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The Lammergeyer

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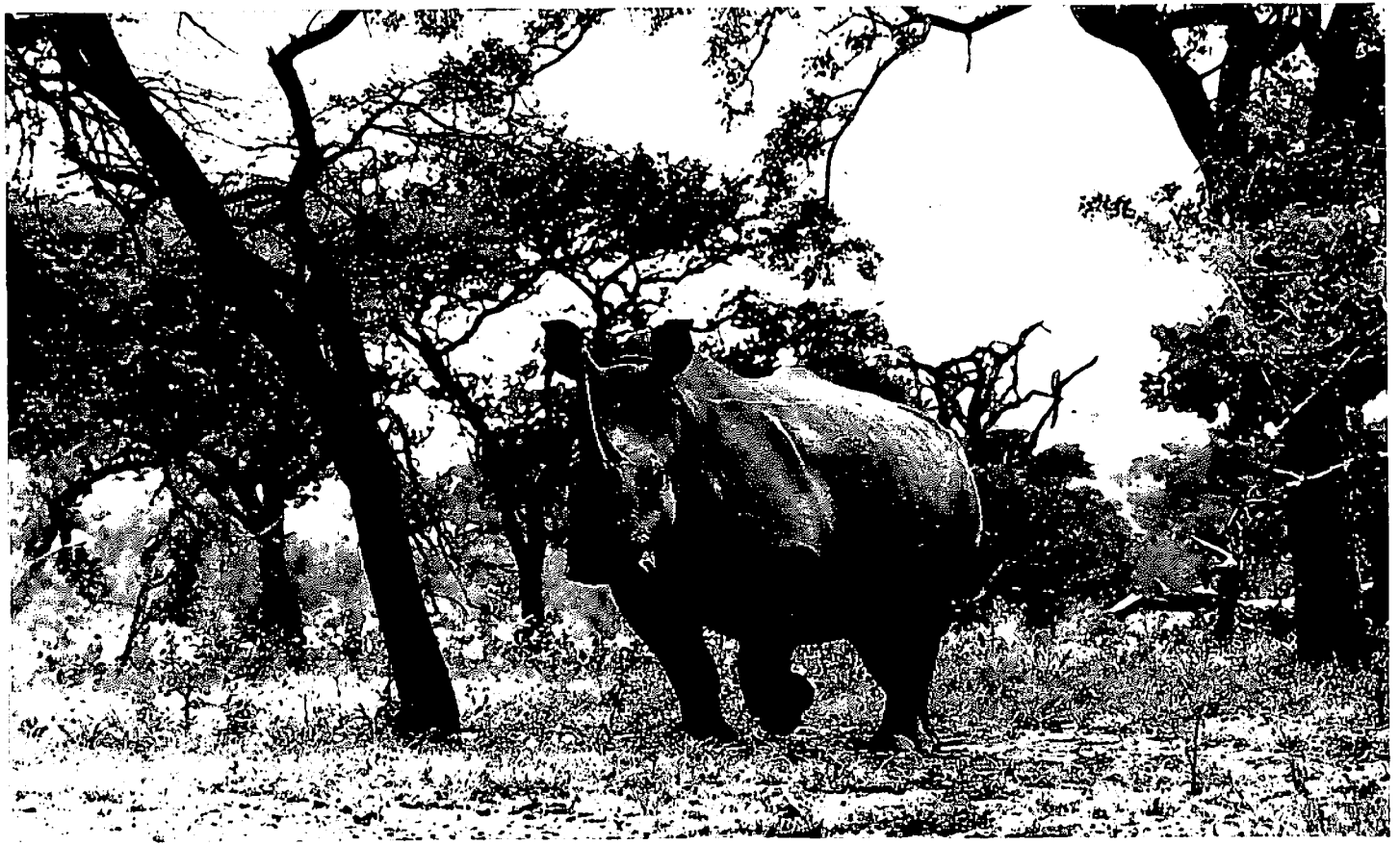


Photo: Dick Wolff

INTRODUCTION.

The Natal Parks, Game and Fish Preservation Board is the authority entrusted with the care and control of the twenty-three Game Reserves, Nature Reserves and National Parks, at present proclaimed within the Province of Natal, which includes Zululand.

Necessarily the Board has a considerable staff of officers in the field, the majority of them permanently and fully occupied with some aspect of wild life management. These officers include not only wardens and rangers, but also ecologists and other scientific workers, and as might be expected, from the very nature of their duties, observations of great natural history interest and considerable biological significance are of daily occurrence to many of them.

It is also pertinent that several of the Board's officers quite apart from their duties, are engaged upon investigations of their own choice; usually into the life histories of those wild creatures which most interest them. In addition to all these more casual observations there are, of course, vital researches of an ecological nature constantly being undertaken.

The Natal Parks, Game and Fish Preservation Board was promulgated in 1947, and ever since its inception a need has been clearly evident, for some medium wherein the more scientifically interesting reports and observations of its field officers could be published and permanently recorded. Time, however, has been the one thing most difficult to find during these years of progress and development, and neither opportunities nor staff have hitherto been available for the introduction of the necessary journal.

This first issue of "The Lammergeyer", therefore, represents the fulfilment of ambitions that have extended over many years, and it is hoped that the journal may now grow and develop into one with a reputation for wild life data of real value and interest.

The ornithological title that has been chosen, results from the fact that several pairs of the now rare *Gypaëtus barbatus meridionalis* occur within the Board's mountain reserves, on the upper slopes of the Quathlamba Drakensberg. These birds never fail to excite the admiration of all those who have the good fortune to see them, and the Board's rangers consider it is one of their special responsibilities to ensure the future safety and survival of these magnificent avians.

So far as mammals are concerned, the choice of a species to be regarded as the Board's most important care is manifestly an easy one. It falls, of course, upon the large typical race of the Square-lipped Rhinoceros *Ceratotherium simum*, which is found only within a somewhat restricted area of Zululand, under the Board's control. For this reason it was decided that the first issue of the journal of the Natal Parks, Game and Fish Preservation Board would be largely devoted to two papers on this huge beast, of whose biology, in spite of its massive bulk and prominence in the field, really very little is known or recorded.

The first paper represents the most up-to-date information

available on the rhinos, compiled by two of the Board's field officers who continue their researches and will doubtless contribute much more of value on the biology of these rare mammals as the journal progresses.

The second paper is from the pen of one of Zululand's pioneers, who completed it only a few months prior to his leaving the Board's service in 1956. Mr. Foster had been living uninterruptedly for nearly forty years among the Square-lipped Rhinos in the Umfolozi Game Reserve. For most of this time he was employed by the Division of Veterinary Services, and occupied with anti-Nagana research measures. When he retired from the Division, however, he remained on in the Reserve as Game Supervisor for the Natal Parks Board, and was able to pass on to his younger brother officers much of his great knowledge and love of its wild life.

It is hoped that a later issue of the journal may contain the only other paper written by the late Mr. W. E. Foster, which deals with the interesting history of the Umfolozi Game Reserve area.

The time and opportunities already referred to in these introductory notes are still by no means all that the editor of any journal might wish, and for the present it is intended that "The Lammergeyer" will not be published so much at regular intervals, as when adequate material is available to ensure a satisfactory issue.

J. VINCENT

Director of Wild Life Conservation in Natal

NOTE:—In the above introduction it has been mentioned that the Natal Parks, Game and Fish Preservation Board controls 23 Reserves. It will be noted that the map of Natal inside the back cover shows 25 such Reserves. The explanation is that the map will have further uses and two new Reserves will be proclaimed very soon after the publication of this journal.

A PRELIMINARY REPORT ON THE SQUARE-LIPPED RHINOCEROS *Ceratotherium simum simum.*

by I. C. PLAYER and J. M. FEELY.

Introduction.

All recent accounts of the Square-lipped Rhinoceros are compiled from early sources which are no longer relevant, except in a historical context. The best compilations of this sort are to be found in Shortridge (1934) and Harper (1945). Both these studies, however, contain only general data on behaviour and, though the authors are very much aware of the imperfections in this paper, it was decided to bring together what knowledge has been gleaned during five years work in the present rhino habitat. It was also felt that a new account of the status and the management problems of the species is needed. Most urgent, it is believed, is that the very grave dangers facing the rhino in its battle to survive should be made known.

For the sake of completeness, sections on history, nomenclature, and the status of the Northern race have been included. This information has been gathered from published sources and personal communications. Furthermore the advice and information so willingly given by the following persons has been invaluable:—

The late Mr. W. E. Foster,formerly Game Supervisor, Umfolozi Game Reserve; Mr. R. Owen, formerly of the Uganda Department of Game and Fisheries; Mr. C. J. Ward, Ecologist of the Natal Parks, Game and Fish Preservation Board; Ranger K. Tinley and Ranger H. R. Dent; and last but certainly not least to Head Game Guard Maqubu Ntombela who has lived and worked among the rhinos continuously for the past forty-two years, and whose observations we have found to be unimpeachable. His knowledge of the rhinos is both detailed and encyclopaedic and his help in the field has been of quite incalculable benefit to our understanding of the animal and its environment.

Finally, the publication of this paper has only been made possible through the encouragement and assistance of Colonel J. Vincent, M.B.E., Director of Wild Life Conservation in Natal.

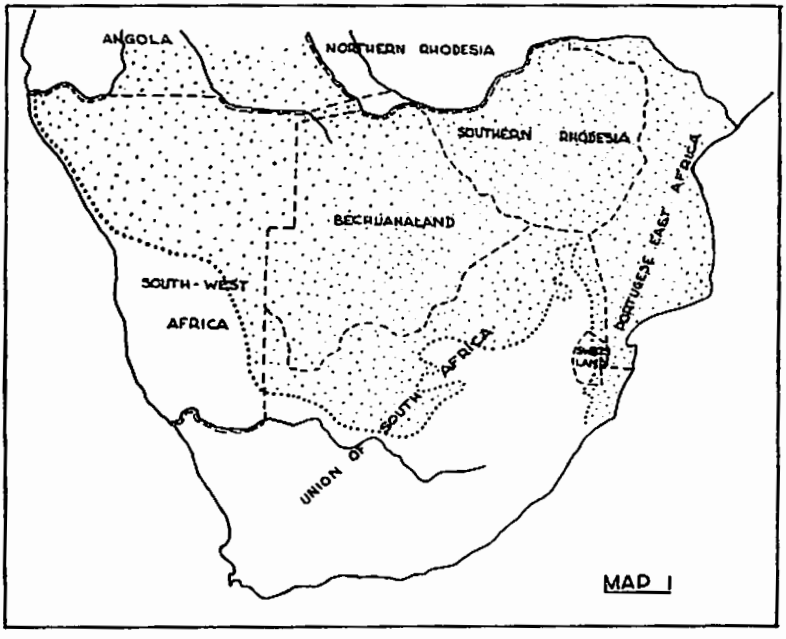
Distribution.

The accounts of the explorers and hunters of the last century —particularly F. C. Selous (see Shortridge, 1934 and Harper, 1945) —all bear out the supposition that the original range of the Square-lipped Rhino coincided with the distribution, before the advent of the European, of those veld types classed together as Bushveld (see Map 1 in Acocks 1953 and Wellington 1955). The northern limits of the distribution in Angola are not known, but it only certainly occurred between the Cunene and the Chobe rivers. Eastwards it did not range north of the Zambezi at any point. Ansell (1959) has indicated that the species is likely to have occurred in the extreme south-west of Barotseland (Northern Rhodesia),

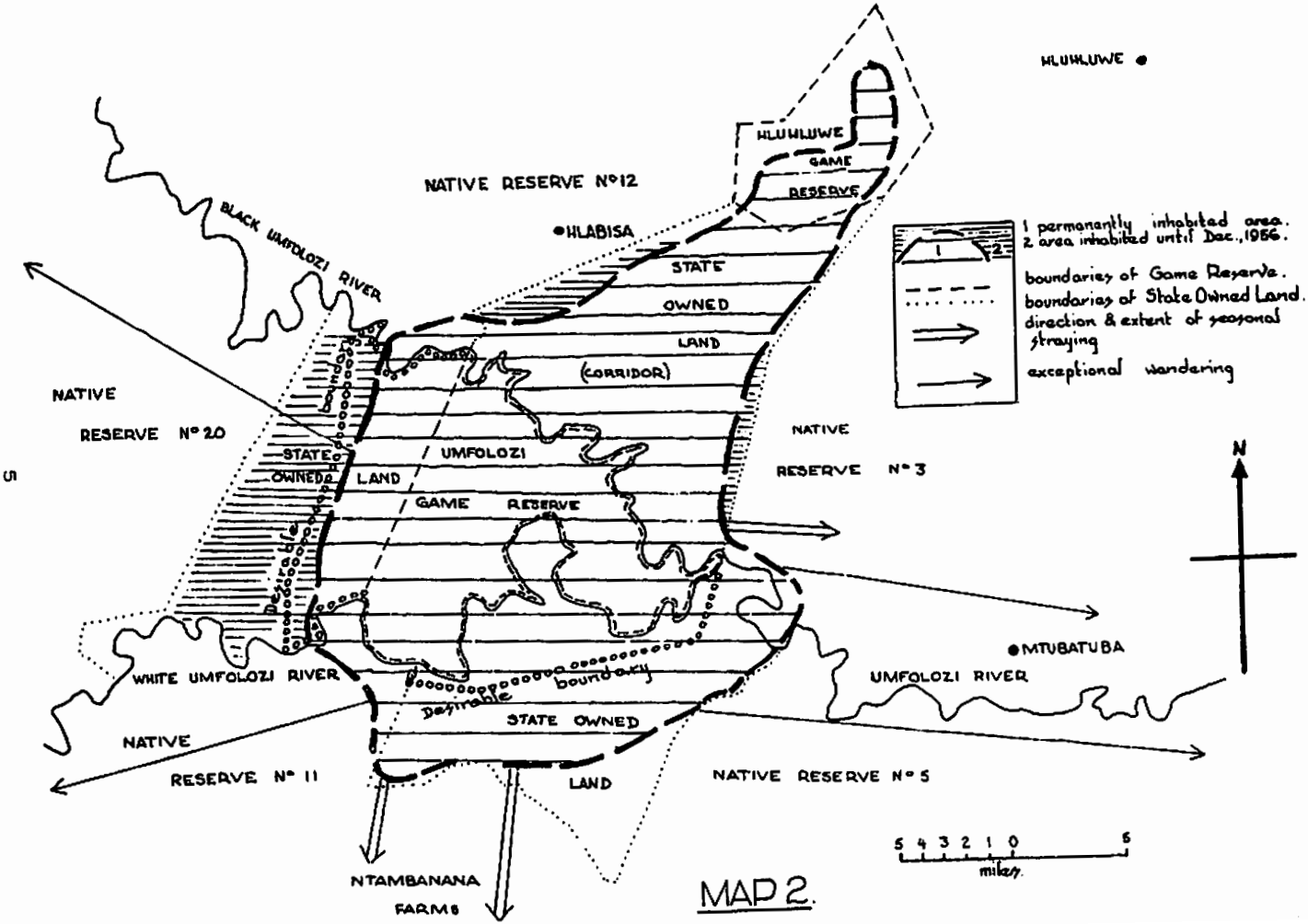
in the country between the Mashi and the Zambezi rivers, even during historical times. There are no ecological or other reasons to doubt this supposition.

The Southern limits were apparently those of the Bushveld, except in the eastern coastal areas where it had certainly not gone any farther south than the Umhlatuzi river (Zululand) when it met the European. Baldwin (1855), the first European to discuss game animals in detail in Zululand, records that he first met this rhino between the Black and the White Umfolozi rivers. It appears that his route led him more or less along the present western boundary of the Umfolozi Reserve through range known to have been the most densely populated for at least the past sixty years, and there is no reason to doubt that this situation pertained a century ago. (Baldwin's route in this area has been worked out by Foster—1954 unpublished mss.)

This distribution pattern is paralleled by many other mammals as well as by many birds. There is no evidence that the species permanently resided in the purely grassland areas of the high plateau in the Orange Free State and the Transvaal or that it occurred south of the Orange River. The putative distribution of this Rhino *circa* 1800 is indicated in Map No. 1.



Almost from the time of Burchell's description of the species from Kuruman in 1812 its elimination from its extensive range began. This coincides with the coming of fire-arms in the hands


HLUHLUWE
HLUHLUWE GAME RESERVE
NATIVE RESERVE N°12
HLABISA
BLACK UMFOLOZI RIVER
STATE OWNED LAND (CORRIDOR)
1 permanently inhabited area.
2 area inhabited until Dec., 1956.
boundaries of Game Reserve.
boundaries of State Owned Land.
direction & extent of seasonal straying
exceptional wandering
NATIVE RESERVE N° 20
STATE OWNED LAND
UMFOLOZI GAME RESERVE
NATIVE RESERVE N° 3
N
MTUBATUBA
WHITE UMFOLOZI RIVER
Desirable boundary
UMFOLOZI RIVER
STATE OWNED LAND
NATIVE RESERVE N° 11
NATIVE RESERVE N° 5
5 4 3 2 1 0 5
miles
NTAMBANANA FARMS

MAP 2.

of the European hunters, who increased rapidly in succeeding years. These more potent weapons were quickly obtained by the Natives, thus hastening the process. By 1880 the species had disappeared from the Northern Cape Province, South West Africa and Bechuanaland. In 1896 it had become extinct in the Transvaal and Southern Rhodesia. At the turn of the century only a few bleached skulls remained in Portuguese East Africa. In eighty years it had been reduced to its present territory where it was from then on protected. This rapid extinction appears to have been the result of the low reproductive replacement rate combined with a sudden increase in mortality. Even a small increase in mortality in a species with these characteristics is sufficient to reduce its population to a point where it naturally dies out. That the mortality due to man was not negligible is made quite clear by the very few hunters who put pen to paper, recording for instance the destruction of eighty animals by two men in one hunting season alone, or the slaughter of eight at a water-hole in a single day. Ansell (*op cit.*) quoting Clay (*in litt.*) records that one European trader in Southern Rhodesia, on the Bechuanaland border, employed some 400 Native hunters in the years around 1890, and the rhinos were exterminated in a very considerable territory through his agency alone.

Apart from the sheer love of killing ingrained in most Europeans there were four attractions about the species to hasten its end; it was easy to approach and kill, the flesh was highly esteemed for its tastiness, the skin was prized for the making of whips and the horns were of value overseas. How it survived at all is difficult to tell.

The last of the Southern Square-lipped Rhinoceros are now confined to the Umfolozi Game Reserve, the unoccupied State-owned Lands adjoining, the Hluhluwe Game Reserve and in small corners of neighbouring Native Reserves (see Map 2). Straying to the south is a seasonal occurrence and also less regularly to the west and east. The total area of inhabited range was until the middle of 1957 about 232,000 acres. This range has in subsequent years decreased by some 20,000 acres because of disturbance by Native squatters illegally occupying the State-owned Land. Of the 212,000 acres now inhabited, 92,000 are proclaimed Game Reserve containing about half the present population. The use to which the remaining vacant State-owned Land is put will determine the fate of the species in its natural state in Southern Africa.

Physical Characteristics.

The general appearance of the species is well illustrated in the accompanying photographs. In the field the following characters distinguish it from the Black Rhino, the first three being visible at a considerable distance:—

(1) prominent hump between ears and shoulders,
(2) head relatively longer,
(3) normal position of head, i.e., with mouth to ground,
(4) lips wide and straight-edged (hence the name),
(5) base of the anterior horn straight-edged in front.

(6) greater overall size of adults,
(7) ears relatively larger, and prominently tipped with hairs.

The colour of both species is similar and depends on that of the mud last wallowed in. Generally they are dark grey. All mounted specimens seen in South African museums are far browner and darker than the living animal. There is no reliable evidence on the origin of the name "White Rhino", although many writers have speculated widely. It seems generally accepted that the first use of the term "White" to distinguish this species was by Boer hunters who called it in Afrikaans "Witrenoster". This was merely translated literally to produce the English equivalent. Some say that the first animals seen had been wallowing in whitish clay, which is perfectly feasible, or again others, more fanciful, derive the use from some supposed better reflecting ability of the skin when seen with the setting or rising sun behind the observer. These suppositions are entirely conjectural, and it is here considered more appropriate that the term be dropped altogether from the proper name.

The characteristic hump on the top of the neck is formed by muscular and epidermal tissue and is not supported by bone. It is in fact analogous to the hump of Zebu or Brahman cattle. After death it decomposes very quickly and is not therefore prominent on a carcase.

It is doubtful whether this species is larger than the Indian Rhino *Rhinoceros unicornis*. The largest adults known, have measured six and a half feet at the shoulder, but the majority are some ten inches shorter. The estimated weight of a big adult is about five tons, but three tons is probably an average weight. The longest anterior horn recorded for the southern race is 62¼ inches, collected by R. Gordon Cumming, but the usual length of adult horns is between two and three feet. Occasional animals have the anterior horn pointing at an acute angle forwards so that with the head held in its normal position it is parallel with the ground. No individuals have ever been recorded with more than two horns, but it is not uncommon to find an animal with either the anterior or posterior horn missing or broken short. The posterior horn is nearly always much shorter than the anterior.

The hearing and eyesight of rhinos is poor but the sense of smell is acute, and it is most probably olfactory stimuli which make up the greatest part of the animal's external world. The first two senses appear only to be used as range and direction finders at short distances. The poor visual capacities are, however, well balanced by the excellent eyesight of the Red-billed oxpeckers *Buphagus erythrorhynchus* which usually acompany rhinos. It is possible for a man to get within six feet of the animals unnoticed, and even to touch a sleeping animal, but if downwind a human is detected at least 800 yards away. This ease of approach, together with its timidity, renders the species perhaps the most suitable of all big game to study. It should be added that the eyesight of young calves is far keener than that of the adult animals.

Growth Rate and Development of Young.

Knowledge of the growth rate and development of the young rhinos is confined to the studies of Bigalke *et al* (1950) and Bigalke (1947) on the young captive female, "Zuluana" in the National Zoological Gardens, Pretoria.

At six days this animal was 23.4 inches high at the withers and weighed 105¼ lbs. At eighteen months she had grown to 39.1 inches high and weighed half-a-ton (1013 lbs.); her anterior horn had grown from 0.1 inches to 3.2 inches. If a percentage growth rate curve is computed from Bigalke's data it appears that this rate increases during the first 150 days (5 months) while thereafter it declines. This applies to the parameters of weight and height.

It is interesting to note that the nuchal hump develops from three separate epidermal callosities which fuse at about six months, though the three-lobed origin is still indicated by two transverse grooves. This can be observed in the field in nearly all individuals of whatever size. Field observations also indicate that the nuchal hump is larger in the summer months than in the winter period.

The order of eruption of the deciduous teeth as recorded for the first 18 months is as follows:

0-46 days:	no teeth	
47 days:	3rd lower premolars	
48 days:	3rd upper premolars	1½ to 2 months
53 days:	4th lower premolars	
58 days:	2nd lower premolars	
60 days:	2nd upper premolars	
110 days:	4th upper premolars	2½—3 months
357 days:	1st upper premolars	(left side)
382 days:	1st lower premolars	
403 days:	1st upper premolars	(right side)

No deciduous molars appear in the first 18 months. The permanent dentition is: 4 upper and 4 lower premolars, 3 upper and 3 lower molars. Canines and incisors are completely absent at all ages. In the northern race sexual maturity is attained some while before the loss of the deciduous molars (Pitman, 1931), in the southern form we have regularly observed what are judged from height to be young cows accompanied by calves at least three years old.

The hooves of new-born rhinos are wide, thick and black, but are worn down and replaced by new, permanent hoof nails. This process is completed earlier on the forelimbs than on the hind. The ages at which these processes are completed are:

foreleg, middle hoof nail—281-282 days.
hindleg, middle hoof nail—358-371 days.

The nails are not the only dermal structures to be replaced after birth for the outer, horny layer of the skin is shed over the head and body between 1½ and 4 months. The new outer layer is much paler than the old skin and produces a marked piebald appearance until the "moult" is completed. Another "moult" of

the horny layer occurs at about 10 months. It is interesting to note that whenever a rhino dies the hyenas start eating the hooves before any other part of the body.

Although adult rhinos can be said to be generally hairless, apart from the ear and tail tufts and the modified hairs of the horns, hair is distributed overall up till the age of 4 months, during which time it is obvious, and can still be observed on the back and sides of the body as late as 15 months. During the earlier period, hair is particularly noticeable at the base of the toes, extending up to the lower forward surface of the limbs.

Bigalke (1947) gives some excellent photographs of the six-day old female.

Numbers and Counting.

Following is a summary of counts and estimates of the population in and around the Umfolozi Game Reserve.

1920 (Kirby, 1920): estimated about 20.

1929 (Lang, in Shortridge, 1934): count of 120, 150 thought possibly to exist, only counted within the reserve.

1930 (Warren in Shortridge, 1934): thought 50 might still remain; not based on first hand knowledge.

1932 (Kluge, 1950): count of 220.

1936 (Kluge, *loc. cit.*): count of 226.

1948 (Kluge, *loc. cit.*): first count, 343 adults, 144 immature, total of 487. Second count 396 adults, 158 immature, total of 554.

1953 (Natal Parks, Game and Fish Preservation Board, 1956): aerial count of 437, estimated 10% not seen, plus 25 animals north of area counted giving possible total of 506.

1959 (*unpubl. rept.*): aerial count of 567 in the area south of the main Mtubatuba-Hlabisa road, of which 86 were calves of 1-3 years old. In the area to the north of the road a further 40 probably occur at the least.

In 1956 a further aerial count was attempted but was obviously very inaccurate since it was carried out after the deciduous trees had come into leaf, obscuring much of the ground. All counts prior to 1953 had been carried out from the ground and had the following disadvantages:

(1) a very large number of personnel was required,

(2) a week was needed to cover the whole area,

(3) considerable disturbance of the animals was unavoidable.

Counts from the air are undoubtedly the most efficient, if the following requirements are present: (1) they must be conducted when all deciduous trees are bare. (2) they should only be done during the first three hours after sunrise, (3) there should be little or no wind, (4) the type of plane used must have as low as possible a cruising speed and the observer's seat should be next to the pilot's and not behind it (even more suitable would be an observation panel in the floor of the plane), (5) only one counter should be

used to obviate duplication, and (6) while counting the plane should not fly at over 500 feet above the ground.

It is probable that Kirby's estimate was too low. Warren's figure is undoubtedly incorrect. The subsequent counts may reflect the position well enough. The 1932 and 1936 counts were made during and shortly after an extraordinarily severe drought period when over 100 rhinos are definitely known to have died. It is the opinion of Head Game Guard Ntombela that in the years 1918-1930 rhinos were more numerous than they are now. Kirby was also well aware of the probable numbers, but it is obvious that in the face of violent and savage attacks on game and game preservation he resorted to considerable exaggeration in making a conservative estimate of the population in order to justify the retention of the Umfolozi Game Reserve. For many years afterwards he stuck to this figure even under virulent criticism subsequent to Lang's counts. It may well be that the present existence of the reserve and a fairly healthy rhino population size is due largely to the courage and wiles of Vaughan Kirby, much as one would wish to know, however, what he actually estimated the population to be.

Although the 1956 attempt was abandoned it was clear that the centres of maximum density near the centre of the game reserve had shifted westwards since 1953 and extended over the western boundary. This has altered completely the proportion of the population outside the reserve as compared with the previous count. As can be seen from the details below even in 1953 a considerable proportion of the total was on Crown Land or Native Reserve. The first aerial count of 437 was made up as follows:—

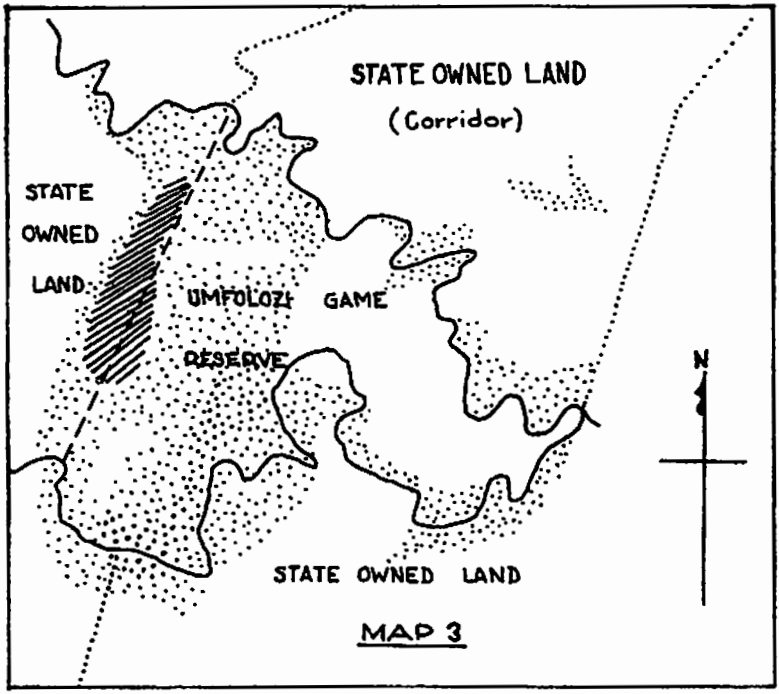
Umfolozi Game Reserve: eastern section ..	33
Umfolozi Game Reserve: western section ..	236 (269)
Crown lands: "Corridor" (only half covered) and Hluhluwe Game Reserve	28
Crown Lands: west of Umfolozi Reserve	56
Crown lands: south of Umfolozi Reserve ..	32
Native reserves, unoccupied portions	52 (168)

Map No. 3 indicates the centre of maximum density in 1956 based in part on aerial count and also on ground patrols, subsequent ground observations do not indicate that the situation has changed much to date (June, 1958). Map No. 3 also indicates the areas where rhinos are now at least one per square mile. The highest densities recorded over short periods (always in the same area) are between 30 and 42 per square mile. It is frequently possible to travel along a certain route through the highest density area and see over 60 animals within five or six miles, all of which would probably be in the western Crown lands.

Habitat.

The present range includes the Zululand Thornveld and Lowveld types of Acocks (1953). A wider range must formerly have been inhabited though all were probably forms of Bushveld.

Grass is the primary necessity and it is the quality of the grazing that determines the density of the population in any area. There are, however, three other factors which are habitat determinants:— water, cover and topography. Water is essential throughout the year and during the hot months at least, must also be available in the form of mud for wallowing. Cover, in the form of clumps or more extensive zones of thick bush is necessary, to provide relief from the extremes of heat or cold, and windy conditions. Cover is also required by females giving birth and during the first few months of the life of a calf. All these factors must be suitably interspersed, though on a larger scale than with smaller animals.



MAP 3

Steeply undulating country is never permanently inhabited, though it will be crossed. This appears to be the only reason for the scarcity of the species in the Hluhluwe reserve.

The majority of the rhinos inhabit an area which has been altered by man in the recent past to a considerable degree:
(1) All the country south of the Hluhluwe reserve was most effectively cleared of all other game mammals during the game extermination campaigns carried out from 1916 till 1952. The "Corridor" has within the past three years been repopulated considerably, but farther south the increase has been very gradual with only certain species such as Warthog, Bushbuck and Grey Duiker being relatively successful. Prior to 1924 Zebra, Blue Wildebeest and Buffalo

were particularly numerous south of the Black Umfolozi River.
(2) A broad belt between two and three miles wide is cleared of all trees and shrubs along the southern edge of the rhino range and the western edge of the Umfolozi Reserve. This clearing was a tsetse fly control measure.
(3) Elephant have been extinct in the range since 1865, lion since 1916, cheetah and hunting dog since 1928, and eland since 1880. Giraffe had certainly disappeared before 1900. These species must have had not only considerable direct but also indirect effects on the rhino's environment.

Food.

The Square-lipped Rhino has only been observed to eat various grasses, in distinction to the Black Rhino, which is a browser. Although the dominant grass species throughout the range is *Themeda triandra* (rooigras, insinde) it is not preferred except when regenerating after a fire when many normally untouched species are also indiscriminately grazed, or during drought. The most frequently eaten grasses are certain "sweet" species of *Urochloa*, *Panicum* and *Digitaria*. These grasses are shade tolerant and more resistant to disturbance than *Themeda* and assume dominance over the latter under such conditions. Rhinos do not occur, except in passing, in areas where rooigras forms a continuous cover during years of good rain. Since this condition pertains in the very open country, the animals are usually found in woodland or denser forms of forest where the preferred grasses are most abundant. In the bush-cleared strip where the original understory grasses have remained, despite the lack of shade, many rhinos occur at times when cover is not needed. Since the greatest densities of population are drawn to areas where the grass succession is being reversed by the spread of forest, and thus hasten this process by heavily concentrated grazing and trampling, it is not surprising to learn that the western portion of the reserve is now more densely wooded than it was thirty years ago. Uncontrolled burning has also hastened the process and the only limiting factor has been the elimination of all other grazing mammals. The elephant probably played a most important part in keeping the trees from assuming complete dominance. These processes present the most serious problems in the management of the area for the benefit of the rhino since they indicate the utmost necessity of enlarging the permanent sanctuary to include *all* the area at present inhabited. It is not possible now to contract the population into any smaller area without jeopardizing its future. Since such a process is in fact being carried on by illegal infiltration of native squatters at a rapid rate in the most vulnerable area, i.e. adjacent to the maximum population density area, it is absolutely vital that revised boundaries to the sanctuary be *immediately* proclaimed.

Water.

The use of water by rhinos is two-fold: for drinking and as mud for wallowing. Rhinos appear to drink once a day, though they

can probably do without it for two days. They drink mostly at night during the winter and at all hours of the day during summer. During the rainy months, October to April, water is plentiful throughout the range, but in the dry winter season it is found only in the two rivers and at three other points in the area. In drought years the White Umfolozi dries up completely on the surface. Four artificial waterpoints are maintained throughout the year under all conditions. Much of the water in the area is very brack, particularly that in the streams (generally seasonal), but is readily drunk. The brack water is vital to the rhino's health for there are no salt-licks in the reserve.

During the rainy season water collects in any hollows and small pans. These are resorted to daily in hot weather for wallowing The heat regulatory system of rhinos consists of highly vascular sub-cutaneous tissue which can only be cooled by contact with an external coolant, there being no sweat glands to reduce the temperature by evaporation of a bodily produced liquid. Wallowing in mud acts primarily as a method of heat regulation and probably also confers some degree of sensuous satisfaction. This behaviour undoubtedly is of great importance in the prevention of physiological stress, and should be taken into account when the species is kept in captivity in a hot climate. Rhinos seldom wallow in either of the two rivers or in sandy streams. On hot summer days they will lie in shallow portions of the White Umfolozi river which is comparatively free of crocodiles. They have never been seen to lie in the Black Umfolozi river, which has a high crocodile population. During the summer months the rhinos are also frequently encountered lying on the hot sands of the river banks, in the early mornings. Many Water Tortoises occur in the pans and they have recently been noticed pulling ticks off the rhinos lying and wallowing in the muddy water. Similar observations were made when Black Rhinos and Warthogs were wallowing. The tortoises appear to be so anxious to get at the ticks that they will cross from one side of a pan to another just as soon as a rhino begins to wallow.

General Notes on Behaviour.

Most of the rhino's time is taken up with feeding, and this is only stopped by certain weather conditions for any length of time. In hot sunny weather the animals retire to wallow and then sleep in nearby shade. Under such conditions they are most inconspicuous by about three hours after sunrise. An hour or so before sunset they bestir themselves and start feeding again. Cold and/or windy conditions also drive them into cover where they will stay throughout the night if need be. On a warm windless day, whether overcast or raining or fine, they will feed continuously. In both summer and winter they have sand baths. During summer this usually takes place after wallowing. In the winter sand-bathing tends to replace wallowing.

Rhinos generally sleep on their bellies, occasionally lying on their sides or standing up. When rising from a lying position they get on to the fore-legs first.

When in a hurry the usual gait is an extraordinarily rapid and graceful trot, timed from a vehicle at 18 miles per hour. They will also canter and gallop for short distances at 25 miles per hour.

During the rainy season all the basic requirements can be found close together at most localities and then rhinos will remain for months in an area of twenty to thirty acres, in fact until one of the requirements runs short. It is not known, however, what the radius of activity during the critical part of the annual cycle is. In very dry years many animals wander out of the range and are liable to turn up in the most unexpected places.

The reaction of rhinos to the alarm note of Red-billed oxpeckers is always immediate. When two or more animals are together they immediately raise their heads and ears and stand with their buttocks touching, facing in different directions. A few nervous steps may be taken. If they suspect anything further they then break away from where they think danger to be. Whether the oxpeckers ever react consistently to animals other than man is not known.

Other commensal birds are Glossy Starling *Lamprocolius nitens* and the Cattle Egret *Bubulcus ibis*.

The starlings have been seen to catch and feed on the numerous flies which swarm about the rhinos. The egrets can be seen accompanying the rhinos in the more open areas of the reserve. They do not, however, follow the rhinos into any patches of bush.

Voice.

From a very early age Square-lipped Rhinos make a variety of sounds, but they are mostly heard while drinking at the pans at night. The youngsters frequently get separated from their mothers and they immediately begin squeaking in a pig-like fashion. The mothers know their offspring despite the fact that there might be over twenty rhinos present, and will seek out the squeaking offspring from the medley. At other times when caught in a thorn bush while trying to run away from something which has frightened them, they set up a peculiar shrieking.

In the adult animal the cow seldom if ever makes any noise beyond puffing and snorting when resisting the advances of a bull or when running away from an enemy. The bull on the other hand is very noisy when fighting and mating. However, the sounds made during these particular times are very different and can easily be distinguished in the field. At mating periods when the female is in oestrus but not quite ready to take the bull, his frustration is very audible. As he follows a cow along a rhino path he will be grunting and snorting, then as the cow turns round and wards off his attempts to mount her, his voice rises to a shrill, elephant-like trumpet.

When fighting, the voices of both male antagonists do not rise in pitch above a bass bellow, and this continues for hours at a time.

If during a mating period a young male should venture too near a cow in oestrus the old bull will warn the youngster with a long rumbling bellow to stay away. (This often inadvertently

happens when a small herd is disturbed by a human being. The outside rhino—usually the young male—rushes to join the rest of the group who may not have heard the human's arrival. The old bull thinks he has some opposition and immediately bellows and lays his ears flat.) Square-lipped rhinos make far more noise than is generally supposed. There have been periods when the authors were waiting for Square-lipped Rhinos to come down to drink at rivers. The animals could be heard approaching for well over 100 yards. If the humans were downwind the rhinos would pay no attention to talking and appear oblivious of the camp fire. With snufflings, snortings and squeakings they would walk slowly past the fire, chewing the grass they had collected in their mouths with loud sucking sounds.

Reproduction.

Accurate knowledge of all reproductive details can only be gathered from the history of individually marked animals. Since no animals have been artificially marked, knowledge of the reproductive characteristics of the species are very meagre.

Females in oestrus are found most frequently in the period July to September, but also individually in the other months. Females not already accompanied by a male probably attract mates in leaving a distinctive odour along the paths they use. In all cases, however, more than one male is in attendance and fighting begins. When only the victor remains does copulation take place, since all previous attempts are frustrated by rivals. Under these circumstances fighting is in earnest, and many combatants are killed. Copulation takes place a number of times while the female is in oestrus. It is a lengthy procedure and males are known to stay mounted for over an hour. As in the Black species the male places both front feet on the female's back and does not grasp round the flanks. There appear to be no ritualised courtship procedures prior to coitus, though the fighting of rivals may act as a stimulant on the female. It is thought that females come on heat at least once every two years but there are also individuals which definitely do not do so for at least four years. For the purpose of computing the average breeding rate of the whole population it is probably best to use three years.

The period of gestation is only known from observations by the late Mr. W. E. Foster on a female marked by a slit horn. It was estimated, probably with little error, to be eighteen months (547 days) but it is not possible to say whether this figure is close to the mean of the species. A single calf is normally dropped but twins have been noted on one occasion by ourselves and on others by earlier writers. The calf is able to accompany its mother within twenty-four hours of birth. It begins to graze when about a week old but suckles for at least a year. When on the move the calf proceeds in front of its mother who guides it with her horn, except in the case of the very young which follows its mother. The Black Rhino calf usually follows after its mother.

The ties between mother and calf are lasting and females are

regularly seen with the calf of the year and another three-quarters grown. Such groups frequently join up forming parties of from four to eighteen in number. Parties are often but not invariably accompanied by an adult male. There is considerable latent hostility towards the male on the part of the females and he is only tolerated if he does not attempt to copulate. Any such attempts are savagely repulsed and indeed may even result in the death of the male. Furthermore the male is only tolerant of the young so long as they do not approach him too closely. A calf accompanying a female on heat is in continual danger and if it remains close to its mother, may be killed by the bull. This simple sociality is probably an early stage of the more advanced forms shown by elephant. While it is general in the Square-lipped only occasionally is it shown by the Black Rhino.

The situations in which aggressive and fear behaviour are manifested have been outlined above. Whether fear is elicited by any other species than man is not known, though lion was probably one. When fighting, the combatants stand horn to horn lunging at each other and attempting to get in a thrust from the side. They also charge at each other and if taken from the side the force of impact is capable of causing extensive internal damage and death. Animals dying under such conditions have often no external signs of the cause of death. While fighting, the animal coming off worst bellows and squeals loudly. A young animal being chased by a bull also squeals. A badly injured animal always makes for water if able to and all dead ones have been found near it. Since thick bush normally occurs next to water, many dead animals are definitely never found. When afraid rhinos curl the tail over its base, as they do when defecating It is curious that the warthog also uses these tail postures in the same situations.

Excretion.

Rhinos frequently defecate where dung already occurs, but from the location of such heaps and their behaviour when passing them it is quite plain that each individual does not regularly resort to the same spot. Dungheaps are always associated with paths which in themselves are determined by one of the following three conditions
(1) Paths are used to cross steep ridges and hills and have been in use for very long periods. The largest dungheaps are spaced along this type of path but they do not show signs of frequent use.
(2) Paths radiate out from waterpoints, fading out some three to five hundred yards from their destination. Smaller dungheaps are found along these.
(3) A maze of paths intersect dense bush, disappearing where they come to the edge of it, and heaps are again found along these.

Since dungheaps are only formed where circumstances make it easier to follow in others footsteps, it is obvious that the animal is stimulated to excrete by the presence of dung and urine previously deposited. This has been directly observed on a number of occasions. When not on the move they excrete as the urge comes on them.

Before and after excreting scratching movements are made with the hind legs. The horn is not used. While defecating the tail is curled over. Urination in the male is effected in a peculiar manner, the penis being directed backwards between the hind legs and the urine ejected as a spray, usually in three powerful spasmodic bursts. Bulls frequently scratch with their hind legs after urination too. The fresh dung of the species is green in colour and finely digested. It soon hardens, becoming dark brown on the outside, and each pellet is barrel-shaped, measuring some seven by four inches. The dung of Black Rhino is distinguished by the presence of twigs and thorns in it. The authors know of a few heaps used by both species, all on paths over hills.

The dungheap features in the environment of many other animals which either visit or live in them. First, there is the invertebrate community living in the heap, the most obvious of which are the dung beetles. The larvae of beetles are very numerous and butterflies regularly visit to feed. Secondly, there are the birds and mammals which take advantage of the concentrated food supply offered by the invertebrate resident.s The Banded Mongoose *Mungos mungo* is a regular visitor feeding particularly on the beetle larvae. Other insectivorous mammals such as shrews, moles and the aardwolf probably also are attracted. The following birds have been seen feeding in heaps:— Crowned Guinea-fowl, Crested and Natal Francolins, Hadedah, European Roller, Black-crowned Tchagra and Red-shouldered Glossy Starling. The game birds also dust bathe in heaps. All these animals soon reduce the dung to a uniform chaff-like consistency. When the dung beetles are active the heap appears to be a heaving mass as hundreds of beetles work and push. The Harvester Termites will be seen carting away the undigested grass stems to their nests.

Range Extension.

Since all the country surrounding the range is a rhino vacuum, there is a strong tendency to recolonise it. Regular seasonal straying southwards into the Enseleni Valley, up the White Umfolozi valley and up the valley of the Dlinza stream on the west occurs. This takes place during the months November to January when all requirements are in optimum supply in the range and such straying can only be the exploration and attempted colonisation of new teritory. This tendency is always frustrated by human disturbance but if not disturbed the species would steadily expand its range each year in the same way as hippos are gradually recolonising some of their old haunts around the St. Lucia lake.system. In drought years straying occurs at all times, probably in search of food and water and under these conditions they would also take up new haunts. There is no hope that the species would ever be allowed to colonise land occupied by man since all the surounding occupiers are intolerant of the species.

Mortality and Longevity.

Thirty-two rhinos are known to have died in the period 1952-1957 but, as already explained above, these probably represent a

fraction of the true mortality. Most of these deaths where the cause was ascertained were from wounds inflicted by fighting, and over half were adult males. The other main cause of death was accident; getting stuck in mud, falling over a cliff, drowning in floods and getting stuck between rocks. It is difficult to see how it would be possible to get accurate mortality figures for each year, but nevertheless such knowledge is vital to management. The oldest known individual in the reserve is a female of 36 years, who is now showing her years, though still bearing calves.

Management.

Since rhinos are not tolerated in any area devoted to human occupation the species must be kept within a wildlife sanctuary. As soon as restrictive measures become necessary some form of management policy must be adopted in order to keep the area as a suitable habitat for the species at all times and in the most critical period of the annual cycle. It follows therefore that the most urgent matter in the present management of the rhino range is that it be completely included within the boundaries of a game reserve. As has been shown above, the present Umfolozi and Hluhluwe game reserves are totally inadequate as a permanent home for even the present rhino population. The authors are convinced that no diminution of the areas at present inhabited by the rhinos can be contemplated if the species is to be preserved in its natural habitat for all time. Any further restriction of the range will immediately result in overpopulation with its inevitable destruction of soil fertility and food resources. Furthermore such density dependent factors as infertility, disease, increased juvenile mortality and a generally weakened constitution throughout the population would result. It cannot be emphasized too strongly that the crucial moment for the survival of the rhinos has now been reached and that the rapidly worsening situation in the Western State-owned lands where native infiltration is increasing literally by the day is rapidly bringing the species to its Rubicon.

Management of rhinos is concerned with the restriction of their movements beyond their own area, and with the maintenance of an environment in which every individual can satisfy all of its requirements throughout the year whatever the climatic conditions. Any policy has also to take into consideration that the natural scene must be as close to that of the original wilderness as possible. Five factors have to be manipulated to achieve these ends.

(1) Restriction of wandering: this can only be achieved by fencing and the revised boundaries of the sanctuary will have to be completely fenced. A rhino-proof fence can be constructed using steel tramlines sunk three feet and projecting five feet, spaced at ten yard intervals. Two strands of half inch steel lift cable are strung at two and four feet above the ground and are spaced by treated timber droppers every ten feet. Indigenous tress and treated timber have been tried as standards and are not effective, furthermore the cutting

of large numbers of a few species of trees is a very serious interference with the natural vegetation.

(2) Provision of water:— the natural water supplies of the area are completely inadequate during very dry seasons. At the present time four artificial waterpoints are maintained in the centre of the Umfolozi reserve throughout the year but are not available to much of the population. At least three more artificially maintained sources must be created. This would be achieved by pumping water from either of the rivers (water being obtainable below the surface of the White Umfolozi when it is dry) to existing natural water holes. In addition when the White Umfolozi becomes dry large holes can be dug at intervals in the bed of the river to make the underground water available; at many points water can be found only nine inches below the surface. Installation of pumps and pipelines should have been started before the recent cycle of wet years ended, and with the increasing severity of the present drought seasons this matter has become of paramount importance.

(3) Maintenance of natural grass pastures:— the climax vegetation in this area is Lowveld and Thornveld forest. In order therefore that the area maintains the preferred grazing, no further extension of the present areas of forest and woodland can be permitted. The wilderness concept restricts the tools available to achieve this to natural agents which can be controlled by man. Scientifically planned and properly controlled burning is the major tool that we possess. Since uncontrolled fires can completely reverse the process which is desired, it immediately follows that an efficient fire control system must be in operation throughout any dry period. The diminution of certain species by hormone weed killers is necessary to open scrub recently developed.

Since the increase in numbers of other grazing mammals immediately imposes an additional burden on the available grass resources it is essential that south of the Black Umfolozi river at the least there must be stringent restriction of the numbers of buffalo, blue wildebeest, zebra, impala and warthog. Restriction of rhino numbers is also inevitable. Man will also have to adopt the elephants' role by thinning out the tree veld and scrub in certain areas. This would of course have to be done selectively, the emphasis being on certain *Acacia* and *Dichrostachys* species, particularly *A. karroo* and *A. arabica*.

With the opening of a rest camp in the present Umfolozi Reserve in 1958, the very real hazard of disturbance by greatly increased numbers of motor vehicles in the heart of the rhino range has developed. It is too early to state just what effect the cars have upon the rhino but in the opinion of the writers, conducted motor tours in vehicles owned by the Parks Board, would be the most suitable compromise.

A Wilderness area of some thirty thousand acres has been set aside in the Umfolozi Reserve, a portion of the most densely populated rhino range is included in this area. Conducted tours of no more than six persons accompanied by an experienced ranger are

taken through the Wilderness area for three days at a stretch. Through these tours the public has gained a far greater understanding of the Square-lipped Rhino problem. The intricate compromise between preserving game in its natural state and tourism can be achieved through the establishment of Wilderness areas. It is perhaps desirable that even more of Umfolozi Game Reserve be declared Wilderness.

(4) Research:— in order that any policy be wisely framed, adequate research into the natural communities of which rhinos form a part must be carried out, together with study of the population characteristics and behaviour of the rhinos. Such a project is the *sine qua non* for the continued existence of the species, and is the only basis for management. The appointment of staff to carry out such a programme will shortly be accomplished.

Legal Protection.

Under Section 9 of the Game Preservation Consolidation and Amendment Ordinance No. 11 of 1955, the Square-lipped Rhino (together with the Black Rhino, Elephant and Hippo) is protected from hunting, capture or being kept in captivity throughout the Province. The maximum penalty for an offence under this Section is a fine of £500 or imprisonment for 2 years. The Administrator of Natal is authorised under the same Section to permit any person to do any of these things. Under Section 20 of the same Ordinance it is unlawful to export rhino horn, or any other portion of the carcase, out of the Province of Natal without the permission of the Administrator. Furthermore under Act No. 33 of 1909 as amended, any rhino horn exported is liable to a customs duty of twenty per cent. of its value. The penalty for failure to obtain an export permit is a fine of £25 or three months imprisonment, and for failure to render the required customs duty, £10 or one month.

Within a game reserve further protection is accorded against wilful disturbance under Ordinance No. 35 of 1947. Under this Ordinance regulations may be enacted by the Administrator for the further control of visitors, and areas may be set aside from which the public may be excluded. Penalties are proscribed for offences against these regulations.

In practice the Administrator does not issue any permits under Section 9 of the Ordinance No. 11 of 1955 without the recommendation of the Natal Parks, Game and Fish Preservation Board.

During the past ten years only one rhino is known to have been illegally killed.

Distribution of the Northern Square-lipped Rhinoceros *Ceratotherium simum cottoni*.

Unlike the nominate race in the south, *cottoni* is not restricted to one small area but is patchily distributed over an extensive range in three different countries. It is at present found in the West Nile Province of Uganda, in the Garamba in the Belgian Congo and in the Sudanese Provinces of Bahr el Ghazal and Equatoria (west of the White Nile). One small group is thought to exist in the Upper

Nile Province in the Sudan a few miles east of Meshra. It is interesting to note that the eastern boundary of this range is the White Nile and that at no point does it cross this river; the reverse holding true for the Black Rhino.

Between 250 and 350 animals are believed to survive in Uganda, 500 in the Belgian Congo and an unknown number in the Sudan. Complete protection of *cottoni* exists legally throughout its range, but is probably completely enforced only in the Belgian Congo. In the other two countries it does not occur in any wild life sanctuary (the special reserve in Uganda is not permanently inhabited) so that absolute control of poaching is not possible. Whereas in Uganda the enforcement of the law is as comprehensively and strictly carried out as possible, this cannot be said for the Sudan, where the situation is probably precarious. The authorities in Uganda hope to be able to introduce the species into the Murchison Falls National Park where far better protection would be afforded to it.

The changing political situation in the range of this form renders its future most uncertain, and there can be little hope for its survival.

Interesting accounts of the habits of this race are contained in Pitman (1931) and Roosevelt and Heller (1914).

Nomenclature.

Order PERISSODACTYLA
Sub-order RHINOCEROTIDAE
Sub-family DICEROTINAE
Genus CERATOTHERIUM Gray, 1868.

Ceratotherium simum simum (Burchell). Square-lipped, Square-mouthed or White Rhinoceros. Witrenoster.

Rhinoceros simus Burchell, Bull. Soc. Philom., Paris, 97, 1817: Interior of South Africa, near Lat. 26°S. (near Kuruman, C.P.)

Ceratotherium simum cottoni (Lydekker). Northern Square-lipped Rhinoceros.

Rhinoceros simus cottoni Lydekker, The Field, CXI, 319, Feb. 22nd, 1908: Lado Enclave.

Synonyms.

1827 *Rhinoceros canus* Griffith, Cuvier's Animal Kingdom, 5: 292: Southen Africa.

1827 *Rhinoceros burchellii* Lesson, Man, Mamm. 332: Interior of the Cape of Good Hope. (substitute for *simus*.)

1854 *Rhinoceros oswellii* Gray, P.Z.S., 1853: 46: Interior of South Africa.

Below are given all the known native names of the Square-lipped Rhino in Southern Africa (from Shortridge *op. cit.*):—

Zulu: *umkhombe, umkhombo.*
Rhodesian Ndebele: *umhofu.*
Tswana: *tshukudu, mogohu, kgetlwa, kobaoba.*
Transvaal Sotho: *tshukudu, mogohu.*

Venda: *tshugulu.*
Bechuana: *tshukuru, tshugudu, kuabaoba.*
Nama Hottentot: *!Navas, !Nawas.*
!Kung, K'au en, and Naron Bushman: *!Naba.*

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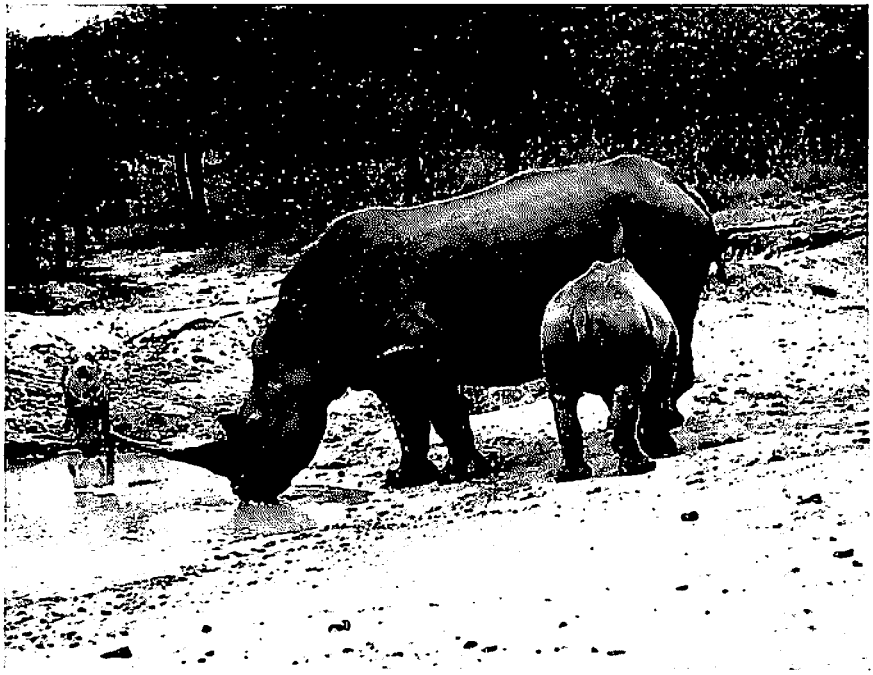

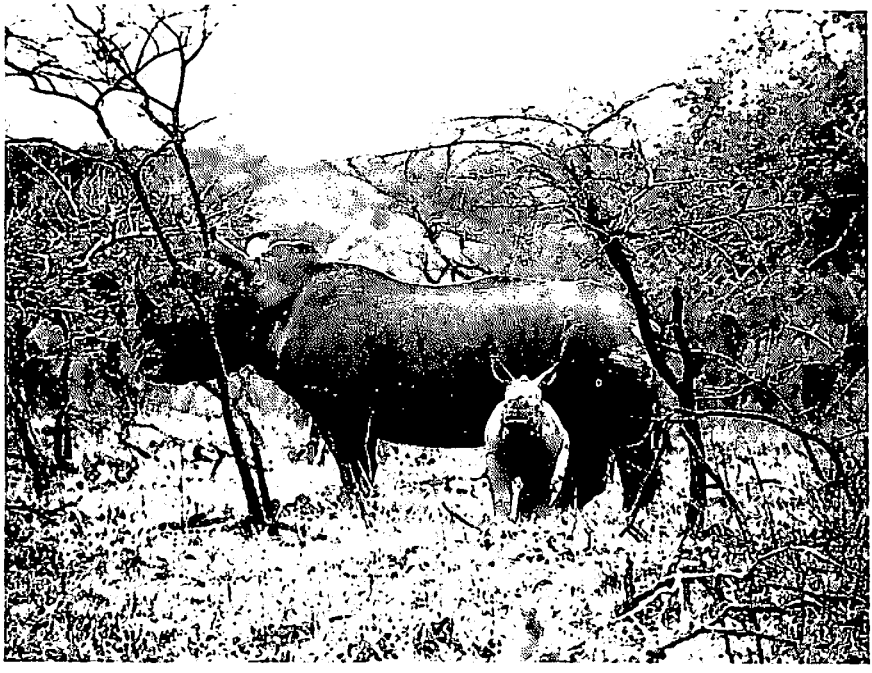

THE SQUARE-LIPPED RHINOCEROS.

By W. E. FOSTER.

The Square-lipped Rhinoceros, or the "White Rhino" as it has been referred to ever since white man first set foot in Southern Africa three hundred years ago, occupies a unique position in the Umfolozi Game Reserve as the animals occurring there are the only representatives of the southern sub-species in the world to-day. They will, however, become one of the vanishing species of mammals unless all possible measures are rigorously maintained for their protection and, more importantly, for the retention of their present habitat, which latter question is referred to later. In the writer's opinion their present habitat is inadequate and should be extended by the incorporation of certain sections of adjoining Crown lands.

Numbers.

The number of these mammals has been a matter of controversy for many years.[a] During the year 1922, Major Vaughan-Kirby, then Game Conservator for Zululand, estimated the number at 20. No attempt was made to verify this until ten years later, when Dr. Herbert Lang was commissioned to make a count, in which he was to be assisted by a local farmer, an official of the Tsetse Fly Control Operations and by a large gang of natives. Dr. Lang reported that 180 had been counted within the Umfolozi Game Reserve but this did not include those known to be roaming in the adjoining Crown Lands, estimated at the time to be about 30. These figures

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[a]Maqubu Ntombela who is still a Game Guard was first employed in the Umfolozi Game Reserve in 1918 by Vaughan-Kirby. Maqubu maintains that Vaughan-Kirby used to make frequent trips into the Umfolozi Reserve of at least a week's duration. He was very keen on taking notes and was always questioning Guards as to how many Square-lipped Rhinos they had seen. When told recently that Vaughan-Kirby had written that there were only 20 rhinos in 1920, Maqubu laughed and said that he was hiding them. It is not thought that Maqubu is wrong because everything read of Vaughan-Kirby's proves that he was a most active and reliable observer. He had every reason to put the number of rhinos at 20 during that period when he did so because the farmers at the Ntambanana Settlement were clamouring for the deproclamation of the reserve, or for the game to be reduced. By maintaining that there were only twenty rhinos left, Vaughan-Kirby no doubt hoped to save the game and the reserve. This is borne out by a letter to the press (Natal Mercury) in 1923 by a Mr. Ernest T. Salberg who says, while writing of Vaughan-Kirby, "After all his years as Game Conservator in Zululand he refused to admit that the Reserves were overstocked, and was badly informed about the number of the White Rhino. Now whatever may be thought of Mr. Harris's estimate of 120 it was not greatly reduced by Dr. Herbert Lang, the eminent Naturalist who was sent down to recount the animals. Dr. Lang had previously said openly that the count was absurd and refused to include 30 outside the Reserve which were offered to be shown to him". There seems to have been a conspiracy to keep the true number of rhinos from the blood-thirsty public.

Maqubu maintains that there were far more Square-lipped Rhinos in Umfolozi than there are at present. As he was born and bred in the corridor (his kraal is where the Reserve's Ongeni camp is now) and is one of the finest observers one could meet he must be believed. The big decline in numbers came in the drought of 1932, and this is dealt with in the other paper.

completely ruled out the estimated figure of 20 in 1922 as being ridiculously low. Subsequent to Dr. Lang's investigations no further count was attempted until 1948, when the Officer-in-Charge of the Anti-Nagana Campaign organised a count which was carried out by his officers and native game guards. According to this count the stupendous number of over 550 was reported to have been seen and counted. This figure has been very dubiously accepted and many people are very sceptical about it.

The probability is that a count which is extended over a period of more than one day can be far from accurate. There are so many contributing factors to be contended with, the major one being the undoubted movement of these mammals after sunset. They only drink during the night when they cover great distances grazing and travelling for water.[b]

An accurate census of rhinoceroses, or of any other game animals roaming over an area of 200 square miles or so of densely bushed country is not humanly possible. An arrangement was made to take a census from the air, but unfortunately, due to many difficulties, this was never completed.

During the extermination of game campaign in the Umfolozi Game Reserve and surrounding areas, it was made a rule that each European Game Ranger was to make a daily record of rhinos seen by himself and by each native gunman. These figures were included in the Ranger's weekly report. A summary derived from these figures, although nowhere near the count of 1948, must also be regarded as far from accurate on account of the many factors to be contended with.

Habitat.

The Square-lipped Rhinos dwell in a very limited and selected area in Zululand, viz. that portion of the Umfolozi Game Reserve bounded by the Black Umfolozi river in the North, the White Umfolozi river in the South, the Mpila range of hills in the East, and extending into the Crown Lands in the West as far as the Mtunzini range of hills and the Ukuku ridge as defined in the accompanying map, which is shaded according to the rhino density. (See opposite page).

This was their favourite resort at the time when the writer first became acquainted with the game areas in 1915, before any dispersion had taken place, and from that date up to the present time it has remained so with the majority of the rhino population.

With the gradual increase in their numbers, there has been a limited dispersion into the surrounding areas. With the exception of about six which found their way into the Hluhluwe Game Reserve

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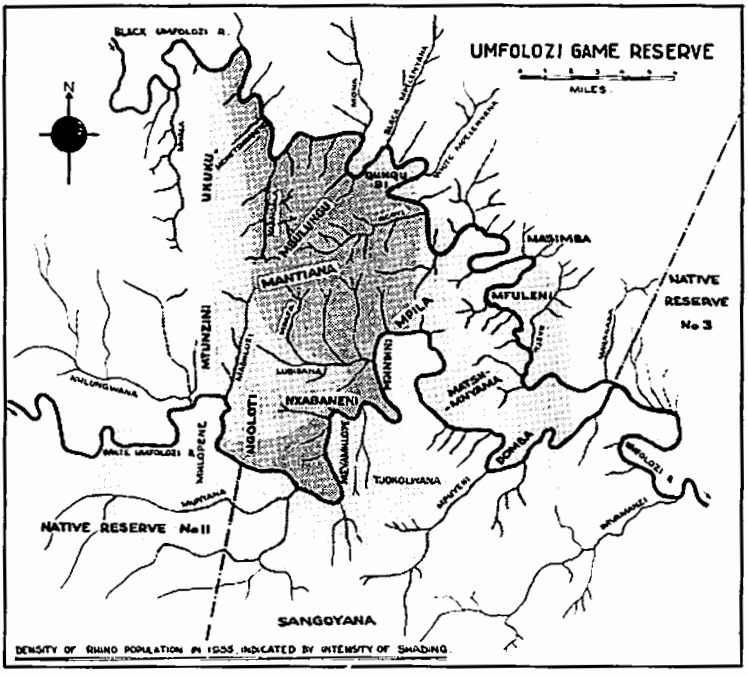
[b]It is quite untrue to say that rhinos only drink at night. They drink at all times of the day, and commonly during daylight hours in the summer months. In the winter, when it is cool for most of the day and sweet grazing is hard to come by, they naturally prefer to spend more time looking for food. It is more than likely, however, that during the anti-Nagana campaign the rhinos learned to keep away from pans, because all the shooting of game was done around the waterholes.



where they remained and increased, the dispersion Northwards has been limited to the Mtubatuba-Hlabisa main road in what is known as the "Corridor". Southwards there has been some dispersion into the Crown Lands in the Lower Umfolozi district, also into Native Reserve No. 11 in the Melmoth district. Westwards the only dispersion beyond the Mtunzini range which has taken place, is a family group of about ten which has made its permanent habitat in the vicinity of the junction of the Mvalo stream and the Black Umfolozi river. Eastwards, that is in the portion of the Umfolozi Game Reserve East of the Mpila range of hills, there were no rhinos dwelling permanently prior to the date of the Proclamation of the Game Reserve in 1897. With the evacuation of this portion of the Reserve by natives, and the increase in the number of rhinos, there has been a greater dispersion into this area than into any other of the adjoining areas. In view of the fact that there has never been any check on their wanderings, the density is surprisingly low as compared with that in the Western section.

Statements from old natives show that in past history there has never been any variation of the habitat favoured by the square-lipped rhinoceros. It is only within the past decade that there has been any attempt to check dispersion and to confine them in a defined sanctuary, but notwithstanding this, they have remained in the one main habitat for over a century. W. C. Baldwin in his book written in 1852 (100 years ago), only mentions having en-

countered rhinos between the two Umfolozi rivers. As far as it is possible to trace his route on his trip through Zululand, he crossed the White Umfolozi river at Hlatikulu, which is at the Southern point of the Ngqoloti range, and the Black Umfolozi river somewhere in the vicinity of Gcoyeni, therefore he must have passed through the present high density area.

There must be a reason, in view of the fact that their dispersion was unchecked, why there has not been a greater dispersion of rhinos over this long period. The reason for this is somewhat difficult to conjecture but there must certainly be an answer. Endeavours to find an explanation have been made for very many years and the problem has often been discussed with pioneers, officials and old natives. The answer may lie in the nutriment, watering facilities, type of mud wallows or in the profile of this particular part of the country, but it is believed that food is the real reason.

Observations have been that the Square-lipped Rhinoceros is wholly a grazer under normal conditions, but in times of drought, when there is a scarcity of grass, they also feed on small shrubs and a dwarf euphorbia *Stapelia sp.*—(Zulu: Isihlehle), as well as on the succulent stems of a leafless creeper *Sarcostemma viminale*—(Zulu: Ingotsha). On account of the sparsity of such plants within the high density area they cannot be regarded as a regular diet of the rhinos. In order to explore the possibility that it may be a particular type of grass which may occur within the favoured rhino habitat, it was suggested many years ago that a survey of the vegetation should be carried out. This unfortunately did not meet with approval but the opinion is still held that such a survey would prove of the utmost value. The rhinos prefer to feed on short grass, although they do feed on the longer grass as well.

Habits.

The progeny of the rhinos are very loyal to their maternal parents and remain with their mothers for many generations. Groups are often seen consisting of the mother with three and four of her progeny. Once when travelling in a motor truck a cow and and a calf were encountered, with the latter in the lead. When the calf crossed the road and the truck was stopped between them, it was expected that the mother would become agitated but instead she turned and made off in the direction from whence she had come, notwithstanding the fact that the calf was squealing and running around in search of her. When the truck was moved, the calf picked up its mother's scent and made off after her.

In another instance, the skeleton of a full-grown rhino was found on a path between two rocks. Obviously the rhino had become wedged between the rocks and had died there. Nearby was the skeleton of a young rhino, the two no doubt being mother and calf. The calf must have remained with its dead mother until it died of starvation.

There is also the example of the young male rhino "Folozi" now in the National Zoological Gardens at Pretoria, which when

first seen by a native game guard, was standing by the carcase of its dead mother along with a full-grown male and a half grown one. When the native approached, the two older animals made off and were not seen again, but the calf "Folozi" remained. When the site was visited the following day, the calf was not to be seen, but the guards who had been posted to keep watch, reported that it had returned later and was standing alone, guarding its dead mother and chasing off the vultures. Even when the party arrived to capture it, it stood its ground, steadfastly charging at anyone who dared to come too close for its liking.

A more recent instance was that of the eight months old female calf which was found guarding the carcase of its mother who had been dead for over a week. The carcase was practically torn to pieces by vultures and hyenas, but the calf remained loyal to its mother and would no doubt have stayed until it died, had it not been located and captured.

Some years ago too the skeletons of an adult and calf were found lying side by side, which was no doubt a parallel case. The young calf, loyal up to the bitter end, had remained alongside the carcase of is dead mother until death had overtaken it as well.

The habit of alternate rearward scraping with the hind feet appears from observations to be actuated by foreign scent. Once whilst being watched from a distance, a group of rhinos came to a water-pan and one young male, happening to pass over a spot where the observer had been standing half-an-hour or so previously, sniffed at the spot and then commenced the rearward scraping [c] This habit is frequently seen to take place across motor tracks, when the scraping seems actuated by the scent of a motor vehicle which has recently passed along the route. The scraping is regularly observed to take place at the common dumps where excreta is dropped, but this is definitely not for the purpose of scattering the droppings as is the case with the Black Rhino. It is believed that it is actuated by the scent of other rhinos which may have recently visited the dump. The scattering of the droppings which does take place at the common dumps, is done by insectivorous animals and birds, especially by guinea fowls in search of caterpillars and other grubs. On the many occasions when this scraping has been witnessed it has been done by the young males. No old rhino has been seen scraping, but it is not suggested that they do not do so. There is certainly the possibility that they may scrape when something has annoyed them, or perhaps during the rutting season.

The writer once came across a place where a rhino which had been travelling along a wet footpath had skidded and fallen. Obviously he had become annoyed with himself and the spoor indicated that there had been much scraping, with the bush knocked about and trampled.

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[c] It has been found that any human scent near a pan which is less than at least one hour old is enough to send a rhino crashing off into the bush. Square-lipped Rhinos do of course scratch their dung; not to the same extent as a Black Rhino but it is done nevertheless. Bulls appear to do it more than cows.

Rhinoceros bulls urinate rearwards, the urine being passed out by intermittent spurts.

The Square-lipped Rhino makes a sound similar to the rumble or bellow of a bovine bull, and this is continued for several seconds at a time. The rumbling is particularly noticeable during the rutting season, generally at the beginning of the Spring. Another sound frequently heard when they are on the run is not unlike the sound made by a barrel of water when shaken and this can be heard at quite a distance. The young calves, when in distress, squeal very much like pigs.

It is considered by many who have had the opportunity of studying the habits of the Black Rhino, that the suppurating wound behind the shoulder has a sexual significance. Assuming this to be correct, the sexual habits of the two species differ entirely, as the Square-lipped Rhino does not manifest these suppurating wounds at any time. From observations, the sexes in the Square-lipped species are brought together by scent as is the case with other animals such as bovines. The number of males killed in fights when breeding forms a high percentage of the deaths.

The Square-lipped Rhinoceros is not an aggressive animal, although it is very much feared by the natives.[d] The only reason they can adduce for their fear is the massive bulk of the animal. They have never been able to quote any instances where anyone has been killed or injured by one of this species of rhino. During many years of association with them, only one instance is known, in 1949, where a game guard was severely gored by what he stated to be a Square-lipped Rhino. He was alone at the time and there has always been a doubt as to whether it was not perhaps a Black Rhino, as there are known to be a number of this species in the vicinity of the attack. However, this may have been an exceptional case.

There are, of course, many unauthenticated stories of both Europeans and natives having been chased by Square-lipped Rhinos. Cases have been witnessed where Europeans have fled from rhinos on the run, and then spun stories about being deliberately chased, when what actually happened was that they were running in the line of the rhino's course.

During the initial stages of the fly trapping campaign, many miles were walked daily within the rhino sanctuary and a great many rhinos were encountered. Although the animals were treated with respect, there was never an instance when the writer had to flee or climb trees to escape from charging rhinos. They are very short-sighted animals, and when on the run, they could, without any evil intent, easily collide with a person or any other obstructjon.

On one occasion, when travelling in a half-ton vehicle, a rhino on the run came straight for the truck. To all appearances it was making a deliberate charge and it was only when it was within

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[d]This should be qualified by a remark that they are not aggressive unless they are interfered with. All the rhinos living on the edge of Native Reserves are most aggressive.

about six feet of the truck that it seemed to realise its presence. It quickly altered its course, but not in time to avoid brushing against the rear mudguard after which it made off in great fright.

Wallowing Habits.

Over the period of the past twenty years, dating from the time that the trapping campaign against the tsetse fly was first launched, there has been a perceptible change in the wallowing time-table of the Square-lipped Rhinoceroses. During the early stages of this period, it was a regular habit for them to wallow round about mid-day at certain selected water-pans, that is pans situated on high ridges and in open flat country where the bush is sparse. At some of these pans in particular one could always be certain of finding rhinos wallowing in groups of sometimes as many as eight or ten in one pan. At that time it appeared that the greater majority spent the midday hours in the sparsely bushed country in the vicinity of the pans.

A gradual divergence came about until to-day[e] we find a complete reversal of their time-table. They have reverted to what is considered their natural habit under normal conditions, that is, lying up in the densly shaded glades during the hot period of the day. Very rarely at the present time can any rhinos be encountered in the sparsely bushed areas or wallowing in the pans during the daytime. It is now found that they retire to densely bushed valleys where they spend the greater part of the day lying up in their respective groups, only emerging in the late afternoon to graze and make their way to the water pans where they generally only drink and wallow after darkness. One explanation, perhaps, is that prior to the eradication of the tsetse fly and the great reduction in the numbers of other blood-sucking diptera, the constant pestering by these myriads of insects made the midday haunts of the rhino untenable. The rhinos were therefore forced to abandon the valleys in the daytime in favour of the high ridges and sparsely bushed areas where the tsetse density was never as high as in the thickly bushed valleys which were their favourite breeding grounds.

The Square-lipped Rhinoceros dwell in units of from one to sometimes as many as twenty. The single units are invariably lone bulls, whilst the majority of the other units consist of a bull, a cow and her progeny, often of three or four generations. As already stated, it is interesting to note the loyalty of the offspring to their maternal parents up to the age of four or five years.

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[e]The reference to "to-day" may mean about 1952 or even earlier, when the effects of the intense shooting campaign were still being felt. Rhinos can be found at pans wallowing at all hours of the day and during recent years many photographs have been obtained of them doing so; it would be quite untrue to say that "they only drink and wallow after darkness". It is thought that Mr. Foster's observation was probably correct but his deductions wrong. The rhinos more than likely retreated into the deep bush after the shooting began, because they were interfered with so frequently when they went to wallow or drink, and it was the shooting campaign which made them more nocturnal.

Horns.

The so-called "horns" of the rhino are in actual fact not horns but consist of closely matted hair which grows from the roots in the skin and unites in a solid mass. The horn which is so formed is not connected with the skull-bone and is not rigid. The horns of the females attain a length of up to three feet or more, the longest seen by the writer measuring 3 ft. 1½ inches. When such a length has been attained the horns become practically straight. The horns of the males do not attain such a length, but they are much thicker at the base than those of the females. As is the case with the horns of other animals, there are occasional deformities. The most common malformation occurs among the females, when the horn curves forwards. There have been instances where the tip of the horn almost touches the ground when the rhino is on the run and in one case, the horn was canted over to the side. Another unusual case seen was that of a female with a practically straight horn about three feet in length. This horn was kinked towards the tip. Two rhinos have been seen, both males, minus the anterior horn, but in such instances there is of course the likelihood that the loss may have been caused by accident. Another case was that of a full grown female with half of its anterior horn slit into strips. It was thought by the natives that the horn had been struck by lightning![f]

As already stated, the horns do not adhere to the skull-bone, the fibrous roots only being bedded in a series of minute indentations provided on the muzzle-bone, and it appears that it would not take much of a wrench to dislodge a horn from its seating to which it is held only by skin. This is perhaps the reason why they do not make much use of their horns when fighting. One rare opportunity was experienced of witnessing a fight between two full grown bulls. Accompanied by a friend, the writer was in the Hlungwane valley in the Mahlabatini district in 1916, and was first attracted by a commotion and by dust rising. Hastening to the spot the two bulls were found in deadly combat and it proved possible to approach to within about thirty yards and to stand and watch. The fight had evidently been going on for some time, as there was an arena of roughly fifty feet in diameter where the ground was trampled and the shrubs and trees broken. The two rhinos were battering at each other with their shoulders like two enormous battering rams and not once while being watched did they use their horns. Their shoulders were bruised and blood-bespattered and their heaving flanks appeared quite wet . Eventually it was decided to interrupt the fight by firing off a shot, when the animals ran off in different directions. It was noticed that one was limping so badly that its shoulder appeared to be dislocated.

The impression gained on this occasion was that the rhinos do not make use of their horns when fighting, but later observations have indicated that this is not always the case. During recent years

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[f]Rhinos are quite frequently found with their horns split, and the damage seems invariably to have been sustained when fighting.

in the many carcases examined of rhinos killed in fights in which punctures have been found, the latter have been generally in the abdomen and appeared without doubt to have been caused by horns.

Breeding.

During the early stages of the tsetse fly trapping campaign in the Umfolozi Game Reserve, a rhino cow (previously referred to) which had half the length of its horn split into strips, was regularly seen in a certain valley. It appeared to be living a solitary life, until the native employees reported that there was a bull with it and that they had actually seen them mating. The incident was noted and the cow then disappeared from this locality and was lost trace of for a considerable time, until a report was made to the effect that a similar cow with a slit horn had been seen in another locality with a calf. She was kept under observation until there was an opportunity of seeing both the mother and the calf. It was concluded that it was the same rhino, but at the time no idea could be formed of the calf's age. Its horn was about two inches in length. Subsequently a comparison with a photograph of "Zuluana" taken at eight months, led to the assumption that this calf was the same age. The period from the date of mating was 27 months. Assuming that the twice-seen cow with the slit horn was one and the same, and that the age of the calf was eight months, the period of gestation would be 19 months.

Movements.

The Square-lipped Rhinoceros when on the run always carries its head in a lowered position, almost touching the ground; unlike the black species which carries its head level with the upper line of its body.

When on the run, the calf always takes the lead closely followed by the mother, this habit being the reverse to that of the Black species where the calf follows the mother.

The action when moving faster than a walk is a trot, similar to that of a horse, and in this pace the animals' movements are very graceful for their size. When harassed they break into a gallop, at which pace they can cover the ground surprisingly fast, but this speed cannot be maintained over very long distances as they soon become winded. On one occasion a group of eight was seen in open ground at a distance of some five hundred yards, and whilst being watched they were disturbed by native poachers. The natives' dogs gave chase causing the rhinos to stampede and they approached at a gallop. When they passed by they were showing signs of extreme distress and were slowing down their pace, notwithstanding the fact that the dogs were right at their heels. One bull completely gave in and stood, flanks heaving, panting for breath. Incidentally, two of the pack of dogs lost their lives with well aimed bullets. These native dogs are a menace to the rhino population as they cause a great deal of disturbance to their peaceful habits. Every opportunity has always been taken to destroy them and all native game guards have instructions to do so.

The maximum rate at which full grown rhinos can travel when at a gallop is possibly not more than 15 miles per hour, but on account of their bulk this speed cannot be maintained for a great distance, perhaps for no more than 400 to 500 yards. One opportunity of checking up on this point was when travelling along a fairly straight stretch of road. Two full grown male rhinos were encountered standing near the road, and when approached they moved off at a gallop, running parallel with the road. The motor vehicle was kept abreast of them for a distance of about 200 yards and the speedometer was registering 15 m.p.h.

Younger rhinos can exceed this speed but not to any great extent. On the occasion when the young female which had strayed into the cane fields on the Umfolozi flats was being chased, in an attempt to drive it back to the Reserve, the animal was being closely followed along a cane-break, and it was observed that the speedometer reached 20 m.p.h.[g]

Senses.

The three faculties, sight, scent and hearing, should be ranked in the following order, first hearing, secondly scent, and lastly—sight. On the latter the rhino is the least dependent, as it has an extremely limited range of view. It appears that a stationary object such as a motor vehicle cannot be seen at a distance of thirty feet, although when assisted by the movement factor they are able to discern objects at this or perhaps even greater distances. Their poor vision is, however, adequately compensated by the very keen hearing. This, of course, as well as the faculty of scent is greatly dependent upon the direction and force of the wind. Invariably when rhinos are encountered at a distance and they suspect the presence of anything foreign, their behaviour indicates they are endeavouring to pick up either sound or scent. It is on such occasions as these that the rhino does raise its head above the usual position near the ground, and their ears can be seen twitching back and forth in an endeavour to pick up the least sound. Nature appears to have provided for their assistance in this respect, since the ears can be moved independently of each other. They can incline one ear forward and at the same time incline the other rearwards, and are thus helped to pick up sounds both back and front.

Size.

Some sizes of adult males and females, measured in feet and inches, and taken from dead animals are:

Shoulder height	5′ 8″	6′ 1″	5′ 11″	5′ 7½″
Overall length	12′ 3″	11′ 10″	11′ 5″	11′ 0″
Girth	9′ 6″	9′ 9½″	9′ 4″	9′ 6″
Horn length	1′ 6″	2′ 4½″	2′ 2½″	1′ 7″
Approx. weight	3½ tons	4 tons	3½ tons	3½ tons

[g]25 m.p.h. is the maximum speed of a Square-lipped Rhino more recently recorded by game rangers in the Umfolozi Reserve.

General.

The Zulus do not eat the flesh of the Square-lipped Rhino. The reason the present generation give is that they have been taught by their forefathers that it is not edible, and that anyone who does eat it would be ill; but they say that it is used for medicinal purposes. This has undoubtedly contributed towards the protection of some of their numbers against the hordes of native poachers who continually trespass within the rhino sanctuary. There are occasions during certain seasons when rhinos do wander out of their sanctuary into the Native Reserve, and these would give the natives opportunities of annexing an animal now and again, if it were not for the fact that the flesh is not eaten.

In the control and study of the welfare of the Square-lipped Rhinoceros it has been noticed that there are instances, fortunately infrequent, of beasts wandering off aimlessly out of their sanctuary until they become hopelessly lost. Such a case recently was the young female which, after wandering about amongst cane fields over thirty miles from the reserve sanctuary, eventually came to an untimely end when she attempted to cross a "Heath-Robinson" type of bridge, over a small stream. The bridge collapsed under her weight, and she was drowned in a pool of water beneath.

It is impossible to estimate the death rate, as there must be many deaths which are not detected. Their favourite haunt when not feeding is the densely bushed valleys, some so dense that humans hesitate to enter and such retreats would be the most likely places in which ailing rhino would retire and remain until overtaken by death. The carcases would remain in such places, undetected even by vultures. The mortality, therefore, if calculated on recorded deaths, must be far below the actual death rate.

MISCELLANEOUS NOTES OF NATURAL HISTORY INTEREST.

1. HYENA PREDATION.

From a report by Ranger N. N. Deane made at the Hluhluwe Game Reserve during September, 1956. What appears to be the first evidence from this Reserve that the Spotted Hyena *Crocuta crocuta* will attack apparently fit and healthy animals resulted from the finding of the carcase of a freshly killed immature Brindled Gnu or Blue Wildebeest *Gorgon taurinus*. Rain had been falling, and from an examination of the tracks clearly imprinted in the mud it was clearly evident that the hyena had first chased and separated the calf from its mother. The calf had then been pursued for several hundred yards along a road before the hyena had grabbed it, and a severe struggle had taken place before the wildebeest calf had been overpowered and killed. The Ranger added that this clear evidence had caused him completely to revise his earlier ideas, that hyenas made attacks only on sick, ailing or otherwise incapacitated animals.

2. CROCODILE'S PREY.

From a report by Ranger N. N. Deane, made at the St. Lucia Estuary during March, 1956. The stomach contents of a Crocodile *Crocodilus niloticus*, measuring 11 feet 8 inches, which had had to be shot, were carefully examined and proved to be interesting. The contents consisted of a complete shark, measuring three feet in length; the jawbone of another shark of similar size; a barbel two two feet long; the hair and hooves of a Red Duiker *Cephalophus natalensis*; several claws from a dog; the hoof of a mammal considered to be from a Bushpig *Potamochoerus porcus koiropotamus* and the usual assortment of stones.

3. BABOON'S PREY.

From a report by Ranger L. C. Denyer, made at the Mkuzi Game Reserve during January, 1957. A Chacma Baboon *Papio porcarius* was noticed to catch a large water tortoise, *Pelomedusa galeata*, which it promptly dismembered by forcibly pulling the head and nether portions of the body from the shell. This was not a very pleasant sight to watch, but absolute silence was maintained in order to ensure that the animal was undisturbed. It appeared that the baboon's sole object was to get at the considerable quantity of eggs the turtle was carrying in her body. In a short space of time the baboon had succeeded in scooping out the entire clutch of eggs, all of which were completely devoured except for a few partly hard shells of eggs which were quite ready for laying. The baboon then left the turtle without eating any of the actual flesh. Natives had earlier related similar incidents, but stated that it was the flesh which the baboons devoured. The Ranger added that he had during previous years seen discarded shells which might easily have been handled by baboons in the same way.

4. FISH-EAGLE'S PREY.

From a report by Ranger T. B. Oatley made at the Ndumu Game Reserve, during September, 1956. A Fish Eagle *Haliaeetus vocifer* was noticed leaving a dead tree on the lake shore, carrying in its talons a large Tigerfish; from its size the latter must have weighed approximately three pounds. Some two weeks later a Fish Eagle was seen leaving the same dead tree, this time carrying in its left talon only, a large Bream *Tilapia mossambica* that must have weighed at least one pound. It is the Tilapia which constitutes the bird's normal prey, and it was interesting to realize that a Fish Eagle has the strength and ability to catch so doughty an opponent as a Tigerfish and one of such a weight and size.

5. SWALLOWS TAKEN BY TIGERFISH.

From a report by Ranger T. B. Oatley, made at the Ndumu Game Reserve during January, 1957. On a number of afternoons careful watch was maintained over the large flocks of European Swallows *Hirundo rustica*, which habitually fed, bathed and drank over the waters of Lake Inyamiti. The reason for the investigation was to determine the cause of frequent loud splashes heard and seen during these bathing sessions, which latter often involved several hundreds of the swallows. On clear, hot days the large flocks of birds would arrive to skim all about the surface of this narrow lake of about 200 yards width, frequently breaking up into small parties of perhaps five or six individuals, all of which would bathe simultaneously by dipping lightly into the water. Sometimes several such small parties would fly close together and the graceful bathing antics would be going on over quite a large surface area. By concentrating on the flight of individual birds it was possible to see how, every now and then, one would suddenly disappear. What happened was that some half dozen birds would come flying prettily over the water; one would splash lightly in and fly up again, so would another and another, until, as one swallow dipped there would be a sudden loud splash and a curtain of spray; no bird would emerge and the other five would fly on, twittering. The Ranger stated that there "was a feeling of incompleteness about the whole affair, one second the swallow was flying with the rest, the next it had disappeared completely and utterly." Crocodiles and Tigerfish are both very common in Lake Inyamiti, but the observer was quite confident that crocodiles were not responsible, because both during and after the kill the predator was never seen. Even if crocodiles were to go to the trouble of catching such small birds, one at a time, which is most unlikely, signs of the reptiles would indubitably be evident at some stage of the proceedings. Such crocodiles as were seen along the fringes of the lake, where the water is shallow, appeared to be taking no interest in the birds and it was felt that the Tigerfish were the most likely predators in this case. Most of the catches took place in mid-channel, where the water is deepest and the largest fish tend to congregate. The most likely explanation is that the Tigerfish would be lying im-

mediately below the surface, and obviously a swallow, taking its line of sight and height above the lake into consideration could not see it; similarly the fish would not see the bird until it touched the surface of the water. With so many birds bathing it is bound to happen that sooner or later one will dip down right in front of a Tigerfish and thus become easy prey. Up to five or six birds were taken on some afternoons, and with a large number of the fish lying in wait and several hundred birds flying over the lake the numbers reasonably support the theory presented.

6. VEGETARIAN MONITOR LIZARD.

From a report by Ranger T. B. Oatley, made at the Ndumu Game Reserve during March, 1957. A medium sized Monitor Lizard *Varanus niloticus*, about 2½ feet long, was watched for some ten minutes feeding on the seeds of the grass *Panicum deustum*. It was reaching up and taking hold of a grass stem, much in the same manner as a tortoise takes hold of a leaf, and then gently pulling the grass seed head towards it. The stems were not broken but the seeds were detached and drawn into the lizard's mouth: the same grass stem was occasionally pulled down two or three times to ensure that all the seed heads were removed.

7. OWL'S "SWEET TOOTH".

From a report by Ranger W. M. Austen, made near the Umlalazi Nature Reserve, during April, 1956. An owl, thought to have been a Cape Eagle Owl *Bubo capensis* was seen eating something on the road, when caught in the headlights of a motor car during the late evening. When the vehicle was within some 20 feet of it, the bird flew off leaving a white object on the road. Being confident that the object was neither a small mammal nor a frog the Ranger stopped the vehicle and examined the prey with the added aid of a powerful torch. To his utter astonishment it proved to be a sticky piece of sugar cane pith to which a small tuft of grass seed adhered, indicating that it may have been carried to the road; around it the road surface was damp with exuded juice.

8. PACK HUNTING BY JACKALS.

From a report by Ranger L. C. Denyer made at the Mkuzi Game Reserve, during May, 1955. Five adult Black-backed Jackals *Thos mesomelas* were seen in the late afternoon running down a Steenbuck *Raphicerus campestris*. When first noticed the Steenbuck was very tired and very little fuss or hurry was evinced by the jackals as they continued the chase. The latter had taken up very strategic positions; two slightly forward, one of them to the right and the other to the left of the antelope: two running on each flank: and the fifth immediately behind the Steenbuck. After some distance had been covered the buck faltered tc the right when it was immediately caught by the jackal covering that side. The others straightaway closed in and started to feast on the carcase. The Ranger reported that although he had several times seen single

jackals chasing antelopes, it was the first time that he had noticed them working in a pack.

9. PYTHON'S FEEDING HABITS.

From a report by Ranger L. C. Denyer, made in the Mkuzi Game Reserve, during February, 1956. A python *Python sebae*, of between 12 feet and 14 feet in length and of good girth, was watched trying to engorge a young male Impala *Aepyceros melampus*. When first seen the reptile had swallowed the head and neck and was approximately halfway down the shoulders. The swallowing process was watched by the Ranger and his Native Game Guards, all of whom were impressed by the power of the reptile's contracting muscles. The snake did not appear to be disturbed by the near presence of the observers, until one of the Natives moved into the wind which carried his scent to the snake. This had an immediate effect for the python simply disgorged the Impala without the slightest apparent effort, and promptly slithered off. An examination of the carcase showed that the capture had largely been effected by the reptile striking the Impala slightly behind the head, for the fang marks were clearly visible and the neck bone had been broken. Some body heat was still apparent in the Impala, which, it was felt, could not have been dead more than an hour. It was remarked that although the head and neck, except the eyes, showed no signs of having been affected by the python's digestive juices, the 6 inch long horns appeared to be in a quite advanced state of decomposition.

10. AN OBSERVANT GIRAFFE.

From a report by Ranger N. N. Deane, made in the Hluhluwe Game Reserve, during June, 1956. A young bottle-reared but three parts grown male Giraffe *Giraffa camelopardalis* frequently made a nuisance of himself by getting into buildings and gardens where he was not wanted. It was customary to get rid of him by waving a branch of Impafu tree *Zizyphus mucronata*, of the leaves of which he was so fond that he could usually be induced to follow the bearer of the delicacy. On the occasion which prompted the report the Giraffe shied away from the titbit and refused to have anything more to do with it. While continuing to try and entice the animal the Ranger noticed a slight movement towards the end of the branch, and closer inspection revealed the presence of a twenty inches long snake. It was later identified as an immature Tree Snake or Boomslang *Dispholidus typus*.

11. UNUSUAL COMPANIONS.

(*a*) From a report by Ranger N. A. Steele, made in the Hluhluwe Game Reserve, during September, 1956. A somewhat unusual sight seen when on patrol, was of five Chacma Baboons *Papio porcarius*, two Warthogs *Phacochoerus aethiopicus* and two Grey Duikers *Sylvicapra grimmia* all lying sprawled out in the shade under the same tree.

(*b*) From a report by Senior Ranger I. C. Player, made in the Umfolozi Game Reserve, during January, 1960. Many interesting mammals were noticed at close quarters on the river banks during the course of an eight miles canoe patrol along the Black Umfolozi. At one point it was possible to paddle within a few feet of some sleeping Warthogs and browsing Bushbucks. But the most entertaining and unusual sight of all, was that of a female Bushbuck, a Warthog, a Grey Duiker and several Vervet Monkeys *Cercopithecus aethiops* all romping together on a sandbank. As the report said —it was a brief and intimate look into a world about which we humans know very little.

12. MEETING OF RHINOS OF TWO SPECIES.

(*a*) From a report by Ranger N. A. Steele, made in the Hluhluwe Game Reserve, during January, 1957. One afternoon a face to face meeting between a Black Rhino *Diceros bicornis* and a Square-lipped Rhino *Ceratotherium simum* was watched. The animals had been feeding in close proximity to one another for some time, when the Black sauntered up to its larger relation. The two then touched noses and began a quiet and playful duelling with their horns. The Ranger went on to say that it is customary for the Black Rhino to give ground when a Square-lipped Rhino is encountered, but in this case it was the latter which steadily backed away; until it eventually turned off and left the Black one standing in possession of the site. The difference in size of the two species was commented upon; both were adults but the Black seemed to be little more than half the size of the Square-lipped individual.

(*b*) From a report by Ranger N. N. Deane, made in the Hluhluwe Game Reserve, during January, 1960. A long vigil from a vantage point on top of a ridge was rewarded by an opportunity to watch the interesting details of a meeting between three Black Rhinos *Diceros bicornis* and two Square-lipped Rhinos *Ceratotherium simum*. When first seen the two parties were feeding in the same general area with the Black Rhinos on the downwind side and gradually browsing away from their grazing relations. When about 200 yards distant, one of the Black turned and began to browse back towards the Square-lips, until it had got to within about 30 yards of them, when it began cautiously and deliberately to stalk the smaller of the two. The latter, hearing the quiet approach, in turn started moving slowly towards the Black cousin which, when the intervening distance was no more than fifteen yards made a sudden charge. Quite unperturbed the Square-lip stood its ground and the charge halted abruptly at about five paces, when the Black turned and moved away a little. Soon the Black started another stalk until the two stood facing one another at perhaps eight or ten paces, with a small clump of bush between them. The next development was a short charge by the Black Rhino through the bushes right up to the Square-lip, when the two animals stood with lowered heads and horns almost if not quite touching. At this point the Square-lip started to give ground backwards with the

Black following, but after a few minutes the Black casually strolled off and went browsing past both the Square-lips. During all this time the large Square-lip, a very big cow, was grazing peacefully not more than thirty yards away, and took no notice whatsoever of the disturbance. Also, whilst all this was going on, the other two Black Rhinos had browsed nearer, and when fairly close one of them performed in exactly the same way as the first. But this time the smaller Square-lip gave the impression of encouraging the Black ones, because it kept on moving slowly towards them. When a second Black made a short charge the Square-lip showed no signs of fear but merely met it with its head down, and then both animals took it in turns to move backwards or forwards, with their horns apparently just touching. Again the larger Square-lip took no part, and only evinced a faint interest when the second Black made a half hearted charge in her direction, but stopped at about fifteen yards and showed no intention of approaching nearer. This large cow Square-lipped Rhino was an enormous brute, and the Ranger reported that it made all three of the Black Rhinos look quite ridiculously small. At this point, and quite amazingly, all five animals moved off in the same direction, the three occupied with their browsing, and the two with their grazing. They continued in this way for quite one hundred yards before separating, and in concluding his observation the officer recorded that the meeting of the two species did not strike him as being in any way different from one between two Black Rhinos. On such occasions a similar brief show of strength and aggression precedes a peaceful acknowledgment by each of the presence of the other.

13. ASSOCIATION BETWEEN HYENA AND WARTHOGS.

From a report by Ranger N. N. Deane, made in the Hluhluwe Game Reserve, during October, 1955. For some days, evening visits were paid to, and observations carried out at a number of burrows, high up on a comparatively open hillside, known to be frequented by Hyenas *Crocuta crocuta*. On each occasion several Warthogs *Phacochoerus aethiopicus* were seen in front of the holes, often together with the Hyenas, and it was clearly and conclusively determined that as and when the Hyenas vacated their burrows and went off on their nocturnal prowlings, so did the Warthogs take up their residence for the night in the same holes.

14. PELICANS KILLED BY SHARKS.

(*a*) From a report by Ranger N. A. Steele, made at St. Lucia Estuary, during May, 1956. Something over 200 Pelicans *Pelecanus onocrotalus* seemed habitually to stay at the Estuary mouth during the month and whilst numbers of them were being watched swimming and fishing at the edge of the open sea, one was seen to be attacked by a shark as it submerged its head to feed. The shark did not succeed in taking the bird but it severed the unfortunate Pelican's jugular vein, killing it almost immediately; the corpse was thereupon washed ashore.

(*b*) From a report by Senior Ranger I. C. Player made at St. Lucia Estuary, during September, 1956. Wonderful views of Pelicans *Pelecanus onocrotalus* were to be had on the Estuary mudbanks during most of the year. Up to as many as 200 could be seen at one time, and many interesting feeding scenes were witnessed, as the birds devoured large mullet and grunter. Two of the birds were killed trying to swallow grunter large enough to be beyond their capacity, and on a number of occasions the Pelicans were observed feeding on mullet in the breakers, despite the presence of sharks. Early one morning in May a large group of the birds was being watched feeding in the open sea, when one was taken by a "Lazy Grey" Shark. The others were quite unperturbed by the tragedy and continued their fishing as though nothing had happened. The officer added that as the tide started to come in and the waves became bigger, it was most amusing to watch the skill with which the Pelicans came surfing in and kept just in front of the breakers.

15. SWIMMING PORCUPINE.

From a report by Ranger H. R. Dent, made in the Umfolozi Game Reserve, during January, 1957. As a motor vehicle, during the late evening, approached the Black Umfolozi River, a Porcupine *Hystrix africae-australis* was seen making its way down the cutting which led to the causeway crossing. Upon reaching the water's edge and finding itself hemmed in by the steep earth banks and the vehicle behind it, the Porcupine moved cautiously on to the causeway and was promptly washed over its edge by the strong current. After allowing itself to be carried downstream for some fifteen yards it turned about, swam strongly against the flow of water, and clambered powerfully back again on to the cement causeway. Seeing, however, that there was still no easy means of escape it slid over the edge once more and swam for the reeds on the bank of the river farther downstream. There it crawled out of the water and was soon lost to view.

16. MORTALITY AMONG EUROPEAN HOUSE MARTINS.

From reports by Ranger A. E. A. Root, made in the Loteni Nature Reserve, during October, 1958 and October, 1959. At about 3 p.m. on 11th October, 1958, a very large flock of Hirundines arrived at the hutted camp of the Reserve, which lies close up under the face of the 10,000 ft. Drakensberg. The number of birds was estimated at not less than 500 and it appeared that they had come down over the Drakensberg from the north. Snow was falling on the mountains at the time and as evening drew on the birds packed in under the eaves of the camp's twelve huts in an apparent endeavour to keep warm. A distinctly cold snap was being experienced and as usual the temperature dropped well below freezing. The Ranger reported that in the morning (12 October) he picked up dead birds literally in heaps at the base of the walls, and estimated the number of casualties at about 300 individuals. Unfortunately examples

were not collected but the officer described the white rump and gave details which tallied with House Martins. Although unfortunate, it is of very considerable ornithological interest that precisely the same sort of events took place in 1959. This time it was at about 4 p.m. on 18 October that another party of Hirundines arrived in cold conditions with drizzling rain. Their numbers were estimated at approximately 100 birds, and they too were obviously distressed. The Ranger and his wife were able to catch some of the birds and these were later safely released, after being kept warm in a kitchen; but over thirty corpses were picked up outside in the camp on the morning of 19 October, 1959. Fortunately, two examples were this time forwarded to the Head Office of the Natal Parks Board, where they were positively identified as immature House Martins *Delichon urbica*.

17. MONITOR LIZARD TAKING CROCODILE'S EGGS.

From a report by Ranger T. P. Dutton, from the upper St. Lucia lake region, during November, 1959. Some nests of the Crocodile *Crocodilus niloticus* as well as of the Monitor Lizard *Varanus niloticus* had been found along the shore of the lake, on a stretch of sandy beach lying between the forest verge and the strip of Phragmites reeds fringing the water's edge; and it was decided to see whether observation on the area would reveal something of interest. Approaching the locality a large *Varanus* as well as a Crocodile were seen to scuttle down through the reeds, and it was noticed that one of the crocodile nests had been tampered with. Climbing a forest tree almost overhanging the nest, the Ranger and a Native Game Guard settled down to watch and after about an hour their patience was rewarded, when the *Varanus* came out of the reeds and cautiously approached the site. Reaching the Crocodile's nest it removed the sand with a front foot until the eggs were exposed, and went through a performance of repeatedly putting its head into the hole and then quickly glancing towards the forest. After about six such attempts the Lizard plucked up enough courage to take an egg, and carrying it in its mouth crept to a low bush about 6 feet away from the nest. There, with head slightly raised and turning the egg in its mouth it started crunching the outer shell until it was able to pierce the inner membrane, when the egg was allowed to gurgle down its throat; the shell was then spat out. In all five eggs were removed one by one from the nest and treated in this manner. Throughout, the Lizard seemed concerned about danger from the forest, and at no stage did it take any notice of the Crocodile owner, which latter remained about five yards out in the lake with its head above water. The Ranger reported that visits to the same area the previous year showed a scarcity of Monitor Lizards but at the time of the report they were particularly numerous, varying in size from about one to four feet, and with their own nests in close proximity to those of the Crocodiles.

18. AGGRESSIVE MARTIAL EAGLE.

From a report by Ranger L. C. Denyer, made in the Mkuzi

Game Reserve, during December, 1958. An unusual incident was noticed during one patrol when a flutter of flying feathers was first seen some distance ahead. Closer investigation revealed a Martial Eagle *Polemaetus bellicosus*, which had a firm grip with its talons on the breast of a White Stork *Ciconia ciconia*. At the same time the Eagle had caught the other bird around the head with its beak and it was evident enough that it was endeavouring to break the unfortunate stork's neck. As the Stork was clearly beyond aid no attempt was made to interfere and the Eagle quite quickly choked it to death. A close approach was then made, in order to see whether or not the Stork carried a ring, which it did not; whereupon the Eagle became most aggressive and did not relinquish its prey and move off until threatened with a stick. Even then it only flew into a nearby tree, and returned to the kill as soon as the Ranger continued on his way. Returning half an hour later the Eagle was found to be still there, but by this time it had contenders for the carcase in two White-backed Vultures *Gyps africanus*. The Eagle was having a hard time keeping its meal to itself, although the Vultures obviously had considerable respect for the raptore and for the most part only tried to interrupt the meal by means of their curious pumping or bowing movements, designed to frighten the other bird away. The Ranger reported that it was the first time he had seen an attack on a White Stork by any predator, and he was tempted to believe that the aggressive Eagle might well be the same one that he had watched in the same area a month earlier, when it had caught a young Baboon and was in the process of devouring it.

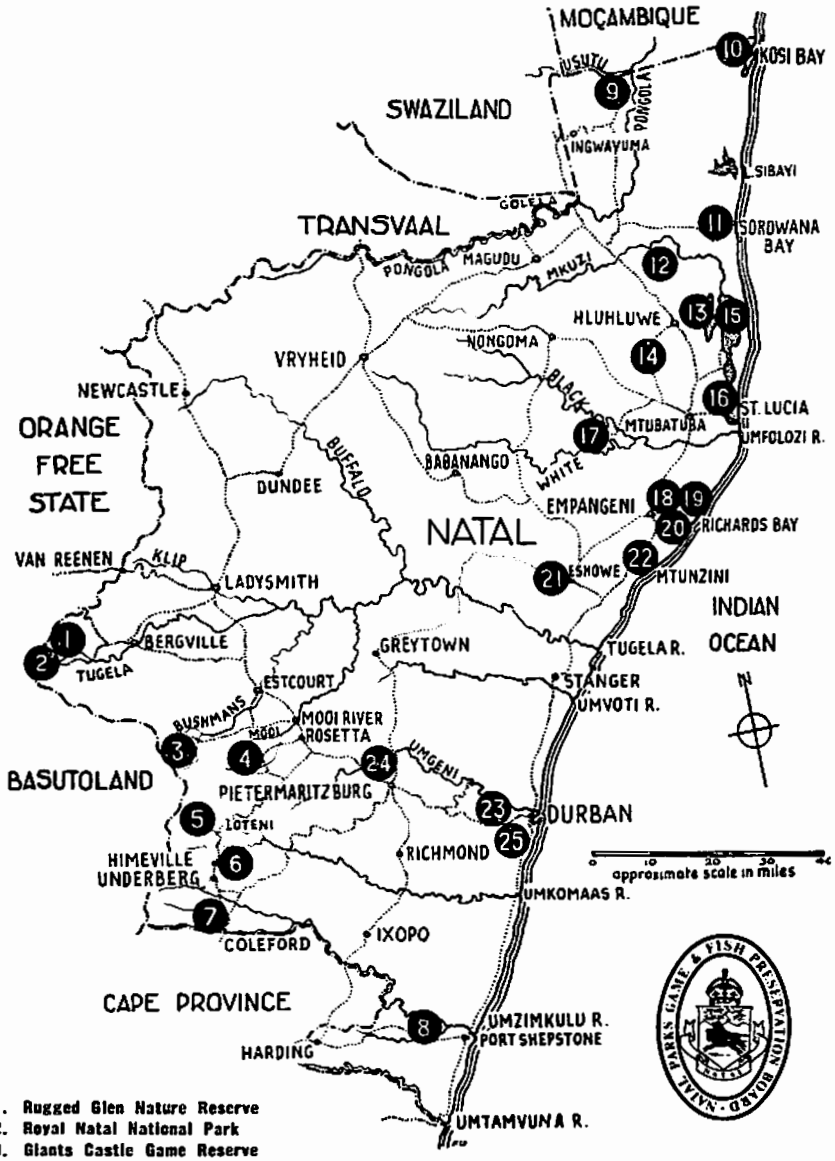
SKETCH MAP

showing the location of the

GAME RESERVES, NATURE RESERVES AND PARKS

under the control of the

NATAL PARKS, GAME AND FISH PRESERVATION BOARD



1. Rugged Glen Nature Reserve
2. Royal Natal National Park
3. Giants Castle Game Reserve
4. Kamberg Nature Reserve
5. Loteni Nature Reserve
6. Himeville Nature Reserve
7. Coleford Nature Reserve
8. Oribi Gorge Nature Reserve
9. Ndumu Game Reserve
10. Kosi Bay Nature Reserve
11. Sordwana Bay Park
12. Mkuzi Game Reserve
13. False Bay Park
14. Hluhluwe Game Reserve
15. St. Lucia Game Reserve
16. St. Lucia Park
17. Umfolozi Game Reserve
18. Enseleni Nature Reserve
19. Richards Bay Park
20. Richards Bay Game Reserve
21. Dhlinza Forest Nature Reserve
22. Umlalazi Nature Reserve
23. Krantzkloof Nature Reserve
24. Queen Elizabeth Park Nature Reserve
25. Coedmore Nature Reserve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