

Distribution patterns and status of some mammals in South West Africa

by
E. JOUBERT AND P.K.N. MOSTERT
Division of Nature Conservation and Tourism
South West Africa Administration

CONTENTS

Abstract	6	6. Distributions patterns and status	11
1. Introduction	6	6.1 The larger mammals	11
2. Resumé of physical geography	6	6.1.1 African elephant <i>Luxodonta africana</i> Blumenbach	11
2.1 Physiography	6	6.1.2 Black rhinoceros <i>Diceros bicornis</i> Linnaeus	12
2.1.1 The coastal desert in the west	6	6.1.3 Burchell zebra <i>Equus burchelli antiquorum</i> H. Smith	12
2.1.2 The escarpment	6	6.1.4 Hartmann zebra <i>E. zebra hartmannae</i> Matshie	12
2.1.3 The plateau in the east	6	6.1.5 Hippopotamus <i>Hippopotamus amphibius</i> Linnaeus	13
2.2 Climate	7	6.1.6 Giraffe <i>Giraffa camelopardalis</i> Linnaeus	13
2.3 Vegetation	7	6.1.7 Roan antelope <i>Hippotragus equinus</i> Desmarest	13
2.3.1 Deserts	7	6.1.8 Tsessebe <i>Damaliscus lunatus</i> Burchell	13
2.3.2 Savannas	7	6.1.9 Red hartebeest <i>Alcelaphus caama</i> Cuvier	14
2.3.3 Woodland	8	6.1.10 Blue wildebeest <i>Connochaetus taurinus</i> Burchell	14
3. The influence of man	8	6.1.11 Kudu <i>Tragelaphus strepsiceros</i> Pallas	14
4. Methodology and evaluation	8	6.1.12 Eland <i>Taurotragus oryx</i> Pallas	15
4.1 Questionnaires	9	6.1.13 Gemsbok <i>Oryx gazella</i> Linnaeus	15
4.2 Aerial surveys	9	6.1.14 Buffalo <i>Syncaerus caffer</i> Sparrman	15
4.3 Personal communications	10	6.2 The smaller mammals	16
5. Results	10	6.2.1 Baboon <i>Papio ursinus</i> Kerr	16
		6.2.2 Vervet monkey <i>Cercopithecus aethiops</i> Linnaeus	16
		6.2.3 Dassies <i>Procavia capensis</i> Pallas and <i>Procavia wendhchia</i> Gray	16
		6.2.4 Porcupine <i>Hystrix africae-australis</i> Peters	16
		6.2.5 Honey badger <i>Mellivora capensis</i> Schreber	16
		6.2.6 Aardvark <i>Orycteropus afer</i> Pallas	16
		6.2.7 Warthog <i>Phacochoerus aethiopicus</i> Pallas	16
		6.2.8 Dikdik <i>Madoqua kirkii</i> Günther	17
		6.2.9 Duiker <i>Sylvicapra grimmia</i> Linnaeus	17
		6.2.10 Steenbok <i>Raphicerus campestris</i> Thunberg	17
		6.2.11 Klipspringer <i>Oreotragus oreotragus</i> Zimmermann	18
		6.1.12 Impala <i>Aepyceros melampus</i> Lichtenstein	18
		6.2.13 Black-faced impala <i>Aepyceros</i> Bocage 1875	18
		6.2.14 Springbok <i>Antidorcas marsupialis</i> Zimmermann	18
		6.2.15 Reedbuck <i>Redunca arundinum</i> Boddaert	19
		6.2.16 Lechwe <i>Kobus lechwe</i> Gray	19
		6.2.17 Sitatunga <i>Tragelaphus spekii</i> Schlater	19
		6.3 The predators	19
		6.3.1 Lion <i>Panthera leo</i> Linnaeus	19
		6.3.2 Leopard <i>Panthera pardus</i> Linnaeus	19
		6.3.3 Cheetah <i>Acinonyx jubatus</i> Linnaeus	20
		6.3.4 Spotted hyaena <i>crocuta crocuta</i> Erxleben	20
		6.3.5 Brown hyaena <i>Hyaena brunnea</i> Thunberg	20
		6.3.6 Cape hunting dog <i>Lycaon pictus</i> Temminck	20
		6.3.7 Lynx <i>Felis caracal</i> Schreber	20
		6.3.8 Black-backed Jackal <i>Canis mesomelas</i> Schreber	20
		6.3.9 Side-striped Jackal <i>Canis adustus</i> Sundevall	21
		6.3.10 Silver Fox <i>Vulpes chama</i> Smith	21
		6.3.11 Bat-eared fox <i>Otocorys megabotis</i> Desmarest	21
		6.4 Unrecorded mammals	21
		7. Discussion and conclusions	21
		8. Acknowledgements	22
		9. References	23

ABSTRACT

A short description is given of the physiographic, vegetation and climatic conditions in South West Africa. The influence of modern man on game animals is given with examples of various situations. The distribution and status of the larger mammals in South West Africa were determined by various methods viz. questionnaires, aerial surveys and personal communications. An evaluation of these methods are given. The questionnaire returns gave a percentage return of 61.0 percent. The distribution and status of 24 game species, 11 predator species and 7 other species in all of South West Africa is given. Analysis of the figure indicate that approximately 60 percent of all the game species occur primarily on privately owned land. Based on actual numbers of all the various species it means that approximately 90 percent of the game, occur on farmland. Of the eleven predators dealt with in the paper, three predators viz. lion, Cape hunting dog and the brown hyena show a marked decline in numbers as well as distribution since 1934.

1 INTRODUCTION

The ever increasing shortage of red meat in Southern Africa has in recent years caused a growing awareness that our indigenous game species are an unutilized resource. At present, various research projects are under way to test the practicability of game ranching and the consumer's attitude towards venison. The question is however more often raised on as to what exactly the present situation is, regarding the status and distribution of game in South West Africa. This paper is the first comprehensive work on both the distribution and status of the wild ungulate mammals in all of South West Africa.

A number of works on the distribution of mammals in South West Africa exist. The oldest accounts of this century are those by the German Colonial Office (1913) and by Fischer (1914). More recent publications include the following: Wilhelm (1931), Shortridge (1934), Bigalke (1958), van der Spuy (1962) and Sidney (1965). Unfortunately most of these works have some serious shortcomings, mainly due to the lack of an intimate knowledge of the total area, which in turn can be ascribed to the vastness of the territory and in the past, the inaccessibility of large tracts of this territory. The work by Shortridge is a compilation of older literature and is therefore an important historical summary. This background is used extensively by the present authors as a basis for obtaining further information on past distribution. Shortridge however, hardly gives any figures to describe the status of most of the mammals.

After the first official attempt at a game census in 1913, another was undertaken during 1955/1956 by the Police authorities. The work by Bigalke (1958) was based on the result of this survey. Unfortunately Bigalke was not able to fully analyse this information and his paper is vague since no maps were used, giving little information on distribution, and nothing on the status of the majority of species.

At the request of the Nature Conservation and Tourism Division another census was done in 1960 and this took the form of a questionnaire, delivered to farmers by police officers. Van der Spuy (1962) based his work on the results of this survey, but unfortunately deals only with six species, i.e. kudu, gemsbok, springbok, eland, hartebeest and mountain zebra. A limitation of van der Spuy's work is that it

only covered the farms in S.W.A. and excluded some of the tribal territories as well as the Etosha National Park, Namib Desert Park and Diamond areas No's 1 and 2. Almost all these areas contain large numbers of game. An advantage of van der Spuy's work, however, is that it was based on questionnaire returns, and since the present work also covered the farms with questionnaires, the results are largely comparable. The distribution in the other areas was determined by aerial surveys and personal communications.

As the Eastern Caprivi is administered from Pretoria and since neither of the authors have experience of that area it is excluded from this paper.

2 RESUME OF PHYSICAL GEOGRAPHY

2.1 Physiography

South West Africa may be divided into the following regions:

- 2.1.1 The coastal desert in the west
- 2.1.2 The escarpment
- 2.1.3 The plateau to the east

2.1.1 The desert is known as the Namib. It stretches along the Atlantic coast and being about 80 km wide, covers the region between the coast and the foot of the escarpment zone. In its northern half the desert consists of pediplains, with dunes mainly in the proximity of the coast. South of the Kuiseb River, dunes cover the desert from the coast almost to the foot of the escarpment zone. The inland portion of the Namib is subdesert (sometimes known as the pre-, pro- or inner-Namib) receives scattered showers during some summers. Perennial waterholes are virtually non-existent in this area. The vegetation is sparse and for the greater part the ground surface is bare.

2.1.2 The escarpment is not a true escarpment as found on the south-eastern side of the subcontinent, but rather a mountainous transition belt, stretching from the inland plateau to the pre-Namib flats. The mountains reach heights of more than 2 000 m and are formed mostly by folded Nosib and Damara sediments that rise above the surrounding granites and gneiss which have been more severely weathered and eroded. All of the seasonal rivers in South West Africa originate in this mountain zone. The larger of these rivers, such as the northern Koichab, Hoarusub, Huab, Omaruru, Swakop and Kuiseb Rivers, drain exoreically into the Atlantic Ocean. Most of the smaller ones, such as the Munutum, Sechomib, Tsondeb, Tsauchab and southern Koichab Rivers, drain endoreically into inland vleis and pans or the waters merely disappear in the dunes. Perennial waterholes are relatively plentiful in this mountainous zone and are situated mostly in the riverbeds. The vegetation on the escarpment is dense and of a much more complex and varied (Joubert, 1971 and 1973) than the vegetation found in the Namib desert.

2.1.3 The inland plateau forms part of the great subcontinental plateau of southern Africa. It reaches

its highest elevations, ranging between 1 500 to 2 000 m, along the western rim. This largely forms the watershed between the catchment areas of the rivers draining into the Atlantic Ocean and the endoreic basins of the Kalahari and to a lesser extent the Etosha Salina. Apart from various drainage lines in the north-west that drain into the Etosha pan, this plateau is also drained in the north-east by a number of omurambas (drainage lines) into the Okavango River, and in the central and south-eastern parts by the Nossob and Auob Rivers into the Molopo River. Two other rivers, both seasonal, drain parts of the inland plateau seawards, the Ugab River in the north and the Fish River in the south. The latter first flows into the Orange and thence into the ocean. The inland plateau is for the greater part a featureless plain covered by calcareous sands, gravel and secondary limestone. Rubble calcrete sometimes forms pronounced ridges. The soil is seldom more than a meter deep. Towards the east the soil varies between clay and sand, the latter forming pronounced dunes. These dunes are mostly stabilized by a typical thicket and woodland vegetation. Perennial waterholes in this region are rare.

2.2 Climate

Generally speaking, temperatures and rainfall are the two main physical factors in determining the distribution of fauna and flora, with the latter actually being the more important. During the summer months of November, December and January daytime temperatures of 40°C or more are reached. From approximately April until September the days are moderately warm reaching temperatures of 30°C. During this period the nights are sometimes extremely cold with frost occurring often. The rainfall is usually of the thunderstorm type. The annual rainfall pattern is extremely irregular and being patchily dispersed, and most areas experience long droughts. The isohyets are more or less parallel to the coastline and the mean annual rainfall increases to the east and north. The rainfall varies from approximately 600 mm per annum in the north eastern corner of the territory to less than 25 mm per annum in the west and extreme south. The decline in rainfall is very sudden from the 600 mm to the 400 mm isohyet, and by studying the rainfall map it is quite clear that approximately 1/5 of the territory can be considered sub-humid, 3/5 semi-arid to arid and 1/5 as extremely arid (the Namib Desert region).

2.3 Vegetation

The vegetation has been described by various workers, Engler (1910), Boss (1934), Pole Evans (1936), Range (1940), Keet (1949) and Giess and Tinley (1966). More recently, Giess (1971) published a comprehensive and detailed description of the vegetation of South West Africa including a map. Giess is followed in this botanical description. Within the three major physiognomic groups viz. desert, savanna and woodland Giess recognizes 15 main vegetation types (see map).

2.3.1 Deserts

Giess (1971) divided the Namib desert into four zones, (i) Northern Namib, (ii) Central Namib and (iii) Southern Namib (basically on geomorphological grounds) and in the extreme southern portion of the Namib, the (iv) Desert and Succulent Steppe (on grounds of the winter rainfall that this area receives). Inland, in the relatively small fringe of halophytic vegetation around the Etosha Pan, Giess recognizes his fifth desert region, the (v) Saline Desert with Dwarf Shrub Savanna Fringe.

2.3.2 Savannas

According to Giess (1971) the savanna region can be subdivided into eight distinct zones on the basis of characteristic plants species. Briefly these zones are the following:

- i) Semi-desert and Savanna Transition (Escarpment zone) which as the name implies lies along the Namib Desert — Escarpment junction and receives an annual rainfall of 100 mm or less.
- ii) Mopane Savanna, with the characteristic plant species being *Colophospermum mopane*. The mopane occurs either as shrub or tree, depending on local edaphic and rainfall conditions, varying from dense woodland in areas to a shortstemmed shrub with scattered trees.
- iii) Mountain Savanna and Karstveld, which has a relatively wide distribution and includes all of the Karstveld, excluding the areas covered by mopane. This vegetation type has a very characteristic tree stratum, characterized by *Kirkia acuminata* on the dolomite ridges and *Peltophorum africanum* on the more sandy plains.
- iv) Thornbush Savanna (tree and shrub savanna), which covers most of the central region of South West Africa. The vegetation consists mostly of grassland with trees and shrubs in dense or open clumps.
- v) Highland Savanna (Bergthorn Savanna), in the mountainous area of the Khomas Hochland, as far south as Rehoboth, with the most characteristic trees being *Acacia hereroensis*, *Combretum apiculatum* and *Ozoroa crassiner-vis*.
- vi) Dwarf Shrub Savanna, consisting of Karoid shrubs with *Rhigozum trichotomum* as the most dominant species. This vegetation type covers the arid plains of the southern part of South West Africa.
- vii) Camelthorn Savanna (Central Kalahari) with *Acacia giraffae* in an open savanna or parkland landscape. This vegetation type is mostly sandbound.

- viii) Mixed Tree and Shrub Savanna (Southern Kalahari) in the longitudinal red dune area of the south eastern part of the territory. *Acacia haematoxylon* in either shrub or tree being the most typical plant.

2.3.3 Woodland

Giess (1971) recognizes only one tree woodland viz. (1) Tree Savanna and Woodland in the north eastern corner of the territory with its relatively high rainfall. Two trees dominate the tree canopy ie *Pterocarpus angolensis* and *Baikadea plurijuga*. Along the lower reaches of most of the larger rivers, one finds tall trees on the alluvial deposits. Giess (1971) classifies these riparian trees into a second woodland which he calls Riverine Woodland. The dominant trees are mostly *Acacia albida* and *A. giraffae*.

3 THE INFLUENCE OF MAN

When man first settled South West Africa he had an adverse effect on the wildlife. The availability of water for wildlife is one of the most important single aspects in their struggle for survival in SWA with its relatively arid climate and limited waterholes, especially in the plateau regions. As human settlement developed around permanent waterholes, these became unavailable for wildlife. With the development of drilling machines new boreholes were constantly being sunk resulting in new, sometimes virgin territory, being occupied by pastoralists. Apart from competing with livestock for water, wildlife also faced competition from livestock for food. The wildlife were thus also forced into competition for living space by the livestock. With the increase in human population, hunting pressure also increased and large numbers of game were shot out. Farming practices as such, also took its toll, especially among the predators whose numbers were severely reduced and in some cases they have even been completely wiped out on farm land eg. lion. The fencing off of farms and the subdivision of the farms into even smaller camps resulted in the game being more easily hunted. A decade ago however, a significant change in attitude towards game became noticeable amongst farmers. This awareness was heightened in 1968 when they received by Ordinance, the ownership of game on their lands and they began to realise the full financial implications of this.

Although most of the wildlife species have had their numbers reduced, several species apparently gained certain benefits. The more obvious example being the herbivorous game species which benefitted by the reduction of certain predator species. Certain species also benefitted by the improvement of their habitat, due to human interference. One of the classic examples of habitat improvement in South West Africa is related to the kudu. The kudu habitat has been improved by bad management practices on many farms, which lead to overgrazing with resulting bush encroachment, as well as by the installation of watering points for cattle all over the farms. This is also clearly illustrated by the increase in

their numbers during the last decade (B.J.G. de la Bat, *pers. com.*).

Other species were also adaptable to changing conditions, and benefitted from a reduction in competition from the more sensitive species which could not adapt themselves and suffered a decline in their numbers. One example is that of springbok and sheep which utilize virtually the same habitat. In South West Africa sheep farming and springbok populations have been and are linked in various ways. Although no figures are available, all indications in old reports and reference works are, that earlier this century the springbok population must have been considerable. With increased human settlement and intensified farming these populations as mentioned earlier, first declined and were then stabilized. At this stage the approach to sheep farming management also changed. Instead of having a flock of sheep with a shepherd to look after them, large tracts of land were fenced off with jackal proof fences and all sheep predators in this enclosed areas were eradicated. Sheep were then allowed to run on their own in these camps. As can be expected, this situation also had several advantages to the resident springbok populations.

With the sheep predators eliminated is meant that they also had no natural enemies left. With the shepherd and his dogs not looking after the sheep anymore, it also meant that the human interference was reduced. Added to this, is the fact that farmers now also started to care for their springbok and the ownership of a springbok herd today almost has a prestige value. During the last decade there has been a steady increase in springbok numbers on farms.

Warthog and dassies, because of the reduction of their predators, are two other species which have increased considerably during the last decade. So much so, that both are causing concern to farmers, especially the dassies in the south. The Division for Nature Conservation and Tourism has also been requested by farmers to render help and reduce the number of hartebeest and giraffe on their land in certain restricted localities. A species which does not seem to be able to hold its own, is the gemsbok. Although still distributed throughout most of South West Africa there has been little increase in their numbers.

4. METHODOLOGY AND EVALUATION

Due to practical considerations no uniform method could be used to cover all of South West Africa. Questionnaires could only be used for the portion of South West Africa which is divided into farms. For the game reserves aerial surveys were carried out and a combination of the latter plus additional information from various authoritative officials with an intimate knowledge of the various homelands, was used for all the other areas. The questionnaire results were analysed according to Bigalke and Bateman's (1962) „percentage occurrence“ method. To quote — „For all animals in each district the ratio of the number of returns recording the species as

present to the total number of completed questionnaires received was expressed as a percentage". Thus in the Gobabis district, of 480 completed questionnaires received, 273 reported the presence of springbok. Evaluated, as a percentage, this gives the figure 56.9 (Table 1).

4.1 Questionnaires:

The basis of this census was roneod questionnaires, on which amongst other things, the occupiers of farms were asked to record the presence and their estimates of the number of each game species occurring on their properties. Addresses were obtained from the Department of Internal Revenue and the questionnaires were mailed. A reminder was sent off to all the farmers after four months. Each returned questionnaire was ticked off against a checklist and the farm from which it came, was marked on a 1:1 000 000 scale map of the farms in South West Africa. Map 3 illustrates the farms that returned the questionnaires. From it can be seen at a glance where there are gaps in the distribution of all species, due to the fact that no questionnaires were received for those areas. The information on the questionnaires was processed and transferred to summarization sheets from which the final analyses were made. For each of the magisterial districts, maps showing the various farms were used to plot the distribution of the various species. One map per species per magisterial district was used. From these maps, a final map was drawn for each species, showing the quarter degree square distribution on farms in all of South West Africa.

The validity of the information obtained with the aid of questionnaires is debatable, but the authors feel that if the limitations of this method are kept in mind, very useful information could be obtained, especially regarding the distribution of the various species and to some extent of their status. The senior author, in the line of duty, visited many farms, and found that the farmers did display certain tendencies. Those animals on which they placed a certain value viz. gemsbok and springbok they either knew accurately or tended to under estimate, while the animal species which caused them problems such as jackal and Hartmann mountain zebra were overestimated. Furthermore, if the numbers of a specific species were high they also tended to over estimate the population. Generally speaking there seemed to be a bias towards overestimation. Of all the game species occurring on farms in South West Africa, kudu is the one that gave the farmers the most problems when it came to estimating their numbers. This is mainly due to their secretive ways and the fact that ordinary fences do not restrict their movement. As their home ranges are also normally spread over a number of farms this complicated matters further, because a number of farmers would record the same group of kudu.

It was difficult to decide what to make of the figures on the questionnaire returns. The following lines of thought were followed. The completion and returning of questionnaires was on a completely voluntary basis. This immediately selected those farmers who are interested in their game and who have game on their farms. During recent years with

the more intensified farming practices and an increased awareness of the value of game Joubert (1974), farmers are paying more attention to the number of game on their properties. The number of game on the farm also plays a role in farm planning because it influences the carrying capacity for stock. Similarly the farmers have to give figures as to the number of game on their property when applying for participation in the stock reduction scheme. Thus the idea of estimating the number of game on the farm is not exactly a new idea or practice to these people. The figures obtained from the questionnaires also compared favourably with estimations by the Division regarding the status of game in South West Africa viz.

	Questionnaires	Division
Eland	7 779	8 000
Cheetah	6 252	5 000
Kudu	110 986	90 000

Since approximately half the farmers replied it was decided to take this figure for all the farm land in SWA. Following this method meant that the overestimate was cancelled to some extent. The other reason for giving the questionnaire figures is for future reference. It would have been extremely interesting to compare the questionnaire estimates of the 1955/56 survey which Bigalke (1958) reported on with the present estimates. Van der Spuy (1962) gave figures for only six species and these figures are compared with those obtained from the present survey.

During the present survey 5 388 questionnaires were mailed and 2 886 completed questionnaires were returned. Several farmers however, own or farm on more than one farm, but completed only one questionnaire for all the farms. As a result, the figure of 2 886 returns, in actual fact represents 3 284 farms. This in turn, gives a percentage return of 61.0 per cent, which can be regarded as high. Bigalke and Bateman (1962) working in the Cape Province reported a return of only 25.9 per cent.

There are at present 16 magisterial districts in South West Africa. The percentage returns from these various districts show some interesting patterns. As already stated, the average percentage returns were quite high, with only two districts returning less than 50 per cent of the questionnaires sent out while seven districts had returns of 60 per cent and higher. On the average the percentage returns show a correlation with the density of game in those particular districts. The returns from the southern districts show an average of 52.0 per cent, whilst those from the northern districts show an average percentage return of 60.7 per cent.

4.2 Aerial surveys

During 1965 the Division of Nature Conservation and Tourism obtained a Piper Super Cup. It was found that this aircraft's low stalling speed and extreme maneuverability at low speeds were ideally

suited for game census work in South West Africa, especially in the mountainous country of the Kaokoveld and the escarpment zone. Since 1966 half yearly surveys of game concentrations in the Etosha National Park have been carried out. These were augmented by a helicopter census in the Park during September 1973. Several aerial surveys have also been done in most of the other conservation areas in South West Africa, as well as in Diamond areas No's 1 and 2. The technique normally used, is to fly in parallel transect lines, the distance apart being determined by the topography of the terrain until a concentration of animals is observed. They are then circled until a count is made, the aircraft then continuing along the original course. During circling the aircraft would gain altitude to prevent excessive stampeding by the game.

Several methods were devised to determine a correction factor that could be used during aerial surveys. The two methods which gave the most satisfactory results were the following: an aerial survey was carried out, flying on predetermined transects, in the Daan Viljoen Game Reserve with its known population numbers for the various species. The factor determined here was used when working over a mountainous terrain. On the plains in the Etosha National Park, simultaneous surveys on the ground and from the air of a game concentration, produced a correction factor that could be used here.

In 1968 and 1969 aerial surveys were carried out in Damaraland, Kaokoland, and the western part of Owambo. These were backed up during the same period by ground surveys. The senior author has

an intimate knowledge of the general distribution and densities of game in this area. This knowledge proved invaluable when the aerial census work was carried out. Since 1970 annual and sometimes bi-annual surveys have been undertaken in the Kavango and Bushmanland. One aerial survey was also done in Hereroland in 1971. During 1971 and again in 1974 aerial surveys were undertaken in Diamond areas No's 1 and 2. Although some of this information is relatively old, it is felt that since nothing else is available, it should be included so as to obtain an overall picture of the present situation in South West Africa.

4.2 Personal communications

The Rehoboth Gebiet and Namaland were never covered by aerial surveys. Information on these areas was obtained from personnel of various government departments stationed there. Information was also obtained from similar sources in Hereroland, Bushmanland and Kavango to supplement the aerial surveys in these areas.

On the distribution maps, a different pattern is used to indicate the distribution of the species in those areas which were covered by aerial surveys and personal communications, since the latter two methods do not represent accurate quarter degree square distribution, such as obtained from the questionnaires.

5 RESULTS

Some of the data obtained from the questionnaires is summarised in Tables 1 and 2.

Table 1. Statistics obtained from the returned questionnaires, recording the more common game species occurring on farms in South West Africa.

PERCENTAGE OCCURRENCE* OBTAINED FROM RETURNED QUESTIONNAIRES																
	No. of farms in district	No. of farms covered by the returned questionnaires	% Returns	Kudu	Gemsbok	Hartebeest	Eland	Hartmann's Zebra	Burchell's Zebra	Giraffe	Springbok	Duker	Klipspringer	Dikdik	Steenbok **	Warthog
TSUMEB	182	97	53.3	82.5	8.2	2.1	41.2	—	3.1	49.5	5.2	79.4	15.5	46.4	10.3	70.1
GROOTFONTEIN	601	387	64.4	66.7	15.0	11.9	40.3	—	1.3	17.1	3.1	67.7	15.8	19.4	5.4	58.9
OUTJO	392	202	51.5	90.1	58.9	3.5	5.0	27.7	7.9	31.2	34.7	79.7	48.5	35.6	5.9	80.7
OTJIWARONGO	260	206	79.2	83.5	63.6	36.4	8.3	2.4	2.4	3.4	13.6	76.2	20.4	20.9	5.3	80.1
OMARURU	131	90	68.7	98.9	80.0	—	—	21.1	2.2	1.1	62.2	88.9	51.1	53.3	10.0	86.7
SWAKOPMUND	45	14	31.1	—	—	—	—	—	—	—	14.3	—	7.1	—	—	—
KARIBIB	164	94	57.3	75.5	51.1	1.1	2.1	36.2	5.3	—	53.2	53.2	50.0	13.8	4.3	57.4
OKAHANDJA	216	159	73.6	83.0	64.2	19.5	4.4	3.1	0.6	1.3	22.0	78.6	15.7	13.8	5.7	81.1
WINDHOEK	514	312	60.7	73.1	42.9	15.4	4.5	21.2	1.3	—	60.3	62.8	47.1	4.2	8.7	50.6
GOBABIS	714	480	67.2	64.0	22.7	16.5	5.2	—	—	—	56.9	79.8	4.8	2.3	6.3	57.1
MALTAHÖHE	203	131	64.5	67.2	31.3	1.5	0.8	23.7	1.5	—	72.5	18.3	55.7	1.5	13.0	3.1
MARIENTAL	990	356	36.0	12.6	27.5	3.1	2.8	0.3	0.3	—	72.8	71.1	3.9	2.5	10.1	3.4
LÜDERITZ	84	44	52.4	47.7	47.7	—	—	13.6	2.3	—	59.1	11.4	63.6	—	2.3	—
BETHANIE	163	83	50.9	67.5	22.9	—	—	8.4	2.4	—	63.9	18.1	72.3	1.2	7.2	2.4
KETTMANSHOOP	400	228	57.0	36.4	20.6	—	3.5	0.4	0.4	—	68.9	41.7	32.5	0.9	10.4	0.4
KARASBURG	329	169	51.4	23.7	9.5	—	0.6	3.6	—	—	62.7	11.2	42.0	—	7.7	—

* See text for explanation.

** Steenbok was inadvertently omitted from the questionnaire and the percentage occurrence in this case represents the occurrence as supplied by some of the farmers of their own accord.

Table 2. Population estimates of the more common game species occurring on farms in South West Africa.

	KUDU	GLIMSBOK	HARTBEEST	FLAND	HARTMANN'S ZEBRA	BURCHILL'S ZEBRA	GIRAFFE	SPRINGBOK	DUIKER	KLIPSPRINGLER	DIKDIK	STEENBOK **	WARTHOG
TSUMEB	4 881	34	21	1 432	—	106	649	293	280	190	1 071	210	1 984
GROOT-ONTEIN	13 875	876	681	5 030	—	49	1 065	146	10 666	1 237	1 843	887	7 070
OUTJO	12 666	4 203	108	406	2 324	274	964	3 602	3 248	1 540	1 986	712	5 341
OTJIWARONGO	15 037	5 837	2 172	270	50	8	19	1 392	5 999	1 145	1 013	955	13 824
OMARURU	9 440	3 442	—	—	1 427	150	3	3 903	1 870	1 018	1 427	362	4 080
SWAKOPMUND	—	—	—	—	—	—	—	15	—	3	—	—	10
KARIBIB	6 277	2 396	51	3	2 204	241	16	6 021	1 719	941	257	300	1 581
OKAHANDJA	11 223	6 753	919	85	275	60	2	2 464	3 700	596	530	635	8 568
WINDHÖEK	18 319	5 367	4 284	137	4 729	144	—	25 368	5 405	2 945	545	970	3 651
GOBABIS	11 430	5 821	3 841	308	—	—	—	25 690	17 465	1 271	425	1 757	6 230
MALTAHÖHE	2 226	1 150	42	1	3 159	17	—	14 415	579	1 867	—	477	235
MARIENTAL	1 393	2 505	67	72	2	5	—	28 483	6 351	370	443	2 176	111
ÜDERITZ	562	809	—	—	1 263	14	—	3 461	99	1 121	—	—	20
BETHANLEN	1 360	316	—	—	786	20	—	4 366	303	1 360	4	260	—
KEETMANSHOOP	1 447	903	—	35	—	2	—	12 666	1 661	2 637	30	2 030	—
KARASBURG	796	157	—	—	216	—	—	9 883	555	2 483	—	875	—
TOTAL	110 986	40 569	12 186	7 779	16 435	1 090	2 718	141 468	62 423	20 721	9 166	12 605	52 705

** Steenbok was inadvertently omitted from the questionnaire and the figures in the table, represent the totals given by some of the farmers of their own accord.

6 DISTRIBUTION PATTERNS AND STATUS

6.1 The larger mammals

6.1.1 Elephant *Loxodonta africana* Blumenbach

Shortridge (1934) considered Kaokoland the only area in South west Africa containing any large numbers of elephant, which he estimated at being between 600 — 1 000. He furthermore mentioned elephants as occasional migrants in the Outjo district, north-eastern and north-western Owambo and in the Kavango region giving figures as low as 15 and 20 for the latter region. In his distribution map he shows no elephant around Okaukuejo or along the southern edge of the Etosha Pan. According to Mr. B. J. G. de la Bat (pers. com.), a small group of elephant were known to keep between Okaukuejo and Namutoni since 1954. This figure increased yearly and today elephant are widely distributed in these northern parts of South West Africa.

Present aerial surveys indicate that the highest concentrations of elephant occur in the Etosha National Park at times. Some of these herds however, migrate to the east along the east-west running drainage lines which debauch into the Okavango River. A number of these migration routes lie just north of the Etosha Salina in southern Owambo and lead to the open mopane savanna in the central region of the Etosha National Park. The farthest west that one encounters any large numbers of these animals is on the plains

to the east and north of Otjovansandu. (Kowares, Onaiso and Omutambo Maowe). Relatively small numbers of herds move further west down the Hoanib drainage system into the western Etosha National Park. Sometimes one encounters them deep in the Namib along water courses. Another limited movement exists from the Otjovansandu, Onaiso regions northwards into the extreme western parts of Owambo and across the boundary into Kaokoland. The elephant herds encountered in the north and north-western parts of Kaokoland around Sanitatas, the Hoarusib drainage system and further north to the Zebra and Baynes Mountains, appear to be sedentary, sedentary in the sense that although they move over an extremely large area, they never seem to leave this mountainous, almost inaccessible, corner of Kaokoland.

There are approximately 200 elephant resident in Kaokoland. The 1973 helicopter census in the Etosha National Park (Joubert *et al.* 1973) gave a figure of 1293 for this National Park. This does not include the elephant in northern Damaraland which must number approximately 100 to 150, and other groups which moves across the Angola/Kavango border to the west of Kuringkuru as well as those in the western Caprivi. The total population for South West Africa, taking the migrants across international borders into consideration, must be approximately 2 000. This is a good deal lower than 20 000 head mentioned in a police report according to Shortridge, but higher than the Shortridge *op cit* estimate of between 600 — 1 000 (most of which occurred in kaokoland).

6.1.2 Black Rhinoceros: *Diceros bicornis* Gray -

The present distribution of the black rhinoceros in South West Africa is fully discussed by Joubert (1971). They occur in northern Kaokoland from Epe-
mbe in the east to Otjipembae in the west. A concentration also occurs around Otjiwero and Okauzuma while in the east a few individuals frequent Ombombo-Owambo. Rhino also occur in the Orupembe, Sanitates, Okonjombo area as well as at Ongango and Kaoko-Otavi in the central part of Kaokoland and at Purros and Otjikondawirongo in southern Kaokoland. In the eastern Etosha National Park a few individuals have been reported from Gobaub and other waterholes in the vicinity, as well as from Chudop, Ombika, Okaukuejo and Grūnewald. They reach their biggest concentration however, on the escarpment to the west of Otjovosandu. From there they occur westwards to Mudorib and as far south as the Ugab.

A census showed that approximately 15 rhino occurred to the north of the Ugab River, in Damaraland. This figure includes those animals, on farms adjoining the previous boundary of the park along the west, in the Unjab drainage system. In Kaokoland they number approximately 30. The Nature Conservation and Tourism Division has started with a project to translocate as many as possible of these animals from along Ugab drainage to localities in the Etosha National Park. Up to date more than 50 of these valuable animals have been successfully translocated and released into the Park. There must be approximately 150 of these valuable animals at present in South West Africa, with more than 80 per cent of the total occurring in the Etosha National Park.

6.1.3 Burchell's zebra: *Equus burchelli antiquorum* (Hamilton-Smith)

Despite their rather restricted distribution in South West Africa, Burchell's zebra still occur in relatively large numbers in the Etosha National Park. They attain their highest concentration in the eastern part of the Etosha National Park, where they show a marked migration pattern. This migration pattern consists of a general movement during the dry season towards the north-east, around both sides of the Etosha salina; the animals along the south-eastern side of the Etosha salina moving towards the Andoni plain, just north of Namutoni, and the animals along the western side of the pan moving into southern Owambo. With the onset of the rains the general movement is then again in a south-westerly direction down both sides of the pan, the movement generally terminating on the plains around Okaukuejo including Groot vlakke en Gembok-vlakte.

They do not occur at all in the central area of the Park (known as the 19th parallel), probably due to certain habitat limitations. In the western Etosha National Park, they only occur around Otjovosandu and about 16 km further to the west. In Kaokoland they are mostly limited to the plateau regions. It is interesting, however, that in northern Kaoko-

land they occur in the escarpment transition zone right down to Orupembe on the subdesert Namib plains. They occur in the Otjiha and Baynes Mountains and it is indeed a strange sight to cross a high mountain pass and suddenly observe Burchell's zebra a few hundred feet higher up against the mountain side. It appears as though they have expanded their distribution range here and in the process pushed the Hartmann zebra completely out of this area which is essentially a Hartmann zebra habitat.

Shortridge's observation in 1934 seems to confirm this. He found that Burchell's zebra only occurred as far west as Kaoko-Otavi while Hartmann's zebra sometimes moved as far inland as the Ruacana Falls. Today Burchell's zebra occur as far as Orupembe which is 160 km further west than Kaoko-Otavi, while Hartmann's zebra do not occur further east in Kaokoland than approximately Okonjombo (48 km east of Orupembe). Along the eastern side of the territory Burchell's zebra only occur around Tsotsana (Kavango) and along the Botswana border with none in the western Caprivi. At present there are still approximately 16 000 Burchell zebra in South West Africa of which more than 90 per cent occur in the Etosha National Park, with the rest occurring mainly in Kaokoland.

6.1.4 Hartmann zebra: *Equus zebra hartmannae* (Matschie)

There is a marked similarity between the distribution of Hartmann zebra and the past distribution of the black rhinoceros in South West Africa. They both occur mainly in the mountainous transition belt between the Namib Desert in the west and the plateau to the east. The Hartmann zebra, however, seems to be much more habitat specific than the black rhinoceros (Joubert, 1973). According to Shortridge (1934) they do not occur further east than Otjovosandu. At present in the Ugab drainage, however, they occur another 200 kilometres further inland (east) on farms near Outjo.

Further south an isolated population is found in the Erongo Mountains. They occur all over the mountains, but especially on the eastern and south-eastern slopes. The bulk of the Hartmann zebra population in South West Africa occurs within the region from the Swakop River southwards along the escarpment as far south as Theron'sberg in the Zaris Mountain range. They only occur eastward into the Khomas Hochland along the Kuiseb and Gaub drainage systems as far as the farms Jonkergrab and Tara. A large concentration remains in the Naukluft Mountain range. In the south the Hartmann zebra are almost exclusively limited to the Fish River Canyon and the Huns Mountains immediately to the west.

Their distribution in Kaokoland has shrunk considerably when compared to the distribution given by Shortridge (1934). In Kaokoland they reach their highest concentration around Orupembe. They are, however, relatively scarce and only approximately 300 occur here. In the Damaraland they are much more common, probably due until recently to pro-

tection from hunting pressure as well as from competition with livestock. According to Joubert (*op cit*) there are still some 7 000 Hartmann zebra in South West Africa. The questionnaire returns give a total of 16 435.

6.1.5 Hippopotamus *Hippopotamus amphibius* Linnaeus

The distribution and numbers of hippopotamus are almost the same as that reported by Shortridge (1934). They only occur in the Swartbooisdrift area of the Cunene River and number approximately four to six animals. In the Okavango River they were only recorded east of Bagani where the river broadens out before entering Botswana. Here they number approximately nine animals. They appear to be relatively abundant in the Kwando River.

6.1.6 Giraffe *Giraffa camelopardalis* Linnaeus

The distribution of giraffe has changed considerably in the north-western parts of South West Africa since Shortridge (1934) published his account on their distribution. From Sesfontein westwards they were very scarce and could have been considered absent. At present however, a concentration of about 15 animals may be found in the lower Hoanib River just before the dunes, approximately 8 kilometres from the coast. The river is sealed in this locality by sanddunes and forms a wide valley with a dense stand of *Acacia albida*; *A. giraffae* and *A. tortilis* trees. It is known to the senior author that these animals have occurred in this locality since they were first observed in 1965.

Shortridge *ibid* mentions that in Kaokoland they occur mainly in the east-central and eastern portions of the Territory. He further states that, according to Native information giraffe did not extend west of the Sesfontein-Kaoko-Otavi line, nor along the valley of the lower Cunene. At present however, they do not occur in the east-central and eastern parts but only to the west of a line between Sanitatas and Orupembe and sometimes wander as far west as the Munutut River. Small parties are at times, also seen west of the Hartmann Mountains. They number between 10 and 15 individuals. Although usually restricted to open woodland and tall shrub savanna they may sometimes be seen miles from the nearest tree, striding purposefully across a flat open plain.

Giraffe are quite common to the south of the Etosha Pan, especially around Namutoni and Okaukuejo, but they very seldom occur in the central Etosha National Park. Around Otjovasandu, however, and especially on Kaross, they are again plentiful. They also occur on a quite number of farms in the Tsumeb (49.5%); Outjo (31.2%) and Grootfontein (17.1%) districts. According to the questionnaire returns there are still approximately 2 718 giraffe on farmland, and although specially protected, permits have had to be issued to farmers during recent years, to reduce the numbers of giraffe on some farms

in the abovementioned districts. A small number also occur in the Otjiwarongo district.

Shortridge *op cit* estimated that there were 400 giraffe in South West Africa during 1934, of which approximately 200 occurred in the Kaokoveld and the rest in the Grootfontein district and beyond into Kavango and Bushmanland. During the present survey, a figure of approximately 4 000 for all of South West Africa was obtained of which Joubert *et al* (1973) counted 935 animals in the Etosha National Park.

6.1.7 Roan *Hippotragus equinus* Desmarest

Roan has had its range considerably reduced in South West Africa since Shortridge (1934) published his account. Shortridge *op. cit.* recorded them from the Ruacana Falls eastwards, throughout all of eastern Owambo and the Kavango and as far south as the Etosha National Park and the Waterberg. At present roan is strictly limited to three general areas in the Kavango (Carelse, pers com 1973). They occur in the western part of the Kavango near Kuringkuru, occasionally along the Omuramba Omtako and along the eastern omurambas leading into Botswana and the Caprivi.

Even in 1934 Shortridge *op cit* reported their numbers to be a great deal less than that of wildebeest, kudu or eland. Thus, apparently never abundant, their numbers have declined sharply. Hofmeyr (1974) estimates their present figure, excluding the Caprivi to be approximately 400. The present authors, after recent surveys, would like to suggest a figure of approximately 300, for all of South West Africa (the Caprivi included), and even considers this figure to be over optimistic.

During the summer of 1970, the Division successfully translocated 74 roan to Otjovasandu in the Etosha National Park from the Chaudum River in the Kavango. (Hofmeyr, 1974). These animals have since almost than quadrupled their number. As a further safeguard to ensure their survival the Division is at present contemplating, translocating part of this population to the Waterberg Plateau Park.

6.1.8 Tsessebe *Damaliscus lunatus* Burchell

At present tsessebe occur only in the extreme north-eastern corner of the Kavango and in the Caprivi. On three of the questionnaire returns, farmers claimed to have tsessebe on their farms. The occurrence of tsessebe on farms however, is very doubtful, and previous rumours of Lichtenstein's hartebeest and/or tsessebe that have been investigated, turned out to be negative. The Kavango area was recently covered (1974) during an aerial survey by the authors and it is doubtful if more than 100 of these animals still occur in South West Africa. Their range and status has declined considerably since Shortridge (1934).

6.1.9 Red hartebeest *Alcelaphus caama* Cuvier

With the distribution for red hartebeest, as described by Shortridge (1934) in mind, their present day distribution has been considerably reduced, especially their southern most occurrence. Shortridge *op cit* records them „mostly east of a diagonal line between Nakop (where the railway enters South West Africa) in the south, and the Ruacana Falls of the Cunene in the north, except in the northern half of the Grootfontein District and along the Caprivi, where it does not occur". This makes their southern most occurrence Latitude 28° 25'S. Some 28 years later van der Spuy (1962) recorded their southern most occurrence as Latitude 25° 42'S. This present study places their southern-most natural distribution at Latitude 23°S, although a few isolated herds were recorded south of this Latitude, mostly reintroduced stock. It is clear that the red hartebeest on farmland, is at present restricted to the north-eastern districts. They were recorded from the Otjiwarongo (36.4%), Okahandja (19.5%), Gobabis (16.5%), Windhoek (15.4%) and Grootfontein (11.9%) districts — (% occurrence). Other districts from which they were recorded, mostly introduced or reintroduced, are Mariental, Maltahöhe, Outjo, Karibib and Tsumeb. Red hartebeest, also still occur in relatively small numbers in Hereroland, Bushmanland and the Kavango. Although they occur throughout the Etosha National Park, they show a preference for the Karstveld area to the south of the pan. None, seem to occur in Owambo or in Kaokoland.

According to the questionnaire returns, there are approximately 12 186 of these animals still on farmlands. This number is substantially more than the total of 6 325 obtained by van der Spuy in, 1962. Approximately another 100 red hartebeest occur in the Bantu territories and approximately 550 in the Etosha National Park and in the Daan Viljoen Game Reserve combined.

6.1.10 Blue wildebeest *Connocheatus taurinus* Burchell

Blue wildebeest were once very widely distributed throughout all of the north eastern parts of South West Africa. Shortridge (1934) shows them in his distribution map to occur from south of the Auob River to the north western boundary of Owambo. He also considered them to be "the most plentiful of large open-country antelope in South West Africa" (pp 468). The blue wildebeest is unfortunately a reservoir for malignant nasal catarrh and with the intensified cattle ranching practices they have been mercilessly eradicated. There has been a sharp decline in their numbers and their distribution is strictly limited to a few areas.

Blue wildebeest occur mainly in the eastern section of the Etosha National Park, where they also reach their highest numbers. In the western sector of the Park a small number occur (25) at the Onaiso waterhole. One individual was once noticed at the Kowares waterhole. No wildebeest occur in Kaokoland. Further east they are found on a few farms in the

Grootfontein and Gobabis districts. In the Kavango they occur in the north, east of Kuringkuru. They also occur along the Botswana border in the Kavango, Bushmanland and Hereroland.

Joubert *et al* (1973) determined that there are 3 717 of these animals in the Etosha National Park. It is extremely doubtful whether there are more than 500 individuals in the rest of South West Africa, this figure includes the 245 individuals which, according to the questionnaire returns, are still on farmland in South west Africa. If it is taken into consideration that the population in the Etosha National Park has shown a steady decline during the last two decades, their survival seems to be endangered. The small herd (34 animals) in the Daan Viljoen Game Reserve shows a steady increase in numbers.

6.1.11 Greater kudu *Tragelaphus strepsiceros* Pallas

Kudu are widely distributed throughout South West Africa, except in the Namib desert regions, the bare plains of southern Owambo and the northern regions of Kavango. The present distribution is very little different from that of van der Spuy (1962). Compared to Shortridge (1934) however, one does notice a slight difference in distribution, mostly however from the northern Bantu territories. In comparing the results of the 1972/73 questionnaire returns in table 1, it is obvious at a glance that although kudu and gemsbok shows basically the same distribution, there is a great difference in the density of distribution. With kudu, two districts viz. Outjo and Omaruru, recorded more than 90 per cent occurrence with nine other districts recording between 60 to 83.5 per cent occurrence. With gemsbok, on the other hand, only one district viz. Omaruru, recorded 80 per cent occurrence while only two other districts recorded a percentage occurrence of more than 60 per cent. The gemsbok distribution according to percentage occurrence is relatively speaking fairly even throughout the 16 districts, while the kudu distribution according to percentage occurrence show a bias towards the northern districts and to the districts situated along the escarpment. The average percentage occurrence of kudu on farmland is 59.4 percent, whilst that for gemsbok is only 34.0 percent. Kudu are also widely distributed throughout the Etosha National Park. They reach their highest concentrations around Namutoni and are also fairly common in the Otjovasandu area.

The questionnaire results show that, there are at present approximately 110 986 kudu on farmland compared to van der Spuy's (1962) figure of 60 810. (An increase of 82.5 percent). No doubt exists in the minds of the authors that this is an overestimate. As stated earlier however, this figure is cancelled to some extent by the fact, that only approximately half of the farmers returned their questionnaires. Outside the farmland, kudu only occur in any fair numbers in the Etosha National Park. This latter figure however, forms only a small percentage of the number of kudu in South West Africa. The authors would like to suggest that the figures of

approximately 110 986 should be taken as the kudu population for all of South west Africa.

It was found that kudu could only be seen from the air with the greatest difficulty owing to their habit of standing under trees and „freezing“ whenever the aircraft passed overhead. With the helicopter they could be spotted more easily.

6.1.12 Eland *Taurotragus oryx* Pallas

Today, eland is one of the most valuable antelope in South West Africa and prices of up to R600 are being paid for a bull-cow pair. Although never abundant, they occurred east of a diagonal line between the Ruacana Falls in the northwest and the Nosib River in the southeast (Shortridge, 1934). Van der Spuy (1962) gives their distribution as mainly between Longitudes 16°E and 20°E and Latitude and 22°S. This is largely in accordance with their present day distribution on farmland as well. The present distribution map of eland for all of South West Africa compares well with the distribution map given by Shortridge *op cit.* although the present distribution south of Latitude 23°S is very scattered in isolated localities. This agrees with van der Spuy's *op. cit.* observation of scattered groups on farms. During the last decade quite a number of eland have been introduced or reintroduced to farms all over South West Africa. At present they show their highest percentage occurrence in the Tsumeb (41,2%) and Grootfontein (40,3%) districts.

Eland are common throughout the eastern and western portions of the Etosha National Park. They reach their highest concentration around Gobaub. In the western Etosha National Park the largest concentration is in the Kaross area, + 150 animals. They also occur on the savanna and open woodland plain of the central Etosha National Park. They are totally absent from Owambo. Rumours have it that a small herd of eland frequents the area to the west of Otjijansemo between Otjipembae and Otjitandu in the Kaokoland. The previous Chief Bantu Affairs Commissioner at Ohopoho, Mr. B. Jooste, reports (pers. com.) that while he was traveling in that area during 1966 a small herd of eland passed in front of his vehicle. Since then, two more reports were made by officials that they had come across eland in that area. Shortridge *op cit* also reports rumours of eland in the interior of the Kaokoland but after an investigation rejects the possibility. Eland still occur in relatively small numbers in the Kavango, Bushmanland and Hereroland.

No figure is given by Shortridge *op cit* for the eland population of South West Africa. Van der Spuy (1962) estimated the eland population on farmland to be 6 080. The present questionnaire survey puts the eland population on the farms at 7 779 which represents an increase of 27,9 percent. The authors feel that this is a very realistic figure, although possibly, slightly over-estimated.

The population for all of South West Africa, taking the possible over-estimation by the farmers into consideration, should not exceed 8 000 individuals.

6.1.13 Gemsbok *Oryx gazella* Linnaeus

Since Shortridge (1934) recorded that „Gemsbok are the most widely distributed of the larger antelope in South West Africa, with the possible exception of Kudu“ the situation regarding their distributions has hardly changed, and these words actually echo the present situation. Although they are still widely distributed their numbers on most farms have shown a marked decline. Virtually no gemsbok are left in Namaland, Rehoboth and Owambo. In the Kavango, Hereroland and Bushmanland they are also relatively scarce. In Kaokoland they are at present restricted to the sub-desert regions of the escarpment area. None occurs on the plateau regions of Kaokoland. A few solitary animals were encountered during 1968/69 to the north of the Zebra mountains and a few in the Ongango area. In Kaokoland they reach their highest concentration along the Marion Fluss. In Damaraland they still occur in relatively large numbers especially in the areas that previously formed a part of the Etosha National Park. In the Etosha National Park, Namib Desert Park and the two diamond areas they are still widely distributed.

In contrast to the distribution of kudu, which shows a higher percentage occurrence on farms to the north of Windhoek, and the distribution of springbok, which shows a higher percentage occurrence on farms in the southern districts, gemsbok on the other hand show a relatively high percentage occurrence throughout central South West Africa (Table 1). Only two districts, viz. Karasburg in the extreme south and Tsumeb in the extreme north show a percentage occurrence of less than 10 percent. There are at present approximately 48 000 gemsbok in South West Africa. According to the figures obtained from the recent questionnaire survey approximately 40 569 still occur on farms compared to van der Spuy's figure of 24 429 — an increase of + 66,1 percent. The remainder of the figure is made up by populations in the Etosha National Park, Namib Desert Park, other game reserves, the two diamond areas and Bantu territories.

6.1.14 Buffalo *Syncerus caffer* Sparrman

Even in 1934 buffalo had a very restricted range according to Shortridge (1934). In his distribution map he shows them to occur only in the extreme north eastern corner of Owambo and the north western corner of the Kavango and eastern Caprivi. Shortridge *op cit* furthermore, indicated that their numbers were relatively low. At present buffalo do not occur at all in Owambo. In Kavango they still occur in the extreme north west and then along the Botswana border in the north east. A small number is also reported from south of the Aha mountains in Bushmanland, approximately where the 20th parallel crosses the Botswana border. In all these areas buffalo only occur in very small numbers. A herd of approximately 500 buffalo were observed by the senior author in 1972 along the western bank of the Kwando River in the Caprivi. This

particular herd is apparently not resident in the area, but crosses into Botswana at random.

Apart from these animals, there are not more than approximately 30 buffalo resident in South West Africa. During 1967 three buffalo were shot on a farm along the Omuramba Omatako, south east of Otjiwarongo by a Mr. K. van der Merwe. These animals apparently moved down from the Okavango along the Omuramba Omatako. This incident was reported to the senior author by Mr. van der Merwe.

6.2 The smaller mammals

6.2.1 Baboon *Papio ursinus* Kerr

Baboons occur all along the escarpment and on the plateau regions of South West Africa as well as in a few isolated localities in the Kavango. In South West Africa, the senior author found the troops to be relatively small, numbering up to 40 individuals per troop. Questionnaire returns suggest a total of 98 223 for all the farmland. The authors feel that this is a gross overestimate, which can be ascribed to the fact that the baboons are problem animals in certain regions i.e. in the Karasburg and Khomas Hochland regions of the territory. During dry years, they kill lambs. The senior author, who did a four year study in the escarpment and plateau regions, would suggest a figure of approximately 30 000 for all of South West Africa.

6.2.2 Vervet monkey *Cercopithecus aethiops* Linnaeus

In South West Africa, vervet monkeys have been recorded by the present authors from along the Orange River and the Cunene valley but also occur along the tributaries viz. the Omuhonga River and Hondoto River. In the Kavango region they are largely restricted to the riverine vegetation. This agrees with the distribution given by Shortridge (1934). Vervet monkeys have been recorded on several occasions from the Namutoni area in the eastern part of the Etosha National Park by Nature Conservators and tourists (J. S. du Preez, pers. com.). Their numbers are rather restricted and the authors doubt whether there are more than 500 individuals in South West Africa.

6.2.3 Dassies *Procavia capensis* Pallas and *Procavia welwitschia* Gray

No distinction was made between the two species in the questionnaire. The map shows the present distribution of the two species, with the distribution limit for each species indicated by Mr. P. S. Swart (pers. com.). The extent of range overlap has not yet been ascertained. Dassies are a problem in the southern part of South West Africa, especially in the Keetmanshoop and Karasburg districts.

6.2.4 Porcupine *Hystrix africae-australis* Peters

The present and past distribution (Shortridge 1934) has remained virtually the same. Porcupine occur throughout South West Africa, except along the coastal edge of the Namib. The figure of 47 917 indicated by the questionnaire returns is suggested for all of South West Africa.

6.2.5 Honey badger *Mellivora capensis* Schreber

There is a marked similarity between both the past and present distribution of the porcupine and the honey badger. The latter also occurs throughout South West Africa, except along the coastal edge of the Namib Desert. The figure of 18 823 indicated by farmers for farmland, is suggested for the whole territory.

6.2.6 Aardvark *Orycteropus afer* Pallas

The questionnaire analysis show a present distribution for the aardvark, covering the whole territory apart from the Namib regions. This agrees with the statement by Shortridge (1934 pp 660): "Ant-Bear occur throughout South West Africa, except along the coastal Namib Desert." Apparently, there has been little change in their general distribution. The questionnaire returns suggest a population of 26 130 antbear, which the authors feel can be accepted for all of South West Africa.

6.2.7 Warthog *Phacochoerus aethiopicus* Pallas

In South West Africa, the distribution of warthog is almost exclusively limited to the regions north of Latitude 24°S. This is also illustrated by their percentage occurrence on farms (table 1), which indicate that the districts to the north of Latitude 24°S have an average percentage occurrence of 72.5 percent, while the southern districts show an average percentage occurrence of only 2.5 percent. According to the distribution map, there are a few isolated localities in the Maltahöhe district and further south, where they do occur.

Warthog do not occur in the sub-desert area of Damaraland and Kaokoland. In the latter area they are also completely absent from the escarpment area. A few may be seen on the plateau around waterholes such as Ombombo — Ovambo. Warthog occur throughout the eastern part of the Etosha National Park, especially along the southern edge of the pan and around the windmills erected along the 19th Latitude in the central area of the park. Around Otjovasandu they are also very common, but their numbers decline rapidly from here westward. They are relatively common in the Kavango and Bushmanland areas, frequenting the pans in the drainage lines.

There seem to be a steady increase in the number of warthog in the northern districts. In some dis-

districts they have become so plentiful that their numbers are creating a certain amount of concern. This population increase is most probably due to the reduction of their predators on farms as well as the availability of water. The authors would like to suggest the total of 52 705, as shown by the questionnaire results, for all of South West Africa.

Joubert *et al* (1973) found that warthog went in groups varying in size between one and five individuals (figure 10). In 28 per cent of the observations the groups were accompanied by juveniles, which also formed 27 per cent of the total population.

6.2.8 Dikdik *Madoqua kirkii* Günther

As pointed out by Shortridge (1934) and Tinley (1969) dikdik are rather habitat specific and their distribution is limited to regions fulfilling their basic requirements. This includes broken ground covered with thicket and shrubs. The present distribution map of dikdik agrees more with the one published by Shortridge *op cit* than the one by Tinley *op cit*. From Windhoek northwards they are evenly distributed throughout suitable localities. The present distribution in the Etosha National Park is centered around Namutoni where they also reach their highest numbers in South West Africa. In the western portion of the National Park they occur at Otjovosandu and northwards through Kaokoland to the Cunene River. In Kaokoland they are mainly restricted to the riverine strips in the escarpment area. Along the Cunene valley, they reach their highest numbers in Kaokoland. Apart from black-faced impala, an occasional kudu or duiker, they are the only game left in the Cunene valley below the Ruacana Falls. In Owambo they occur only in the north-western mountainous area around the Ruacana Falls.

Dikdik also occur farther east than indicated by Tinley *op cit*, being quite numerous around the Waterberg, especially on the eastern side of the mountain. Shortridge (1934) reports (pp 483) "... they are believed to extend as far east as Ondekaremba near the Windhoek — Gobabis border in the south, farther north to the Waterberg..." Dikdik still show virtually the same distribution occurring along the Gobabis — Windhoek borders and northward. He furthermore states *ibid* "Dikdik have been reported with doubt from two localities a long distance outside their ascertained range: (1) The neighbourhood of Oas (Gobabis district); (2) Keetmanshoop: the Karas Ranges would be the only possible region in this district, and even there, owing to insufficient bush cover, an unlikely habitat." The recent questionnaire returns however, seems to confirm these two doubtful localities, because it indicates an isolated occurrence of dikdik near Oas as well as in the Keetmanshoop district (See map). Tinley *op cit* also shows dikdik occurring south from Windhoek towards Keetmanshoop and Brukkaros mountain. The present questionnaire returns plus personal surveys show them to occur in only a few isolated localities along the Fish River without the continued

distribution south of Windhoek as suggested by Tinley *op cit*.

The questionnaire analysis shows a dikdik population of 9 166 for farmland in South West Africa. The authors suggest this figure for the whole territory.

6.2.9 Duiker *Sylvicapra grimmia* Linnaeus

Duiker seems to be evenly distributed throughout South West Africa and show a percentage occurrence of 52.0 percent for the farms which returned the questionnaires. The questionnaire analysis furthermore indicates them to be much more common in the denser vegetation types of the northern and eastern districts. See table 1.

Although duiker are more common in the eastern part of the Etosha National Park, they have also been seen in the Kaross area near Otjovosandu in the western part of the Park. In Kaokoland they were observed near Kaoko-Otavi and Ehombo, and also in the Omuhongo River. Here they reached their highest numbers in Kaokoland. No definite information regarding their distribution and status in Owambo could be obtained but apart from the region around Ruacana, it is thought that they must be extinct or nearly extinct in Owambo. They are relatively evenly distributed throughout the Kavango and Bushmanland.

Questionnaire returns shows a population of 62 423 on farmland in South West Africa. The authors suggest this figure as the population for the whole territory.

6.2.10 Steenbok *Raphicerus campestris* Thunberg

Unfortunately, due to a typing error the steenbok was omitted from the final list of mammals in the questionnaire. Despite this, a good number of farmers added steenbok to the list of their own accord. Personal observations by the authors and colleagues show the steenbok to be distributed throughout the territory. This statement is substantiated by the distribution obtained from the questionnaires, which although very scattered, indicate that they occur all over South West Africa. The scattered distribution pattern can be attributed to the abovementioned omission of steenbok from the questionnaire. The distribution map should actually show a very much more even distribution for steenbok. The observation by Shortridge (1934, pp 500) that "The steenbok is the most ubiquitous antelope in South West Africa, and occurs over the level parts of every district — whether open or bushcovered — from the Orange River in the south to the Cunene and the Okavango in the north, and throughout the Caprivi.", still holds true at present.

Nothing much can be said about their status. The questionnaire analysis, with the abovementioned shortcomings, gives a population estimate of 12 606. The authors feel that an estimate of approximately 60 000 for South West Africa would be more realistic.

6.2.11 Klipspringer *Oreotragus oreotragus* Zimmermann

Klipspringer shows virtually the same distribution at present, as it did in 1934, according to Shortridge (1934). They are mainly restricted to the mountainous escarpment and broken plateau regions of South West Africa. Klipspringer occur in a number of conservation areas. They are relatively plentiful in the Fish River Canyon Park, Naukluft Mountain Zebra Park, Namib Desert Park and the Waterberg Plateau Park. In the Etosha National Park they occur only in very limited numbers in the extreme western part.

According to the questionnaire returns there are some 20 718 of these animals still on farmland. The authors feel that this is probably a considerable overestimate, especially since the numbers given for certain districts, which have relatively speaking, little klipspringer habitat, i.e. Gobabis, Grootfontein and Otjiwarongo, are unrealistically high. A figure of approximately 15 000 for all of South West Africa is probably more realistic.

6.2.12 Impala *Aepyceros melampus* Lichtenstein

In South West Africa there are at present two populations of impala (excluding the black-faced impala). The one is the remnant of the original indigenous impala population along the Okavango River and the other is the impala on farms. Impala imported from the Transvaal, is at present often exchanged for South West African springbok and gemsbok. During 1973 alone, permits were issued to import 384 impala. The questionnaire returns indicate an impala population on farms totalling 730.

The only regions where impala occurred naturally in South West Africa, once more excluding the black-faced impala in Kaokoland, is along the Okavango River. Shortridge (1934, pp 550) reported that; "Impala only occur in the near neighbourhood of the Okavango; even during the rains, they do not habitually wander very far south of that river."

During the present survey no impala were found along the Okavango River. They have apparently disappeared from this original locality during the last decade. At present they occur at two localities, not previously recorded viz. the Chaudum omuramba (E. Carelse *pers com*, 1973) and around Tsumkwe in Bushmanland (Ds. F. Weich through V. du Plessis, *pers com* 1974).

According to the abovementioned report there cannot be more than 50 of these original animals left in South West Africa.

6.2.13 Black-faced Impala *Aepyceros petersi* Bocage, 1875

According to most recent authors, Steinhardt (1924), Shortridge (1934), Roberts (1951), Gaerdes (1965) and Swart (1967) the black-faced impala never occurred more than a few miles south of the Cunene River. The most southerly habitat of black-faced

impala according to Shortridge (*op cit*) was Ombathu. It is interesting to note that Shortridge (*op cit*) records that "in 1926 a specimen was shot by the Earl of Atholone. This herd probably originated from a small party which — during some period of heavy rain — trekked south from the Cunene and remained in the Namutoni Game Reserve owing to the existence of a permanent though limited water supply."

Joubert (1971) gives a detailed description on the present-day distribution of the black-faced impala. He mentions that they are not restricted to the banks of the Cunene River but also occur in several other localities, some of which are very isolated. They still occur between Swartbooisdrift and Epupa. Between Epembe and Otjijanasemo several small herds have been noticed. The biggest concentration in northern Kaokoland occurs at Omuhonga. The furthest west that black-faced impala occur along the Cunene River is at Otjiomborongbonga. Black-faced impala still occur in small numbers at Ombathu, Otjirekeha, north of Ohopoho, Etanga and Otjiwero. They also occur at Otjovosandu, where 57 animals were counted in 1969 during a census. During the past three years approximately 200 of these animals have been translocated to Otjovosandu by the Nature Conservation and Tourism Division. It is difficult to determine the exact numbers of these animals. The total number of black-faced impala for South West Africa is probably between 750 and 1 000 animals, the former probably being the more accurate figure, of which 271 occur in the Etosha National Park.

6.2.14 Springbok *Antidorcas marsupialis* Zimmermann

The present day distribution of springbok in South West Africa has hardly changed when compared to the distribution maps of Shortridge (1934) and van der Spuy (1962). The average percentage occurrence on farms throughout South West Africa is approximately 43,6 per cent, with the highest percentage occurrence in the districts of the south of Gobabis viz. 61,1 per cent. To the north of Gobabis they have a considerably lower percentage occurrence with the exception of the Karibib (53,2%) and Omaruru (62,2%) districts in the west.

They still occur in relatively high numbers in the Namib Desert Park and the Etosha National Park. In the two diamond areas however, their numbers have declined sharply during the last two decades. This is mostly due to several droughts during this period and the fencing off of the desert border farms which limited their range.

In Kaokoland and Damaraland they occur in small, scattered herds on the subdesert zone of the Namib plains. In Kaokoland small herds may also be found on the central plateau. They do not occur in the north-eastern corner, east of the Marion Fluss (although they occur in large numbers on the latter itself) and north to the Giraffe Mountains. At Ongango and towards Ohopoho their distribution slightly overlaps the distribution pattern shown by black-faced impala. In Kaokoland they reach their highest

concentration along the sub-desert plains to the west of Orupembe. In both Kaokoland and Damaraland they occur right down to the coast into extreme desert.

As mentioned earlier, man at first had a detrimental effect on the springbok numbers, but recently due to modern farming practices and a change in attitude towards game the number of springbok on farms, have shown a considerable increase. Van der Spuy (1962) recorded 37 280 springbok on farmland in 1960, while the present questionnaire results indicate a total of 141 986 on farmland — this represents an increase of + 280 percent. As in the case of kudu, the number of springbok on government land (diamond areas), game reserves and the Bantu territories is such a small percentage when compared to this latest figure that it is ignored. The authors therefore would like to suggest that this figure of 141 986 springbok should be considered as the total for all of South West Africa.

6.2.15 Reedbuck *Redunca arundinum* Boddeart

Shortridge (1934) recorded reedbuck along the Okavango River, north-eastern Owambo, around the Ruacana Falls and in the Caprivi. Recent surveys by the authors in the Kavango and personal communications with various officials, indicate the present distribution of reedbuck in the Kavango to be the following. They occur on the floodplains along the Okavango River, especially below Andara, where they reach their highest numbers and along the Kwando River. They also occur in small numbers in the north eastern corner of the territory, along many of the west-east flowing omurambas (drainage lines) which lead into Botswana. Reedbuck has also been reported along the Omuramba Omataka (Carelse *pers com.*, 1974). The present distribution thus shows reedbuck to have a much wider distribution, away from the actual vicinity of the Okavango River compared to the distribution as reported by Shortridge *op cit.*, when they were mostly restricted to the Okavango River. This is quite understandable, if one considers the increased human activity and cultivation along the river.

A reedbuck was recently reported from the Otjoavasandu area of the Etosha National Park (Hofmeyr and Steyn, 1974).

The authors feel that there are at present, a maximum of approximately 50 reedbuck in South West Africa.

6.2.16 Lechwe *Kobus leche* Grey

Shortridge (1934) recorded lechwe from two localities along the Okavango River, one in the west near Kuring-Kuru, and the other in the east on the "lower Okavango". Another locality indicated by Shortridge (*op cit.*) is along the Kwando River. The authors also located a small number of lechwe in the Chaudum omuramba during 1974. These three localities are at present the only places where lechwe occur in South West Africa. The total population is not expected to exceed 100 individuals.

6.2.17 Sitatunga *Tragelaphus spekei* Selater

Sitatunga at present occur only along the Kwando River and nowhere along the Okavango River as indicated by Shortridge (1934). During an aerial survey in 1972 the senior author counted 11 of these animals along the lower Kwando River and considers this to be the approximate figure for all of South West Africa.

6.3 The predators

6.3.1 Lion *Panthera leo* Linnaeus

Of all the larger predators still in South West Africa, the lion numbers are at present the lowest. Even in the northern Bantu territories they have been systematically eradicated by trapping, poisoning and shooting. Their present day distribution shows a marked decline since Shortridge (1934) recorded them over a relatively large area of South West Africa. They are completely absent from all farmland. There are still a fair number present in the north-western corner of Damaraland (formerly part of the Etosha National Park). In Kaokoland they have been reported only from Orupembe and Purros. They do not occur on the plateau regions of Kaokoland or Owambo anymore. Lion occur throughout the Etosha National Park. In Kavango they occur in the southern regions and along the Botswana border, as well as further south into Bushmanland and Hereroland. In the Kalahari region of South West Africa they sometimes cross the border from Botswana into South West Africa, where they are then immediately hunted. It is extremely doubtful whether more than 500 lion still occur in South West Africa, of which approximately 90 percent would occur in the Etosha National Park.

6.3.2 Leopard *Panthera pardus* Linnaeus

Questionnaire returns indicate that leopard occur all along the mountainous escarpment region in South West Africa and in the northern part with the denser vegetation, they also occur on the plateau regions. According to reports by nature conservators they also occur in the eastern and western parts of the Etosha National Park. No records could be obtained from Owambo, to confirm their presence there. This distribution shows hardly any change from the distribution given by Shortridge (1934) pp 86: "Leopard are widely distributed over South West Africa, except perhaps along the extreme coastal portion of the Namib Desert. They are comparatively scarce in the arid and open plains of Great Namaqualand, and some what less numerous than usual in the more thickly populated parts of Ovamboland." Owing to the stealthy habits of leopards, it is difficult to determine their status. Judged by their tracks at waterholes and the number of skins offered for sale they must still be relatively abundant. The questionnaire analysis indicate that there are 3 353 leopards on farmland. The authors suggest this number as the total population of South West Africa.

6.3.3 Cheetah *Acinonyx jubatus* Erxleben

Cheetah show almost the same past and present distribution pattern as leopard. During recent years their numbers have apparently increased on farmland. There is a general agreement amongst farmers (J. Gaerdes 1974) that this might be attributed to two factors. The first being, that since the other predators such as lion, hyaena and Cape hunting dogs have been virtually eradicated from farmland, the competition for immature game has lessened and the cheetah pups thus have a better chance of becoming adults. These predators apparently also feed on young cheetah. The second factor being the increase in kudu and accordingly kudu calves which insured a better supply of food. The questionnaire estimate by farmers of approximately 6 252 for farmland is only little higher than a recent official estimate and the authors feel that this figure should be accepted as the population for South West Africa.

6.3.4 Spotted hyaena *Crocuta crocuta* Erxleben

The spotted hyaena was unfortunately omitted from the questionnaire and thus no information regarding their distribution on farmland was received. It is doubted whether there are many spotted hyaena left on farms anywhere in SWA. Shortridge (1934) reported pp 160: "the Spotted Hyaena is much more local and very much scarcer than the Brown species, being absent or of sporadic occurrence everywhere south of the Tropic of Capricorn. In the eastern districts, in fact, it appears to become scarce below the latitude of the Etosha Pan — although sparsely distributed throughout Damaraland. . . . the Brown hyaena everywhere greatly outnumbers the Spotted species."

At present, the spotted hyaena occurs in Diamond area no. 2, where they have been recorded from Sos-sus vleis and Tsondab vleis as well as in the Namib Desert Park, especially in the Kuiseb River. During the dry season gemsbok congregate in the Kuiseb River bed to pick up Acacia pods and utilize the waterholes. During the dry period, in the summer of 1973 prof. Hamilton (*pers. com.*) saw eight spotted hyaena at a gemsbok carcass in the Kuiseb River. Further north they occur in the north-eastern corner of Damaraland as well as in Kaokoland. Spotted hyaena have been recorded from the Etosha National Park, where they appear to be relatively abundant, especially in the western part — (west of approximately Longitude 15°E). They also occur around Okaukuejo, where a group of eight was observed by the senior author, Halali and Namutoni. They are sparsely distributed throughout Kavango (the southern parts), Bushmanland and Hereroland.

The authors feel that there may be approximately 150 spotted hyaena left in South West Africa.

6.3.5 Brown hyaena *Hyaena brunnea* Thunberg

The brown hyaena was unfortunately also omitted from the questionnaire and thus nothing can be said

about their distribution on farmland. Recently a brown hyaena was trapped in the Gobabis district on a farm. There is a possibility that they may occur in the Otjiwarongo district. Outside farmland, brown hyaena are much more restricted in their numbers and distribution than the spotted hyaena. In contrast to the spotted hyaena, they were never seen in anything but singles or pairs. Definite records were obtained by the senior author along the west coast at a point halfway between Lüderitz and Walvisbay, the Namib Desert Park, the beaches of the Skeleton Coast Park, Kaokoland, around Sesfontein in Damaraland, the western part of the Etosha National Park, to the north and south-east of Okaukuejo and from Halali. It is doubtful whether 50 brown hyaena still occur in South West Africa.

6.3.6 Cape hunting dog *Lycaon pictus* Temminck

The status and distribution of the Cape hunting dog has changed considerably since Shortridge (1934) wrote (pp 181): "Wild dog are widely distributed in South West Africa, and hunting packs may be met with periodically almost everywhere except in the extreme south. Today, it is one of the most endangered species in South West Africa. Although recorded throughout the Etosha National Park in previous years, they have now practically disappeared. The last reported sighting was at Stinkwater in the Namutoni Area during October 1973 as reported by Grobler (1973). They have been recorded sporadically from the Waterberg plateau area, eastern Damaraland and the north-eastern corner of the Otjiwarongo and Grootfontein districts. They may still occur in Kavango, Bushmanland, Hereroland and eastern Owambo, but no definite records could be obtained. It is estimated that not more than 100 individuals survive in all of South West Africa."

6.3.7 Lynx *Felis (Lynx) caracal* Schreber

Lynx occur throughout South West Africa at present, which is in accordance with Shortridge (1934). This is a tribute to the hardiness and adaptability of this predator. The farmers estimate that there are 16 481 of these animals on farmland. The authors suggest this figure is acceptable for South West Africa.

6.3.8 Black-backed jackal *Canis mesomelas* Schreber

The situation regarding the black-backed jackal has not changed much since Shortridge (1934) reported them to be (pp 167) "... exceedingly abundant throughout South West Africa ...". Their present distribution still includes most of South West Africa. The only exception is the sheep farming areas in the south, where their numbers have been severely reduced by jackalproof fences and organized hunting. Until the bounty system was stopped in 1973 more than 20 000 tails were handed in annually at Police

stations and magistrates offices. In the northern districts however, they are still relatively plentiful.

According to the questionnaire analysis there are 51 325 black-backed jackal on farmland. The authors feel that this figure could be accepted for all of South West Africa.

6.3.9 Side-Striped jackal *Canus adustus* Sundevall

The side-striped jackal was included in the questionnaire, but the returns clearly indicated that this animal is completely unknown to farmers. According to the questionnaire returns, this jackal occurs throughout the territory from the Orange River in the south to Kamanjab in the north. The only positive records obtained by the authors were from the Waterberg area of the Otjiwarongo district. They may still occur in the sandveld areas of Grootfontein, Kavango, Bushmanland, Hereroland and the Western Caprivi.

6.3.10 South African silver fox *Vulpes chama* Smith

The silver fox at present has a much wider distribution than the black-backed jackal. They are generally recognized by farmers to be harmless and as such, are not ruthlessly exterminated. In certain areas though, such as in the Stampriet district, where black-backed jackal have been completely exterminated within jackalproof camps, farmers have found that the population of silver foxes has increased markedly and cases have been reported where they have taken newly born lambs.

The figure of 25 576 silver foxes, estimated by farmers to occur on farmland is suggested for all of South West Africa.

6.3.11 Bat-eared Fox *Otocyon megalotis* Desmarest

As reported by Shortridge (1934) bat-eared Fox occur throughout South West Africa in relatively large numbers and the figure of 50 022 obtained from the questionnaire returns, is suggested for all of South West Africa.

6.4 Unrecorded mammals

Shortridge (1934) mentions a number of mammals occurring in South West Africa of which the authors could find no trace. These animals are, — oribi *Ourebia ourebia* (Zimmermann), Sharpe's grysbok *Raphicerus sharpei* (Thomas), vaal rehbok *Pelea capreolus* (Forster), waterbuck *Kobus ellipsiprymnus* (Ogilby), Bushbuck *Tragelaphus scriptus* (Pallas), African Bushpig *Patamochoerus porcus* (Linnaeus).

Two other species mentioned by Shortridge *op cit* viz. sable antelope *Hippotragus niger* (Harris) and mountain reedbuck *Redunca fulvorufa* (Afzelius), warrant discussion. Although no sable were ever

observed during surveys in Kavango, one report was received of a herd seen in the western Caprivi during 1972 (V. du Plessis, *pers. com*). The authors however, are of the opinion that these animals must have briefly crossed the Botswana border. Shortridge *op cit* mentions that during his survey, a pair of mountain reedbuck horns was brought to him. Persistent reports are received by this Division of an antelope, which might be a mountain reedbuck, that occurs in the Huns Mountains along the Orange River in the south. These rumours were officially investigated but no evidence could be found of these animals occurring there (V. du Plessis *pers. com* 1974).

7 DISCUSSION AND CONCLUSIONS

1. Despite many limitations as discussed elsewhere, the present survey did supply interesting information and new insight regarding the present day situation of game in South West Africa. The wild life spectrum of South West Africa as discussed in this paper is made up by 20 artiodactyl game species including the warthog and hippopotamus; three perissodactyl game species including two zebra and the black rhinoceros, with the elephant forming the last species, giving a total of 24 game species. A break down of their distribution and status indicates that with 12 (50 percent) of these species + 90 percent of the population at present occurs on farmland viz. eland, gemsbok, kudu, springbok, duiker, klipspringer, hartebeest, Hartmann mountain zebra, giraffe, dik-dik and warthog; another eight species occur only in Bantu territories, with the exception of black-faced impala and roan which have been translocated to the Etosha National Park, viz. tsessebe, buffalo, reedbuck, lechwe, sitatunga and hippopotamus. The remaining species viz. Burchall's zebra and blue wildebeest, occur largely in the Etosha National Park.

To this list one may also add the black rhinoceros and the elephant, the latter reaching their highest concentration in South West Africa in the Etosha National Park during the summer months.

2. If one excludes the species that occur only in Bantu territories because of their specialized habitat requirements viz. lechwe, sitatunga, hippopotamus and reedbuck it means that 60 percent of the game species in South West Africa occur primarily on farms. According to the estimated figures for all the various species, it means that approximately 90 percent of the game occurs on privately owned farmland. This is truly, a unique situation and it is doubtful whether a similar situation exists anywhere else in the world. This places a heavy responsibility on the shoulders of the land owners, because it is largely up to them to ensure the judicious exploitation of the game.

3. One finds almost a similar situation regarding the predators. Of the eleven predators species dealt with in this paper, only five species reach their highest numbers outside farmlands viz. lion, Cape

hunting dog, spotted hyaena, brown hyaena and side-striped jackal. The other six species viz. leopard, cheetah, lynx, black-backed jackal, bat-eared fox and silver-fox occur largely on farmland. According to the estimated figures for the various predator species, it appears that approximately 90 percent of the predators, also occur on farmland.

4. The lion, Cape hunting dog and brown hyaena are the three predators species, whose distribution and status show a marked decline since Shortridge (1934). Although this might be because these species have had the most direct confrontation with man, it also shows a lack of ability to adapt to changing situations, when compared to the other predators viz. leopard, cheetah and black-backed jackal.

5. Springbok and kudu are the most numerous game species in South West Africa today, each species totalling more than a hundred thousand individuals. These two species together form $\pm$ 54 percent of the game animals on farmland.

6. Eland showed the smallest increase in numbers compared to van der Spuy's (1962) figures viz. 27.9 percent, but since they are considered to be a truly nomadic species, it is quite possible that the present day restriction of movement, by fences etc. has a detrimental effect on their recruitment rate.

7. Hartebeest and Hartmann mountain zebra are both considered by farmers to compete directly with their live-stock and are exterminated at an alarming rate.

8. Blue wildebeest, apparently occurred in large numbers on farmland and was considered by Shortridge (1934) to be the "most plentiful of large open-country antelope in South West Africa." According to the questionnaire returns there are at present only 245 of these animals on farmland. The alarming low total of approximately 4 200 individuals, most of which occur in the Etosha National Park, is suggested by the authors, for all of South West Africa.

9. The eight game species occurring only in Bantu territory can all be considered to be endangered species with their present low populations figures in South West Africa.

They are:

Tsessebe	100 individuals
Buffalo	30 individuals
Reedbuck	50 individuals
Lechwe	100 individuals
Sitatunga	11 individuals
Hippopotamus	13 individuals
Roan and	300 individuals
Black-faced impala	1 000 individuals

Two of these species have been translocated with considerable success by the Division of Nature Conservation and Tourism, viz. black-faced impala and roan, and their survival, at present seems ensured. With three of the abovementioned species viz. lechwe, hippopotamus and sitatunga however, the problem arises that their habitat requirements are so specific that no suitable conservation areas exists outside their present range.

10. The overall situation regarding the predators is much more promising. Despite the fact that the distribution and status of the lion has declined considerably, their survival is ensured in the Etosha National Park. Three other species however, do give cause for alarm viz. Cape hunting dog, brown hyaena and spotted hyaena. The latter two species still maintain small breeding nuclei in various conservation areas and with proper management practices might improve their status. The authors however, are not too sure about the future of the Cape hunting dog. Unless these animals can increase their numbers so as to cope with successful hunting, they are not expected to survive. The problem is further aggravated by the fact that there are very few wild dogs left in any of the conservation areas in SWA.

11. Despite problems elsewhere in Southern Africa, the situation regarding the spotted cats in South West Africa, is satisfactory at present. The questionnaire returns confirmed general beliefs that they were in no danger of becoming extinct at present.

12. The division has already made substantial progress in assuring the continued survival of several endangered species. Black rhinoceros, roan and black-faced impala have been very successfully re-introduced to the Etosha National Park. The Division hopes to translocate and re-introduce buffalo, tsessebe and reedbuck into existing conservation areas. To relieve the problem regarding the Hartmann mountain zebra and gemsbok, approval has been granted to extend the Naukluft Mountain Zebra Park by 144 000 ha which will then link it with the Namib Desert Park and thus ensure the survival of viable units of Hartmann mountain zebra and gemsbok.

8 ACKNOWLEDGEMENTS

Our sincere appreciation is expressed to the officials in the various Bantu territories for their hospitality and help on numerous occasions. They are, especially Mr. B. Jooste, Chief Bantu Affairs Commissioner and Mrs. Jooste, Lieutenant B. Holtzhausen, Rev. S. Visser, Mr. K. Muller, Commandant's G. de Beer and E. Carelse.

Our thanks is also due to our colleagues the Administration pilots N. Maritz and M. de Jager for many hours spent flying, J. du Preez for aiding with the aerial census and with W. Jankowitz for ground support at various times, all the nature conservation and tourism personnel in the various game reserves, and at head office especially messrs. C. J. V. Rocher, P. Stark, P. vd. Westhuizen, V. du Plessis and J. Conradie.

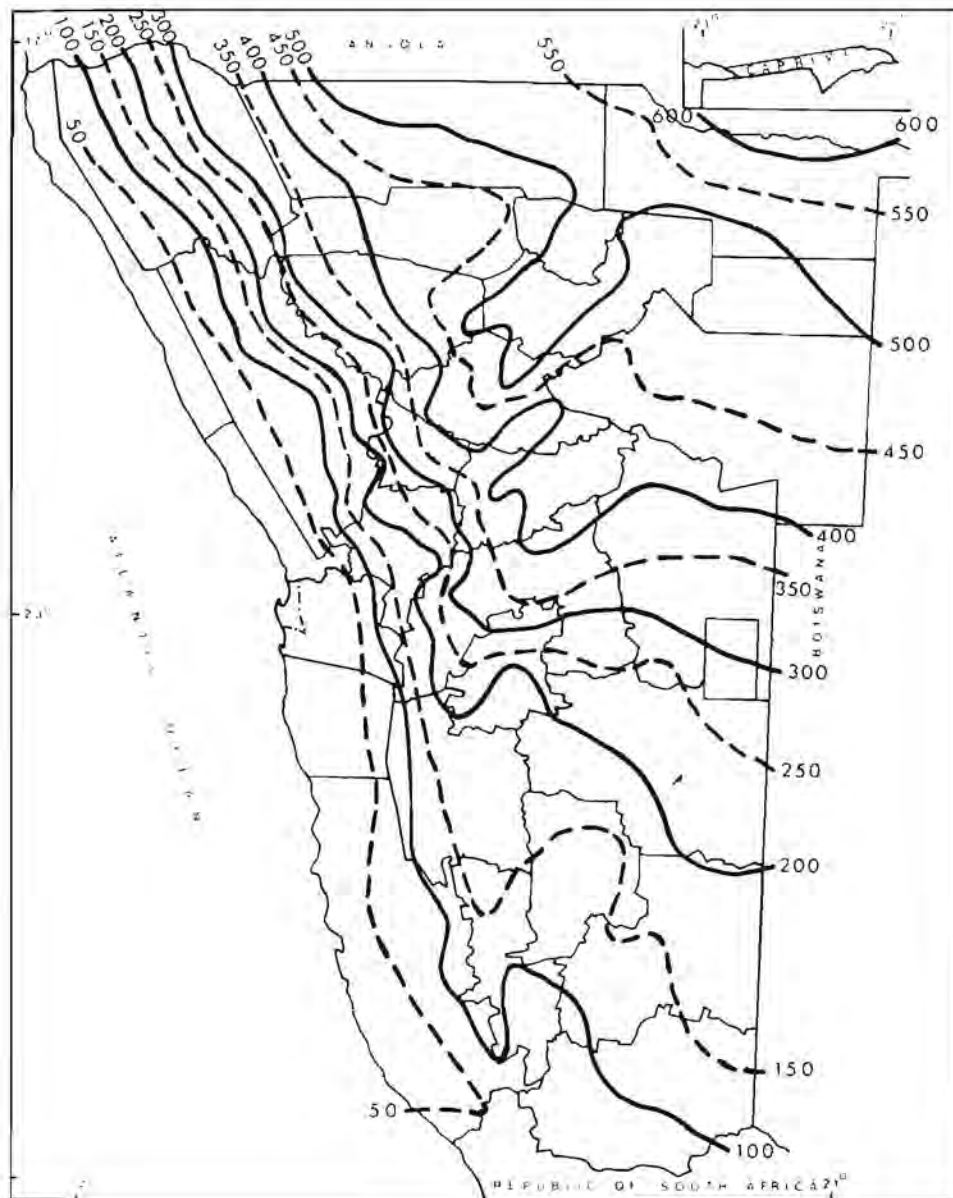
Mr. B. J. G. de la Bat, C. G. Coetzee and K. L. Tinley are cordially thanked for critically reading through the manuscript.

Esmé du Preez and Marie Joubert are thanked for typing the original manuscript.

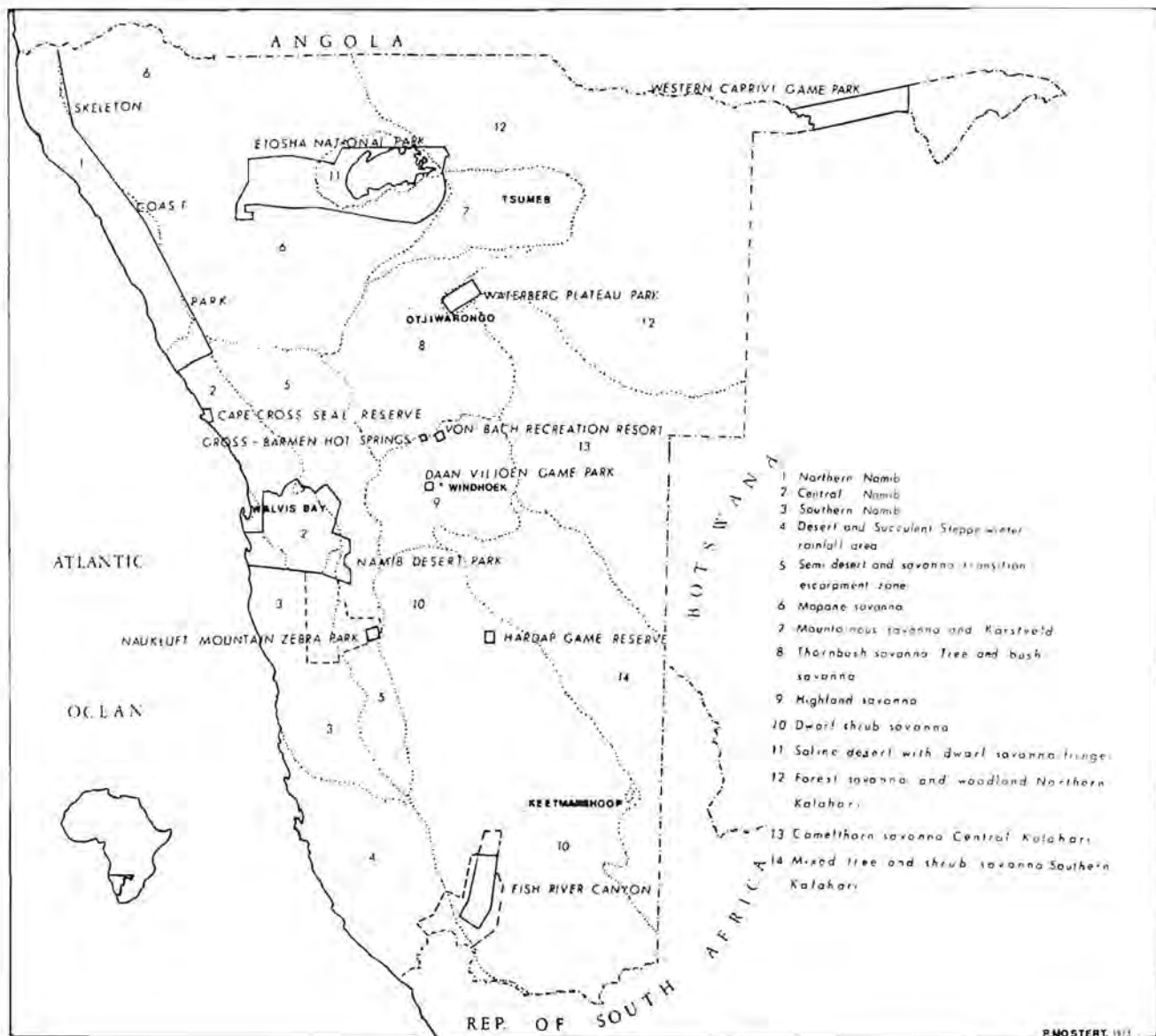
And finally all 2 886 farmers who returned their completed questionnaires are thanked as well as Mr. A. Brinkman M. E. C. whose idea it was in the first place.

REFERENCES

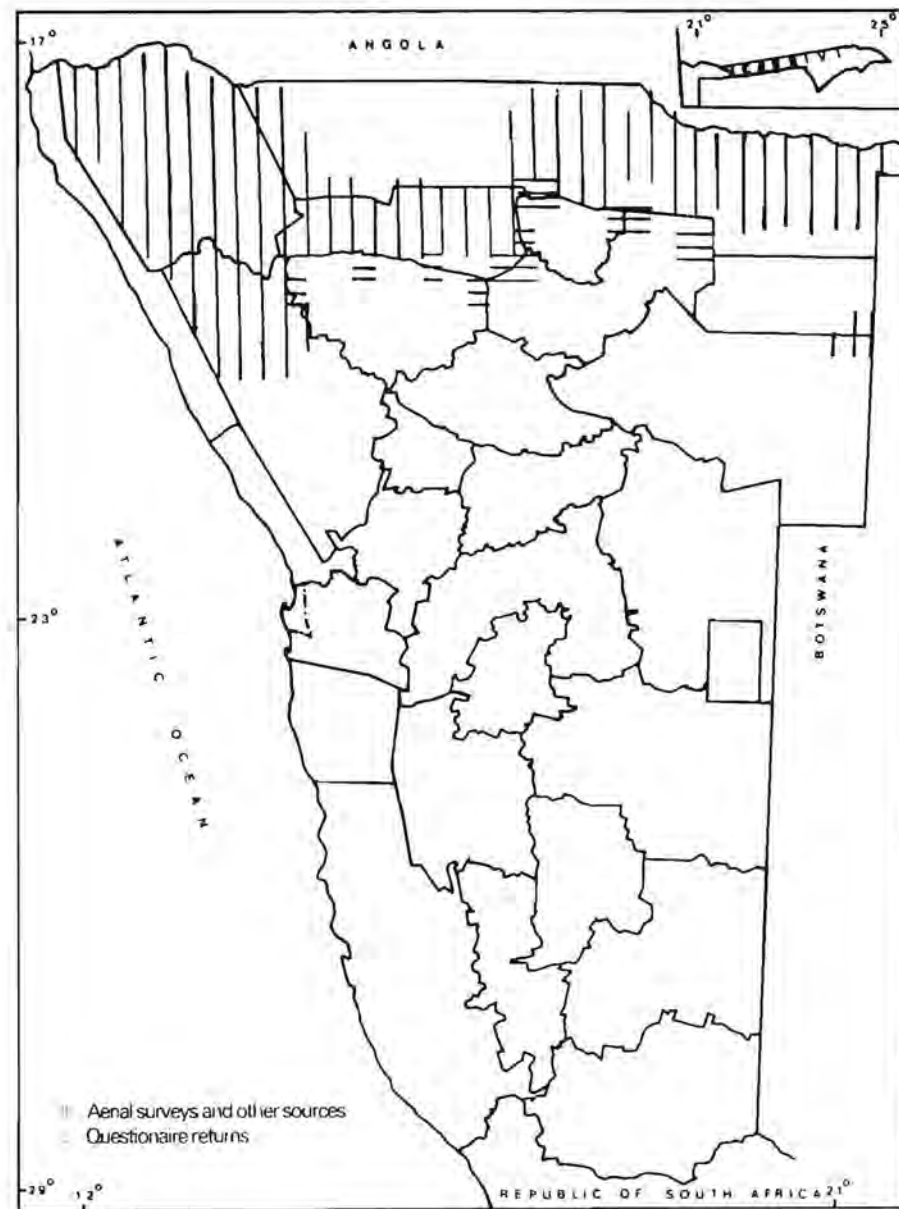
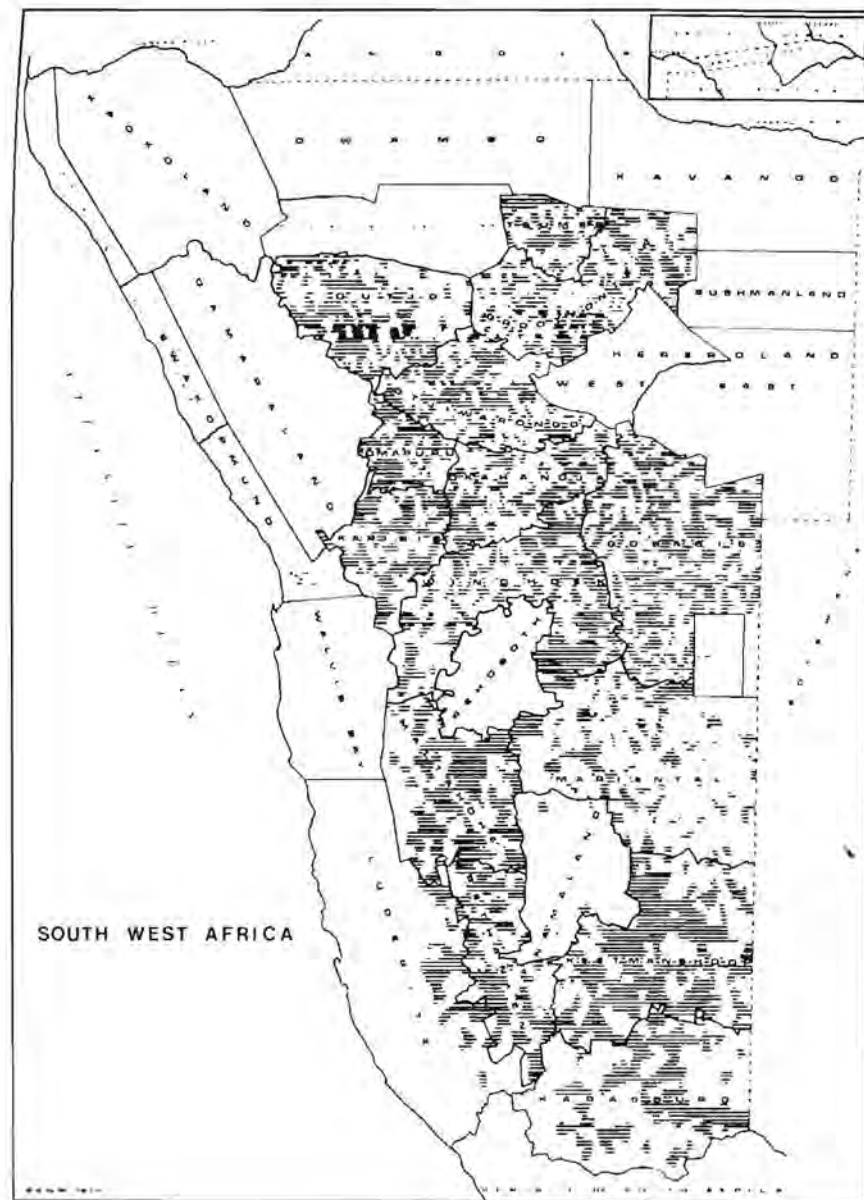
- BIGALKE, R. C.
1958 On the present status of ungulate mammals in South West Africa. *Mammalia* 22: 478 *et. seq.* Paris
- BOSS, G.
1934 *Aus dem Pflanzenleben Südwestafrikas*. Windhoek: John Meinert
- ENGLER, A.
1910 Die Pflanzenwelt Afrikas insbesondere seiner tropischen Gebiete. In Engler, A. und Pruefer, O.: *Die Vegetation der Erde* 9. 1. 1.
- EVANS, I. B. POLE
1936 A vegetation map of South Africa *Mem. Bot. Surv. S. Afr.* 15
- FISCHER, A.
1914 *Menschen und Tiere in Deutsch-Südwestafrika* Stuttgart.
- GAERDES, J.
1965 The Impala of South West Africa *Afr. Wild Life Vol.* 19 No. 2
- GAERDES, J.
1974 Jagluiperde in Suidwes-Afrika *S.W.A. Wetenskaplike Vereniging Nuusbrief* XIV 9/10.
- GIESS, W. & TINLEY, K. L.
1968 South West Africa: In Conservation of vegetation in Africa South of the Sahara. *Acta Phytogeogr. Suecia* 54:250-253
- GIESS, W.
1971 A preliminary Vegetation Map of South West Africa *Dinteria* No. 4
- GROBLER, M.
1973 Die vrylating van wildehonde *Lycan pictus* in die Nasionale Etosha Wildtuin. *Ongepubliseerde vorderingsverslag* Afd. Natuurbewaring en Toerisme, S.W.A.
- GERMAN COLONIAL OFFICE
1913 *Jagd und Wildschutz in den Deutschen Kolonien*. Gustav Fischer, Jena
- HOFMEYR, J. M.
1974 Developments in the capture and airlift of roan antelope *Hippotragus equinus equinus* under narcosis to the Etosha National Park. *Madoqua* Ser. 1, No. 8.
- HOFMEYR, J. M. & STEYN, G. P.
1974 The reedbuck, *Redunca arundinum* (Boddeart. (1785): a new record from the Etosha National Park. *Madoqua* Ser. 1, No. 8.
- JOUBERT, E.
1971a The Physiographic, Edaphic and Vegetative Characteristics found in the western Etosha National Park. *Madoqua* Ser. 1 No. 4
1971b The past and present Distribution and Status of the Black Rhinoceros (*Diceros bicornis* Linn. 1758) in South West Africa. *Madoqua* Ser. 1, No. 4.
1971c Observations on the Habitat Preferences and Population Dynamics of the Black-faced Impala *Aepyceros petersi* Bocage, 1875, in South West Africa. *Madoqua* Ser. 1, No. 3.
- JOUBERT, E. & ELOFF, F. C.
1971 Notes on the Ecology and Behaviour of the Black Rhinoceros (*Diceros bicornis* Linn 1758) in South West Africa. *Madoqua* Ser. 1, No. 3.
- JOUBERT, E. & ELOFF, F. C.
1972 The ecology, behaviour and population dynamics of the Hartmann zebra *Equus zebra hartmannae* in South West Africa. D.Sc. *Wildlife Management Thesis*, Univ. of Pretoria.
- JOUBERT, E., DU PREEZ, J. S. & GROBLER, M.
1973 Lugensus van die wild in die Nasionale Etosha Wildtuin gedurende September 1973 met hulp van 'n helikopter. *Ongepubliseerde vorderingsverslag*, Afd. Natuurbewaring en Toerisme, S.W.A.A.
- JOUBERT, E.
1974 The development of wildlife utilization in South West Africa. *J. Sth. Afr. Wildl. Mgmt. Ass.* 4 No. 1.
- KEET, J. D. M. *et al*
1949 *Suidwes-Afrika. Verslag van die kommissie insake langtermynse landboubeleid*. Windhoek: John Meinert.
- RANGE, P.
1940 Vegetationskarte und Vortrag. *Ber. Dt. Bot. Ges.* 58: 226-229
- ROBERTS, A.
1951 *The mammals of South Africa*. Trustees of "The Mammals of South Africa" Book Fund, Johannesburg.
- SHORTTRIGDE, G. C.
1934 *The mammals of South West Africa*. Vol. 1 and 2 William Heinemann Ltd., London
- SIDNEY, J.
1965 *The past and present distribution of some African ungulates* Trans. Zool. Soc. of London, London
- SWART, P. S.
1967 New data on the black-faced Impala (*Aepyceros melampus petersi* Bocage) *Cimbebasia* 20
- UNPUBLISHED REPORTS ON AERIAL SURVEYS
1966-1973 Division of Nature Conservation and Tourism, Windhoek
- TINLEY, K. I
1969 Dikdik *Madoqua kirkii* in South West Africa: Notes on Distribution, Ecology and behaviour. *Madoqua* No. 1
- VAN DER SPUY, J. S.
1962 A preliminary report on the distribution and size of population of some ungulate mammals in South West Africa. *Ann. Cape Prov. Mus* vol. II
- WILHELM, J. H.
1931 Das Wild des Okavango und Caprivi *S. W. A. Wissenschaftliche Gesellschaft*, Windhoek

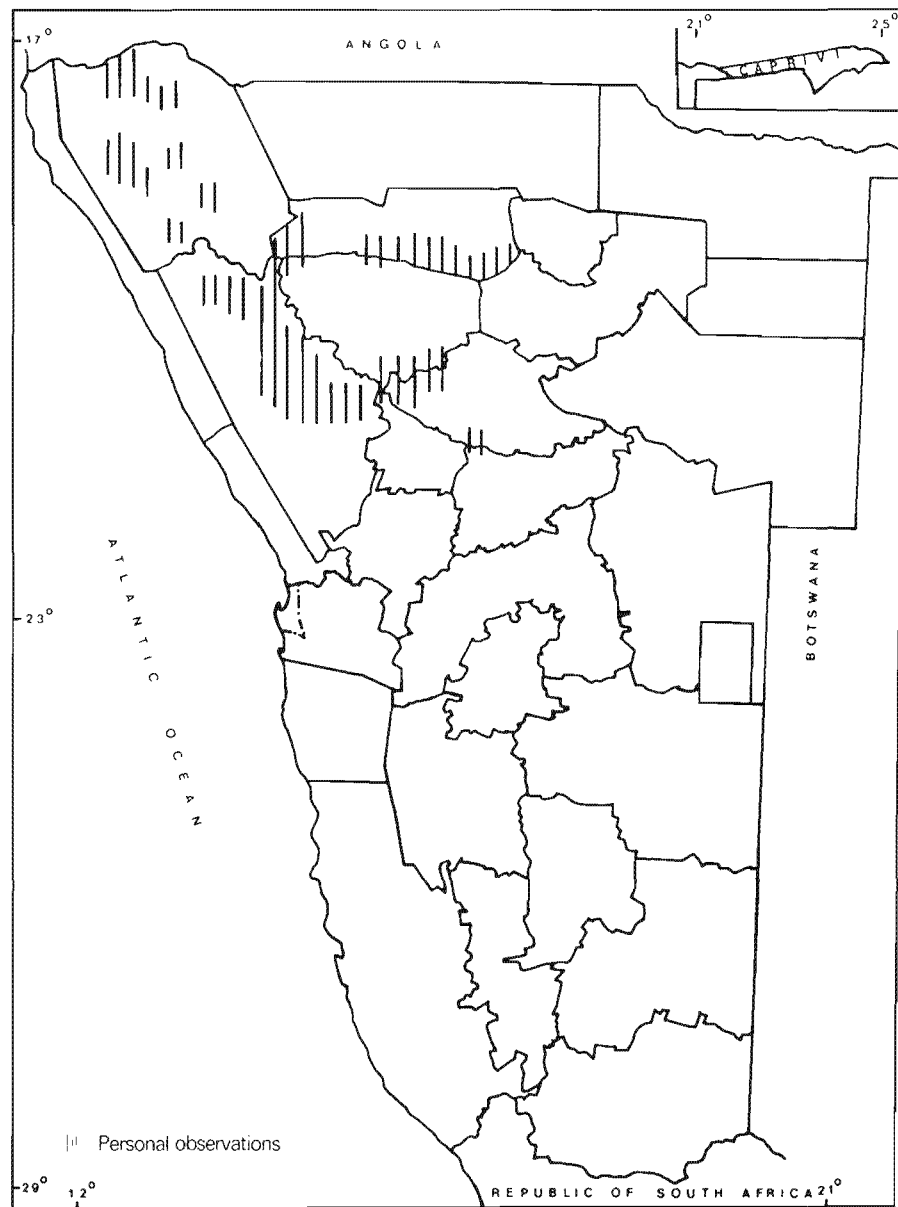


Map 2. Rainfall isohyets for South West Africa

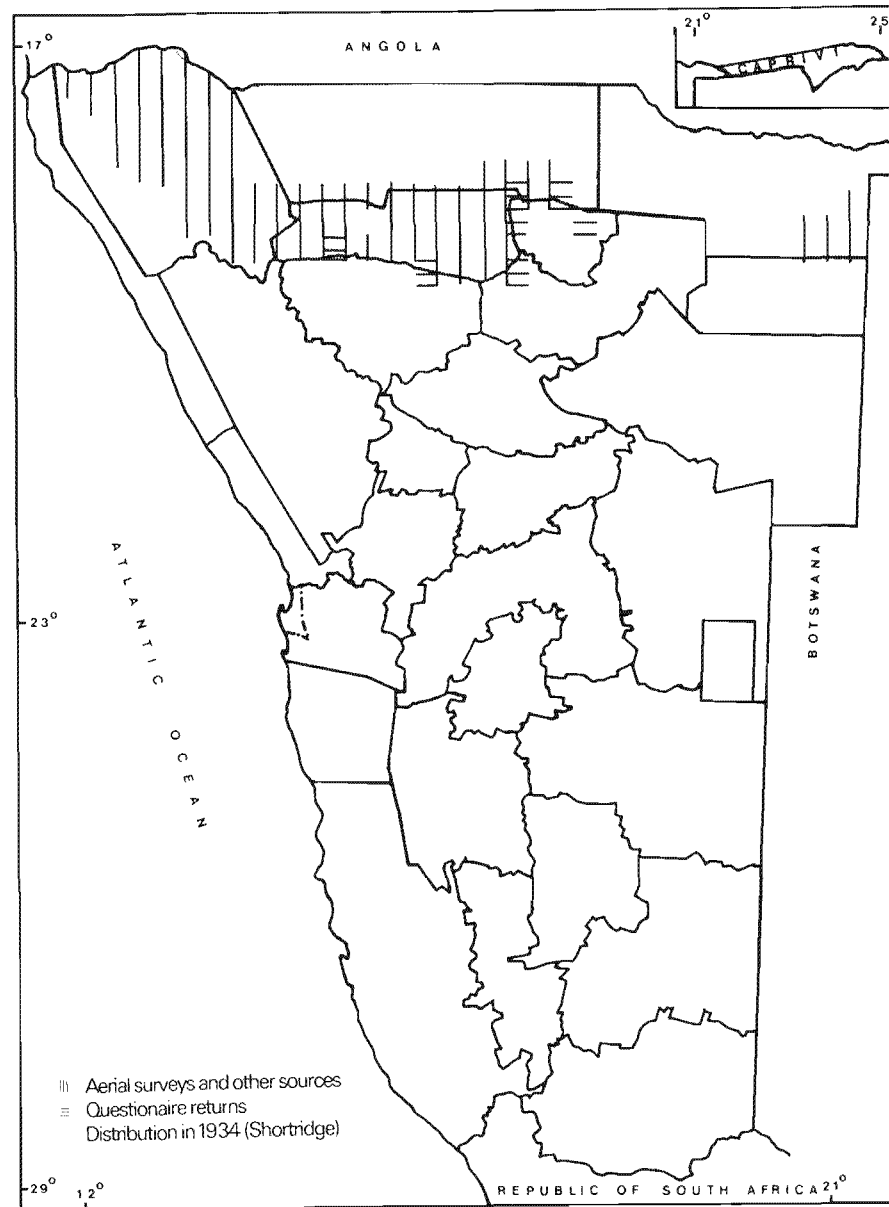


Map 3. Vegetative regions in South West Africa.

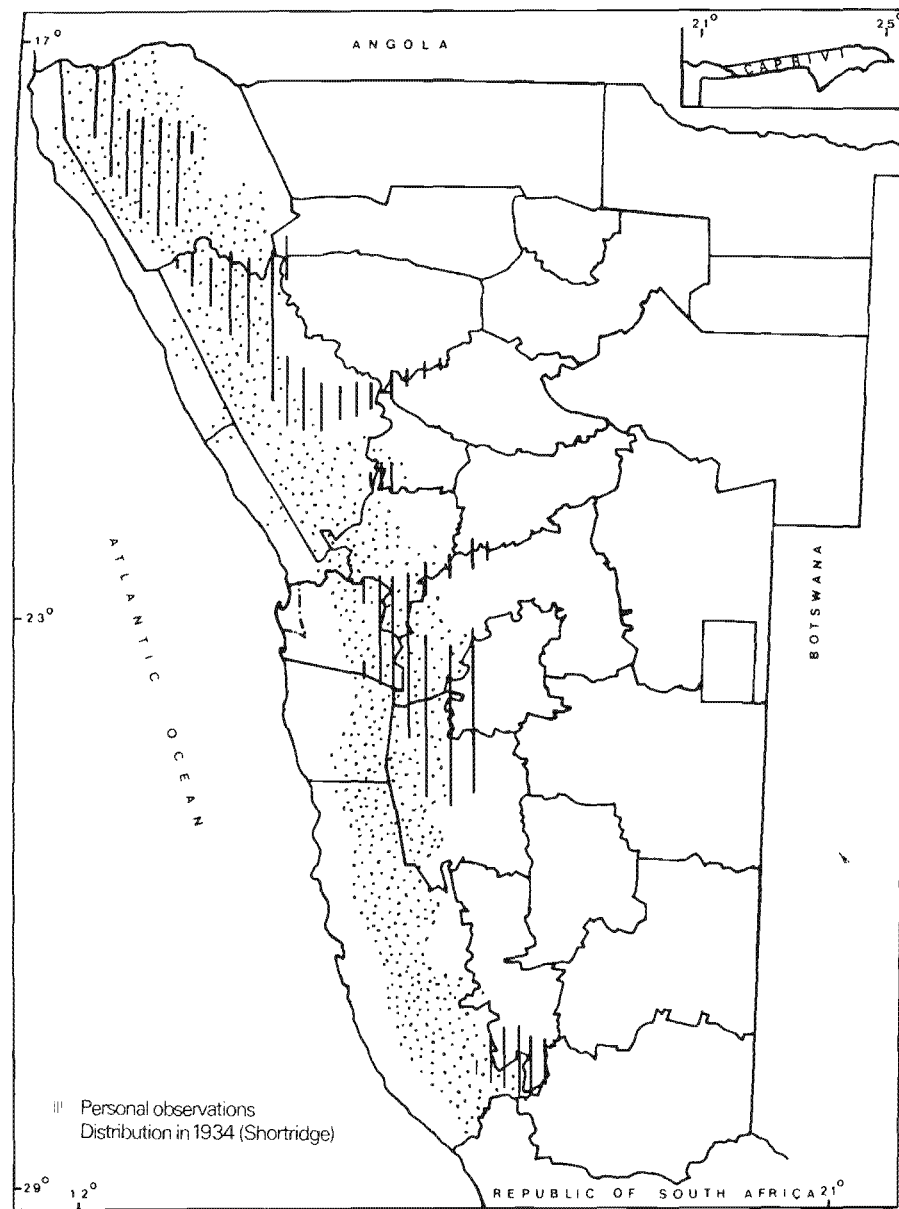




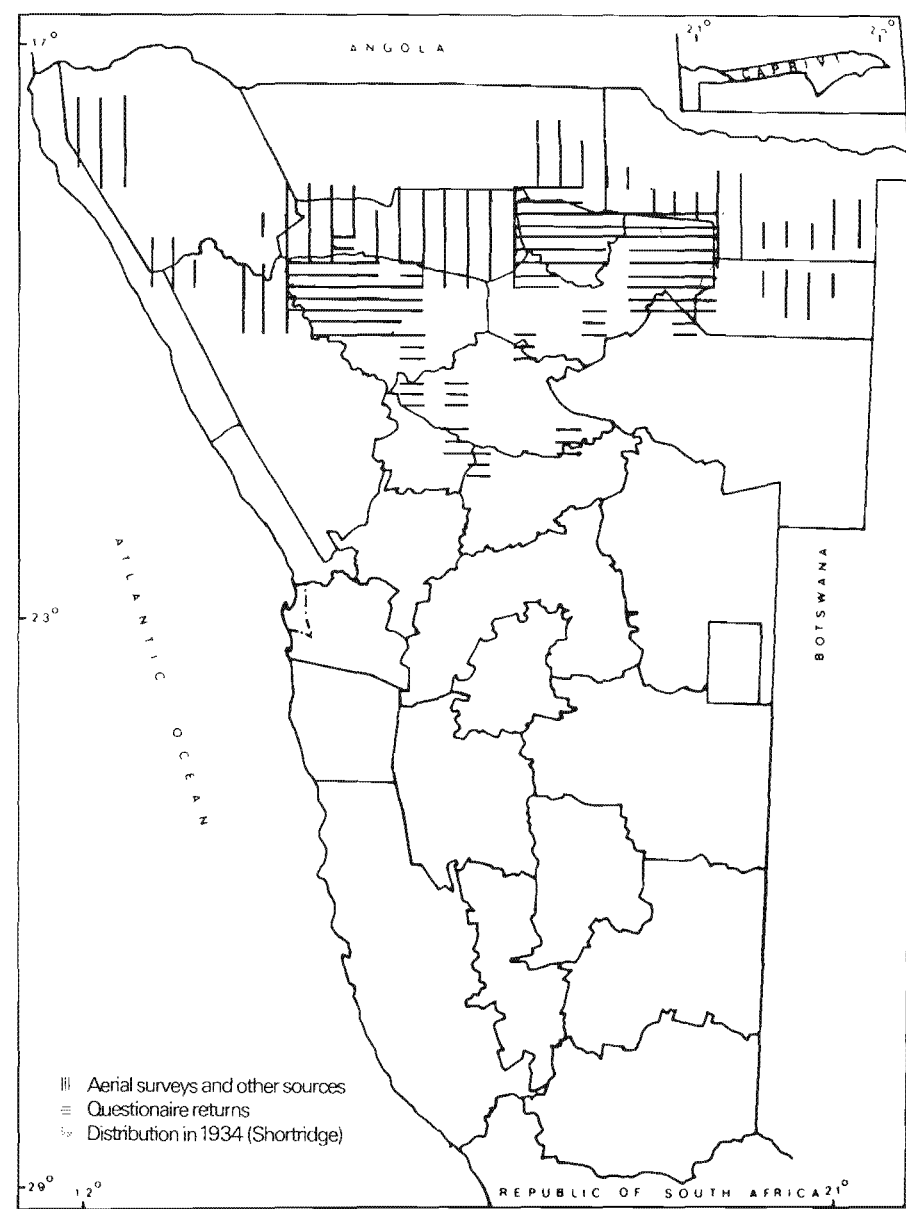
Map 6. Black rhinoceros



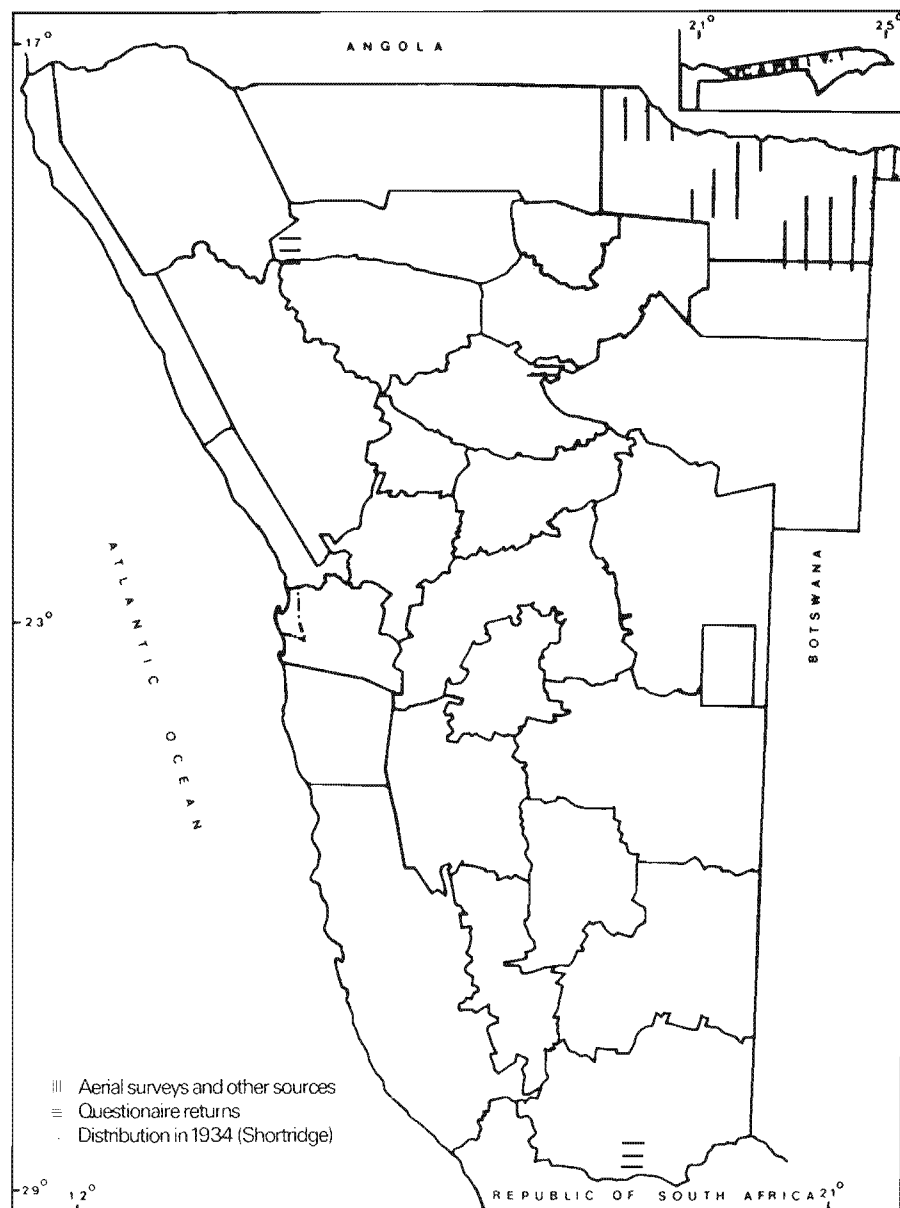
Map 7. Burchell's zebra.



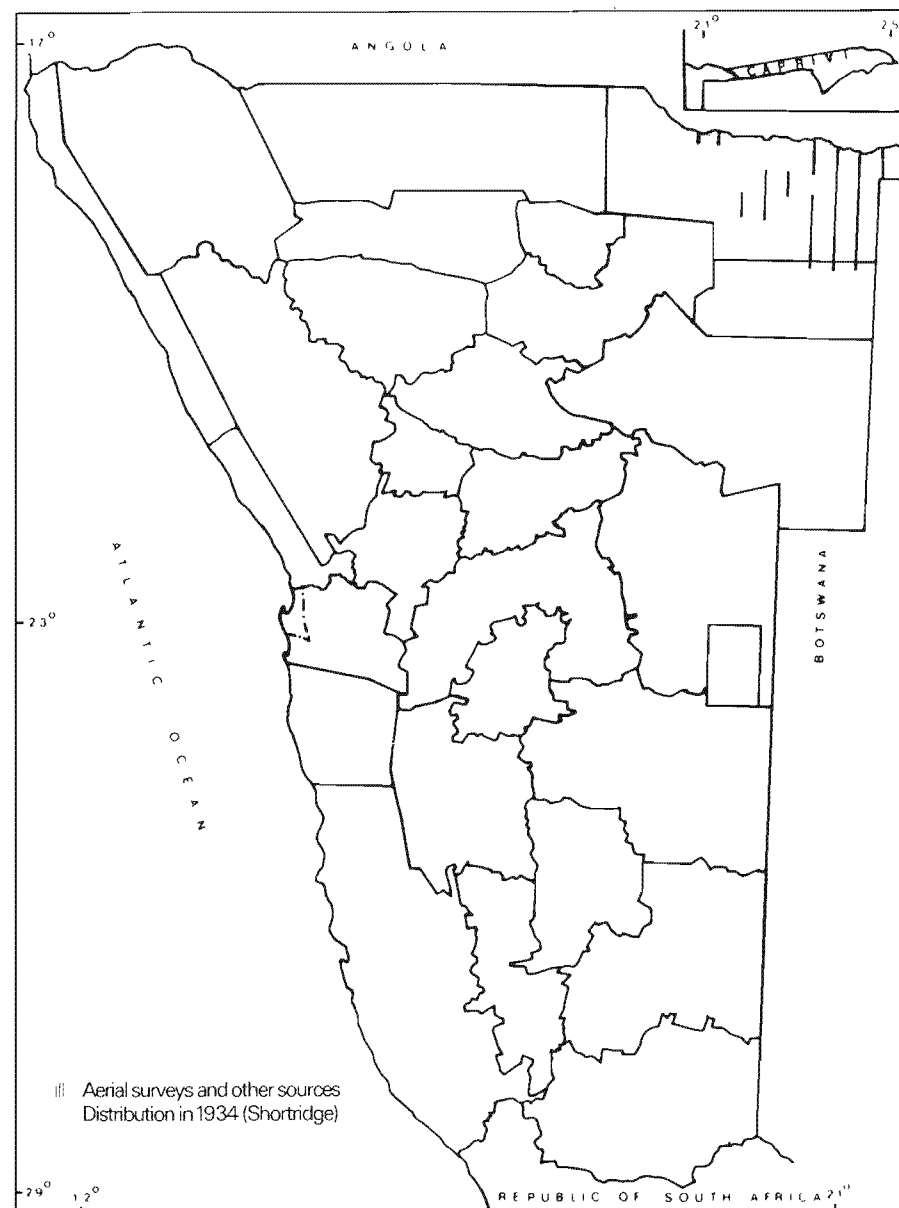
Map 8. Hartmann zebra.



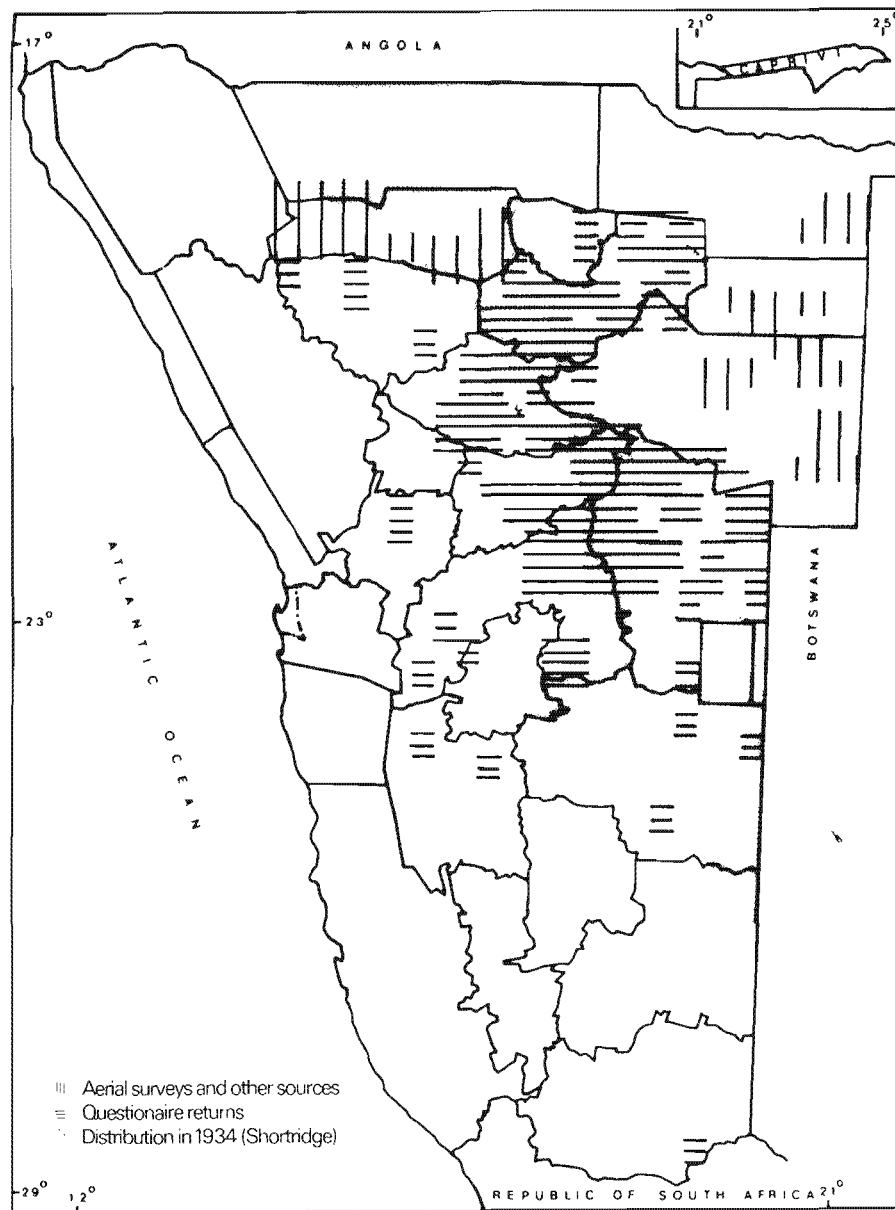
Map 9. Giraffe.



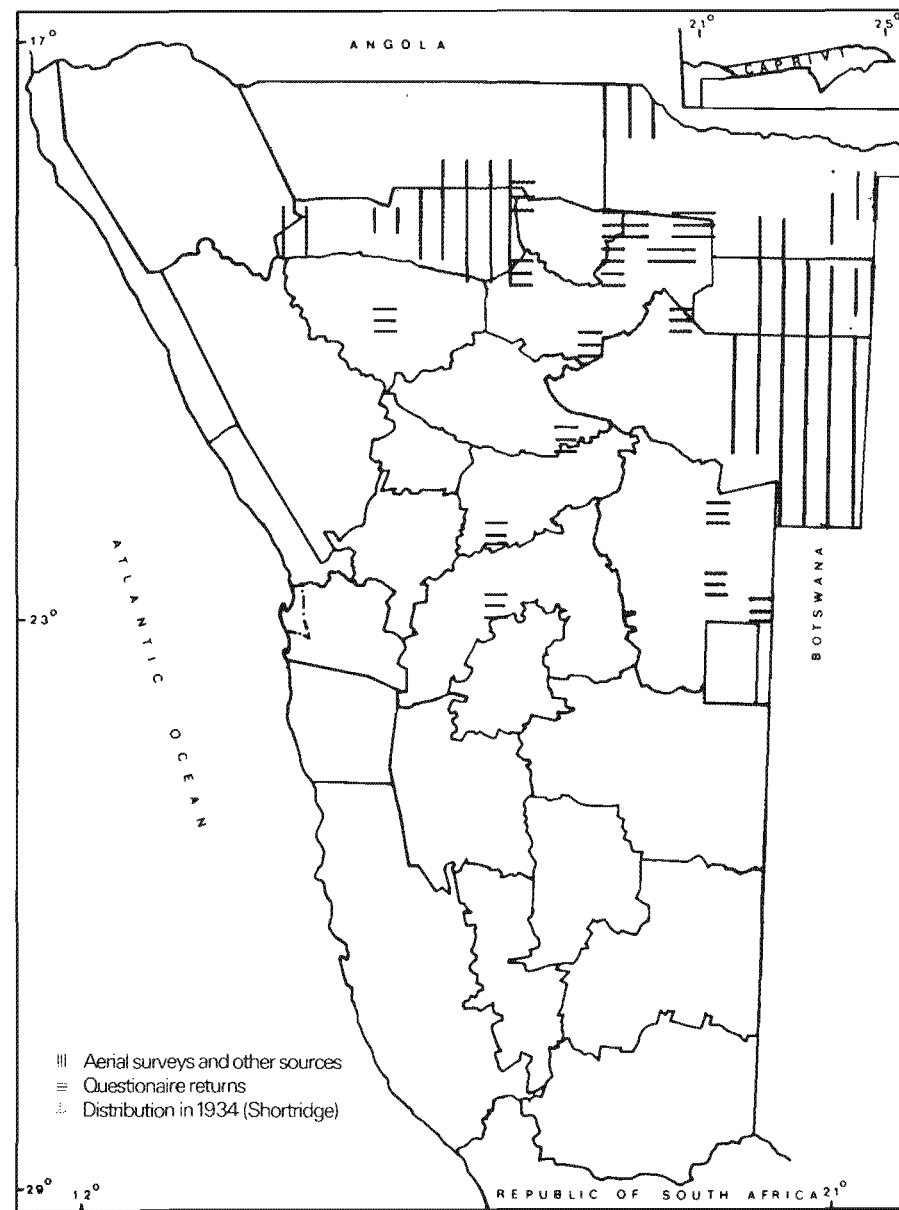
Map 10. Roan.



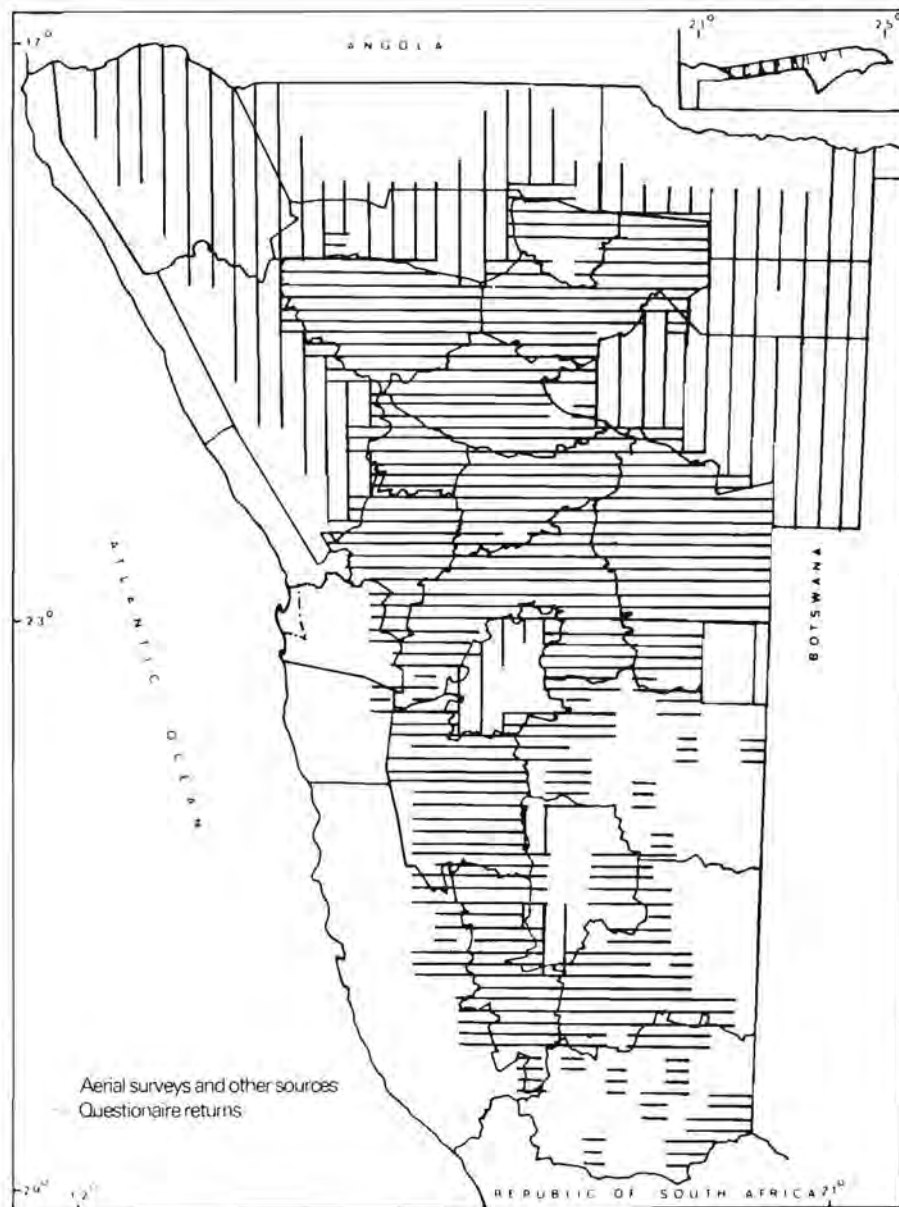
Map 11. Tsessebe.



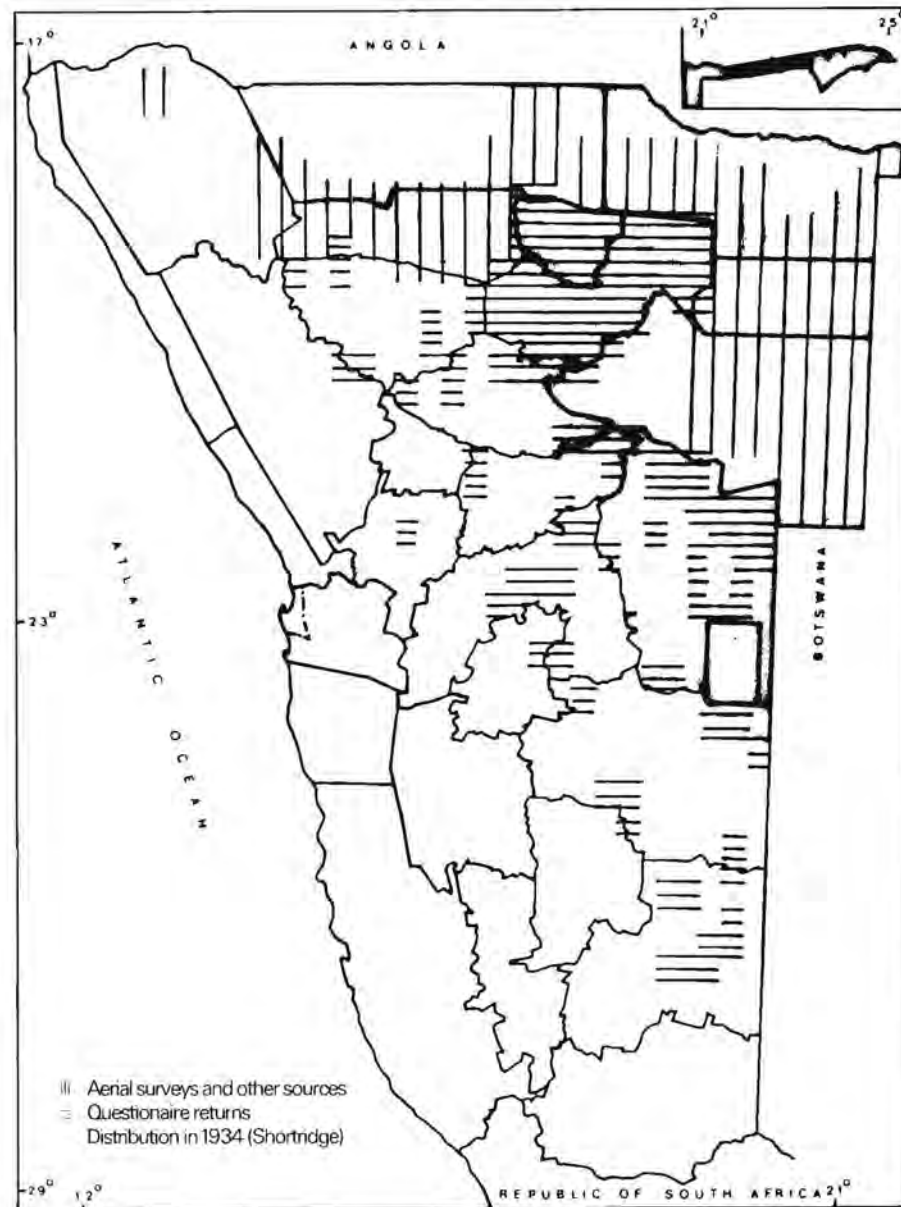
Map 12. Red hartebeest.



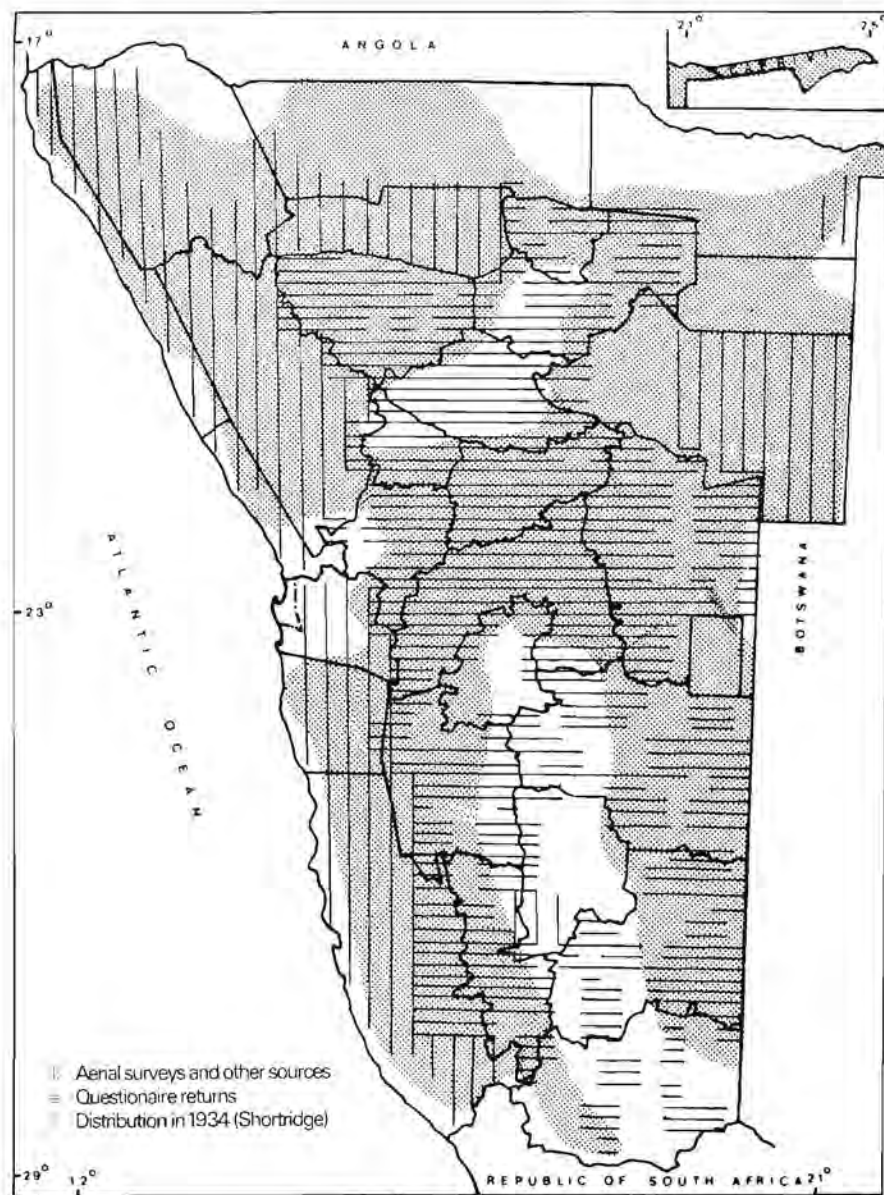
Map 13. Blue wildebeest.



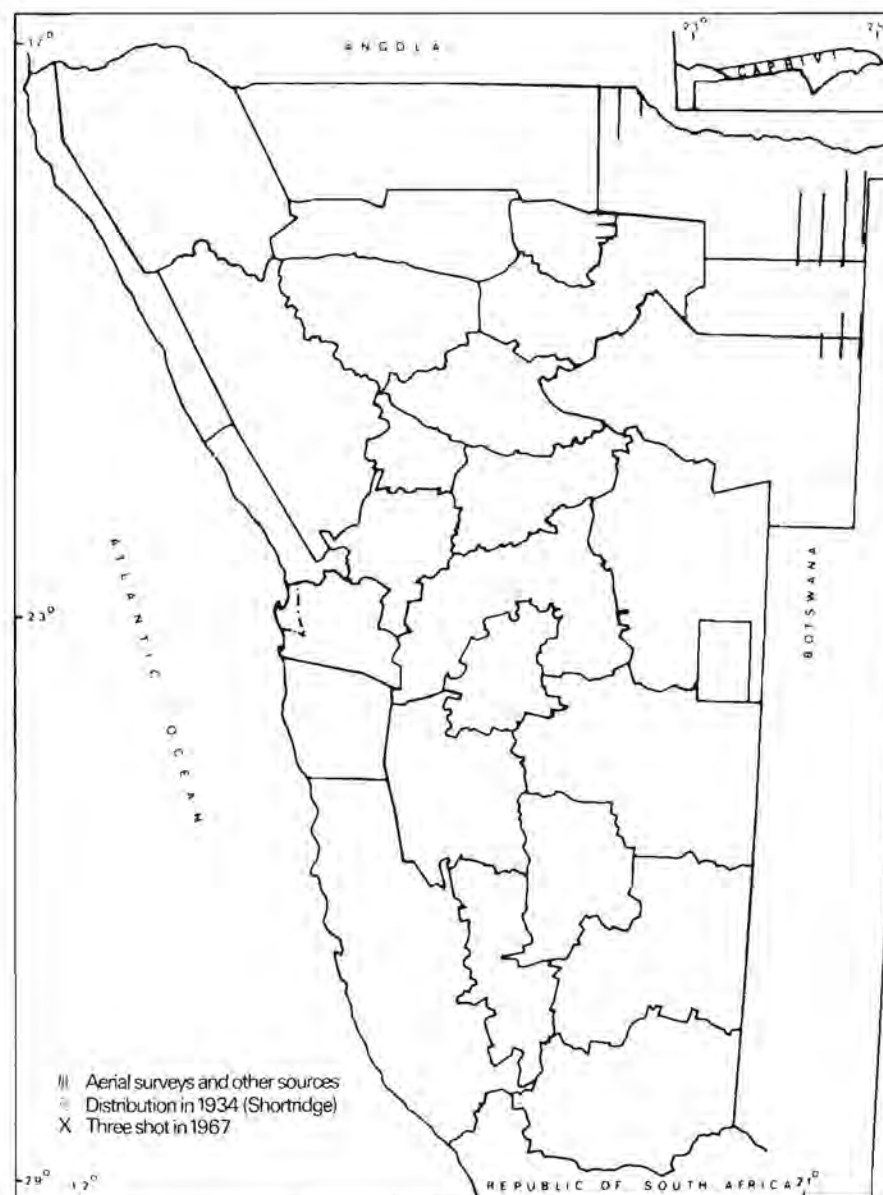
Map 14: Kudu.



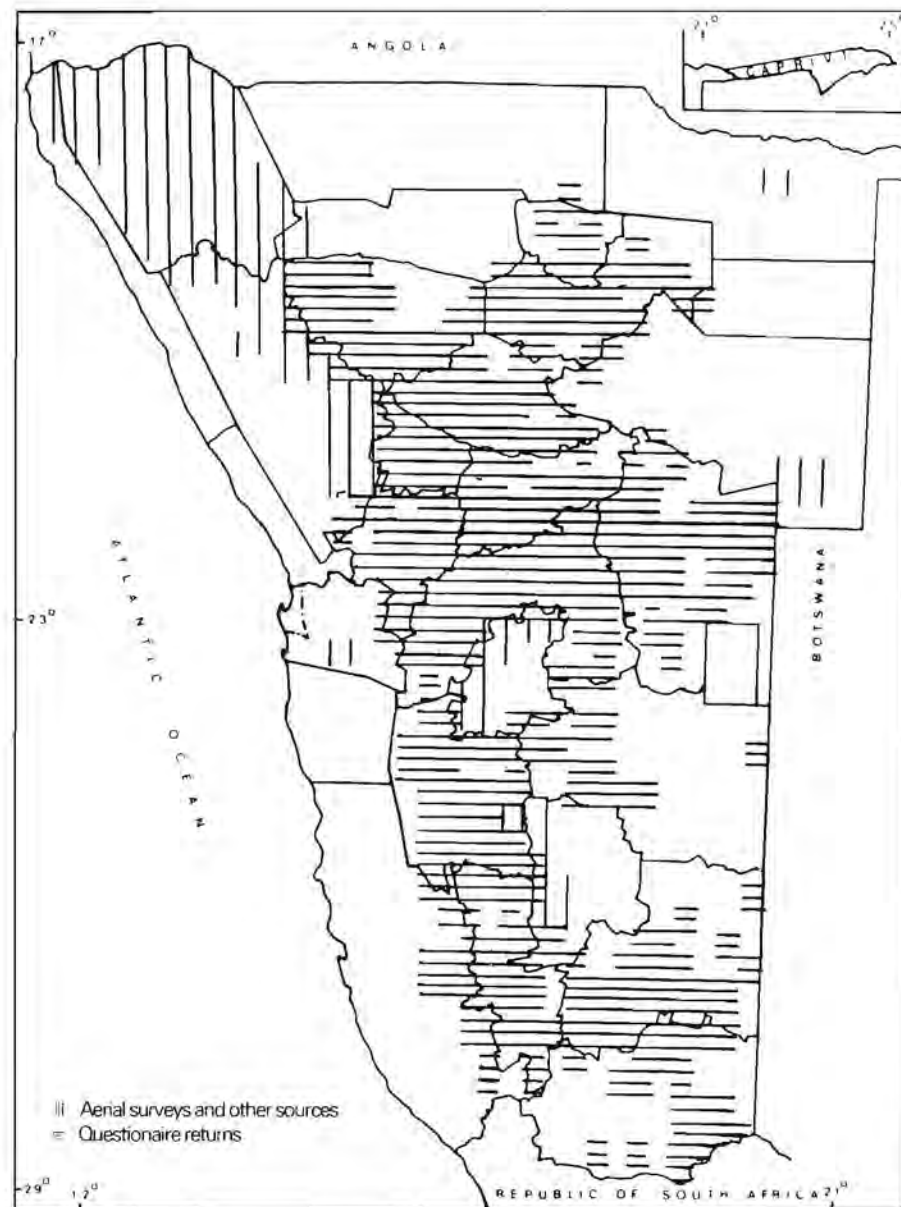
Map 15: Elephant.



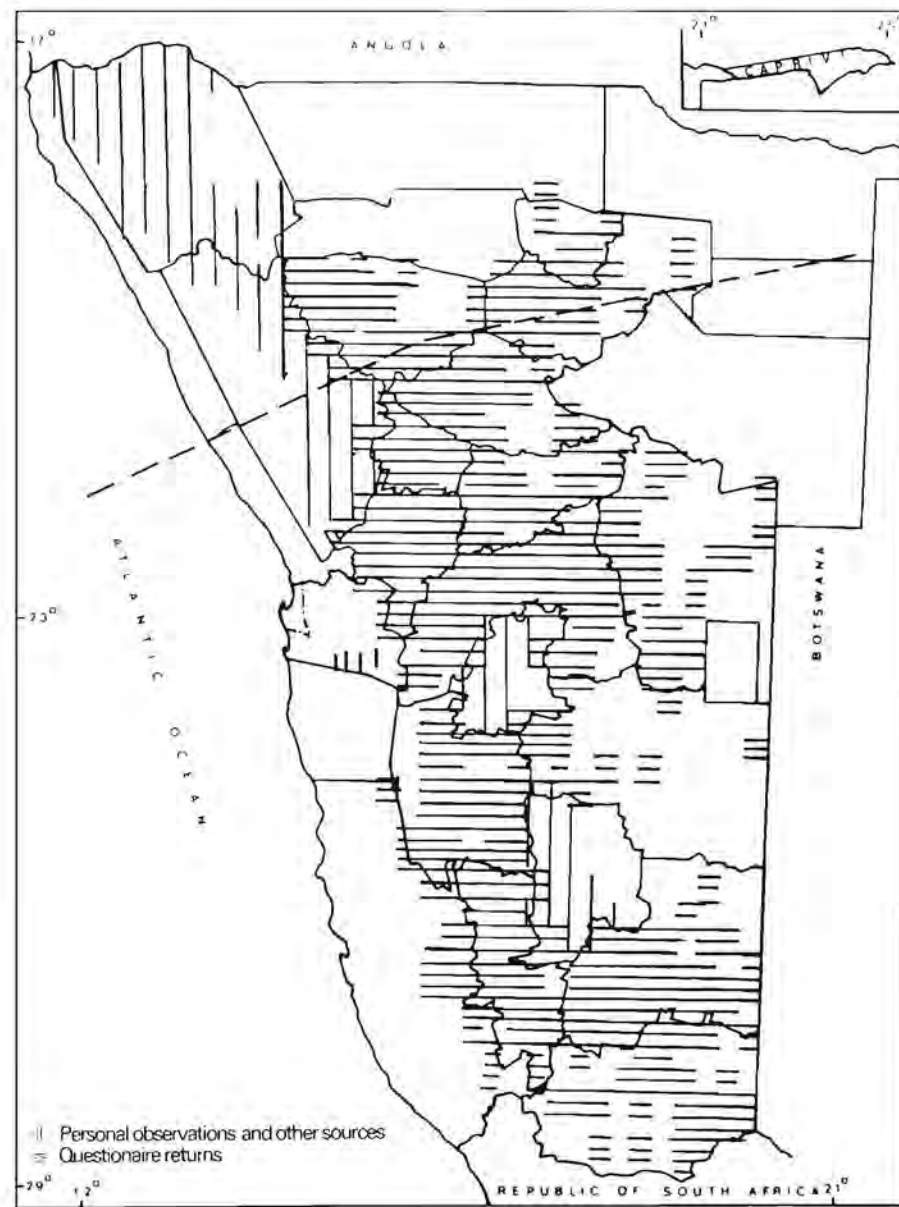
Map 16. Gemshok

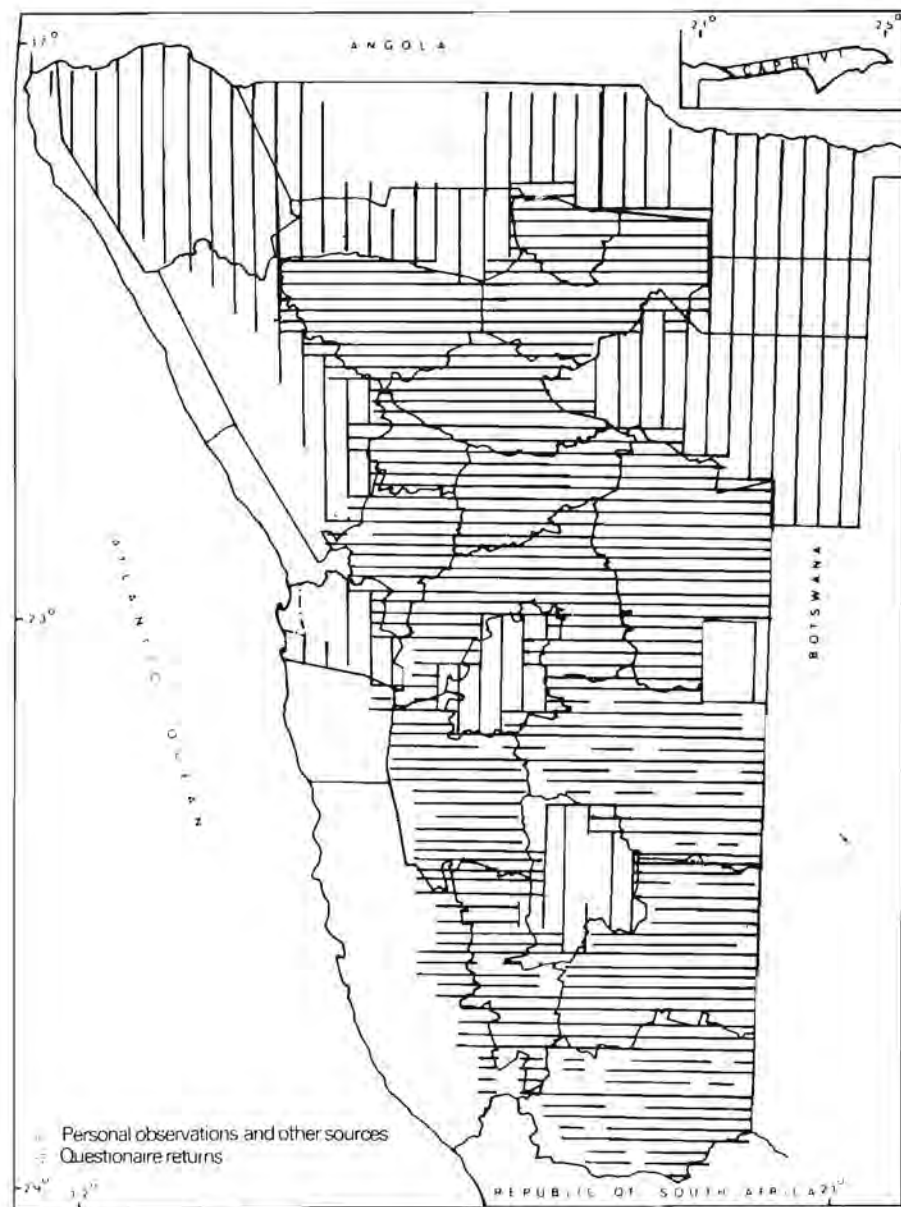


Map 17. Buffalo

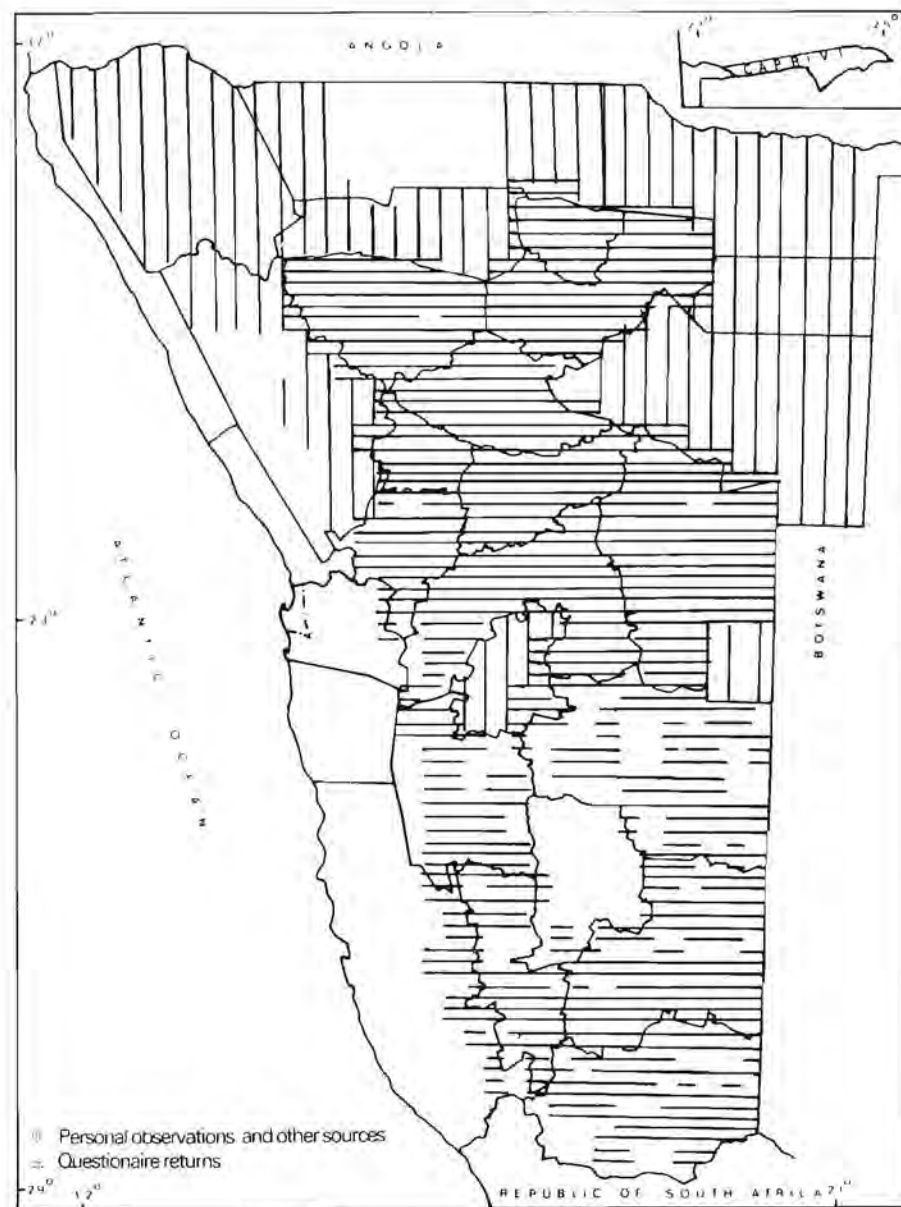


Map 18. Baboon

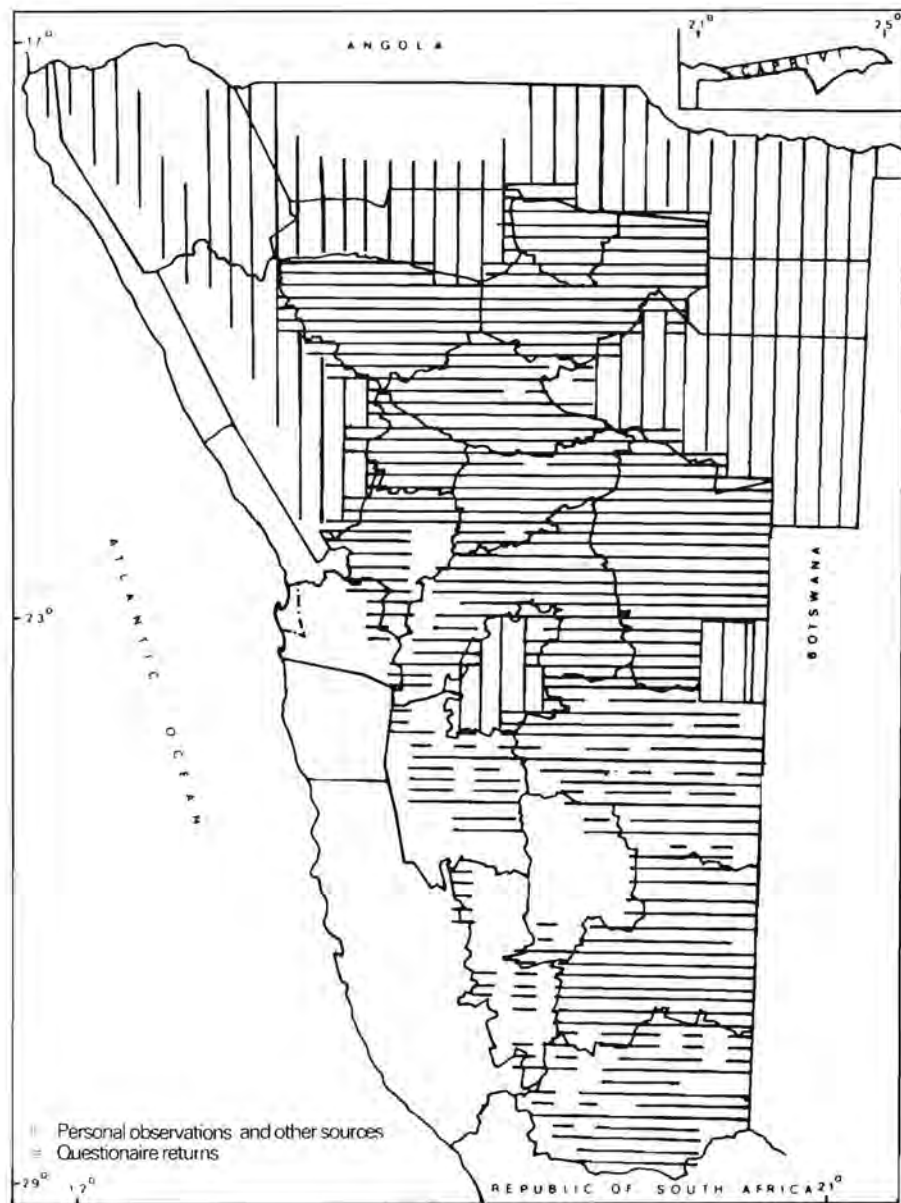
Map 19. Dassies — *Procavia welwitschii* north of the dotted line and *Procavia capensis* south of it



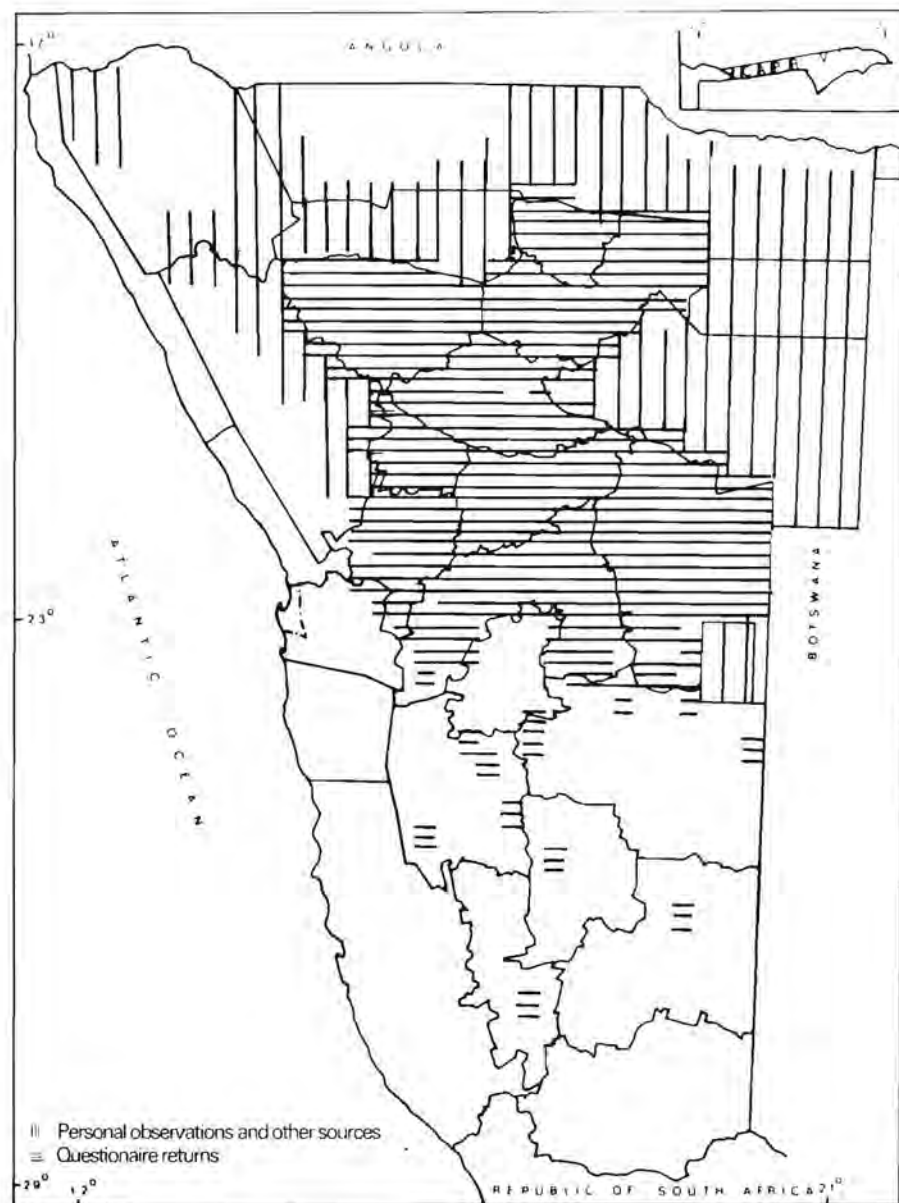
Map 20 Porcupine



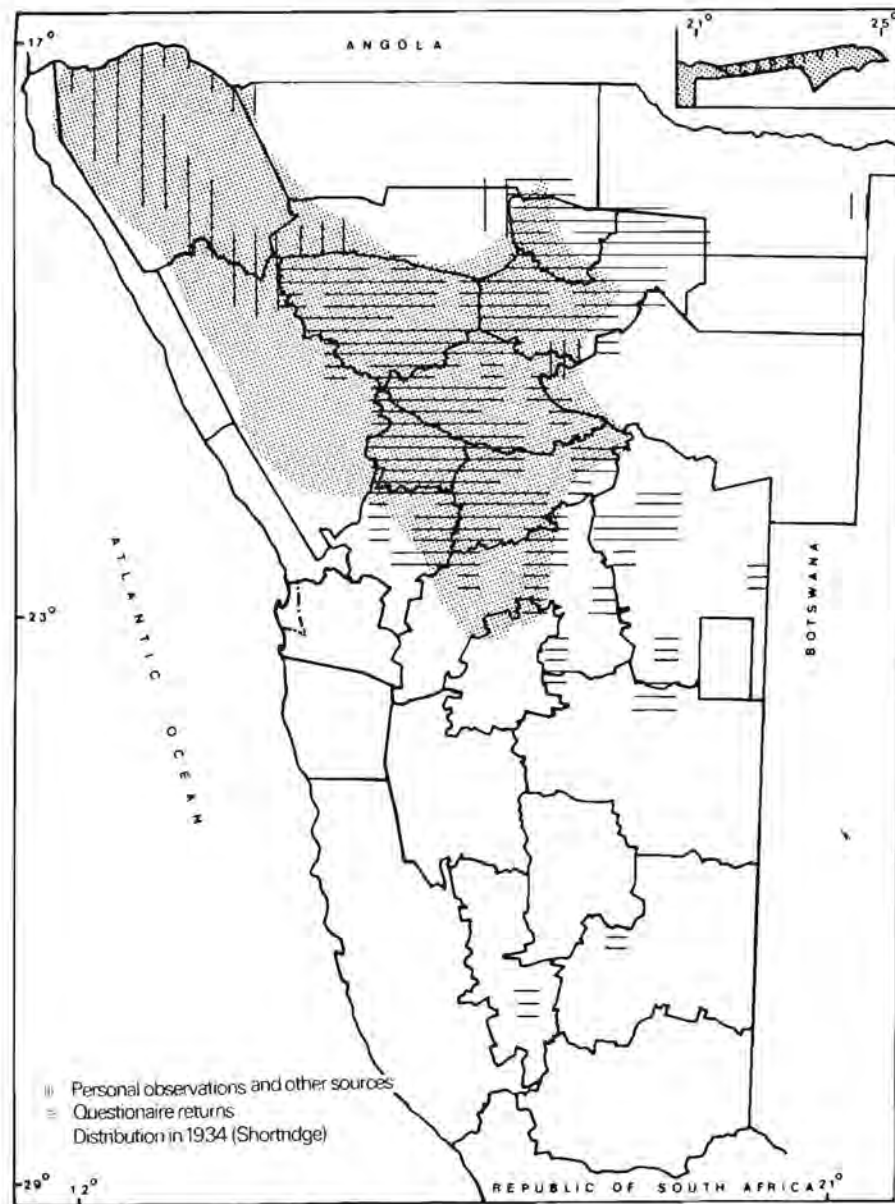
Map 21 Honey badger



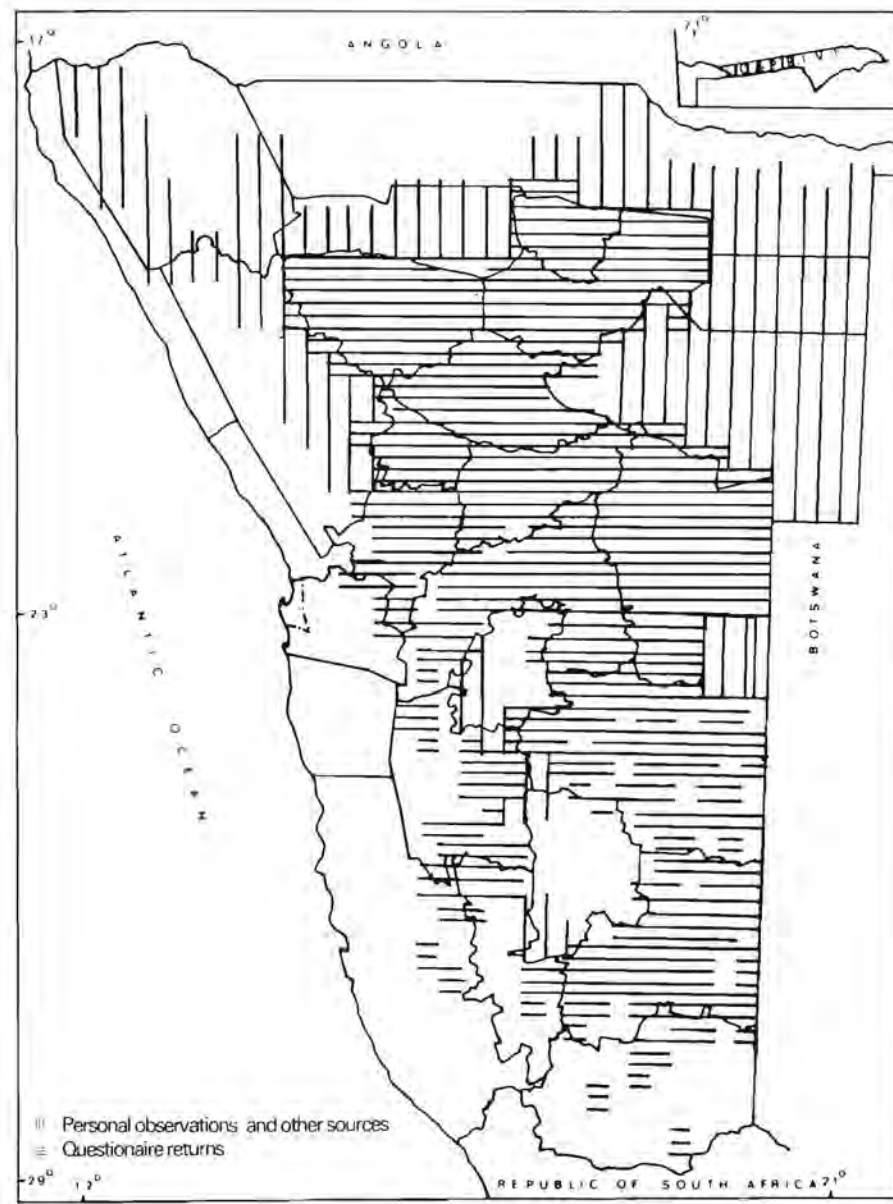
Map 22. Aardvark



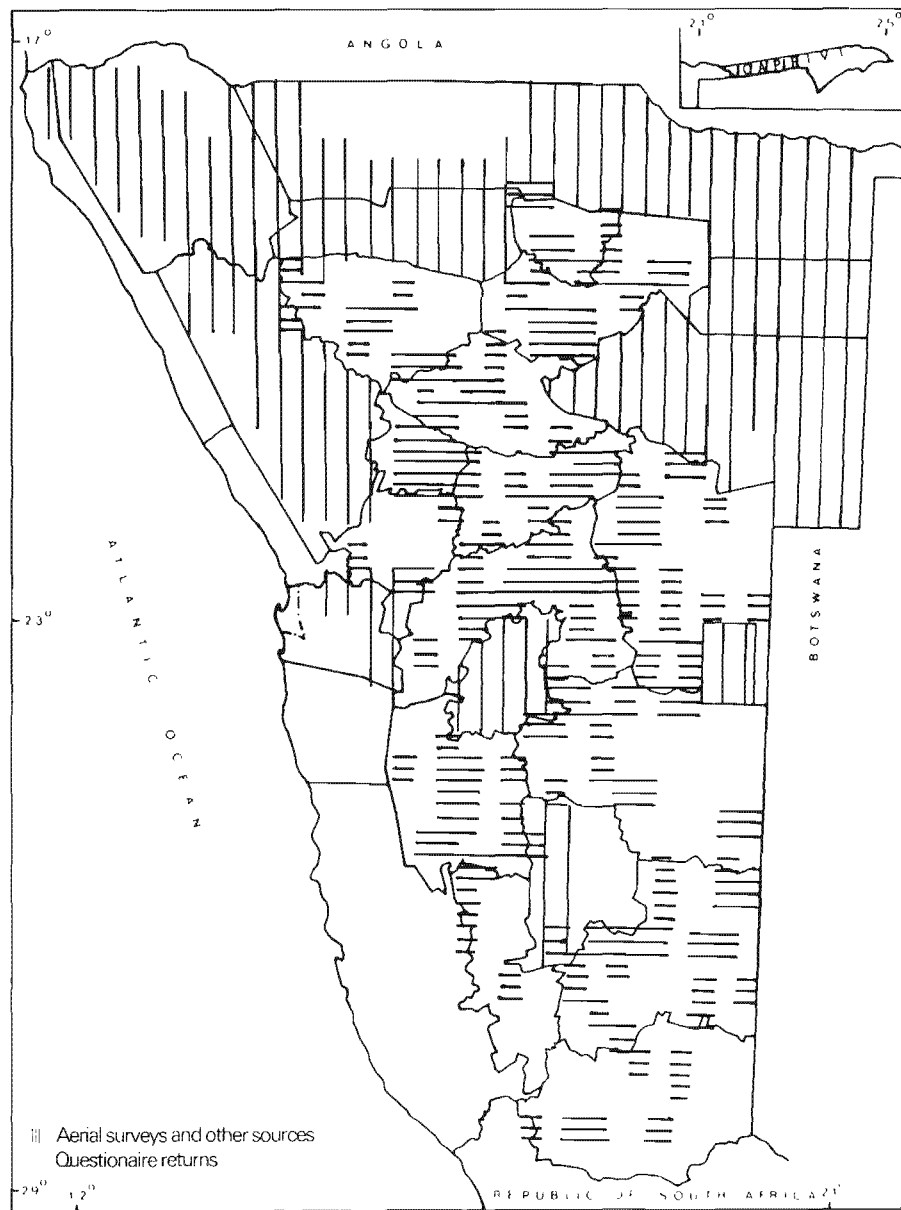
Map 23. Warthog



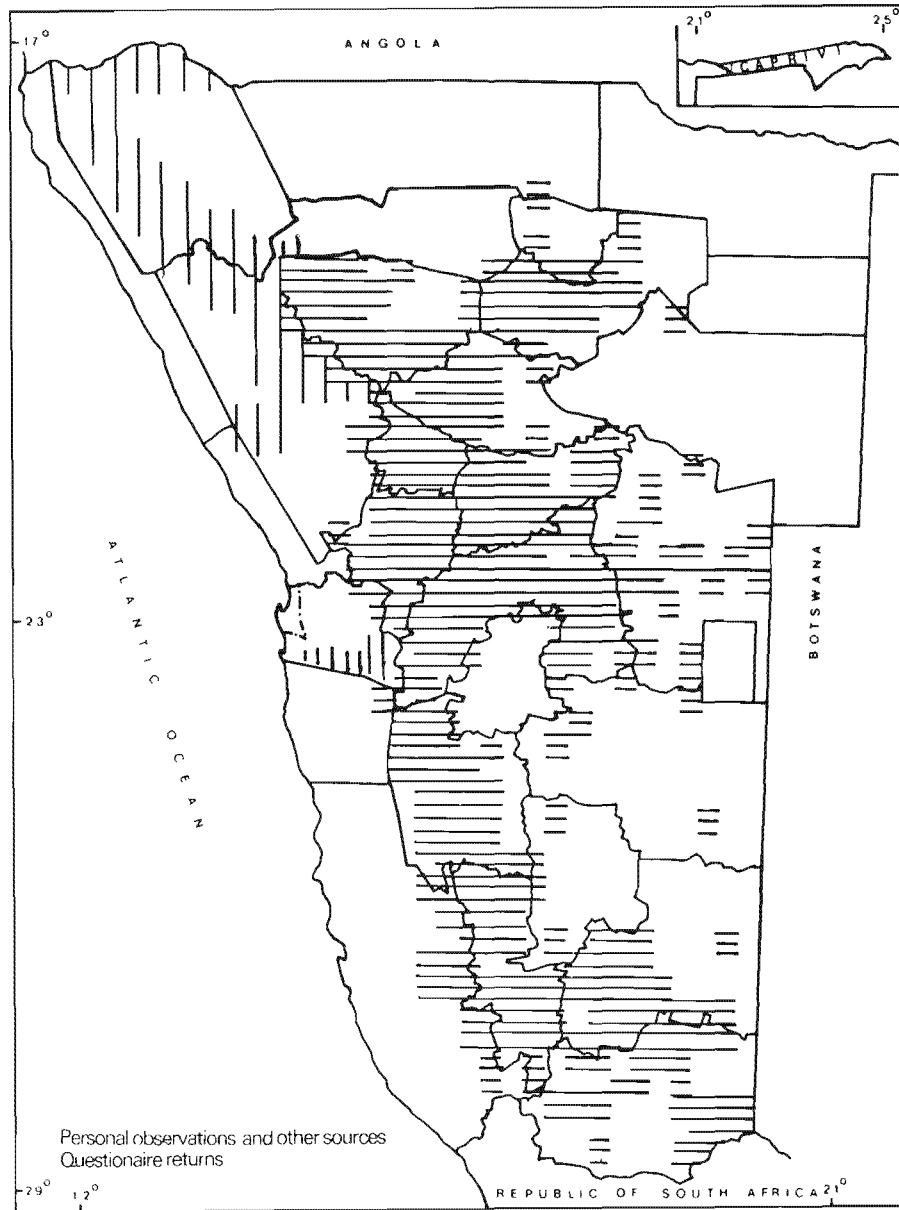
Map 24. Dikdik.



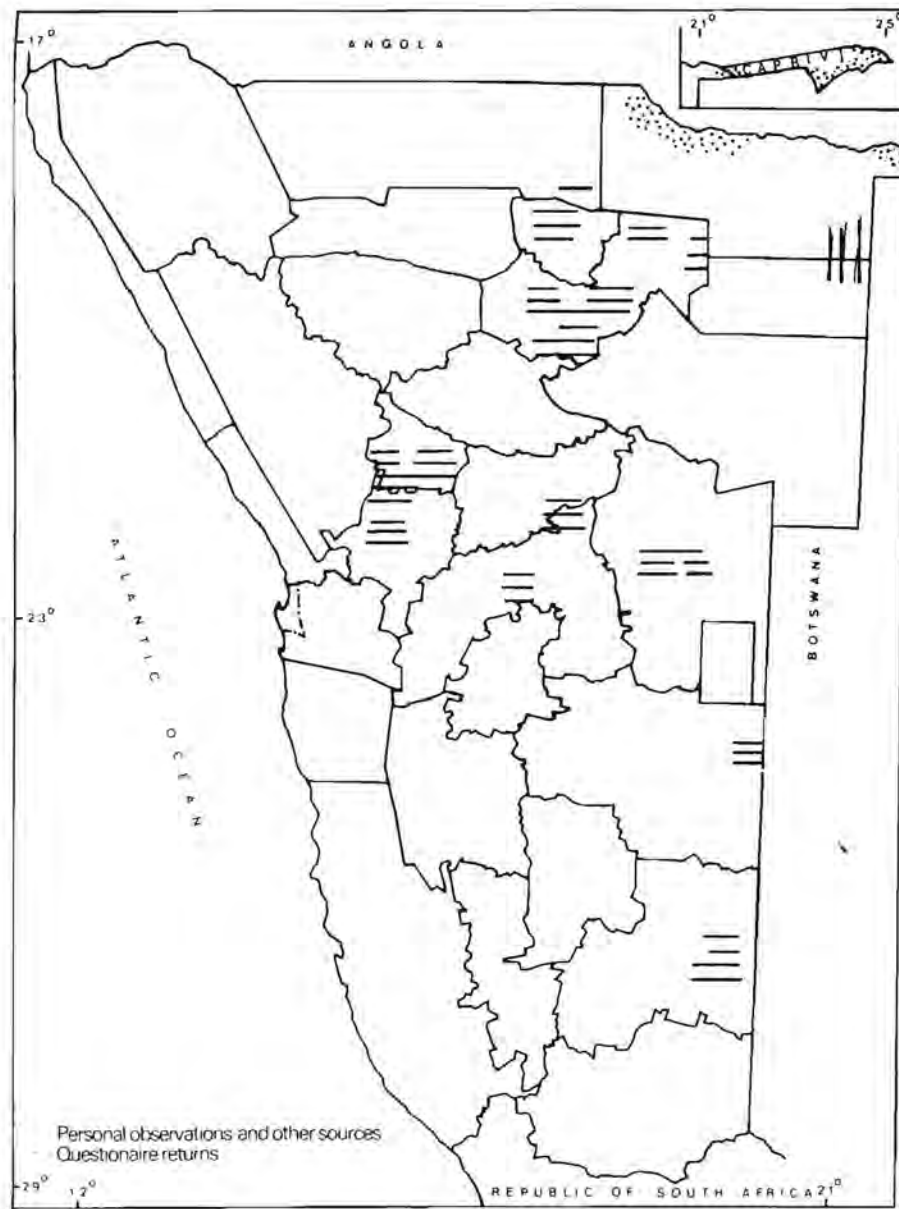
Map 25. Duiker



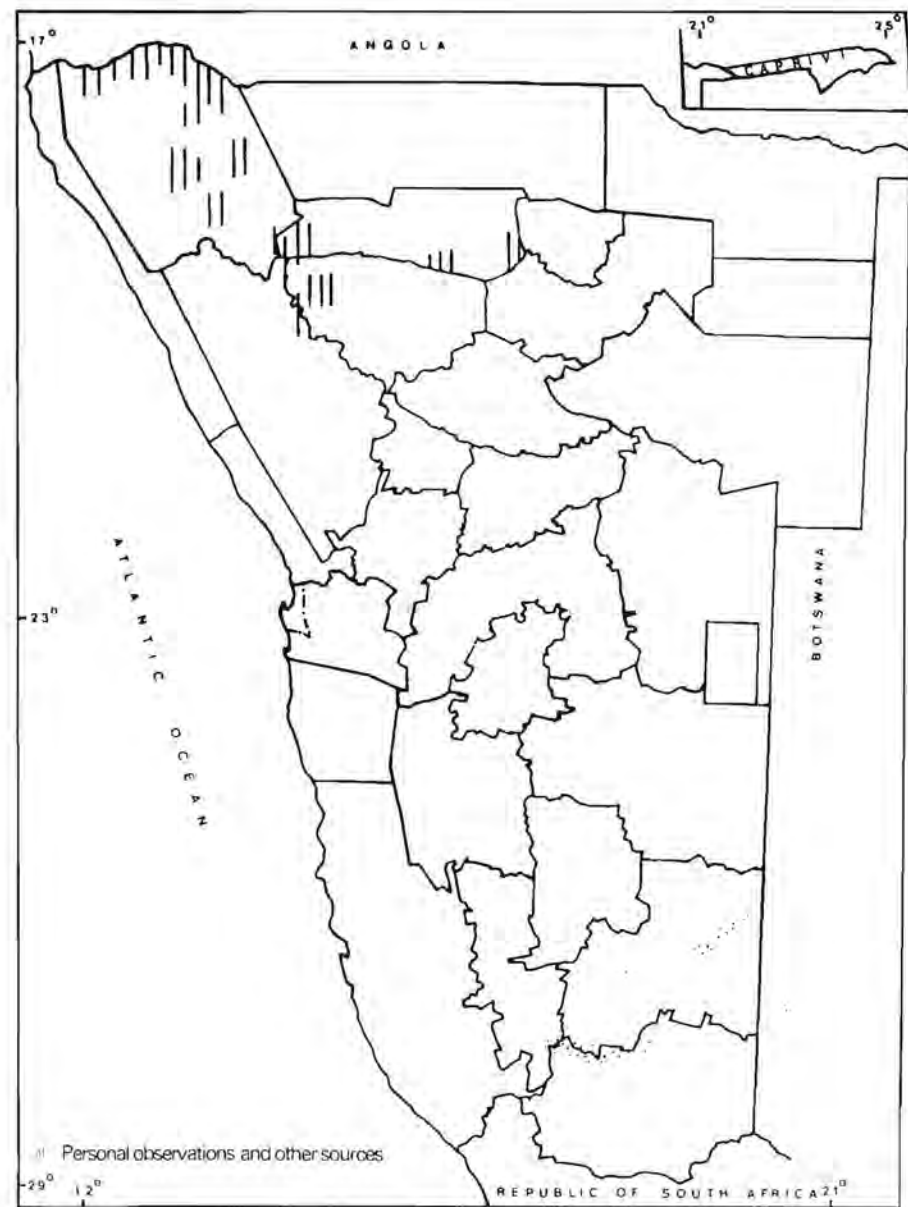
Map 26. Steenbok



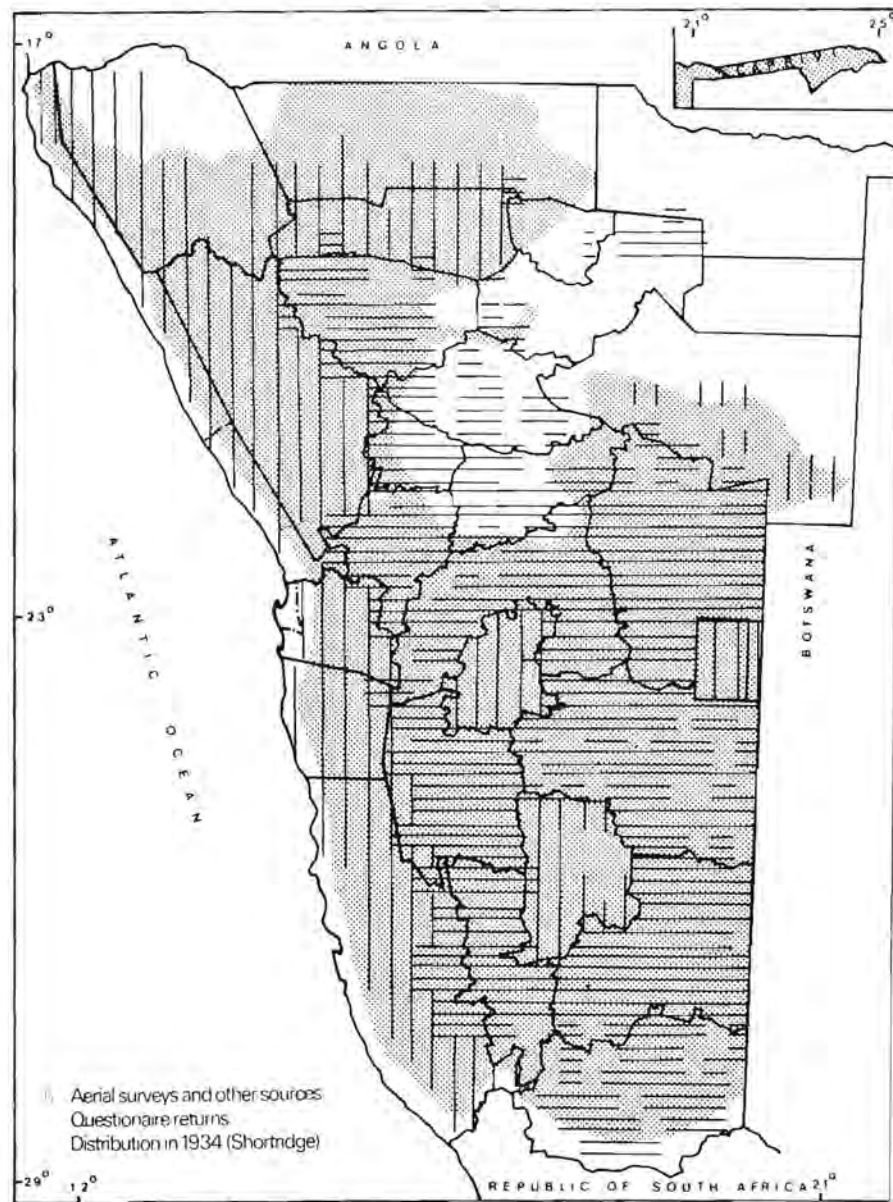
Map 27. Klipspringer



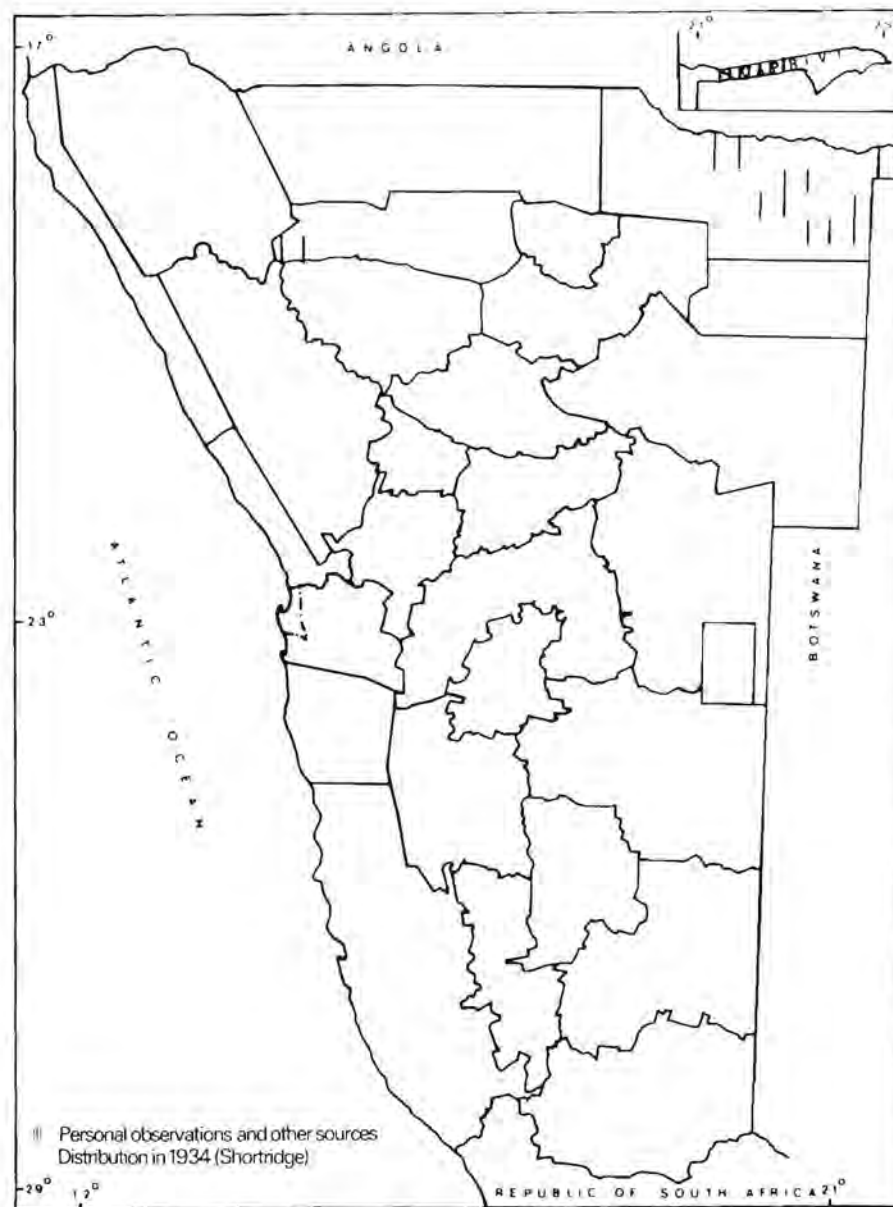
Map 28a. Impala *Aepyceros melampus*



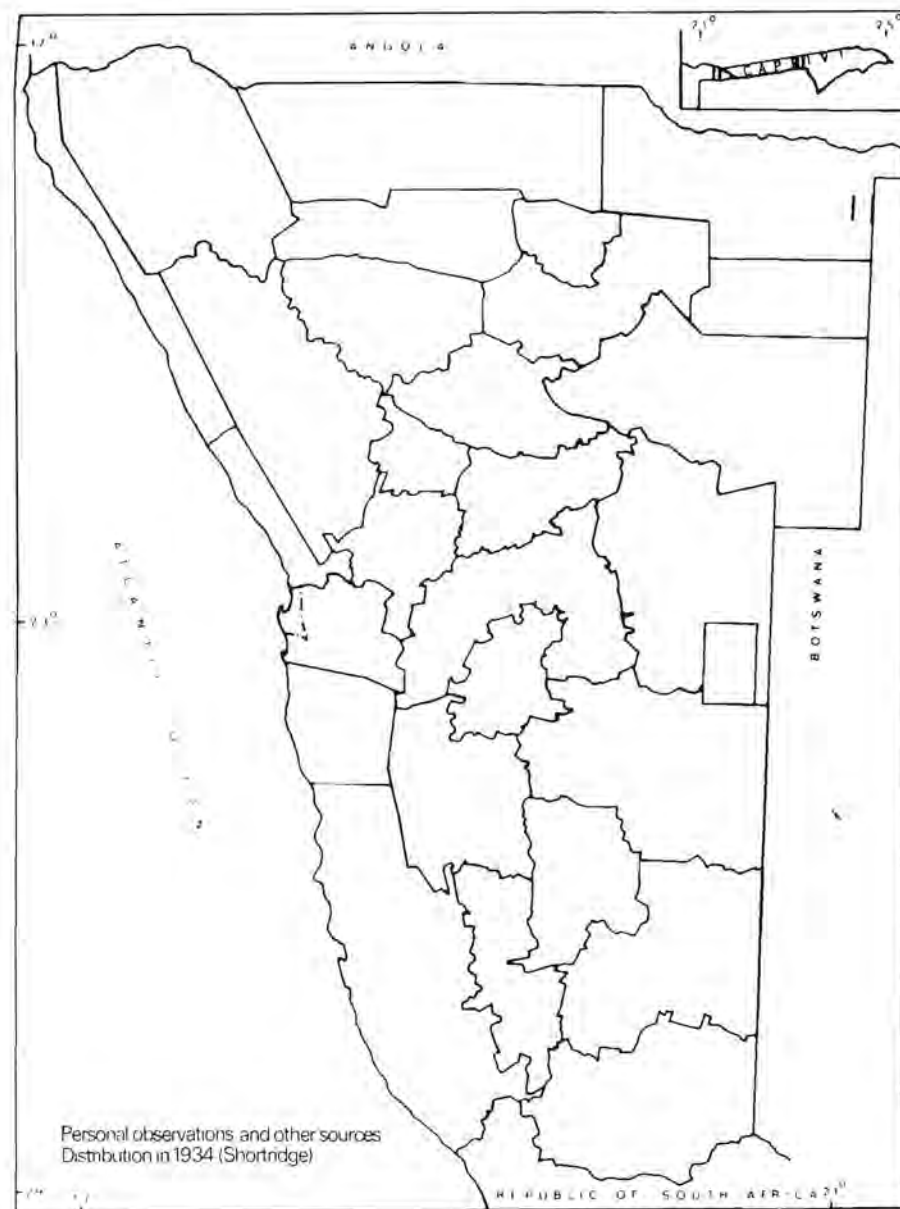
Map 28b. Black-faced impala *Aepyceros petersi*



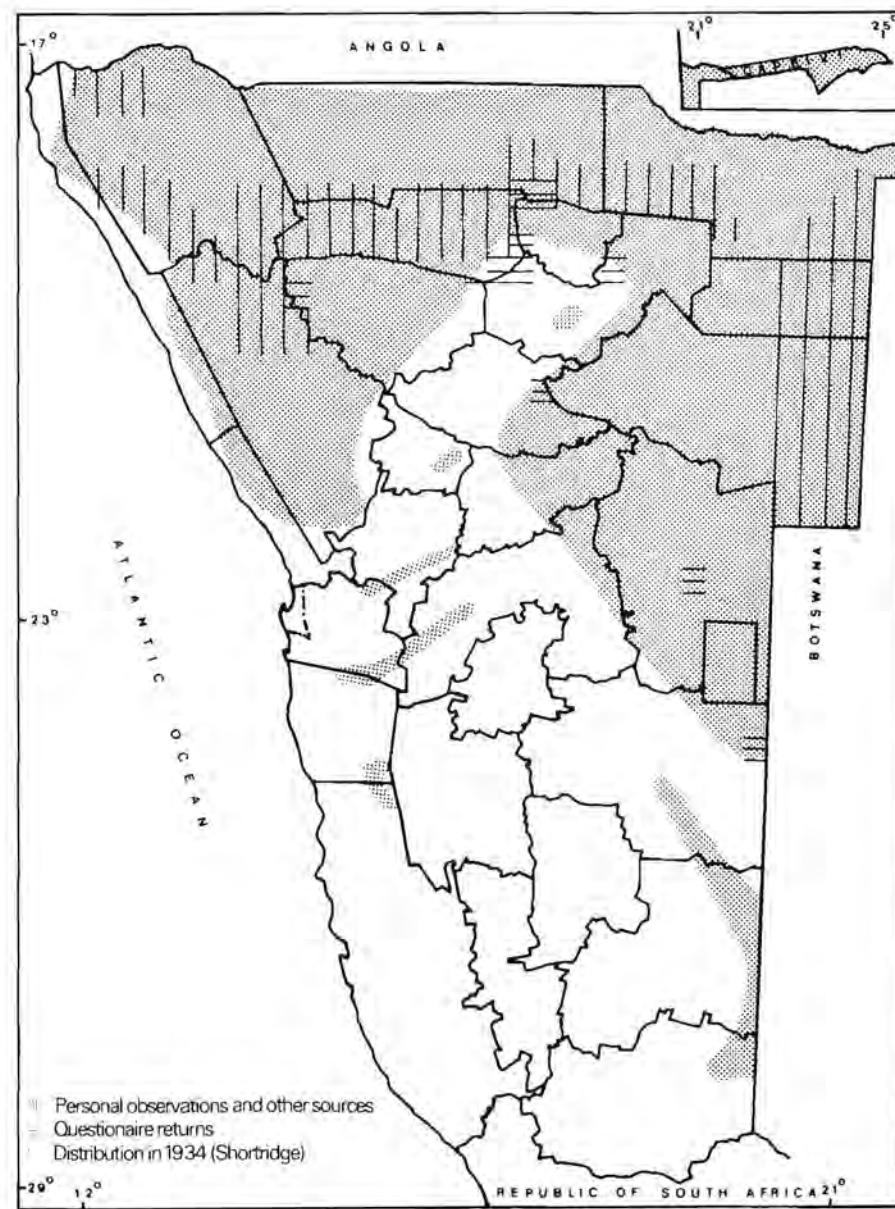
Map 29: Springbok



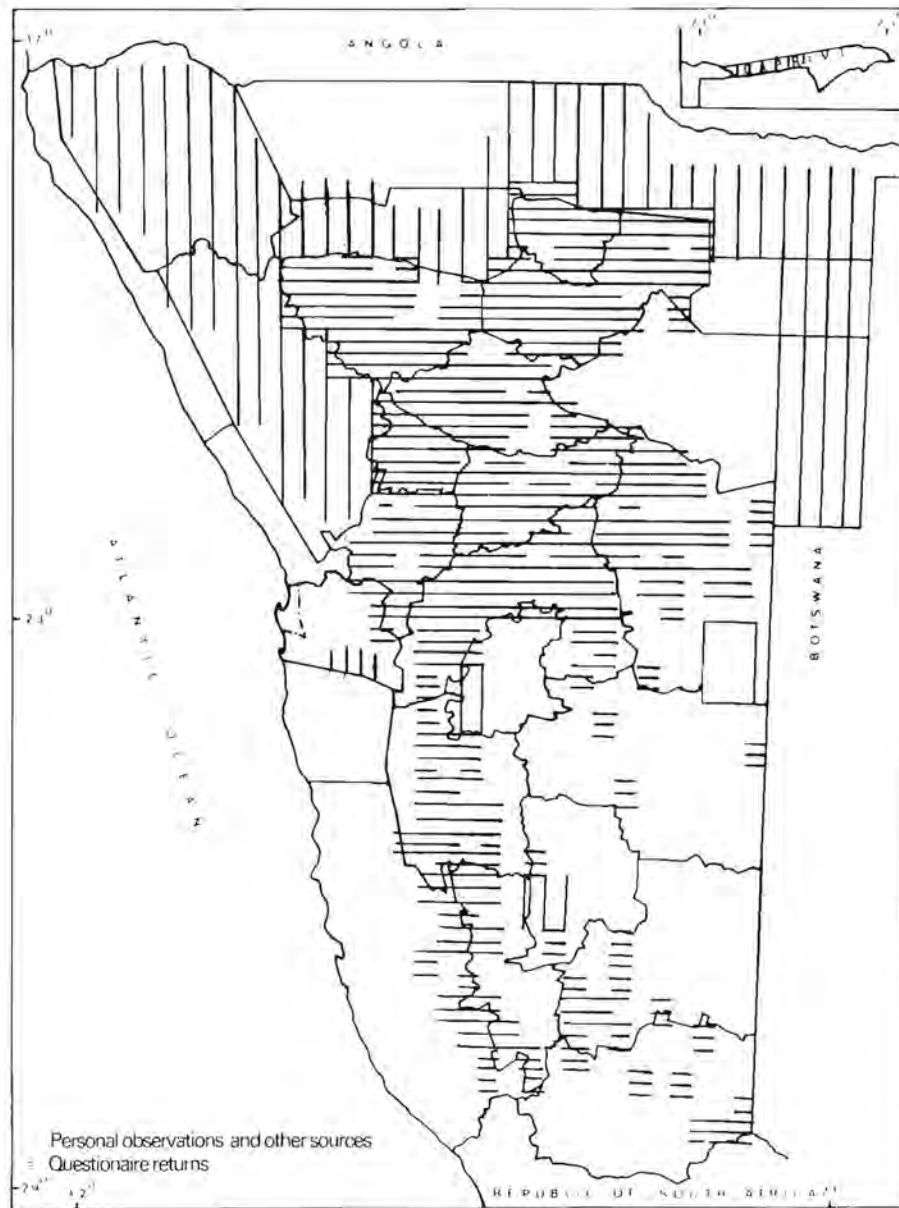
Map 30: Redbuck



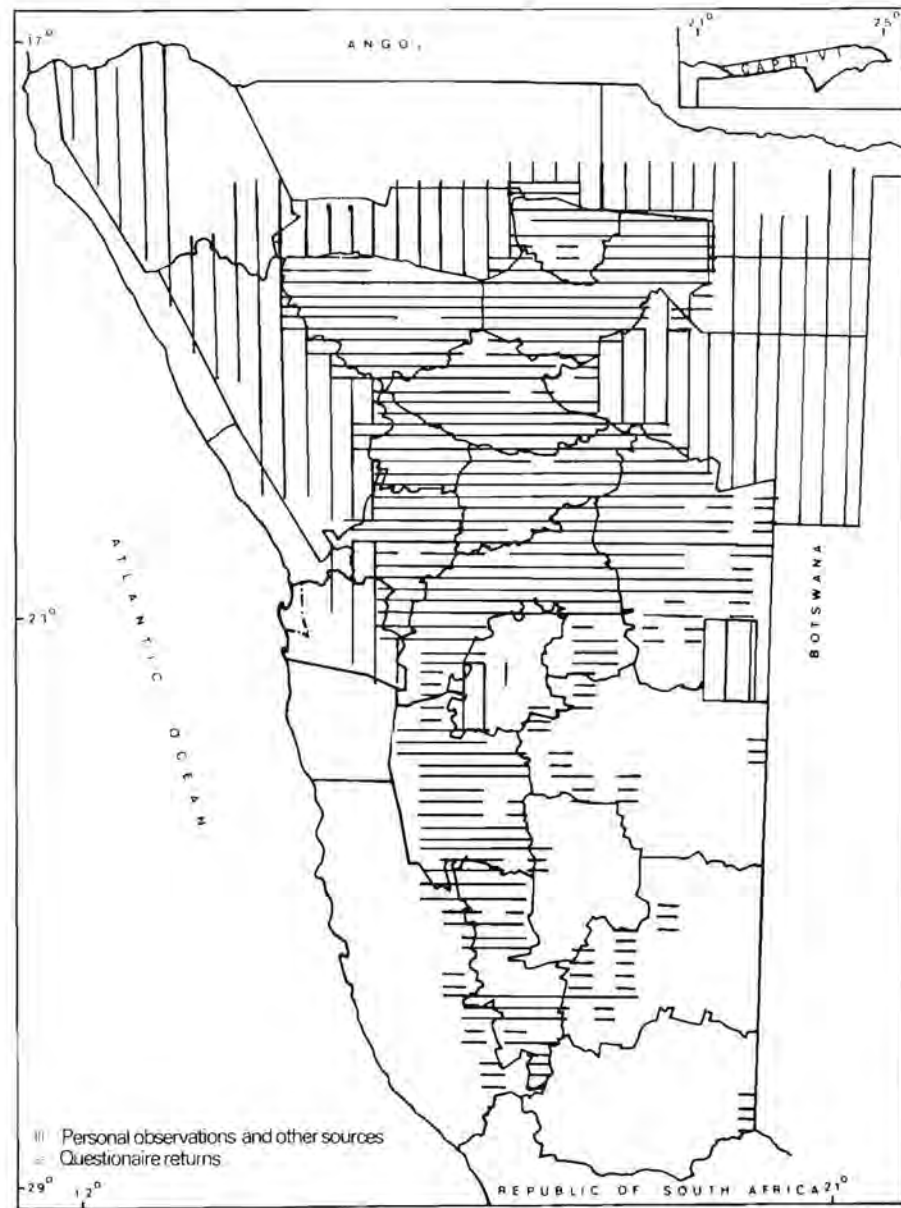
Map 31. Lechwe



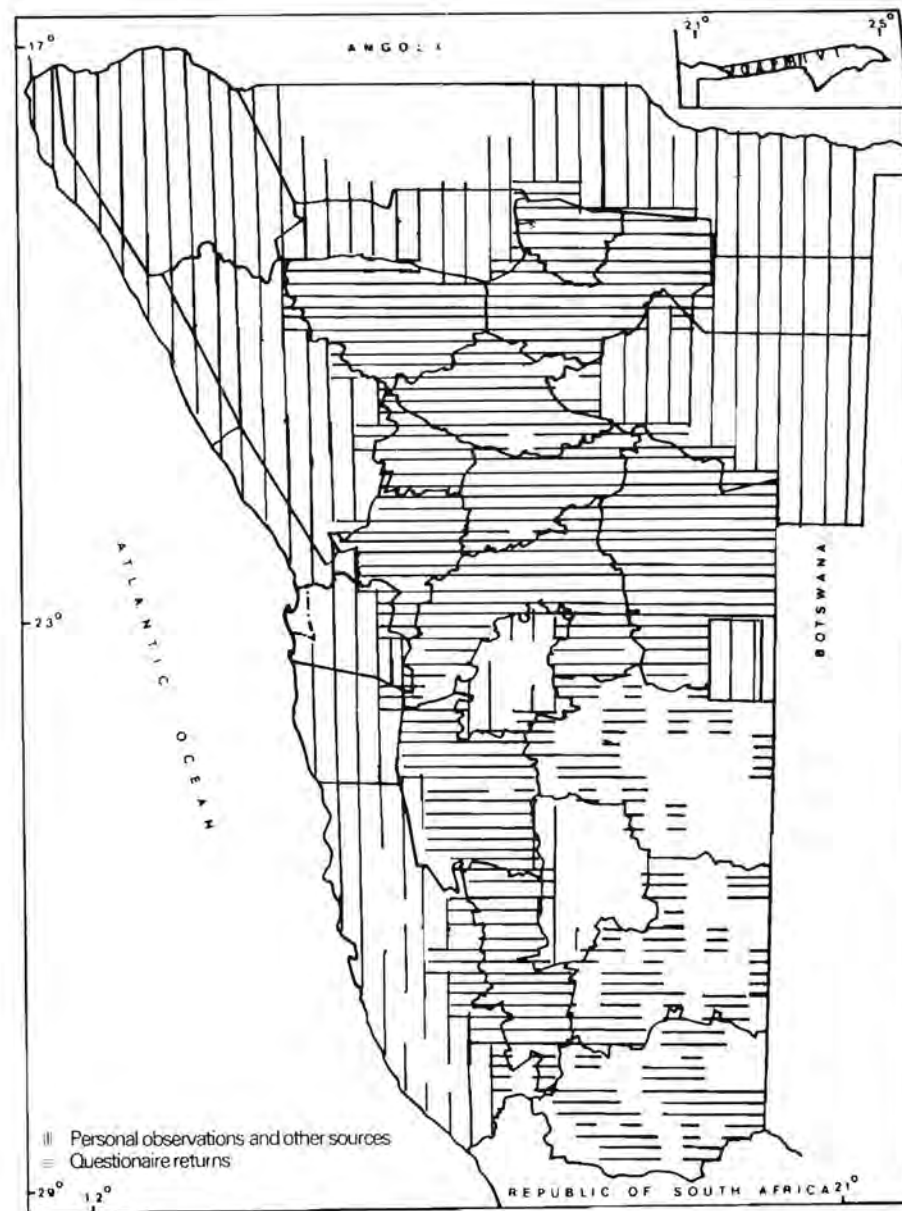
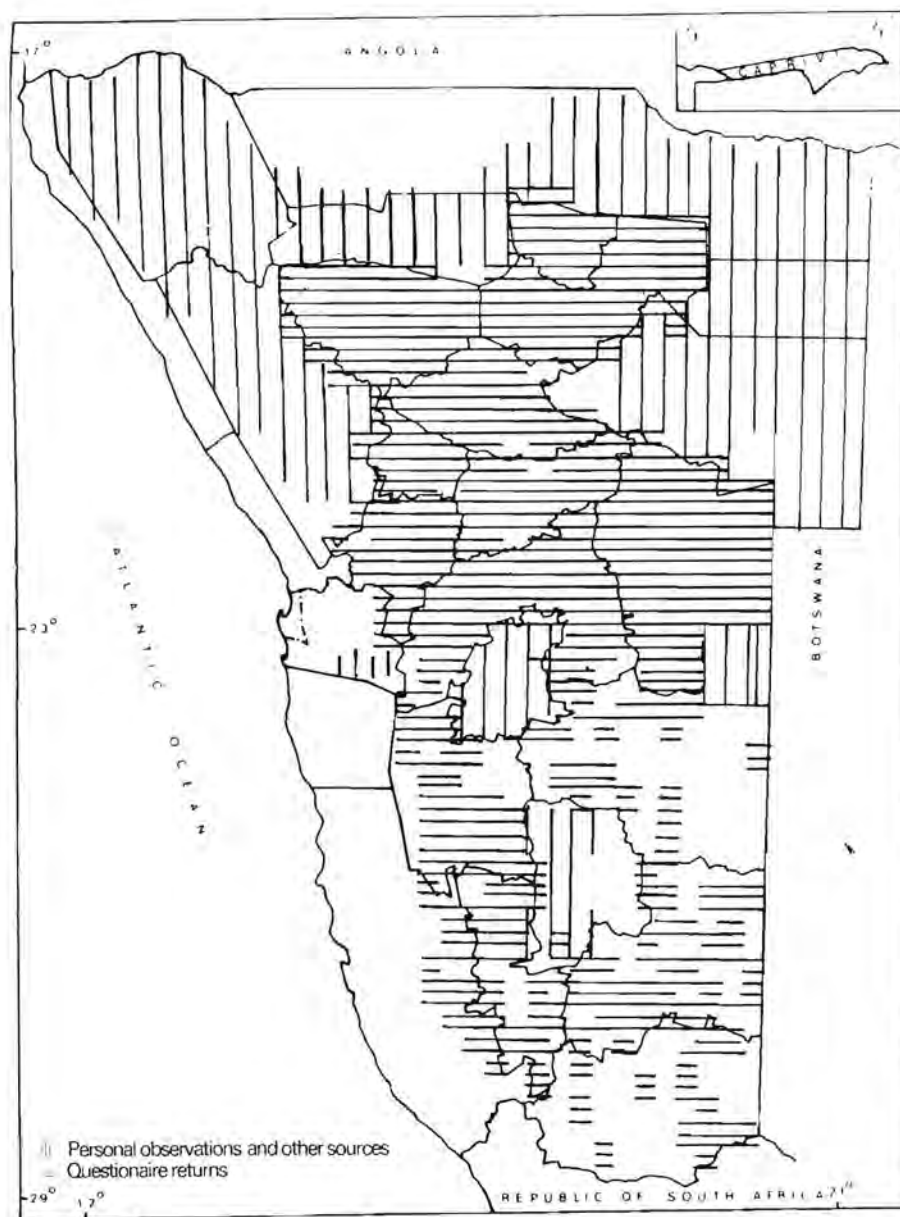
Map 32. Nammas

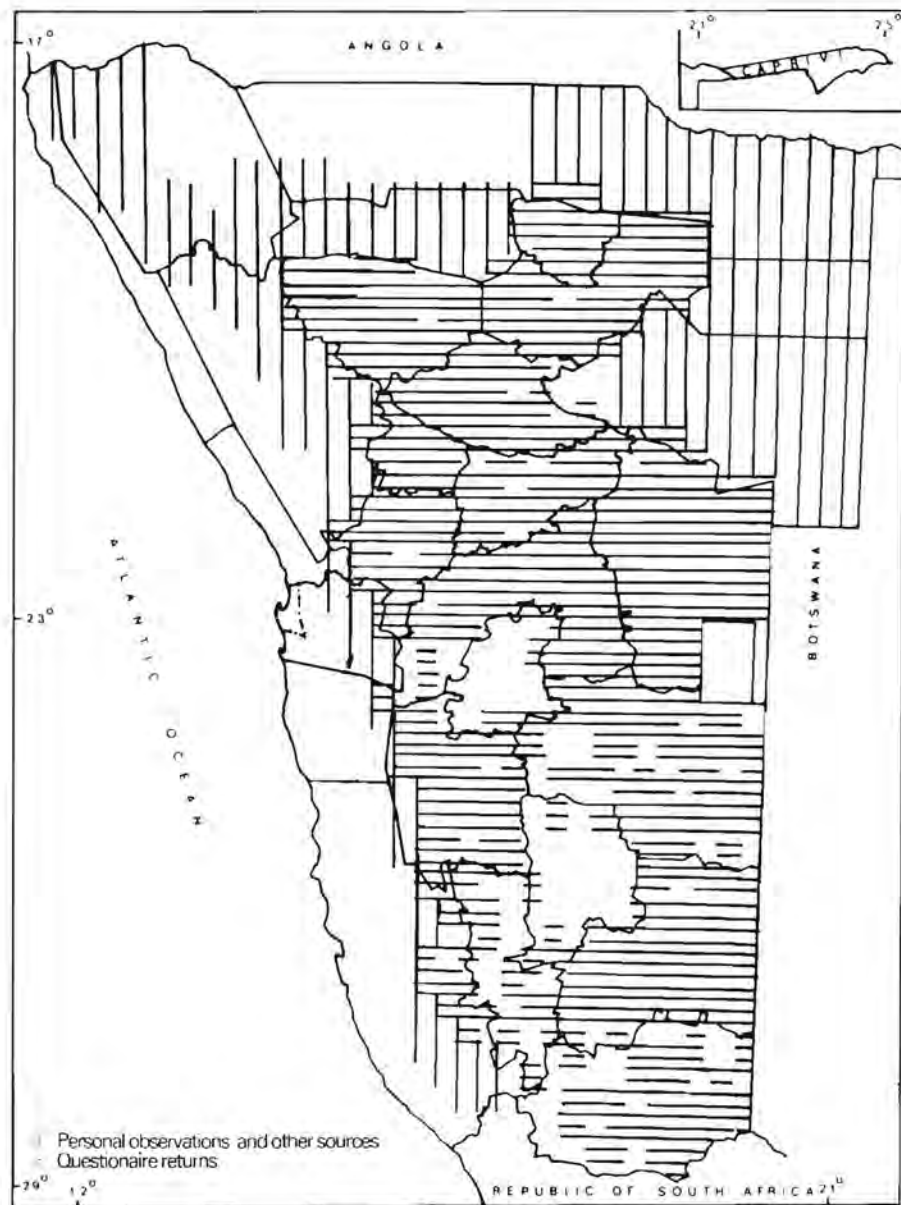


Map 33. Leopard

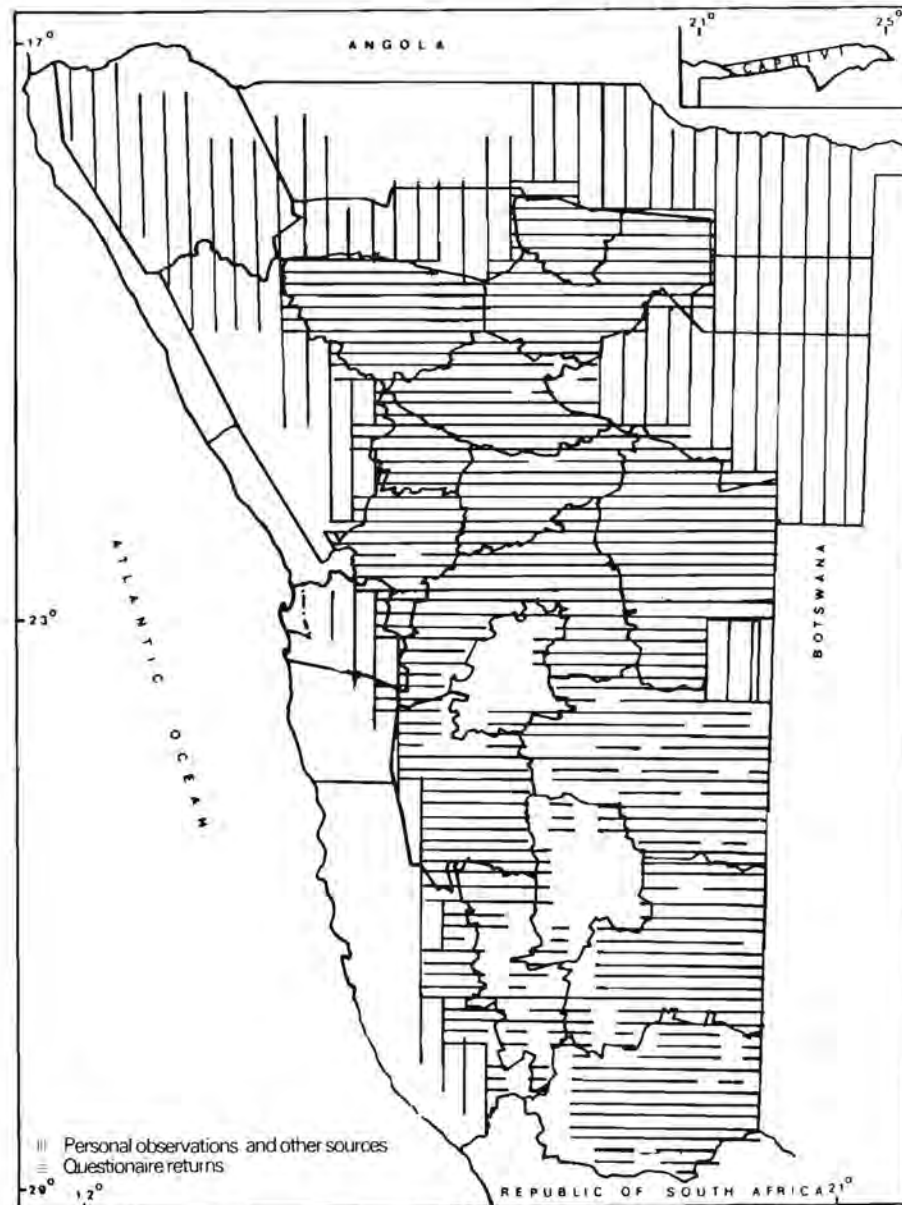


Map 34. Cheetah





Map 37. Silver fox.



Map 38. Bat-eared fox.