuru NP	1 month (all areas of NP)
Ngulia RS	2 months (monitoring at piped waterholes)
Aberdares NP	2 months (monitoring at Ark, Treetops, salt licks)
Masai Mara NR	2 months (all areas of NR)

In order to keep track of sightings frequencies for individually known rhinos in each area, sighting frequency forms (Annex 5) will be completed. This will also assist security of individual rhinos, where surveillance officers can mount intensive searches of known home ranges to locate animals which have not been sighted for a period longer than the required MIS. Maximum Intervals between Sightings will be re-classified after one year of routine use in each area. After this time the sightings patterns and frequencies for individual areas and individual rhinos will have become clear. At this stage it will be possible for each rhino surveillance unit head to decide on an updated MIS. In any sanctuary, any rhino not sighted for one year will be considered dead, or no longer part of the population monitored.

In areas where routine daily monitoring of the rhino population is not in effect, and population estimates can only be calculated on the basis of additions (births, translocation, known immigration) or removals (mortalities, translocation, known emigration) of rhino since the last time the total rhino numbers were known, a total census of the population will be required. In these cases no longer than three years should elapse before a full census is repeated.

6.2 Ecological monitoring in rhino sanctuaries

The successful management of rhino sanctuaries and other small Parks and Reserves, particularly those enclosed by fencing, and/or surrounded by human settlement, will depend critically on detailed ecological monitoring. Particular attention will be paid to assessment of vegetation status, and the numbers and population dynamics of several species of grazing and browsing herbivores, as well as predator species. In rhino sanctuaries, priority should be given to the requirements of the black rhino. This should entail complete protection for this species, and maintenance of the habitat conditions and population structure to promote maximum sustainable breeding output.

Judging by the events that have taken place already in fenced rhino sanctuaries in the last 10-15 years (e.g. Solio Ranch GR, Lewa Downs RS, Ol Jogi Ranch GR; Lake Nakuru NP, Nairobi NP), these enclosed systems are susceptible to major fluctuations in the numbers of different species. The following changes have already been observed: die-offs of eland, greater kudu, oryx and wart-hog in dry years (e.g. Lewa Downs); overpopulation of waterbuck and impala at low predator numbers (LNNP); increase and decrease in predator numbers (Aberdares NP: hyaena); large increases in numbers of giraffe, zebra and buffalo in several areas (Ol Jogi, Lewa Downs, LNNP); overbrowsing of favoured browse species by black rhino (made more acute by giraffe grazing at lower browse levels after depleting reserves at higher levels) (Ol Jogi). In addition three sanctuaries have existing or potential problems with elephant (Ngulia RS, Ol Pejeta, Lewa Downs, Ol Ari Nyiro). Confinement of elephant is causing noticeable habitat change, problems with fence maintenance, and possibly disturbance to rhinos. Particularly in the areas mentioned above, there is a need for a monitoring system appropriate to the whole enclosed ecosystem.

Appropriate long-term vegetation monitoring will be carried out by KWS in enclosed and un-confined rhino sanctuaries in National Parks and Reserves, and the numbers and inter-relationships of other major predator and herbivore species will be monitored, particularly the number of potential competitors with the rhino. Private land rhino sanctuaries are encouraged to employ their own resident ecologists or research assistants to carry out relevant ecological monitoring in consultation with KWS ecologists.

Vegetation monitoring in rhino sanctuaries will concentrate on the following techniques:

1. Routine ground photography from fixed points/cairns (N,S,E,W directions) at the end of wet and dry seasons, and use of these points as markers for long-term transects. Photographic points will be selected to provide coverage of several representative areas of rhino habitat and feeding areas.
2. Aerial photography of fixed points/transects as for 1.(above), and the use of satellite imagery, if appropriate, feasible, and affordable.

3. Determination of rhino diet and identification of key browse species through direct (feeding observations) and indirect methods (feeding site observation, faecal analysis). Inventories of preferred browse species will be compiled and reference herbarium specimens catalogued and stored in each area.
4. Ground monitoring of browse abundance and availability, including belt transects, exclosure plots; measurement of bush/tree heights, browse levels and stem diameters; measurements of woody vegetation cover.

In addition, the susceptibility of enclosed areas to major and minor fires is potentially a big threat to the rhino populations they may contain, especially to their food resources and cover. Fire policies will be devised for each management area. Determining management should involve controlled and/or rotational burning programmes or the total exclusion of fire, for which the maintenance of firebreaks will be essential.

6.3 Genetic studies

Research is required on the molecular genetic differences between black rhino populations and ecotypes in Kenya; this has been recommended by the PHVA workshop (Foose *et al* 1993). At present data from genetic analyses are not available to resolve fully the question of whether there are significant genetic varieties of black rhino within Kenya, and if so, whether these (e.g. highland and lowland ecotypes: section 2.1) should be readily intermixed. For these reasons, every black rhino immobilised requires assessment of levels of genetic variation within chromosomal and mitochondrial DNA. Foose *et al* (1993: section 5) provides additional background information on past results of genetic analyses on samples collected from Kenyan black rhinos.

More detailed analyses of genetic material collected in the past, and in the future, may enable detection of levels of inbreeding, and also degrees of relatedness between individual rhinos. These analyses could affect management decisions in the future, in particular those involving the choice of particular animals for translocations between sanctuaries in order to minimise inbreeding.

Genetic analysis of samples collected from Kenya black rhinos will continue in collaboration with NMK and CRES/ZSSD. All individual rhinos immobilised during translocation or treatment are sampled for blood and tissue, the latter conveniently collected from notches cut from ears for marking purposes.

As data on the population dynamics, survivorship, individual life histories and breeding performance of well-monitored rhino populations accumulate, the value of computer modelling and projections of the future performance and inbreeding levels in each area will increase. In collaboration with IoZ/ZSL and IUCN/SSC CBSG, computer analyses of well-known small rhino populations in Kenya are providing indications of how soon action will have to be taken to avoid inbreeding (VORTEX: Foose *et al*

(1993), GAPPS: Dobson *et al* (1991)). Projections of harvest or removal of surplus rhinos above carrying capacity can also be made.

Biopsy darting will be used to sample tissue from selected rhinos where specific questions about lineage and genetic variability can be answered through genetic analyses, including the use of DNA fingerprinting and the use of mini-satellite DNA probes. The black rhino population on Ol Jogi ranch is an example of a potentially dangerous inbreeding situation, which will be monitored through sampling in 1993 of each rhino for tissue through biopsy darting.

6.4 Disease resistance and monitoring

Studies will continue in collaboration with ICIPE, KETRI, ILRAD and KARI on establishing the feasibility of routine translocations of black rhino from upland areas of Kenya, free of tsetse fly and trypanosomiasis, to lowland tsetse-infested sanctuaries or release areas. These involve the movement of a few selected 'guinea-pig' rhinos from upland sanctuaries (e.g. Solio Ranch, Nairobi NP) to lowland areas (e.g. Tsavo NP, Meru NP), holding them in bomas, monitoring their infection by trypanosomes, and characterising the latter collected from rhino and from tsetse fly populations surveyed in the recipient area. Most of the successful rhino donor sanctuaries are located in non-fly areas, and most of the potential release areas for large numbers of rhino are located in tsetse fly/trypanosomiasis areas.

Work completed so far in monitoring eight rhinos translocated to Tsavo from Nairobi (Mihok *et al* 1992) indicate that upland rhinos can easily become resistant and habituate to infection with trypanosomiasis in tsetse fly areas, as long as their nutritional status is good, and rhinos are moved into tsetse areas at times of low tsetse densities and reduced trypanosomiasis challenge. However, there are several species of tsetse fly each potentially or actually carrying several species of trypanosome, and these will vary from area to area, often markedly within small areas (e.g. Ngulia rhino sanctuary). For different recipient lowland areas, even within Tsavo NP, further monitoring work must be carried out in each case, and because of the large numbers of rhinos that need to be moved, these studies are of particular urgency and importance to the future management of the black rhino in Kenya.

6.5 Boma management and post-translocation monitoring

Critical to the successful introduction of translocated rhinos to new areas is the intensive monitoring of rhinos managed in bomas, or holding pens, prior to release, and the detailed monitoring of the movements and behaviour of rhinos after release. The KWS Veterinary and Capture Units will provide all necessary care, provision and adaptation of penned rhinos to local browse, dietary supplements where appropriate, and treatment for any diseases or ailments. Where donor and recipient areas differ widely in habitat and browse species available, it will be particularly important for translocated rhinos to become thoroughly adapted to the new diet and, if possible, only to be released after a gain in condition and body weight is noted during the

holding period before release. All translocated rhinos will be tipped (tip of anterior horn cut off) in order to prevent subsequent injuries during confinement and after release, reduce the risk of total accidental horn loss in confinement, and also to provide horn samples for analysis (see section 6.8).

Post-release movement and behaviour will be monitored by radio-telemetry where conditions (e.g. closed bushland or forest) make routine sighting or detection from the ground difficult or impossible. Horn-implant radio transmitters (Telonics unit IMP/300/L, or units installed by Pienaar & Hall-Martin (1991)), or transmitters attached to elastic collars or ear-tags will be used. Released rhinos will also have distinctive marks cut into toe-nails to assist identification of tracks, in addition to ear-notching to enable identification of the animal by sight (Annex 5).

Translocation of rhinos to new areas, particularly those with already resident populations of rhino, can only be considered successful after the animal has integrated successfully and maintained good condition and consistent home range movements for six months after release.

6.6 Parasitology

Endoparasite loads of translocated rhinos will be monitored in selected areas, as well as wild rhinos in any monitored populations which show negative effects on health and condition as a result of heavy parasite burdens. Studies of the species and densities of endoparasites in rhinos translocated from Nairobi NP to Tsavo West NP are ongoing, and have already assisted KWS vets in decisions over whether to de-worm individual rhinos.

Attention will be given to the occurrence and life history details of the black rhino-specific, and apparently harmless bot fly *Gyrostigma rhinocerontis*, which has disappeared from many areas of Kenya as the black rhino has been eradicated (Dewhurst, pers comm). Large numbers of bot fly larvae have been collected from the dung of rhinos captured in Nairobi NP, indicating healthy populations in this area. Attention will be given to improving prospects of re-infection of rhino populations and recipient areas (e.g. Tsavo NP) where *Gyrostigma* spp may be extinct, and can be re-introduced with translocated rhinos from Nairobi NP.

6.7 Nutrition

Particular conservation areas for the black rhino in Kenya are known to suffer from deficiencies of certain minerals in the soil and browse (e.g. Lake Nakuru NP). In collaboration with ICL, mineral studies will continue in these areas as necessary, in order to assess the potential impact of these deficiencies on the health and breeding of rhinos in these areas, and the requirements for the provision and recommended composition of mineral supplements.

The nutrition of rhinos is of particular concern in management of rhinos in sanctuaries, and of rhinos confined in bomas. The chemical defences of food plants may have an important influence on the suitability of rhino habitat. This particularly applies to those defences raised by plants in response to browsing pressure, and which may become toxic to rhinos at high browsing intensities. In collaboration with NMK, EAH and ecologists from ZNPWLM, studies will be initiated on the phytochemistry of browse plants consumed by black rhinoceros under different feeding intensities, taking into account browse preferences, plant phenology and habitat conditions (e.g. seasonal variation/droughts). Phenolic compounds in browse plants will be analysed using standardised techniques. In addition, the metabolites of secondary plant compounds excreted in the urine and/or faeces of rhinos will be measured. These measurements could provide an indication of the response of different key browse species to feeding intensity as a function of rhino density, and ultimately some measure of maximum tolerable rhino density or the carrying capacity for a given area. These studies could also provide an early warning for the assessment of habitat quality in areas which are seriously overbrowsed, or undergoing periods of drought which impact on rhino health, condition or breeding performance.

6.8 Source Identification of rhino horn

Samples of rhino horn will be collected from all dead or immobilised rhinos. In collaboration with the University of Cape Town, these samples will undergo isotopic analysis in order to type samples to origin or source. Source identification has already proved successful in analysis of horns from various regions of southern Africa (Van der Merwe, pers comm). Similar work on horns originating from different geographical regions of Kenya may enable future detection of origin of horns recovered from the illegal trade, inside and outside of Africa. Horns of translocated rhinos are of particular interest, because horn growth and the isotopic ingredients of new growth will differ between each geographic area where a rhino has lived, and thus differing isotopic spectra may be found along the length of the horn according to each location, and the period of a rhino's residence in each area.

7.0 IMPLEMENTATION SCHEDULE

7.1 Capture and translocation programme

7.1.1 Rescue of outliers

Where groups or individual black rhinos are found to be without security, isolated (no breeding contact with other rhinos) or otherwise judged to be inviable, they will be captured and translocated to sanctuaries or secure release areas. The location and capture of such rhinos are often very difficult and/or prohibitively expensive, and with the funds and capture facilities available it must be accepted that it will be impossible to recover some isolated rhinos. The use of helicopters (e.g. Puma, Sea King) capable of lifting a rhino and crate may allow capture and recovery of several of these outliers, but may be of limited use at high altitudes. Such outliers requiring capture are listed below, in approximate order of priority (see also Table 1). The survey and translocation work planned for 1993 will aim to establish the location and status of many of these animals, with immediate capture and translocation to follow if feasible.

<u>Area</u>	<u>Number of rhinos</u>
Keno/Losai NR/Laisamis	1-3
Luoniak Ranch/Amaya/Losuk	3
Karissia Hills	6
Chyulu Hills (north)	2
Jilori-Chacama	1
Wajir District	2
Tana River District	8
(if Tana Delta National Reserve is not gazetted)	

7.1.2 Translocation of surplus rhinos

With the current state of sanctuaries having surplus rhinos, and those requiring completion of stocking, several substantial capture and translocation operations in Nairobi NP and Solio Ranch are required. Given projections of continued surplus, further removal of rhinos from Nairobi NP, Solio and Lake Nakuru will be carried out in the next decade. From the realistic projections of 4.7% growth in Nairobi NP and Solio Ranch in the next five years (Table 8; Foose *et al* 1993), minimum numbers of rhino to be translocated are listed in Table 13. Choice of translocates will be adapted to maintain a 1:1 sex ratio in donor and recipient areas if possible.

Additional rhinos to these which exceed management levels after 1994, if birth rates are actually higher than 4.7%, will be translocated to specified destination sanctuaries or release areas. These may include Amboseli and Meru National Parks, conditional on adequate security and habitat availability (see also section 5.1.8). After initial removal of surplus rhinos in 1993-94 from Solio and Nairobi NP, the numbers of rhinos removed will not exceed the numbers of rhinos born in the preceding year.

TABLE 13 TRANSLOCATION IMPLEMENTATION SCHEDULE

DONOR SANCTUARY	RECIPIENT SANCTUARY/AREA	1992 TOTAL	1993	1994	1995	1996	1997
Nairobi NP	Ngulia (Tsavo West NP)	17	4				
Nairobi NP	Tsavo East NP	2	2	5	4	3	5
Solio Ranch	Lewa Downs Ranch	13	8				
Solio Ranch	Oi Pejeta Ranch	11	8				
Solio Ranch	Aberdares NP	50		3		3	
Solio Ranch	Mt Kenya (Kihari Forest)	5		2		3	
TOTAL		98	22	10	7	6	5

7.1.3 Other translocations

There are two sanctuaries which require introduction and/or removal of selected rhino in order to achieve demographic stability (e.g. provision of breeding male) or improved composition of a small population in order to avoid incidence of inbreeding, and improve breeding performance. Translocations necessary to correct these situations are listed below.

<u>Area</u>	<u>Action required</u>
Lewa Downs Ranch	Introduce breeding male (from Keno/Losai NR/Laisamis)
Oi Jogi Ranch	Remove 3-4 adult males (to Lewa Downs) Introduce breeding male (from Solio)
Oi Ari Nyiro Ranch	introduce breeding females

7.2 Development and maintenance programme

This section briefly outlines the priority developments and management actions that will be required in each KWS rhino conservation area, with a schedule for implementation within the next five years (1993-1997). Many of these items have had funding committed for them within the IDA PAWS project, also scheduled within the next five years. Only those items confirmed for funding by the PAWS project are indicated as such. This coincides with PAWS workplans and implementation schedules already drawn up for the project years 1992/93 and 1993/94. Commitment to funding by other donors and NGO's is indicated in each table. Priority projects with no source of funding located are also indicated.

The listings of requirements for each area are not comprehensive, and include only major priority items identified at the beginning of 1993 for provision or construction within the next five years. Each rhino conservation area, particularly the fenced rhino sanctuaries carries a heavy maintenance burden, and as in the last few years, the assistance of several donors and NGO's (e.g. WWF, DSWT, AWF, EWT, FoC) in maintenance of rhino sanctuaries and key activities (e.g. translocations) and provision of contingency/emergency funding has been crucial to their success, independent of recurrent funds/votes allocated to each area by KWS for expenditure by respective wardens. This requirement for additional funds for recurrent and contingency expenses in different rhino conservation areas will continue to exist within the next five years.

Lake Nakuru NP

Action/Input required	1993	1994	1995	1996	1997	Donor Identified
Water development: Lanet/Lion Hill scheme						PAWS/WWF
Water development: Pwani scheme (includes new borehole)						PAWS
Accommodation for rangers/fence staff: 15 houses						PAWS
Purchase of vehicle: Suzuki LWB Pickup						WWF
Replacement of vehicle: Toyota Hi-Lux						None
Rehabilitation of Isuzu lorry						None
Surveillance equipment: 4 prs binoculars						None

Aberdares NP

Action/Input required	1993	1994	1995	1996	1997	Donor Identified
Fencing FR boundary: Phase II (Wandari Gate - Rhino Gate)						Rhino Ark
Fencing FR boundary: Phase III (Rhino Gate - Shamata Gate)						Rhino Ark
Fencing FR boundary: Phase IV (Ruhoruni - Chinga)						Rhino Ark?
Fencing FR boundary: Phase V (Chinga - Gatakaini)						Rhino Ark?
Vehicle for rhino surveillance: Suzuki LWB Pickup						WWF
Accommodation for rangers/fence staff: 15 houses						PAWS
Hides for rhino surveillance at salt licks						None
Surveillance equipment: 3 prs binoculars, 2 night scopes						None
VHF radios: 2 base/mobile sets, 5 handsets						None
Construct holding pens - permanent (3)						Werihe/FoC
Radio-tracking equipment						None

Ngulia rhino sanctuary (Tsavo West NP)

Action/Input required	1993	1994	1995	1996	1997	Donor Identified
Accommodation: Assistant Warden's house						PAWS
VHF radios: 2 mobile sets, 3 handsets						AWF
Purchase vehicle: Suzuki LWB Pickup						Savanna Club
Replace vehicle: L/R 110 Pickup						None
Replace vehicle: Suzuki LWB Pickup						None
Rehabilitation of tractor						WWF/KWS
Rehabilitation of Bedford lorry						None
Surveillance equipment: 5 prs binoculars, 1 night scope						None

Nairobi NP

Action/Input required	1993	1994	1995	1996	1997	Donor identified
Construct Outpost: Mbagathi River						None
Construct Outpost: Marimbeti/Embakasi						None
Replace electric fence: Carnivore to East Gate						None
Construct holding pens - permanent (3)						DSWT/FoC
Accommodation for capture rangers at Banda Gate: 10 houses						PAWS
Replace rhino surveillance vehicle: L/R 110 Pickup						None
Replace fence maintenance vehicle: Suzuki LWB Pickup						None
Surveillance equipment: 4 prs binoculars, 2 night scopes						None

Kitchich - Matthews Range - Ngeng Valley

Action/Input required	1993	1994	1995	1996	1997	Donor identified
Replace vehicle: Toyota L/Cruiser						None
Accommodation for rangers: 10 houses/rondavels						None
Surveillance equipment: 35 mm Camera plus lenses						PAWS
Surveillance equipment: 4 prs binoculars, 2 night scopes						None
VHF radios: 3 base/mobile sets, 5 handsets						None

Tsavo East NP

Action/Input required	1993	1994	1995	1996	1997	Donor identified
Construct holding pens - temporary (3)						DSWT/EWT
Accommodation for rangers: 5 tents/rondavels						EWT/DSWT
Vehicle for rhino surveillance: Suzuki LWB Pickup						M Werikhe
VHF radios: 1 mobile, 3 handsets						None
Radio-tracking equipment						PAWS/WWF
Surveillance equipment: 2 prs binoculars, 1 night scope						None

Mt Kenya (Kihari Forest)

Action/Input required	1993	1994	1995	1996	1997	Donor identified
Fencing FR boundary SW, W & NW of Kihari Hill						None
Construct holding pens - temporary (3)						PAWS
Accommodation for rangers: 6 houses						PAWS
Radio-tracking equipment						None
Surveillance equipment: 3 prs binoculars						None

Masai Mara NR - Loita Hills

Action/Input required	1993	1994	1995	1996	1997	Donor identified
Rhino surveillance vehicle: L/Cruiser or L/Rover						None
Surveillance equipment: 3 prs binoculars, 1 night scope						None

Capture Unit

Action/Input required	1993	1994	1995	1996	1997	Donor identified
Capture lorry (6 x 6)						PAWS
Equipment/spare parts/maintenance for capture lorries						FoC
Portable/temporary metal holding pens (6)						None

Rhino surveys and census - general

Action/Input required	1993	1994	1995	1996	1997	Donor Identified
Vehicle for rhino programme office: KWS HQs						None
Survey of outliers for relocation: UNEP/ARSG proposal 1						None
Support for intelligence/monitoring: UNEP/ARSG proposal 2						None
Full census of Ol Ari Nyiro ranch black rhinos						None
Full census of Solio ranch black rhinos						None
Full census of Tsavo West NP black rhinos						None
Routine census of Ngulia black rhino at water holes						-
Routine census of Aberdares NP black rhino at salt licks						-
Routine census of Matthews range rhinos at salt licks						-

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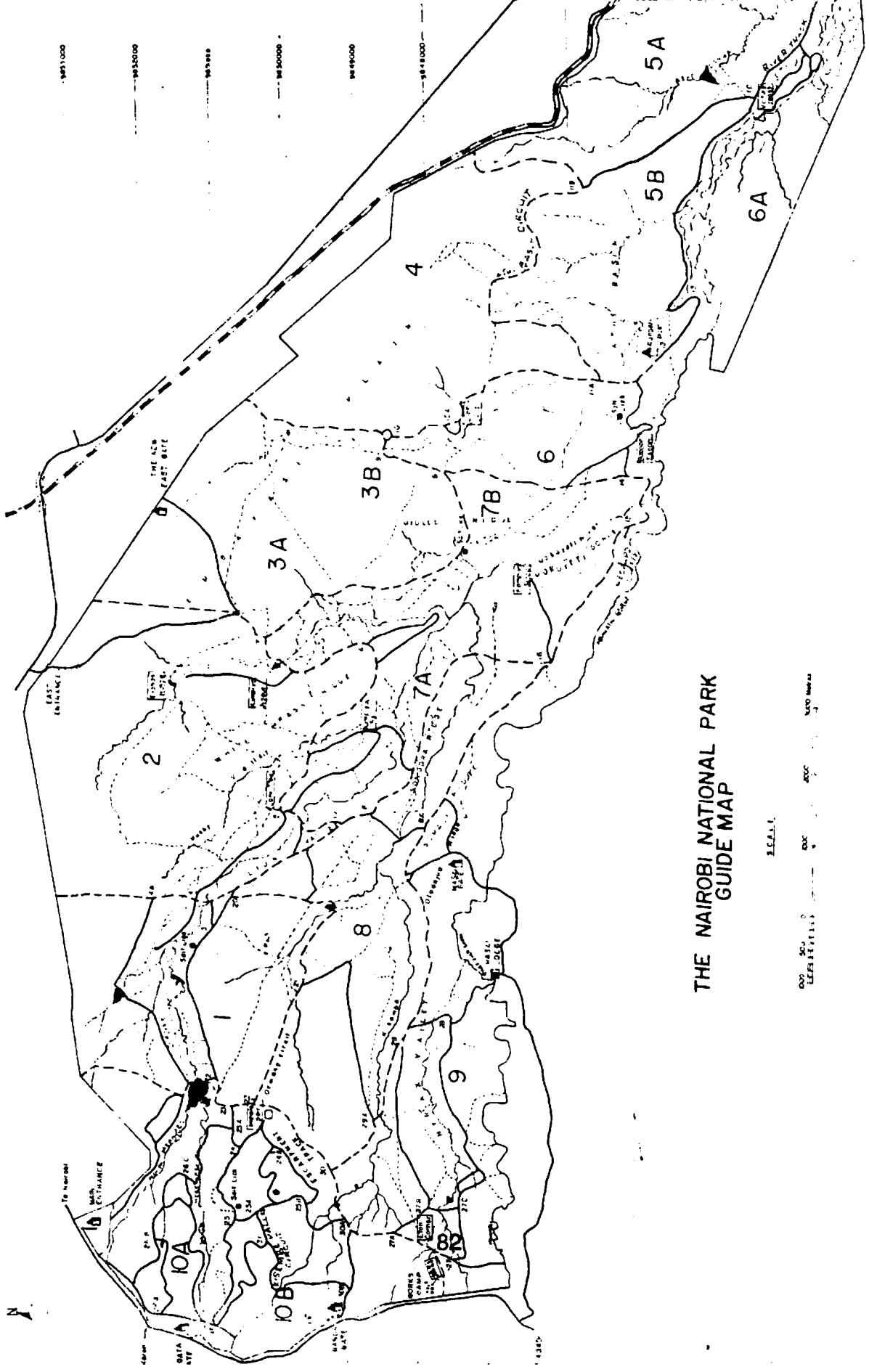
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ANNEX 1 MAPS OF KENYA RHINO SANCTUARIES

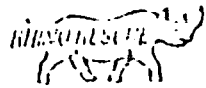
MAP OF NAIROBI NP



THE NAIROBI NATIONAL PARK
GUIDE MAP

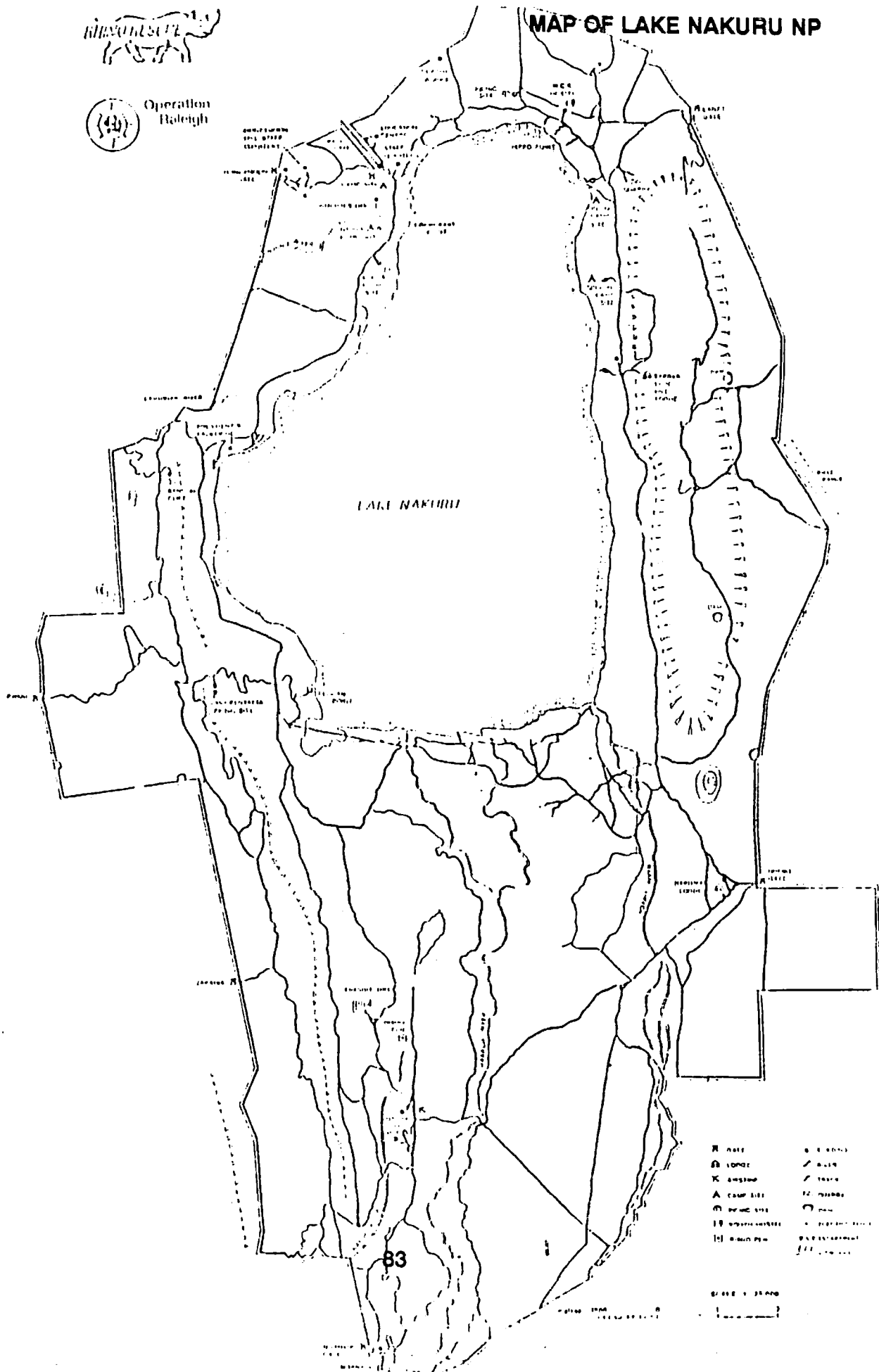
SCALE
 0 500 1000 2000 4000 8000 METERS
 0 500 1000 2000 4000 FEET

7300 72500 72000 71500 71000 70500 70000 69500 69000 68500 68000 67500 67000 66500 66000 65500 65000 64500 64000 63500 63000 62500 62000 61500 61000 60500 60000 59500 59000 58500 58000 57500 57000 56500 56000 55500 55000 54500 54000 53500 53000 52500 52000 51500 51000 50500 50000 49500 49000 48500 48000 47500 47000 46500 46000 45500 45000 44500 44000 43500 43000 42500 42000 41500 41000 40500 40000 39500 39000 38500 38000 37500 37000 36500 36000 35500 35000 34500 34000 33500 33000 32500 32000 31500 31000 30500 30000 29500 29000 28500 28000 27500 27000 26500 26000 25500 25000 24500 24000 23500 23000 22500 22000 21500 21000 20500 20000 19500 19000 18500 18000 17500 17000 16500 16000 15500 15000 14500 14000 13500 13000 12500 12000 11500 11000 10500 10000 9500 9000 8500 8000 7500 7000 6500 6000 5500 5000 4500 4000 3500 3000 2500 2000 1500 1000 500 0



MAP OF LAKE NAKURU NP

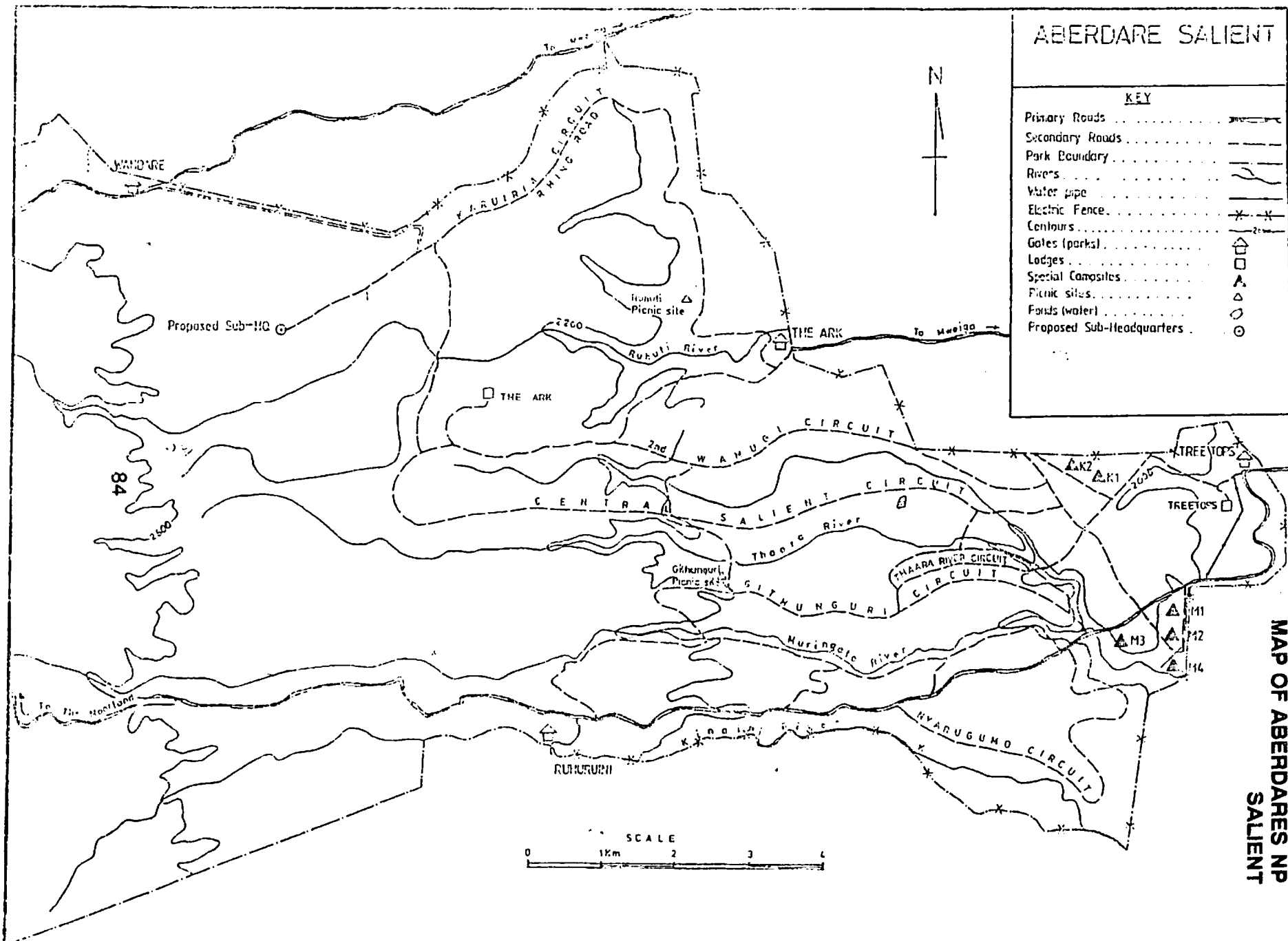
Operation Raleigh
(43)



ABERDARE SALIENT

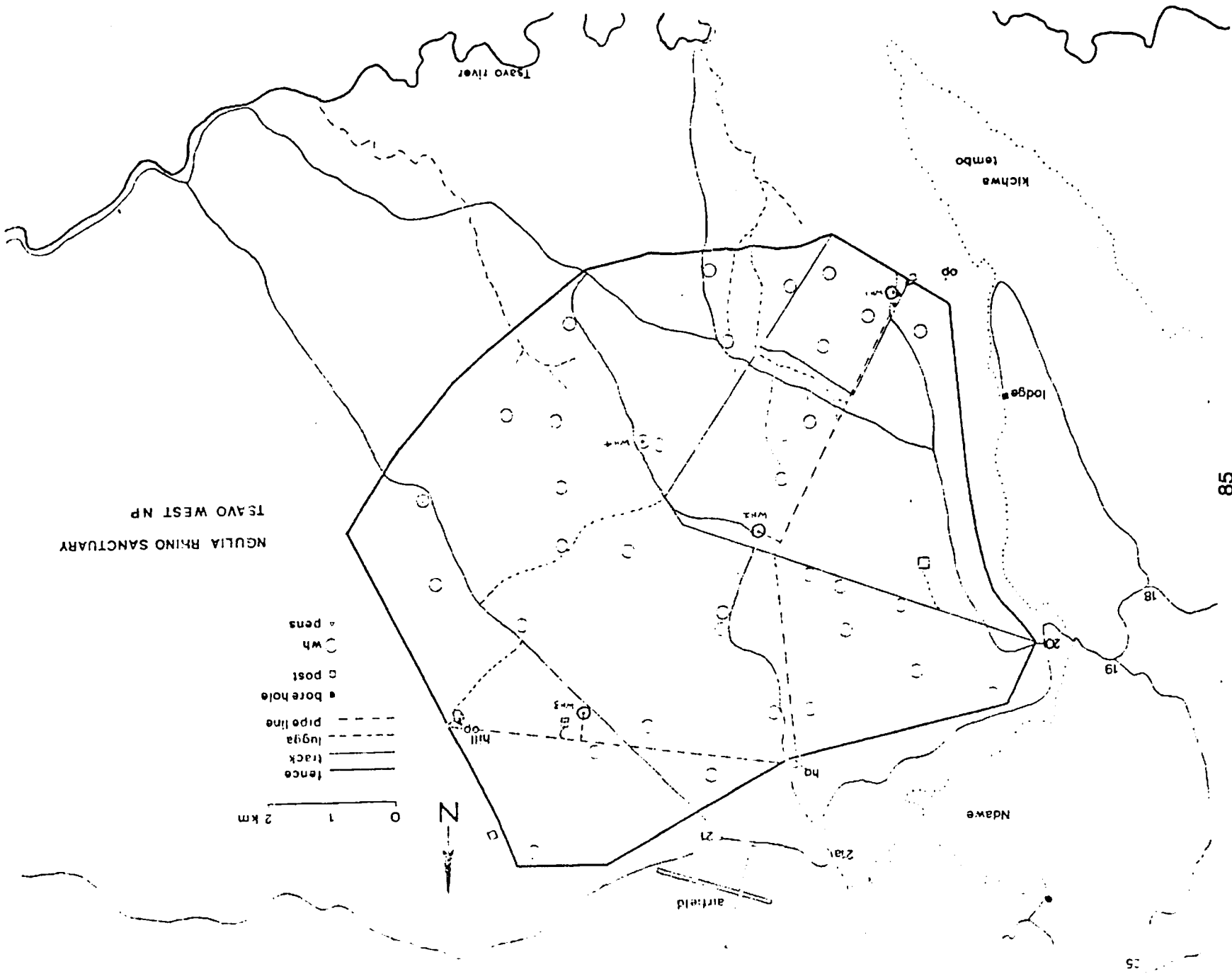
KEY

Primary Roads	—
Secondary Roads	- - -
Park Boundary	⋯⋯⋯
Rivers	~~~~~
Water pipe	⋯⋯⋯
Electric Fence	-x-x-
Contours	⋯⋯⋯
Gates (parks)	⊠
Lodges	□
Special Composites	△
Picnic sites	▲
Fords (water)	○
Proposed Sub-Headquarters	⊙



MAP OF ABERDARE NP
SALIENT

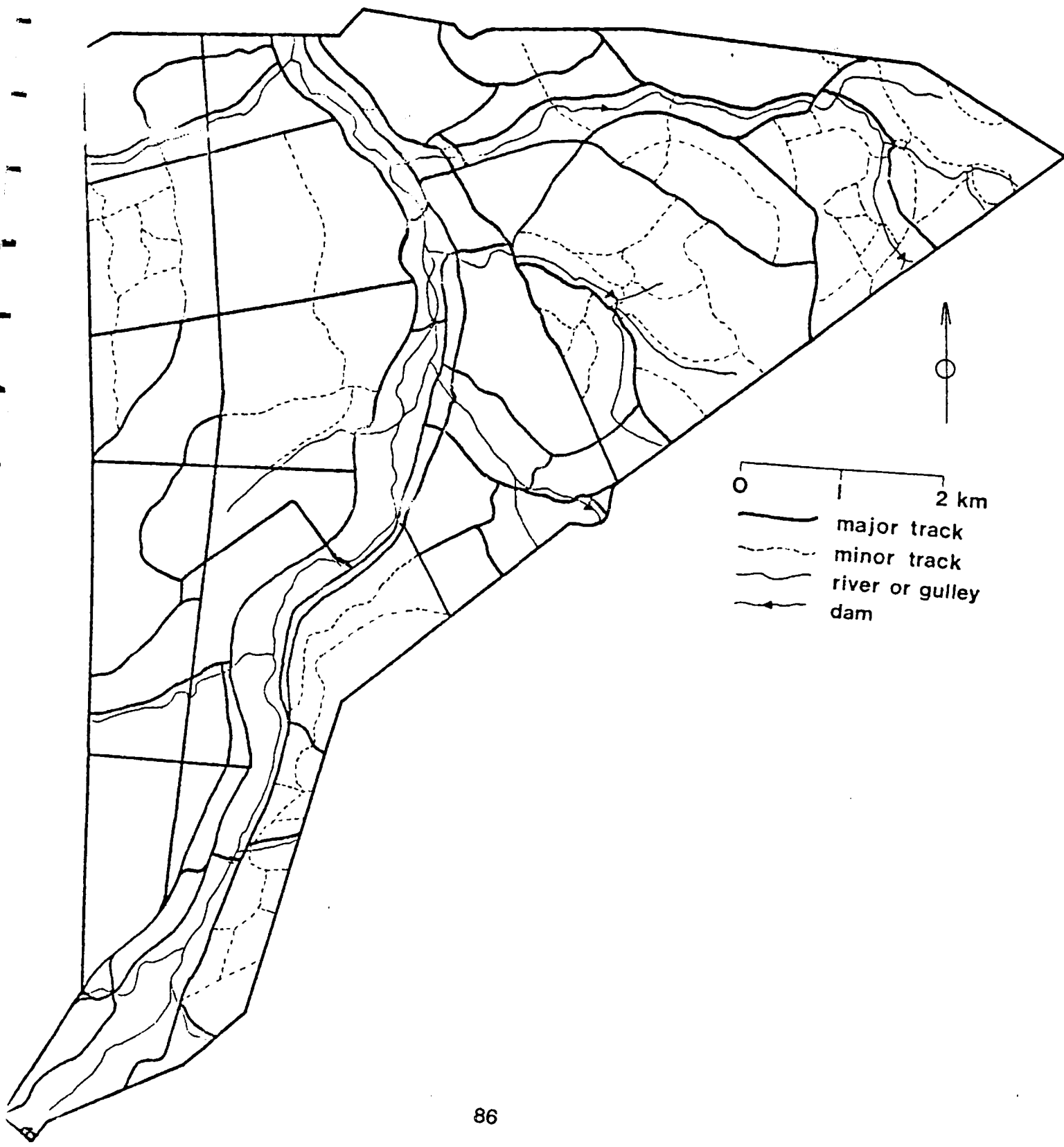
MAP OF NGULIA RHINO SANCTUARY - TSAVO WEST NP



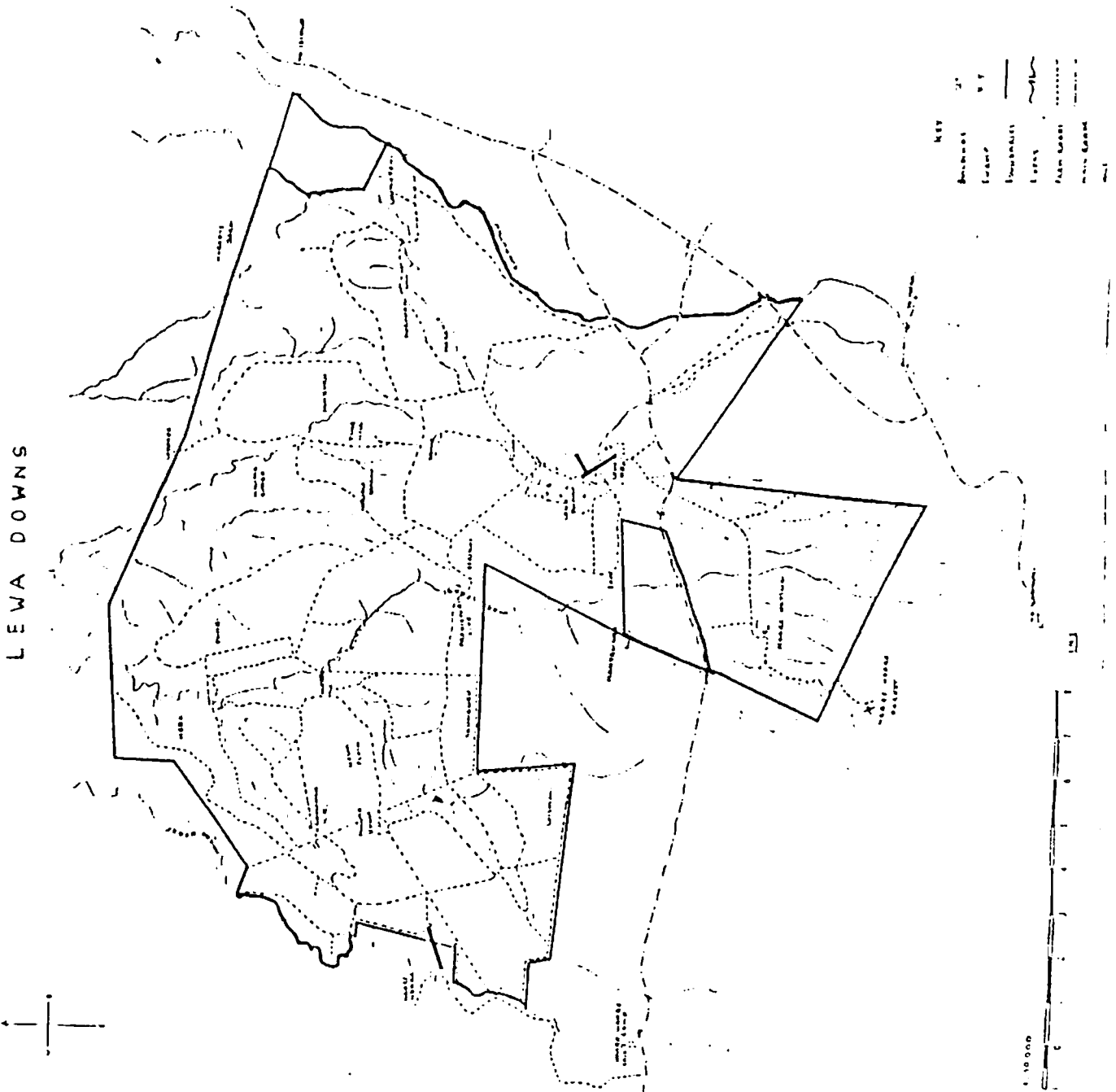
NGULIA RHINO SANCTUARY
TSAVO WEST NP

- ▲ pens
 - wh
 - post
 - borehole
 - - - pipeline
 - lugya
 - track
 - fence
- 0 1 2 km
- N

MAP OF SOLIO RANCH - GAME RESERVE

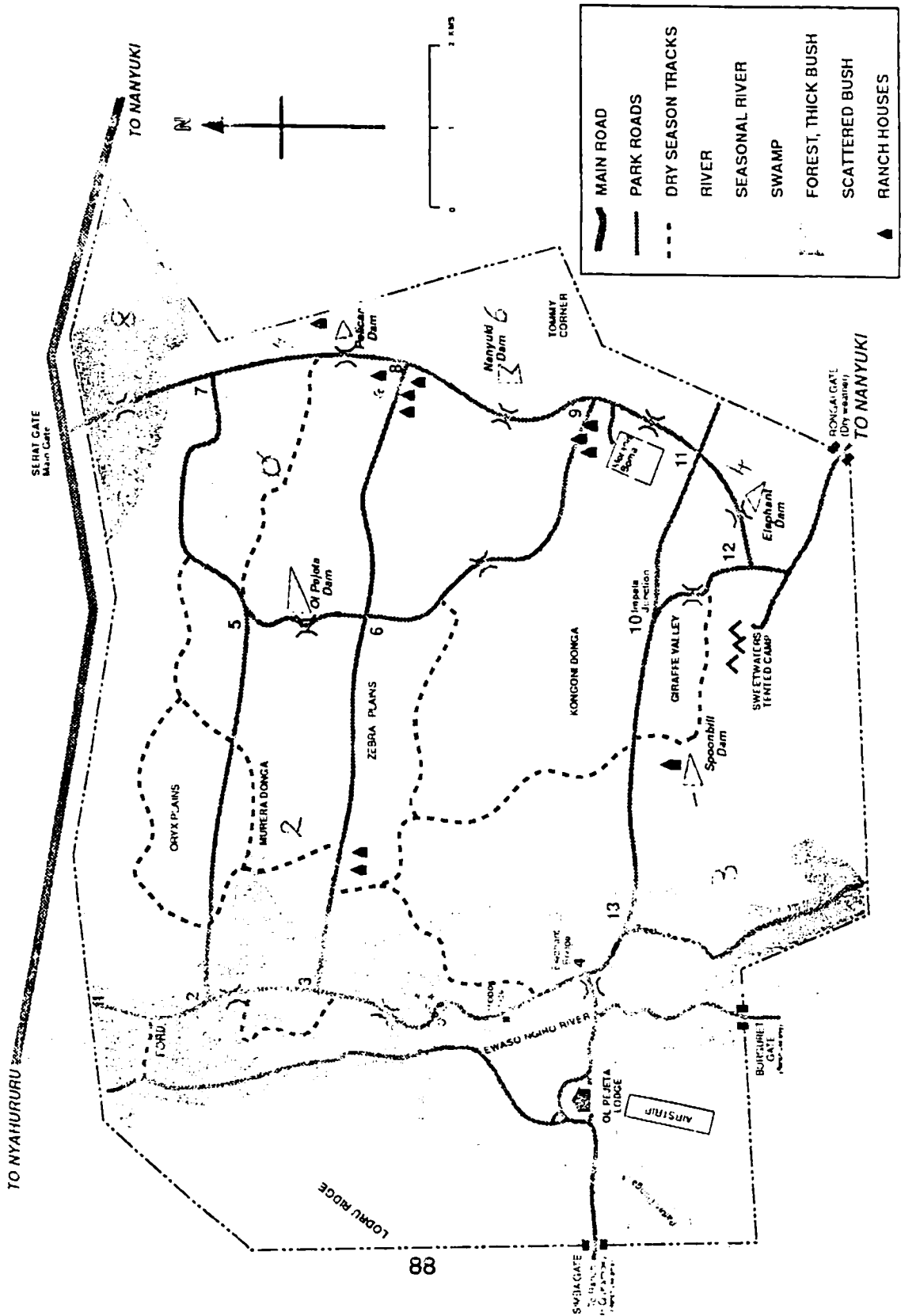


MAP OF LEWA DOWNS RANCH - RHINO SANCTUARY

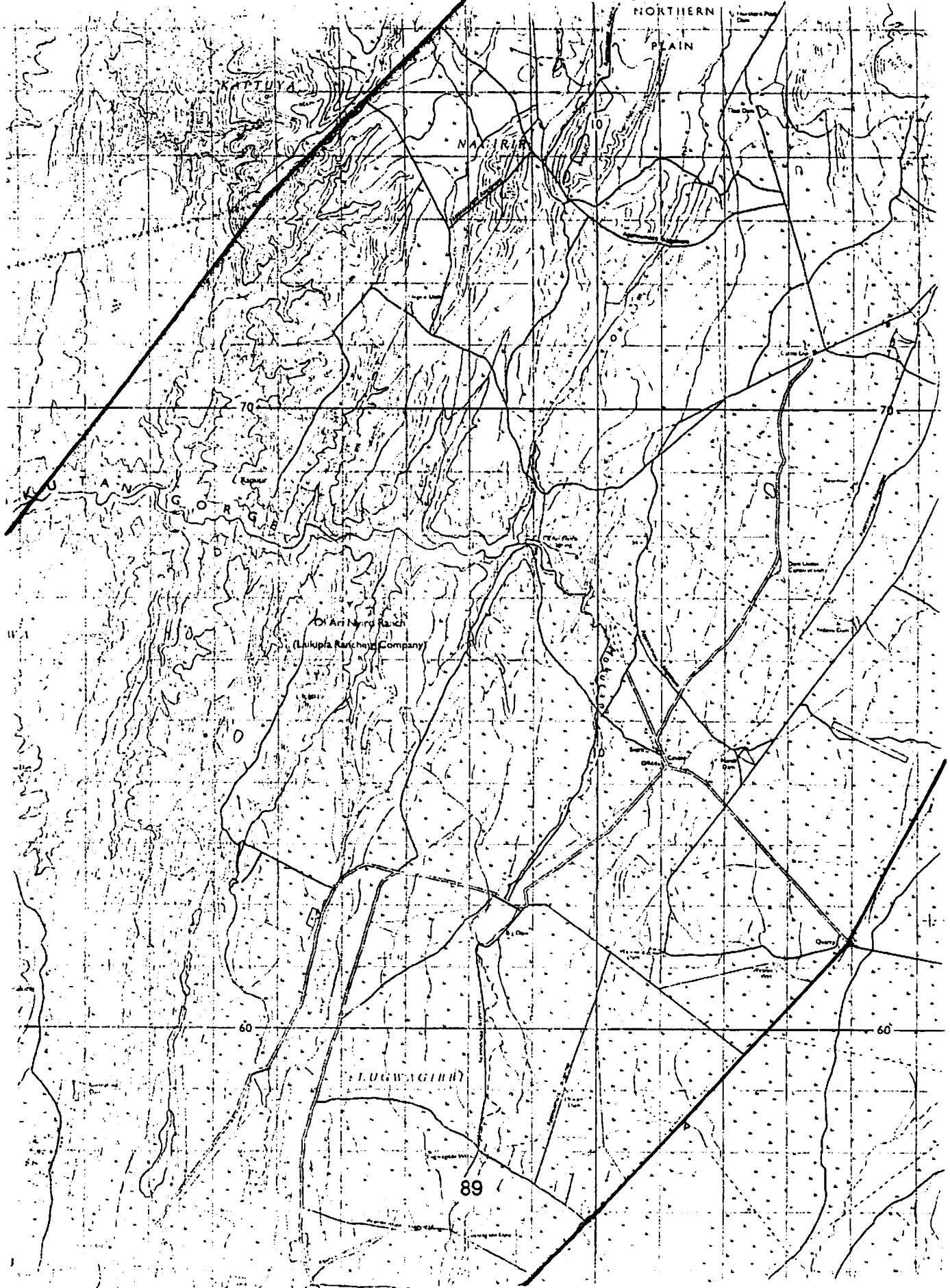


MAP OF OL PEJETA RANCH - SWEETWATERS RHINO SANCTUARY

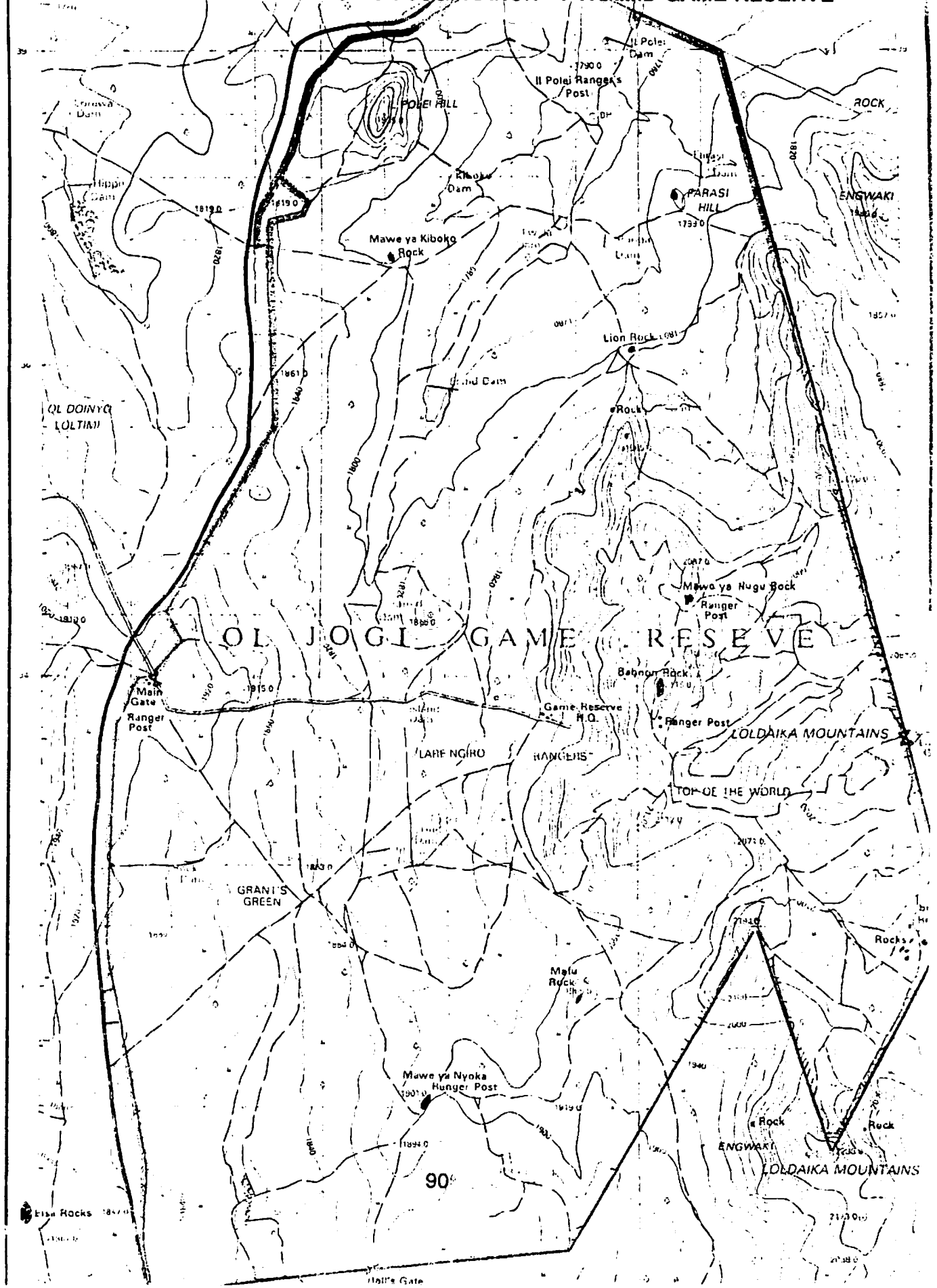
Sweetwaters Rhino Reserve



MAP OF OL ARI NYIRO RANCH (LAIKIPIA RANCHING)



MAP OF OL JOGI RANCH - PYRAMID GAME RESERVE



ANNEX 2 THE WHITE RHINOCEROS IN KENYA

There are close to 74 white rhinoceros in Kenya, all of the southern race (*Ceratotherium simum simum*). Evidence from fossils and cave paintings in Kenya and northern Tanzania suggests that the white rhinoceros, presumably similar to the northern race (*C.s.cottoni*), was widespread and a part of the East African savanna fauna until 3,000 years ago or less (M Leakey pers comm), when it was probably displaced by pastoralists who could easily kill such tame animals. The reintroduction of white rhinos into Kenya, all of which were imported from South Africa (20 in the 1970's, five in 1992), cannot therefore be judged as a case of bringing in an ecologically exotic species.

A list of the numbers and distribution of the white rhino in Kenya is shown in Table 14, below. All but two of the white rhinos in Kenya are at present located on private land and are privately owned. KWS will be conserving this species along side the black rhino, and establishing at least one breeding population in enclosed National Parks with appropriate habitat, particularly those with good potential for tourist viewing (Lake Nakuru NP). Once sufficient numbers of white rhinos have been bred up in such National Parks, KWS may generate revenues from sale of animals to the private sector in Kenya, or to other Governments or parties outside Kenya.

Unlike the black rhino, white rhinos in Kenya are the property of the landowner. They may be purchased and sold at mutually agreed prices, inside or outside of the Republic of Kenya. However all decisions over their sale, movement, management and protection must be made with the approval of, and in consultation with KWS. Any movement of white rhino in and out of the Republic of Kenya must have the written approval of the Director of the Kenya Wildlife Service, as authorising party to the CITES convention. KWS may enforce management decisions for the white rhino on private owners as for any other species of wildlife in the Republic, particularly if they compromise or conflict with measures to conserve the black rhino in Kenya.

TABLE 14 KENYA WHITE RHINO POPULATION ESTIMATES (December 1992)

NP/RESERVE Area/Section	Population Estimate	Area (km ²)	Density (km ⁻²)	Census-Precision Remarks
KWS NPs/Reserves:				
LAKE NAKURU NP	2	140	0.01	Known Population
Private/Group Ranches:				
SOLIO	55	68	0.81	1991 census, minimum
LEWA DOWNS	11	40	0.25	Known population
OL JOGI	2	55	0.04	Known population
MT KENYA GAME R	2	-	-	Known population
OL CHORO OIROUA	2	-	-	Known population
TOTAL	74			

ANNEX 3 CRITERIA FOR PRIVATE LAND RHINO SANCTUARIES

The following criteria will be used in assessment of private land or communal land areas which hold black rhino in Kenya, or assessment and selection of those that wish to hold them in future. These criteria will be considered in addition to those applying to all potential new areas for rhino conservation in Kenya (section 4.5.2), and for assessment of existing rhino populations (Annex 6).

Security Risk

- Proximity to dense human populations
- Lack of security on international boundaries
- Legal/protection status of rhino in recipient areas
- Comparative security status of region
- Adequacy of physical boundaries of property (e.g. perimeter fencing)
- Anti-poaching capabilities on property

Habitat Suitability

- Practicality of future population monitoring, management and manipulation (e.g. terrain constraints on capture and translocation)
- Vegetation status:
 - Proportional browse species composition
 - Key browse species and size classes
 - Grass component
 - Density of other browsers (e.g. giraffe, kudu)
 - Grazer populations
 - Soil nutrient status
 - Water availability
- Carrying capacity (property size and habitat suitability)

Management competence and control, and funding available

Conservation Record/Attitude

Disease threat/risk

Predator densities and threats (e.g. hyaena densities)

In-situ management concerns

- Ability of area to maximise production of rhinos
- Monitoring capability
- Adequacy of protection
- Change in owner, or owner's circumstances
- Commitment to provide full-time professional expertise

Current and potential future land use or classification

Legal aspects

ANNEX 4 RHINO PROGRAMME COMMITTEES

A. National Management Committee (NMC)

Chairman: Director, KWS. Established in March 1988; 21 meetings have been held up to the end of 1992.

Terms of Reference:

- i. Feedback from rhino conservation areas: wardens and rhino sanctuary OICs
- ii. Management of all rhino conservation areas and sanctuaries:
 - Security
 - Infrastructure, maintenance, staffing
- iii. Monitoring, data collection, population densities & trends
 - Rhino population surveys
 - Captures and translocations
 - Habitat studies
 - Genetic considerations
 - Mortality patterns
- iii. Funding: priorities for funding requirements
 - a. Advise donors (NFC)
 - b. Monitor funding, expenditure and effectiveness
- iv. Rhino conservation areas and sanctuaries
 - a. Assess priority areas for rhino conservation
 - b. Assess new rhino conservation areas

B. National Forum Committee (NFC)

Chairman: Director, KWS. Established in March 1988; 11 meetings have been held up to end of 1992.

Terms of Reference:

- i. Funding requirements
 - a. Capital costs of construction for infrastructure in new and existing rhino sanctuaries
 - b. Recurrent costs: assistance with operating costs as necessary
 - c. Vehicles & Equipment: new & refurbished; maintenance
 - d. Capture & translocation of rhinos
- ii. Information for donors:
 - a. from National Management Committee
 - b. from rhino conservation areas

C. Association of Private Land Rhino Sanctuaries (APLRS)

Established in May 1988; Officially registered in May 1990; 14 meetings have been held up to the end of 1992.

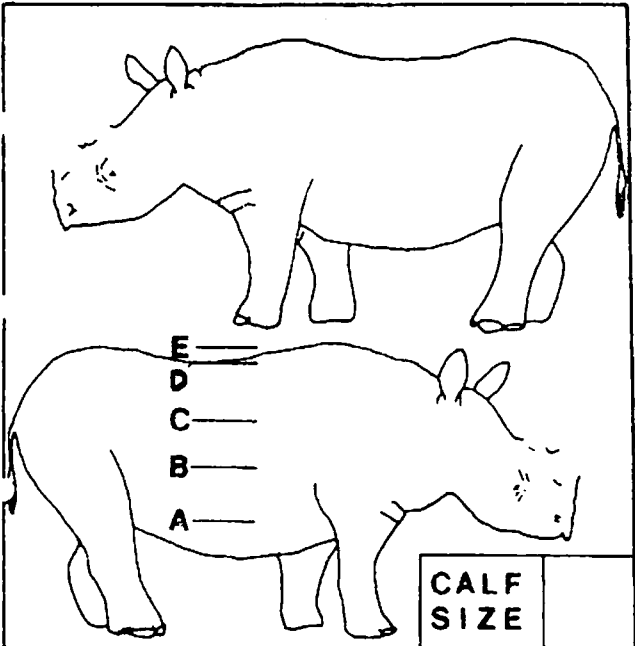
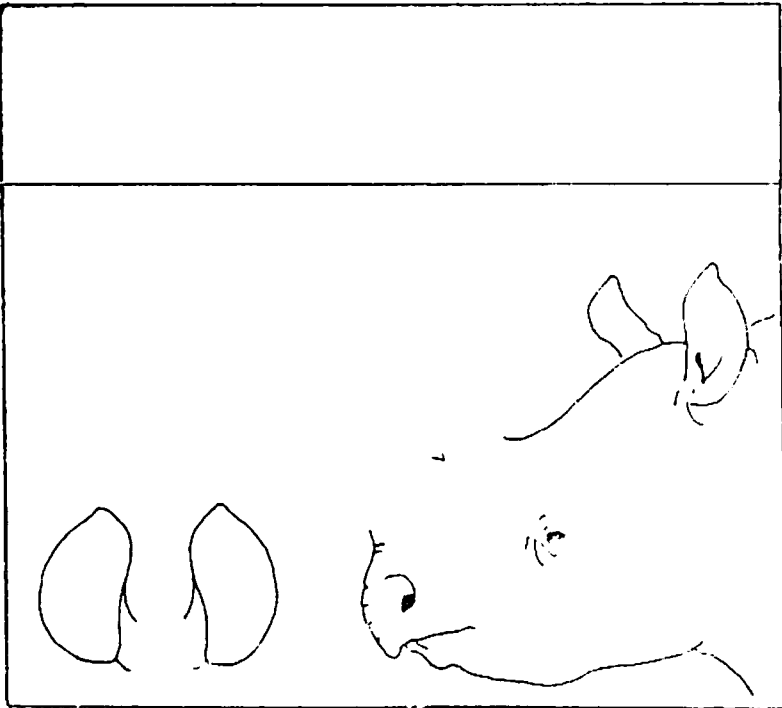
Terms of reference:

- i. Representation of the interests of the private sector involved in the conservation of all rhinos on private land;
- ii. Security, management and liaison and/or collaboration with KWS.

ANNEX 5 RHINO MONITORING: DATA AND RECORD FORMAT

The following pages present samples of Data cards and Record Books used by KWS rhino surveillance personnel in monitoring black rhino populations.

RHINO IDENTITY CARD

IDENTITY 	LOCATION 	ORIGIN 	CLASS - AGE - YEARS 	SEX
				
				
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 5px;"> CALF SIZE </div> </div>				

KENYA WILDLIFE SERVICE
RHINO PROGRAMME: SURVEILLANCE AND SECURITY
SIGHTINGS FREQUENCY FORM

AREA: LAKE MAKURU NP


MONTH:

RHINO NAME	ID NO	NOTCH	SEX	AGE	MOTHER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
AMBONI	0501		M	AD	JUNO																																	
KISERIAN	0502		M	AD																																		
TATU	0503	3	M	AD																																		
RIDGEBACK	0504	4	M	AD																																		
NDERIT	0505	5	M	AD																																		
MWIKALI	0506	6	F	AD																																		
JEBUNGEI	0508	8	F	AD																																		
WANGARI	0510	10	F	AD																																		
NDUKU	0511	11	F	AD																																		
NYAHURURU	0512	12	M	AD																																		
RODNEY	0513	13	M	AD																																		
SINDANO	0514	14	M	AD																																		
MAMA WINNIE	0515	15	F	AD																																		
WANJIKU	0516	16	F	AD																																		
WACHIRA	0517	17	M	AD																																		
MWENDE	0518		F	AD																																		
KISEE	0519		M	AD																																		
KAGIRI	0521	21	M	SA	MWIKALI																																	
NG'ANG'A	0525		M	SA																																		
BERNHARD	0526		M	CF	JEBUNGEI																																	
WINNIE	0527		F	SA	MAMA WINNIE																																	
NJAMBI	0003	20	F	SA	MIRIAM																																	
SIHOHO	0009	24	M	AD	FATUMA																																	
SUZIE	0006	23	F	AD																																		
JUDY	0052	22	F	AD																																		
	0528			CF	WANJIKU																																	
WAMBUI	0529		F	CF	WANGARI																																	
KYELA	0530		F	CF	SUZIE																																	
MBURUGU	0531		M	CF	MWIKALI																																	
ZAWADI	0532		F	CF	NDUKU																																	
MUYA	0533		M	CF	MAMA WINNIE																																	

RHINO SIGHTINGS FREQUENCY FORM (example from LNNP)

RHINO CAPTURE RECORD	
Officer completing record	Date
Signed	Record no. of 19

RHINO	
Species	Black / White
Rhino Name	
ID no.	
Sex	Male / Female
Age Class	Adult / SubAdult / Calf
Age (A-F)	
Age (years)	
Capture Location	
Grid ref.	
Details of other rhino in area	

IDENTIFICATION			
Ear Notch No. Old		New No.	
Ear Tag Colour			
Identifying features — Remarks			
			

IMMOBILISATION			
Vet(s)			
i/c Capture	Crate / Holding Pen / Enclosure / Free-Ranging /		
Rhino in			
Spotter A/c		Reg.	5Y —
Pilot		Observer	
Darted from		Time	am. / p.m.
Dist. moved	m.	Down time	min.
Reason	<input checked="" type="checkbox"/>	Remarks — Destination — Details	
Translocation			
Treatment			
Isolation			
Tagging			
Other			
Data / samples	<input checked="" type="checkbox"/>	Vet's anaesthesia ref.	
Aged		Tooth Wear Index <input type="text"/>	Age yrs.
Measured		Body measurements ref.	
Blood sample		ref.	
Tissue sample		ref.	
Other		Details	

TRANSLOCATION — HOLDING PENS			
Location 1		Location 2	
Date into pen		Date into pen	
Date out / release		Date out / release	
Free-Release?	<input checked="" type="checkbox"/>	Free-release?	<input checked="" type="checkbox"/>

86

RHINO MORTALITY RECORD	
Officer completing record	Death reported by
Signed	Record no. of 19
Date	

RHINO	
Species:	Black / White
Date of Death	
Rhino Name	
ID no.	
Ear Notch no.	
Sex	Male / Female / Unknown
Age Class	Adult / SubAdult / Calf
Age (A-F)	
Age (years)	
Carcass Location	
Grid ref.	

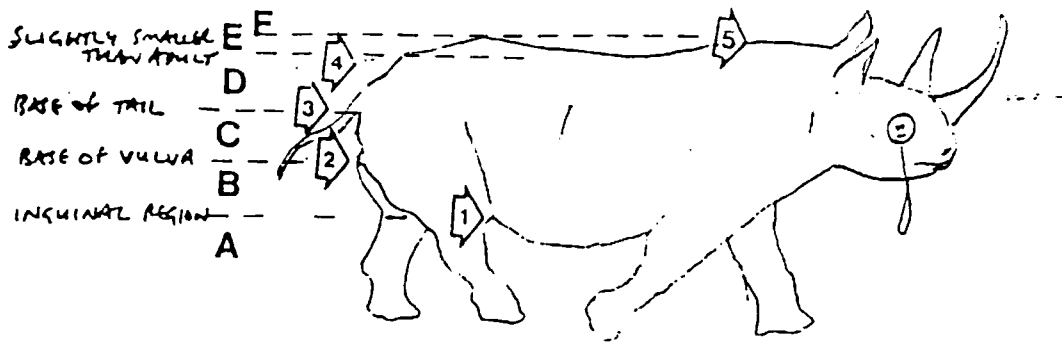
CAUSE OF DEATH ✓	
Poacher / Human	
Carnivore	
Fighting Injury	
Other Injury	
During Capture	
Destroyed	
Other (e.g. disease)	
Unknown	

EVIDENCE OF PREDATION ✓	
Observed Kill	
Heard Kill	
Predators at carcass	
Spoor at carcass	
Signs of struggle	
Other signs	
(details)	

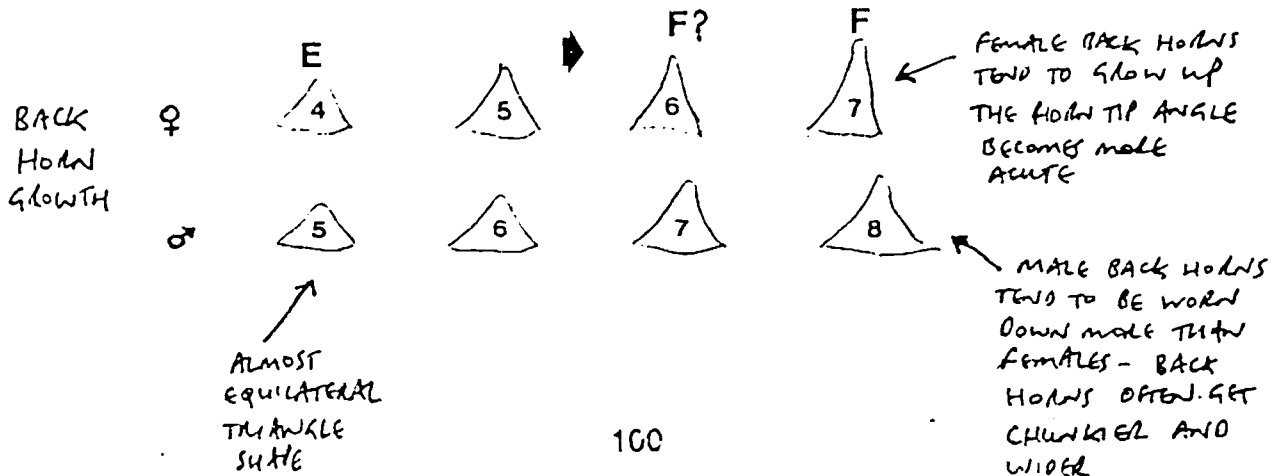
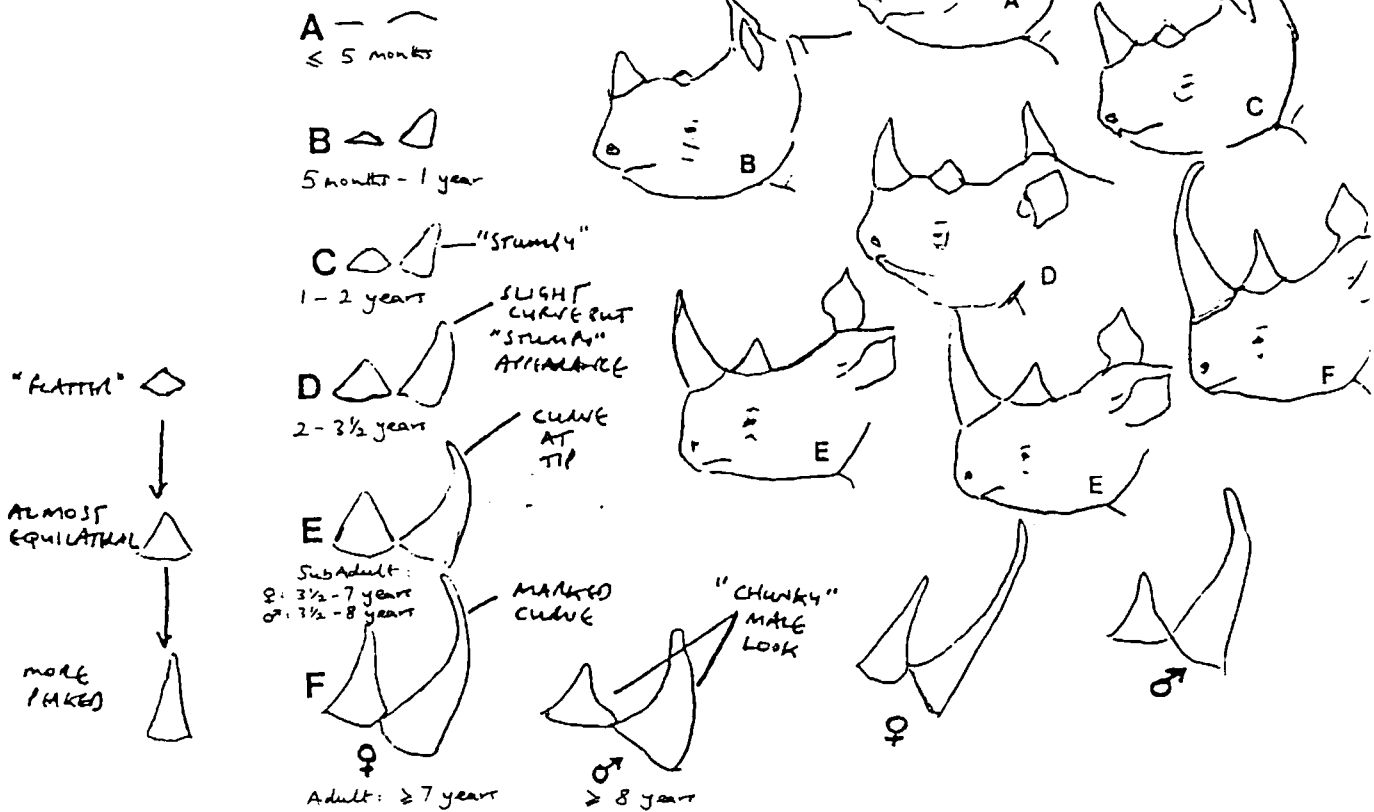
HORNS ✓			
Present		Where stored	
		Collected	
		Marked	Method / no.
Destination		Date	
Measurements:		Front	Rear
Length — front curve (cm)			
Circumference — at base (cm)			
Weight (kg)			

POST-MORTEM	
Name of Vet	
P-M Report ref.	
Cause of death (details) & Remarks	

SKULL ✓			
Collected		Where stored	
		Marked	Tag Number
Aged		Tooth Wear Index	
Measured		Measurement Record ref.	
		Age	yrs



RHINO AGE AND SIZE CLASSES
 RMG: Emslie, Adcock & Hansen (1993)
 after Hitchins (1970)



THE ALLOCATION OF INDIVIDUAL BLACK RHINO ID CODE NUMBERS

All rhinos are given one code number (at origin population) which they retain for life

<u>Area</u>	<u>From</u>	<u>To</u>
Nairobi NP	0000	0499 (e.g. Fatuma 0008)
Lake Nakuru NP	0500	0999 (e.g. Kiserian 0502)
Aberdares NP	1000	1499
Masai Mara NR	1500	1999
Amboseli NP	2000	2499
Lewa Downs Ranch: Ngare Sergoi RS	2500	2999
Laikipia Ranching: Ol Ari Nyiro Ranch	3000	3499
Ol Jogi Ranch: Pyramid Game Reserve	3500	3999
Ol Pejeta Ranch: Sweetwaters RS	4000	4499
Solio Ranch	4500	4999
Tsavo West NP: Ngulia RS	5000	5999
Tsavo NP	6000	6999
Meru NP	7000	7499
Mt Kenya	7500	7999
Matthews Range: Kitchich	8000	8499
Loita Hills	8500	8999

ANNEX 6 CRITERIA FOR EVALUATION OF RHINO POPULATIONS (ARSG)

NB Maximum score is 39, minimum is 13

A. POPULATION SIZE

- 3: Medium over 200 in discrete population
- 2: Small 25-200 in discrete population
- 1: V Small < 25 in discrete population

B. GENETIC RARITY

Assessment of Evolutionarily Significant Units (ESUs), Subspecies, Locally adapted populations (e.g. Highland/Lowland Kenya)

- 3: High
- 2: Moderate
- 1: Low

C. EXPANSION PROSPECTS

- 3: Good Area of suitable habitat sufficient for >100 additional rhino; no significant limiting factors such as water availability, disease, predation, competing herbivores (elephants in confined areas)
- 2: Moderate 50-100 rhinos (additional)
- 1: Poor <50 rhinos (additional)

D. STRATEGIC PLANNING

- 3: Good Detailed strategy/action plan being effectively implemented by management authority
- 2: Some Draft strategy/action plan **or** partial implementation of an approved strategy/plan
- 1: Nil No strategic planning for rhino conservation

E. POACHING THREAT

- 3: Low No significant poaching threat at present
- 2: Moderate Some threat of subsistence poaching (on species other than rhino) and/or limited commercial poaching (< 2% offtake)
- 1: High Considerable threat of commercial poaching

F. RECENT POPULATION TREND

- 3: Up (% net annual increase)
- 2: Stable
- 1: Down

G. SURVEY QUALITY

- 3: Good Intensive ground survey or specialised aerial survey within last year or certainty of little change since earlier survey
- 2: Moderate Scientific survey conducted before last year, or non-scientific reconnaissance survey
- 1: Poor Only guesses available

H. GENETIC DIVERSITY

- 3: No likelihood of loss of genetic diversity through inbreeding and genetic drift
- 2: some likelihood
- 1: strong likelihood

I. DEMOGRAPHIC VIABILITY

- Adequacy of breeding contact, birth rates, sex ratios, age distribution
- 3: Good
 - 2: Moderate
 - 1: Poor

J. RECURRENT EXPENDITURE

- 3: High > US\$ 200/sq km/yr
- 2: Moderate \$50-200
- 1: Low < \$50

K. MAN POWER

- 3: High 1 man/20 sq km or less
- 2: Moderate 1 man/20-50 sq km
- 1: Low 1 man/> 50 sq km

L. LOCAL PARTICIPATION

- 3: High Local people receive direct benefits, auxiliary scouts, tourist revenue
- 2: Some
- 1: Low

M. ECONOMIC POTENTIAL

- 3: High tourism/safari potential, being realised with rhino as a major attraction/component
- 2: Moderate
- 1: Low

ANNEX 7 LIST OF ACRONYMS

AERSG	African Elephant and Rhino Specialist Group (IUCN/SSC)
AFEW	African Fund for Endangered Wildlife
APLRS	Association of Private Land Rhino Sanctuaries
ARSG	African Rhino Specialist Group (IUCN SSC)
AWF	African Wildlife Foundation
CBSG	Captive Breeding Specialist Group (IUCN/SSC)
CC	Carrying Capacity
CITES	Convention on International Trade in Endangered Species of wild fauna and flora
CR	Census Rating (as du Toit 1989, ARSG 1992)
CRES	Centre for Reproduction of Endangered Species (ZSSD)
CWS	Community Wildlife Service (KWS)
DSWT	David Sheldrick Wildlife Trust
EAH	East African Herbarium (NMK)
EWAA	Elsa Wild Animal Appeal
EWT	Eden Wildlife Trust
ESU	Evolutionarily Significant Unit
FoC	Friends of Conservation
FZS	Frankfurt Zoological Society
GoK	Government of Kenya
GMF	Gallmann Memorial Foundation
GR	Game Reserve
ICIPE	International Centre for Insect Physiology and Ecology
ICL	Imperial College London
IDA	International Development Association
ILRAD	International Laboratory for Research on Animal Diseases
IUCN	International Union for the Conservation of Nature and Natural Resources (World Conservation Union)
IPR	Institute of Primate Research (NMK)
IoZ	Institute of Zoology (ZSL)
KARI	Kenya Agriculture Research Institute
KETRI	Kenya Trypanosomiasis Research Institute
KRRP	Kenya Rhino Rescue Project
KWS	Kenya Wildlife Service
KNP	Kenya National Parks
LNNP	Lake Nakuru National Park
MIS	Maximum Interval between Sightings
ML	Management Level (e.g. 75% of Carrying Capacity)
MMNR	Masai Mara National Reserve
MoTW	Ministry of Tourism and Wildlife
NANC	Namibia Dept of Agriculture and Nature Conservation
NFC	National Forum Committee
NGO	Non-Governmental Organisation
NMC	National Management Committee
NMK	National Museums of Kenya
NNP	Nairobi National Park

NP	National Park
NPB	Natal Parks Board
NR	National Reserve
NYZS	New York Zoological Society
ODA	Overseas Development Administration (UK)
OIC	Officer In Charge
PAWS	Protected Areas & Wildlife Service Project (IDA/WB)
PHVA	Population & Habitat Viability Analysis
PTES	Peoples Trust for Endangered Species
RMG	Rhino Management Group (South Africa/Namibia)
RRT	Rhino Rescue Trust (UK)
RS	Rhino Sanctuary
SANP	South Africa National Parks
SSC	Species Survival Commission
TENP	Tsavo East National Park
TWNP	Tsavo West National Park
WB	World Bank
WGI	Wildlife Conservation International (NYZS)
WCMD	Wildlife Conservation and Management Department
WPU	Wildlife Protection Unit (KWS)
WWF	World Wide Fund for Nature
ZNPWLM	Zimbabwe Dept of National Parks and WildLife Management
ZSL	Zoological Society of London
ZSSD	Zoological Society of San Diego