Gary & Peter Hitchins

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CENSUSING BLACK RHINO IN N.W.DAMARALAND BY INDIVIDUAL IDENTIFICATION

Garth Owen-Smith

MOTIVATION FOR PROJECT

The individual identification of black rhino in Damaraland was first started in 1982 as a means of determining the numbers of this species that survived in the region after large scale illegal hunting had occured here during the previous decade. Furthermore, once most of the individuals in the population were known, the regular monitoring of them by Directorate of Nature Conservation and Namibia Wildlife Trust / Endangered Wildlife Trust field staff would keep us informed of where poaching was still taking place. With this information, problem areas could be identified and patrol work in them could be intensified.

By mid 1983, after a number of succesful prosecutions, the illegal hunting of rhino and elephant in Damaraland had been brought under control. Nevertheless, it was decided to continue with the identification and monitoring of rhino here in order to provide us with an "early warning system" should poaching start up again. Over and above this, a considerable amount of information on the Damaraland rhino's population dynamics and ecology had been collected which alone justified the continuation of the project.

At the "request" of the Directorate of Nature Conservation, the NWT/EWT's Damaraland/Kaokoland Project ceased operations at the end of 1984. The assurance was, however, given that DNC staff in the region would be increased and that rhino monitoring here would be continued by the Directorate's staff and by Blythe Loutit based at Uchabmond.

In November 1985, during the interogation of witnesses involved in a giraffe and zebra poaching case, one of the accused admitted that two rhino had also been killed recently in Damaraland. The succesful prosecution of those responsible followed. However, the exact locality where the rhino were shot was not established, nor was any serious attempt made to find out whether any more rhino had been poached in the region.

During February 1986, Dr. David Cumming, Chairman of the I.U.C.N.'s African Elephant and Rhino Specialist Group, visited Damaraland. He was informed of the recent rhino poaching. Dr. Cumming was also disturbed to learn that of the 29 adult rhino (12 male, 17 female) already identified N. of the veterinary cordon fence, 18 (6 male, 12 female), or 62%, had not been seen for a year or more. In fact, 8 of the then known adult rhino N. of the fence (28%) had not been seen for over two years. In order to establish whether these rhino were still alive, Dr. Cumming requested that this census be undertaken.

The census was carried out between 1st April and 30th September 1986. During this period, a total of 77 days were spent in the field actually censusing rhino. A further 36 days were spent liasing with Blythe Loutit, Des and Jen Bartlett and DNC officers working in the area, extrapolating field notes and on logistics.

ACKNOWLEDGEMENTS

The New York Zoological Society and the Wildlife Society of S.W.A./Namibia (Windhoek and Namib Centres) provided the funds for the census. The Foundation to Save African Endangered Wildlife allowed their Landrover to be used. Dr. P.van der Walt of the DANC gave his support for the census. Des and Jen Bartlett made their Ultralight aircraft available for a total of nearly two weeks. DANC officers stationed in the area, notably Duncan Gilchrist, Steve Braine, Rudi Loutit, John Paterson and Rod Braby, contributed much valuable information on rhino they had seen in the census area, as did Blythe Loutit. Ruth Gilchrist kept exellent records of rhino data collected in the census area by myself and others. Sakeus Kasaona proved to be an outstanding tracker and observer, without whose services many rhino would not have been located. Game rangers Augustinus Ochams and Edward Aibeb also assisted on a number of occasions.

CENSUS AREA

The rhino sub-population in the lower Uchab/Goantachab area has been continuously and well monitored by Mrs. Blythe Loutit and the DANC staff based at Uchabmond. Consequently, it was decided to concentrate on the area north of the veterinary cordon fence - where most of the known rhino not seen for twelve months or more were located and where poaching was most likely to have taken place.

A further sub-population of rhino is known to occur on Damara/Riemvasmaker farmland to the east and south of Wereldsend. A brief survey was conducted here in February 1986. If further funds become available, this sub-population will also be censused.

For convenience, the census area was divided into six eco-zones. In most cases natural watersheds were used as boundaries so that watercourses - the focal points of animal activity - were encompassed within a single eco-zone. (See Map 1.) The eco-zones were named as follows:

West:	i)	Achab-Lower Uniab (AU)	- Average annual rainfall	> 125mm
	ii)	Hunkab-Obob (HO)	- " " "	"
	iii)	Mudorib-Hoanib (MH)	- " " "	"
Centre:	iv)	Barab-Upper Uniab (BU)	- " " "	100-150mm
	v)	Sesfontein-Khovarib (SK)	- " " "	"
East:	vi)	Omborombonga-Ombonde(OO)	- " " "	125-200mm

METHOD

1. LOCATION OF RHINO

During the census four methods were used to locate rhino:

i) Random searching from a light aircraft.
ii) " " " " 4x4 vehicle.
iii) " " on foot.
iv) Tracking down of individual rhino.

i) Random Searching from a Light Aircraft:

Des and Jen Bartlett kindly flew me in their "Ultralight" aircraft for a total of 14hrs 20mins mainly over the more open western parts of the census area. Flying was random, usually concentrating along watercourses where rhino were known to occur. I also had the oportunity to fly for two hours over a part of the census area (eco-zones AU and BU) in a Cessna, fixed-wing aircraft owned by Mr. Nico Louw of Uis.

ii) Random Searching from a 4x4 Vehicle:

A total of 3186 kms were driven in a 4x4 vehicle within the census area on rough tracks. Kilometers travelled on main roads through the census area were not included as high speed travelling reduced searching efficiency and game, including rhino, tended to keep away from these roads during daylight hours. After dark travelling on both main roads and rough tracks was not included as part of the census. An attempt was made to cover, at least once, all tracks in those parts of the census area where rhino were known to occur.

iii) Random Searching on Foot:

A total of approximately 630 kms (188 hrs) were covered on foot in the census area. Most of the walking was done in localities where there were no vehicle tracks (primarily in eco-zone BU). Distances covered on foot while looking for fresh rhino tracks and while following up these tracks has been included in the total distance randomly walked as there was always the possibility of locating rhino other than those being tracked. On a number of occasions this did occur. All such rhino were recorded as having been found by random walking.

iv) Tracking Down of Rhino:

Typically, camp would be made in an area where rhino were known to occur. Before sunrise the following morning we would leave camp and walk untill fresh rhino spoor was located. After measuring the spoor, we would decide whether to follow it or not. The spoor of suspected known and recently seen animals, and that of sub-adults, was generally not followed. If a decission was made to follow up spoor, the rhino would be tracked untill either it was located or the spoor was lost. If

there was sufficient time after either locating the rhino or loosing the spoor, a second set of tracks might be followed up on the same day.

2. COVERAGE OF CENSUS AREA

Since 1982, patrol work by DANC and NWT/EWT field staff had established the approximate distribution of rhino in N.W. Damaraland. Consequently, during the census, greatest coverage was given to those eco-zones where rhino were known to be most plentiful. The Ombonde-Omborombonga and Sesfontein-Khovarib eco-zones were only lightly covered in areas where signs of rhino had previously been recorded.

Eco-Zone	Kms Aircraft	Kms 4x4	Kms foot	Total
Achab-Lower Uniab	180	960	50	1190
Barab-Upper Uniab	210	1073	508	1791
Hunkab-Obob	385	317	36	738
Ombonde-Omborombonga	-	44	-	44
Mudorib-Hoanib	420	618	6	1044
Sesfontein-Khovarib	-	174	32	206
Total	1195	3186	632	5013

3. IDENTIFICATION OF RHINO

The method of individual identification used during this census was developed by Blythe Loutit, Karl Peter Erb and Garth Owen-Smith during 1982 and 1983. It was chosen as the best method of determining black rhino numbers in Damaraland for the following reasons:

i) In the rugged mountainous rhino habitat here, aerial censusing was regarded as being inaccurate.

ii) The large number of natural waterpoints in NW Damaraland (many of which are not marked on any maps) made 72 hr waterhole counts impractical.

Five criteria were used to identify individual rhino. They were:

i) Sex
ii) Age
iii) Horns size and shape
iv) Ear marks
v) Spoor size

i) Sex

Whether a rhino was male or female was determined only by observation of the genitals. Horn or neck thickness was not used because, although some sexual dimorphism exists for these characteristics in adult animals, it was found to be unreliable.

ii) Age

Only three age classes were distinguished: Calf, Sub-adult and Adult. All young animals still accompanying their mothers were classed as calves. Young animals not with their mothers, but which had a rear foot width of less than 195mm in the case of females, and less than 200mm in the case of males, were regarded as sub-adults. (It was generally found that these animals had relatively short unidentifiable horns and also seldom had ear marks) Rhino with rear foot widths of 195mm or more in the case of females and 200mm or more in the case of males, were classed as adults.

iii) Horn Size and Shape:

All rhino located were approached as close as possible and profile photographs were taken using a 300mm telephoto lens. In cases where good photographs could not be taken, drawings of the rhino's horns were made on the spot.

iv) Ear Marks:

86% of the identified adult male rhino were found to have clearly visible ear notches, cuts or other marks. 57% of the adult females identified were also found to have clear ear marks. These were recorded by drawings of both ears as seen from the front.

v) Spoor Size:

Rhino spoor size was determined by measuring from side toe to side toe across the hind foot. To avoid mistakes, before any spoor measurement was taken, the position of both side toes on the front and back feet - which usually overlap during walking - had to be clearly distinguishable. (see Fig.1) The measurement of at least three tracks with similar results (to within 5mm) were needed before a recording was acceptable. The width of the rhino's front foot was also measured wherever possible. I and others have been regularly using this technique to measure rhino spoor for over four years and have found that, once a recorder is experienced, it is reliable to within 5mm on all substrates.

Other Means of Identification:

The amount of hair on the tip of the rhino's tail was also found to be useful for identification in a few cases. Furthermore, two rhino (one male adult and one male calf) were found to have amputated tails - probably the results of hyena or lion attacks while the animal was young. Prominent body scars or deformities could also be useful identification marks, but only one animal (a male calf) was actually found with a deformity. (only one ear)

3. RECORDING OF RHINO OBSERVATIONS

All rhino sightings were recorded, but only adult rhino were identified. Sub-adults were regarded as being generally too similar for positive identification. Calves could be identified as long as they remained with their mothers.

During the period the census was being carried out, DANC personel based in Damaraland and the Skeleton Coast Park, as well as Blythe Loutit also made periodic patrols through the area. All positive identifications made by these persons were recorded in order to make the census more complete.

All clear rhino tracks seen during the census were measured and recorded. This information was used to determine whether further, as yet unlocated, rhino were in a particular area.

4. RECORDING OF OTHER ANIMALS

While censusing the rhino, all other larger mammals seen in the census area were recorded as well. In the case of elephant, giraffe, Hartmann zebra, kudu, gemsbok and springbok, total numbers, group sizes and the number of juveniles in the group (except for springbok) were also noted. Ostrich, raptors and snakes seen were also recorded. These observations have been summarised and discussed in Appendix 2.

RESULTS

1. RHINO LOCATION

i) A total of 16 hrs 20 mins (aprox. 1200 kms) were flown in light aircraft (Ultralight and Cesna) during the census. 18 rhino (8 adult, 3 sub-adult and 7 calves) were located by random flying over the area. Of these, 5 individual adults (1 male, 4 females) were identified. In two of these cases, the rhino could not be positively identified from the air, but landing nearby (with the Ultralight) enabled us to follow up on foot and identify the rhino.

ii) A total of 3186 kms (aprox. 212 hrs) were driven by 4x4 vehicle in the census area. 15 rhino (8 ad., 3 sub-ad., 4 ca.) were located by random driving through the census area. Of these, 6 individual adults (4 male, 3 female) were identified.

iii) A total of 188 hrs 30 mins (aprox. 630 kms) were walked in the census area. 9 rhino (3 ad., 3 sub-ad., 3 ca.) were located by random walking through the census area. Of these, 3 individual adult females were identified.

iv) A total of 30 attempts were made to track down rhino of which 24 were succesful and 6 were abandoned. 34 rhino (20 ad., 4 sub-ad., 10 ca.) were located by tracking. All 20 adult rhino (10 males, 10 females) were identified. The time taken to track down a rhino varied from less than 1 hour to more than 6 hours, with an average time of approximately 4 hours. The distance tracked before the rhino was located varied from 2 kms to 18 kms. Rhino in the census area usually lay up in the shade from 10-11hoo to 15-17hoo. Consequently, if an early start was made in the morning, the rhino could usually be located during this period. On one day 5 rhino (1 ad. male, 2 ad. females and 2 calves) were tracked down and identified in the space of 5 hours.

2. RHINO IDENTIFICATION

i) A total of 73 rhino were located during the census. This figure includes all rhino seen by myself during the census period (from the air, 4x4, foot and tracking) whether they were identified or not.

ii) Of these, a total of 27 different individual adult rhino were identified (by myself) during the census. 22 were previously known rhino (81%) and 5 were previously unrecorded (19%).

iii) During the census period, a further 4 previously known adult rhino and 1 previously unrecorded adult rhino (not seen by myself during the census) were located and positively identified in the census area by DANC officers, NC Steve Braine and GR Duncan Gilchrist, and Blythe Loutit .

iv) Thus, a total of 26 previously known adult rhino and 6 previously unrecorded adult rhino were identified during the census period.

v) Of the 29 adult rhino known at the start of the census, a total of 26 were thus seen during the census period (90%).

3. POPULATION STRUCTURE

i) Of the 32 adult rhino (26 known + 6 prev. unrecorded) identified during the census period, 15 were male (47%) and 17 (53%) were female.

ii) All 17 of the adult female rhino identified during the census period had calves at foot. 10 of these calves were under 1 year old.

iii) Of the 17 calves recorded during the census period, 4 were male, 5 were female and 8 were unsexed.

iv) Of the 12 sub-adult rhino seen during the census, 4 were male, 3 were female and 5 were unsexed.

4. POPULATION DISTRIBUTION

i) Of the 73 rhino located during the census:

17	(9 ad., 2 sub-ad., 6 ca.)	were in eco-zone AU
40	(21 ad., 9 sub-ad., 10 ca.)	" " " BU
11	(5 ad., 1 sub-ad., 5 ca.)	" " " HO
0		" " " OO
5	(3 ad., 0 sub-ad., 2 ca.)	were in eco-zone MH
0		" " " SK

ii) Of the 32 adult rhino individually identified during the census period:

9	(4 male, 5 female)	were in eco-zone AU
16	(9 male, 7 female)	" " " BU
4	(0 male, 3 female)	" " " HO
0		" " " OO
3	(2 male, 2 female)	" " " MH
0		" " " SK

In three cases identified adult rhino females were seen on seperate occasions in adjoining eco-zones. In each cases, the rhino was included in the eco-zone where it has most often been seen (since 1982). No cases of identified adult male rhino being seen in different eco-zones were recorded during the census period.

CONCLUSIONS

1. LOCATION OF RHINO

For a census by individual identification to be accurate, it is essential that an effective method/s of rhino location be employed.

Time/Effectivity of the Four Rhino Location Methods Used.

	Random Aircraft	Rand.4x4	Rand.Foot	Tracking
Total hours spent	16,3	212	188	188
No. of rhino located	18	15	9	34
Rhino loc. per 10 hrs	11,0	0,7	0,5	1,8
No. ad. rhino ident.	3	7	3	20
Ad. rhino ident./10hrs	1,8	0,3	0,2	1,1

From a time/effective point of view, flying was clearly the most succesful of the four methods used for locating rhino. However, only 3 adults out of the 18 rhino (8 adults) that were located by this method

could be positively identified from the air. In contrast, all 20 adult rhino located by tracking could be identified. Tracking also gave the oportunity for targeting individual adults (by recognising their spoor), so that time was not wasted on sub-adults or by relocating rhino already seen. Obviously, the cost of tracking to locate rhino is considerably lower than flying. This is well illustrated by comparing the distance travelled (by air, 4x4, foot and while tracking) to rhino located and identified.

	Rand.Aircraft	Rand.4x4	Rand.Foot	Tracking
Total Kms travelled	1200	3186	632	632
No. of rhino located	18	15	9	34
Rhino loc. per 100 kms	1.5	0.5	1.4	5.4
No. ad. rhino identified	3	7	3	20
Ad. rhino ident./100 kms	0.25	0.22	0.48	3.18

Flying was therefore found to be the most time-efficient method of locating rhino, but it is not very effective on it's own as a means of identifying known adults. Tracking was not far behind flying in time efficiency for identifying and recording adult rhino. Tracking was also by far the most efficient from a cost (i.e. distance travelled) point of view for both locating and identifying known rhino. Random driving and random walking were least time/effective for both locating and identifying known rhino. Random walking was more efficient than random driving (and a lot cheaper) as regards distance covered per rhino located and known rhino identified.

2. IDENTIFICATION OF RHINO

If all five criteria (sex, age, horn shape and size, ear marks and rear spoor width) were recorded, every adult rhino could be positively identified. Calves could be identified by their mothers. (In some cases the age and sex of the calf assisted with the identification of adult female rhino.) However, most of the sub-adult rhino located could not be positively identified.

A total of 32 adult rhino (15 males, 17 females) were located during the census period. The three previously known adult rhino not seen during the census period were:

1 male (in AU eco-zone) not seen for 8 months (as at 30.9.1986)
1 female (" AU ") " " " 19 " (" " ")
1 female (" AU ") " " " 38 " (" " ")

The male and the female in AU not seen for less than two years are probably still alive. The female in AU not seen for 38 months was young and had no ear marks. It is possible that she is one of the new rhino identified during the census. It is also possible that she was one of the rhino poached in N.W. Damaraland during 1985. This rhino should

therefore be removed from the records.

The present total of adult rhino in Damaraland north of the veterinary cordon fence is thus not less than 34. (16 males, 18 females).

Only 6% (2) of the presently recorded adult rhino north of the Vet. fence were not seen during the census period, and only 3% (1) of them has now not been seen for more than a year.

A total of 17 calves were recorded during the census period. The present total of rhino calves in Damaraland north of the veterinary cordon fence is thus not less than 17.

Sub-adult rhino could not be individually identified during the census. However, since the end of 1982, a total of 10 rhino calves are known to have left their mothers in the census area and, if still alive, should now be sub-adults. Other adult females, not identified at that time, may also have had calves that are now sub-adults.

During random flying, driving and walking in the census area, a total of 19 adult and 9 sub-adult rhino were located, sugesting a probable present ratio of approximately 2 adults to 1 sub-adult in this population. If this ratio is extrapolated, then with 34 known adult rhino in the census area, their should be about 17 sub-adults.

The present total of sub-adult rhino in the Damaraland north of the veterinary cordon fence is thus probably between 10 and 17.

This gives a probable total population of between 61 and 68.

However, based on spoor seen during the census, I believe there could be between 2 and 5 adult rhino in Damaraland north of the veterinary fence that have not yet been identified. The real total population would thus be about 70.

3.POPULATION STRUCTURE

Accepting a known population of 34 adults (16 males, 18 females) and 17 calves, and an estmated number of 13 sub-adults, the present age structure within the population would be:

53% adults
20% sub-adults
27% calves.

As 10 of the recorded calves are under one year old, 15.6% of the population are juveniles.

At the end of 1982, 15 adult rhino (5 males, 10 females) had been identified in the census area. Only 3 of the then 10 known females had calves at foot and none were under one year old.

By the end of 1983, 26 adult rhino (10 males, 16 females) had been identified in the census area. Only 6 of the then known females had calves at foot, two of which were under one year old (approx. 5% of the population).

4. DISTRIBUTION OF RHINO

Of the known adult and calf population of 51:

5	ad.	males,	6	ad.	females	and	5	calves	(31%)	were in eco-zone AU.
9	"	"	7	"	"	"	7	"	(45%)	" " " BU.
0	"	"	3	"	"	"	3	"	(12%)	" " " HO.
2	"	"	2	"	"	"	2	"	(12%)	" " " MH.

Sub-adult rhino have been recorded from all four of the above eco-zones.

No adult rhino have been identified in eco-zones OO and SK, but the tracks of sub-adult rhino were recorded in eco-zone OO near the edge of BU, and eco-zone SK near the edge of BU and MH.

RECOMMENDATIONS

Poaching for rhino horn has, over the past fifteen years, reduced the black rhino population of Africa from more than 60 000 to less than 5000. In Kenya, only about 500 rhino now survive from an estimated population of 15 000 in 1970. Only five years ago, Tanzanier and Zambia had about 3 000 rhino each. Recent reports sugest that less than 500 rhino now survive in both countries combined. The battle to save a significant number of black rhino in Africa is presently being waged on the south bank of the Zambezi river, where the largest population left in Africa (1 000 plus animals) occurs. Over the past 18 months, between 100 and 200 black rhino have been poached here and 14 of the poachers have been killed by Zimbabwe National Parks and Wildlife officers.

Whether Zimbabwe can bring it's rhino poaching under control or not, the supply of rhino horn from Africa to the markets of North Yemen and the Far East (recently averaging between 2 000 and 5 000 horns a year) will dry up in the near future, and the price of rhino horn (now wholesaling at well over USA$ 1000 per Kg and retailing at between $5000 and $15000 a Kg) can be expected to rise even higher.

For this reason, it would be grossly irresponsible for conservationists in SWA/Namibia not to prepare for the inevitable onslaught on our black rhino populations in Damaraland and Etosha. The continuous close monitoring of the extremely vulnerable Damaraland population is, therefore essential so that, should poaching start up once more, we will not be caught napping.

The following recommendations are therefore made:

i) Conservation extention and education work amoung the residents of Damaraland and Kaokoland should be regarded as a matter of utmost urgency.

ii) Patrol work by DNC officers in N.W. Damaraland must be increased and made more effective.

iii) I.D. files of all known adult rhino in the region should be kept at the DNC offices in Khorixas, Opuwo, Sesfontein, Mowe Bay, Springbokwater and Uchabmond, so that officers based there can make positive identifications of the rhino they see while on patrol.

iv) Central records should be kept of all rhino sightings in Damaraland. They should be brought up to date on a monthly basis.

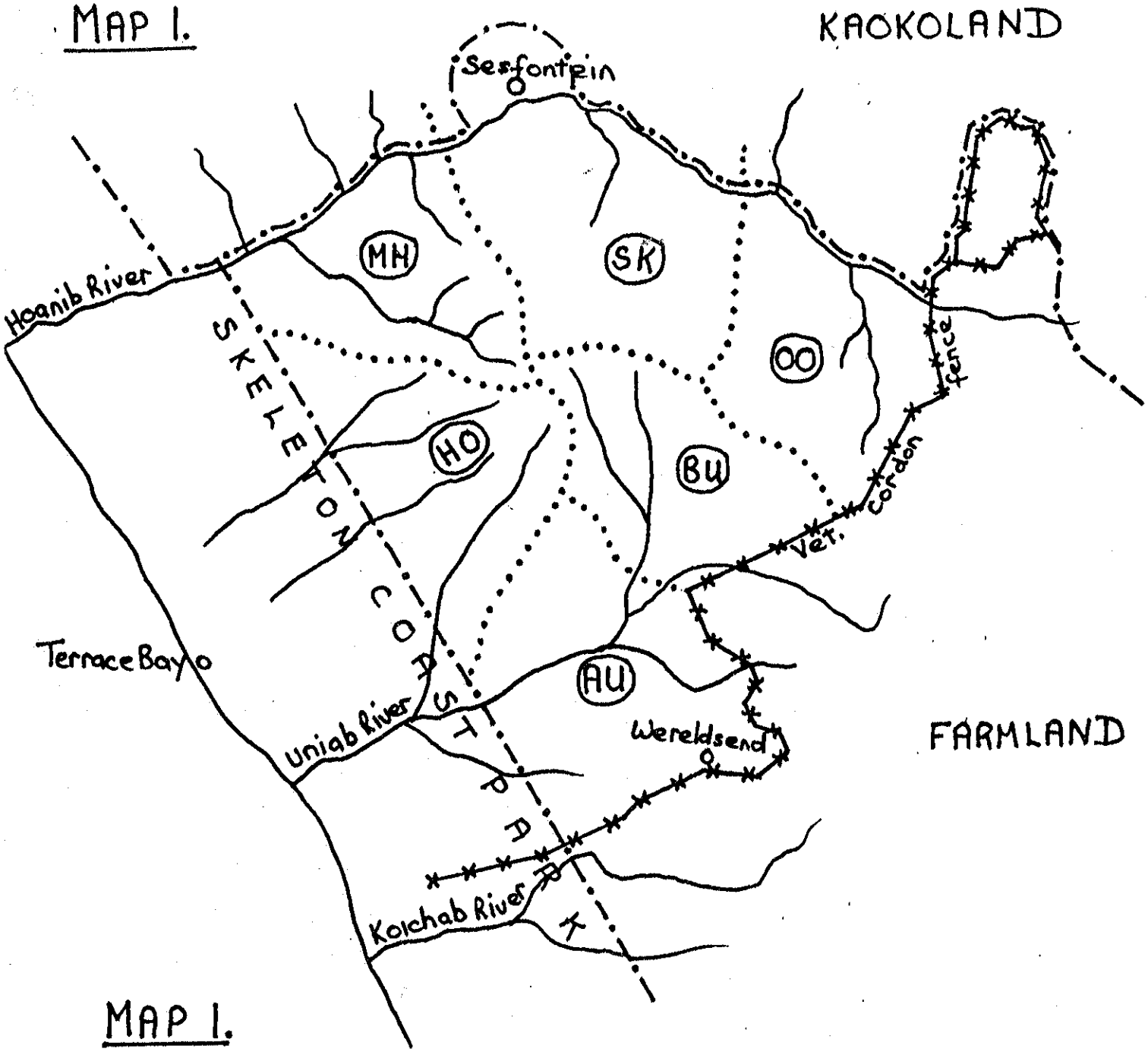
v) Rhino not sighted for a year or more should be deliberately searched for.

vi) If these rhino are not located for a further period of twelve months, mortality should be presumed.

vii) Obviously, if large numbers of known rhino are not being sighted in a particular area, poaching should be suspected and patrol work in this area intensified.

viii) The fact that we have an I.D. file of all the known rhino in Damaraland should be publisized, but the information within the files (particularly regarding distribution and home ranges) should be regarded as confidential.

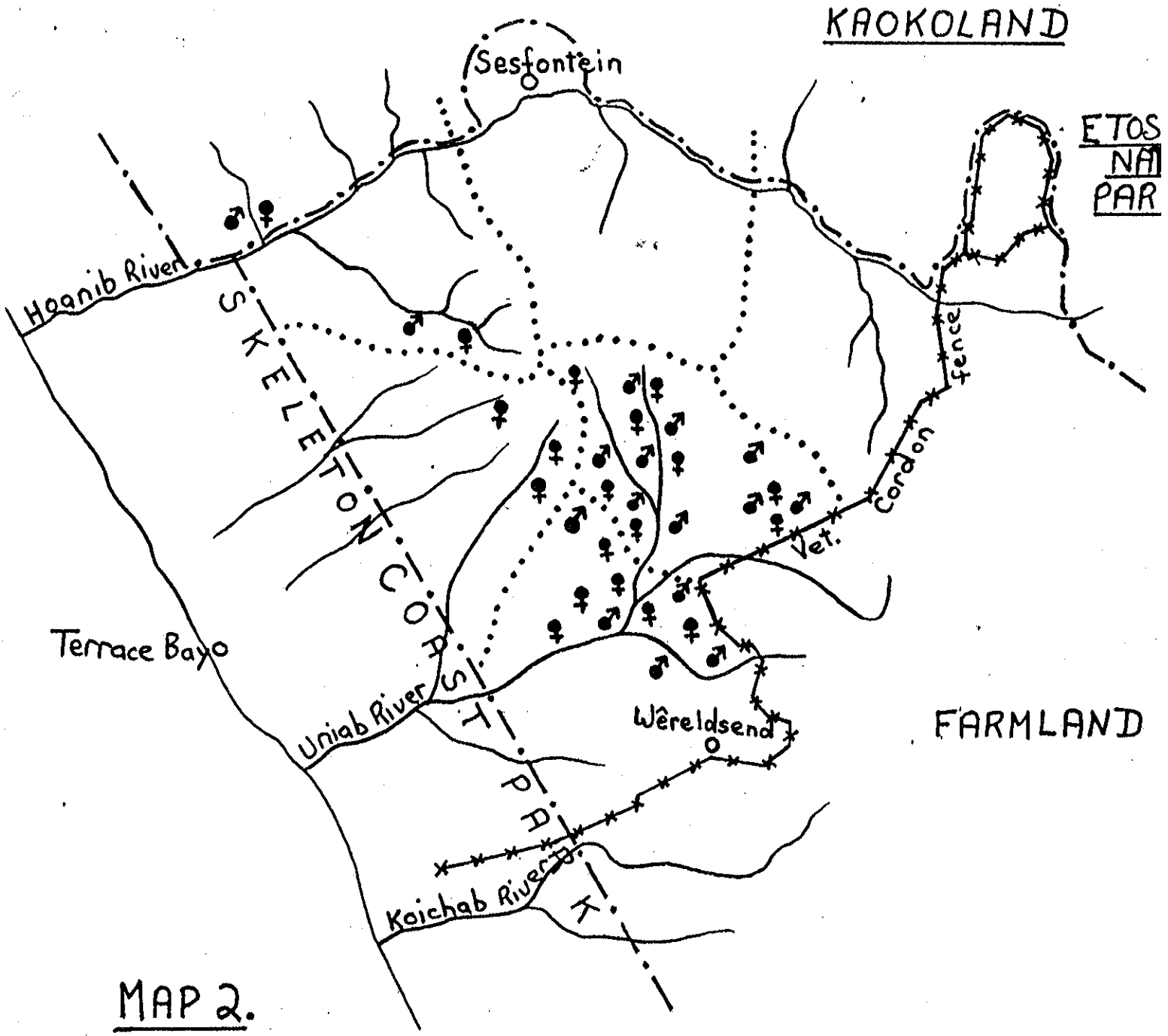
ix) It is further sugested that the individual identification of adult black rhino could also be undertaken in the western parts of the Etosha National Park and of adult white rhino in the Waterberg Plateau Park. This could be carried out by DANC nature conservators stationed in these areas.



NORTH WEST DAMARALAND

ECO-ZONES USED DURING RHINO CENSUS

AU - Achab-Lower Uniab
BU - Barab-Upper Uniab
HO - Hunkab-Obob
MH - Mudorib-Hoanib
SK - Sesfontein-Khovarib
OO - Ombonde-Omborombonga.

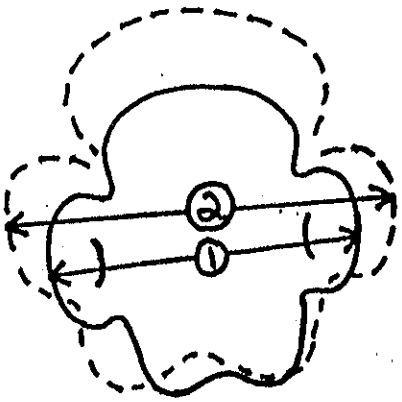


MAP 2.

NORTH WEST DAMARALAND
DISTRIBUTION OF ADULT RHINO
(SEPT. 1986)

♂ - Male
♀ - Female

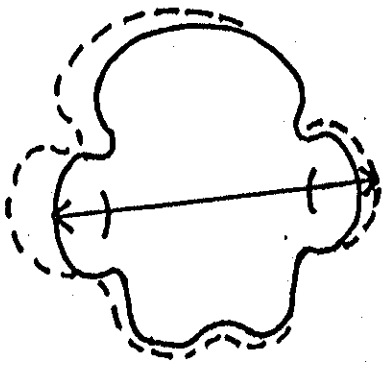
Fig 1. Measuring Rhino Spoor



a) Typical rhino track with hind foot imprinted on top of front foot.

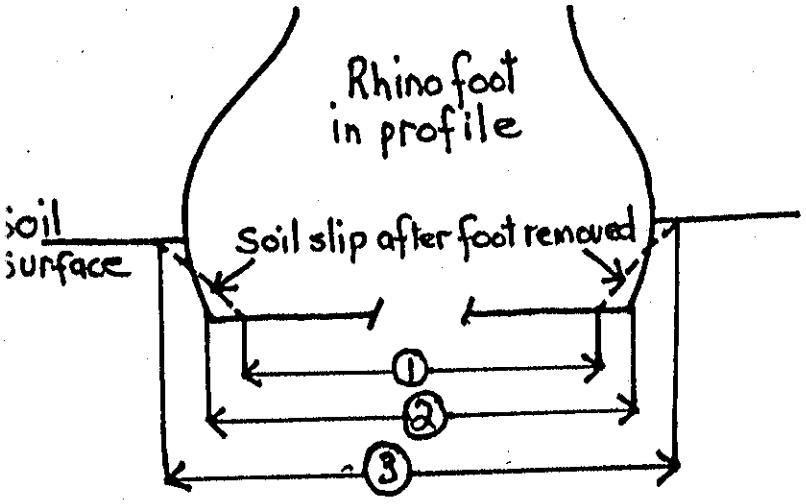
① Correct measurement of hind foot.

② Correct measurement of front foot.



b) Common mistake.

Measuring from left toe of hind foot to right toe of front foot.



c) Common mistake in soft sand.

Soil from edge of spoor falls into footprint when rhino's foot is removed.

① Incorrect measurement.

② Correct measurement.

③ Incorrect measurement.

APPENDIX 1.

APPROXIMATE BLACK RHINO HIND FOOT SIZE IN RELATION TO AGE AND SEX

(Based on rhino observations and spoor measurements made in N.W. Damaraland during 1986)

Approx. Age	Spoor Width in MM (Female)		Spoor Width in MM (Male)	
New born calf	110-120		110-120	
One month old	120-130		120-130	
Three months old	130-145		130-145	
Six months old	145-155		145-155	
1 year old	155-165		155-170	
2 years old	165-180	(leaves mother)	170-185	(leaves mother)
3 years old	175-185		180-190	
5 years old	185-195	(sex. mature)	190-200	
7 years old	195-200	(first calf)	200-205	(sex. mature)
10 years old	200-210		205-215	(fully mature)
15 years old +	205-225		210-230	