Paper No. 54

The Management of Large Mammals in Natal, with Special Reference to Utilization for Stocking or Restocking Purposes

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ABSTRACT

The major game reserves of Natal, South Africa, fall into two broad life zones—the highveld and the lowveld. Each has its own problems, which are described, and which may be attributed to restrictions imposed by artificial boundaries. Essentially, the numbers of large ungulates in the highveld are limited by environmental factors acting productivity. In the lowveld, however, the reverse is true, and past management has resulted in overpopulations of ungulates. These have been controlled very intensively, and the policy continues although it is a dynamic process and alterations are made from year to year. Methods developed to catch animals alive for redistribution are described, and the numbers controlled by both shooting and capture, together with the revenue accrued from sales, are provided.

INTRODUCTION

In this paper I shall be attempting to relate behaviour to management (which is, after all, the theme of the Conference), laying particular emphasis on the effects that management has had on the behaviour of large ungulates in Natal. Clearly, the problems and consequences are not unique, but have their parallels elsewhere in the world.

May I start by reiterating what is perhaps obvious to any student of wildlife management or to any conservationist? It is that conservation and consequently management have exhibited a clear evolutionary pattern:

1. A natural ecological balance between primitive man and his environment.
2. A period of ruthless exploitation during which the prime object was economic gain or sport hunting.
3. The recognition of a need to preserve what was left of the natural heritage, and the enforcement of this need, sometimes to almost fanatical lengths, as evidenced by the destruction of predators.
4. A period of ecological enlightenment, in which the natural balance became better understood, and in which numerous management techniques were applied, often quite intensively.
5. Finally, a stage of commercial exploitation on a very rational basis, exhibited by tourism, sport hunting and game ranching.

In South Africa we are very largely in Stage 4 at the present, but are moving slowly into Stage 5. We are therefore vitally concerned with management, part of which of course is a need to understand behavioural aspects of the biology of game animals, as well as the effects which management policies have had, or are having.

Judging from experience gained, in particular, in the game reserves of Natal Province, it is clear that vital changes in behaviour, especially that of populations, have taken place in the 75 odd years of the existence of these reserves.

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A brief statement of background is perhaps necessary at this stage. The earliest proclaimed reserves in Natal were established in 1897, at a time when the pressures

place, resulting in the extinction in the [illegible] species of large ungulates. After their establishment, pressures from settlers increased rapidly with the opening up of nearby land, and the situation today is that nearly all of the reserves comprise mere 'islands' surrounded by intensive settlement.

The result has been that, whereas before, the large game populations had been able to range extensively (and indeed there is clear evidence that seasonal migrations took place), today they are confined for 12 months of the year to only a remnant of their former range. The future management implications are obvious in that the habitat is subjected to year-round utilization—a situation which has, as we shall soon see, had diametrically opposite effects on ungulate population behaviour in two different habitats in Natal.

Coupled with this fact is that of the destruction of predators, in the belief that it was only by doing this that the herbivorous ungulates could be preserved. So was manifest stage 3 of the evolution of game management, and whilst it was not sound policy in the eyes of modern conservationists, the practice must not be too heavily criticised. This control of predators, embracing not only the large cats such as lion and leopard, but also hunting dog, jackal and baboon, continued until after 1950, before wisdom prevailed.

It is too much to hope that the situation will revert to that pertaining before the interference of man, and it must remain a basic tenet of conservation in almost any area throughout the world that some form of management in the form of habitat manipulation or population control will always be necessary.

This 'nettle' has been firmly grasped by the Natal Parks, Game and Fish Preservation Board, which is the body responsible in the province for the control of all wildlife—not only inside game and nature reserves.

THE PAST AND PRESENT

Firstly, a brief explanation of conditions in Natal is necessary. The altitude varies from over 3000 metres to sea level, with a wide range of habitats from subalpine to truly tropical. Game reserves are so situated as to embrace these extremes, although regrettably there is little reservation in the intervening life zones. However these conditions, when considered in relation to the fact that game populations are restricted, have led to interesting problems which are far from being properly solved, and a good deal of improvisation has had to be employed with, so far, adequate results.

The Highveld Area. Only one major reserve is situated in this zone, namely Giant's Castle Game Reserve. It consists of very open grassland on rugged terrain, and is subjected to severe winters. During the winter the grass has a very low nutritional value and is unpalatable. Few ungulate species are endemic to the Drakensberg, although of those occurring in Giant's Castle, the blesbok *Damaliscus lunatus*, the black wildebeest *Connochaetes gnou*, and the vaal rhebok *Pelea capreolus* are typically highveld forms.

The first two mentioned are re-introductions to the reserve, whilst the third is a smaller antelope and has always occurred there. Little is known of the past habits of the blesbok and black wildebeest, before they were exterminated from Natal, but because of the nature of the vegetation, it is unlikely that the latter species could successfully have existed in the Giant's Castle area on a permanent basis. Certainly von Richter (1971) has shown that the area is very probably marginal to its distribution, as evidenced by the poor reproductive and survival rates. The same can be said of the blesbok population, which has shown a poor performance since its introduction.

Liebenberg (1964) quotes several early travellers, indicating that migration into the highveld grasslands in summer was a feature of the vast herds of game that inhabited the interior of South Africa. In winter they moved back towards the 'lowveld'.

Another important species which occurs in Giant's Castle is the eland *Taurotragus oryx*. This is a mixed feeder, although in this area it has adapted to an almost purely

grated to lower altitudes in the winter months, returning to the open plains and grasslands when the grass became palatable. Today this movement is restricted, and the animals can only repair to the lower ground within the reserve where limited browse is available. The results had been that the population has not increased to any extent, having remained very stable since it was first censused by air in 1962. Estimates made by residents prior to this date confirm this fact, as shown in Table 1. It would appear again that the rates of reproduction and survival are severely impaired by this existence—a result of management in the form of artificial restriction.

TABLE 1. ESTIMATES OF NUMBERS, AND CENSUSES OF ELAND IN THE NATAL DRAKENSBERG.

(Figures marked * are estimates, the remainder are results of aerial censuses)

Year	Number
1916	600*
1921	700-800*
1926	1,000*
1962	703
1963	650
1964	817
1965	709
1966	777
1969	536
1970	682
1971	870

Those smaller ungulates species which occur in the area do not pose problems in management: there is no evidence of any serious decline in numbers or of over-utilisation of the habitat, and it must be concluded that they have achieved a reasonable balance with the habitat. Research is needed to establish whether the stability is due to spatial or nutritional reasons—or both.

Thus it is that highveld conditions impose a restrictive effect on population performances, whilst it will now be shown that the reverse is true of the lowveld.

The Lowveld Area. The vegetation of the lowveld is of the form of woodland of varying density, generally with a grass understorey. Severe winters are not a feature of this biome, and the grasses retain their nutritional value throughout the year, being of a different species composition to that in the highveld. The consistent high level of palatability has lent the general term 'sweetveld' to it, as opposed to the 'sourveld' which is applied to the higher altitude areas.

The presence of both grass and woody plants has meant that a wide range of ungulate species has evolved along with this habitat, to include pure grazers, mixed feeders and browsers. Traditionally, it is the lowveld which has become known as the main game area of Africa, the same—or similar—grass species occurring throughout most of the continent.

Because of the nature of the vegetation, the main problem in management of the lowveld reserves, including Umfolozi, Hluhluwe, Mkuzi and Ndumu Game Reserves, has been one of over-utilisation caused by overpopulations of game.

This fact became very evident in the 1950's after rigid protection had been enforced for some years. It resulted in the introduction of a policy of population control which initially took the form of shooting, although small numbers of impala *Aepyceros melampus* were caught alive for distribution to a few interested farmers. Prior to this time, one of the main reasons for there not having been any such problem was the policy adopted by the veterinary authorities in an effort to eradicate the tsetse fly, which was responsible for the transmission of a disease fatal to domestic stock and carried by game animals. Tremendous numbers of game animals were destroyed, as described by Vincent (1969) and Mentis (1970), particularly in Umfolozi Game Reserve.

Thus it was that in 1954, probably one of the first planned ungulate population control programmes in Africa was put into motion in Hluhluwe Game Reserve—planned that is with the benefit of the habitat as the ulterior motive. During the period August 1954 to May 1955, 729 wildebeest *Connochaetes taurinus* and 494 zebra *Equus burchelli* were shot in the area. Then in 1958 it was resolved that population control in Hluhluwe and Umfolozi Game Reserves should become an established management technique, and efforts were directed initially at wildebeest and zebra, but later also at warthog *Phacochoerus aethiopicus* and impala *Aepyceros melampus*. It was clear at this stage that the step was an essential one if habitat deterioration was not to continue, and the benefits thereof were soon evident. It is interesting to note that there was no real problem in so far as browsers were concerned. Furthermore, the control was based largely on estimated populations, and not on census and calculation of annual increments. The numbers of animals destroyed to date, including those shot specifically for rations are shown in Table 2.

TABLE 2. NUMBERS OF ANIMALS SHOT IN THE HLUHLUWE AND UMFOLOZI GAME RESERVES SINCE THE INCEPTION OF THE POLICY OF NUMERICAL CONTROL OF UNGULATES

	Species				
Year	Warthog	Wildebeest	Impala	Nyala	Zebra
1957	39	309	146	16	
1958	580	199	124	21	
1959	4,353	1,325	1,330	501	577
1960	2,769	732	566	228	246
1961	1,154	741	441	5	9
1962	2,371	894	455	49	84
1963	2,408	954	456	15	73
1964	3,390	835	427	5	45
1965	1,811	1,209	1,283	176	333
1966	1,059	979	1,153	146	16
1967	827	694	586	1	1
1968	782	332	453	0	21
1969	1,842	274	438	0	18
1970	1,222	267	418	0	0

In Mkuzi Game Reserve, the predominant species has for many years been the impala. In the early 1950's small numbers of these animals were caught alive for redistribution to other reserves and to local farmers, who were already recognizing the ad-

vantages of having small herds for sport hunting and domestic use. This in fact was the start of an ever-increasing demand in Natal for live animals, and culminated in 1966 in the establishment of the first game ranch in the province.

The numbers of animals shot in Mkuzi Game Reserve are shown in Table 3. The large numbers controlled in the period 1963-1965 followed the realisation of the need for a drastic reduction in the population. Carcasses were sold on the open market.

TABLE 3. NUMBERS OF ANIMALS SHOT IN MKUZI GAME RESERVE SINCE THE INCEPTION OF THE POLICY OF NUMERICAL CONTROL OF UNGULATES.

Year	Species		
	Warthog	Wildebeest	Impala
1960	5	205	118
1961	17	307	237
1962	38	375	346
1963	32	201	1,567
1964	7	267	4,360
1965	138	506	3,045
1966	159	191	845
1967	26	2	624
1968	109	1	691
1969	140	185	559
1970	103	193	284

In order to provide for the game ranching movement, the Natal Parks Board modified its game control policy to allow for the larger scale capture of ungulates, and to this end employed one man to develop satisfactory methods. Regrettably, the evolution of the capture technique has not been documented, so that it will not go amiss if it is described here very briefly.

At first it was done by means of nets, into which animals were driven, and in which they became entangled. This technique involved a good deal of manhandling of animals, often resulting in injuries to both captors and captives. Variations of this method included driving on foot, on horseback, and by vehicle. A significant breakthrough was the discovery that a blue plastic material provided sufficient of a barrier to the animals' movement to enable them to be trapped in a 'boma' or corral, constructed of the material, and enabling them to be subsequently brought down by sheer force of numbers and manhandled into travelling crates.

This method proved good for wildebeest and zebra, whilst impala continued to be caught by hand at night, with the aid of spotlights. Oelofse (1969) describes the method of catching with the use of blue plastic. Initially it was considered that blue had some 'magical' property, but it was subsequently found that the mere presence of a sufficiently high, opaque barrier, whatever colour—was sufficient to prevent animals from attempting to escape; this despite the fact that any animal could simply walk through the material. Bomas so constructed have been known to contain square-lipped rhinoceros for over 24 hours without water (Oelofse, pers. comm.).

The technique has been further perfected, so that at no stage are the animals handled, but are separated into manageable groups and driven up a ramp into waiting lorries carrying a wooden superstructure. Up to 15 wildebeest or zebra may be transported at once in this way.

The latest major development has been the introduction of a helicopter for use in

driving the game into the capture bomas, as described by Oelofse (1970). This has enabled large herds of animals to be captured in a short period, and one of the best operations to date accounted for over 200 wildebeest in 20 minutes of driving. The loading operation of course is a more-time-consuming process. The helicopter technique has been used successfully on most species: wildebeest, zebra, impala, waterbuck *Kobus ellipsiprymnus*, and kudu *Tragelaphus strepsiceros*.

Warthog and Nyala *Tragelaphus angasi* require a specialised capture technique, as neither species is amenable to being driven by any means. The demand for warthog is very limited, although its potential as a meat producing animal is considerable. They are usually caught by placing nets over the sleeping burrows at night and stampeding them very early in the morning. Nyala, being primarily inhabitants of dense bush, have to be caught in small numbers by driving them for short distances into similar traps as are used for larger species.

Specially designed holding pens have been built to obviate handling, where any of the ungulate species may be kept for a period before they are taken by a buyer, who may not be able to collect the animals in the field, or until they are shipped to the overseas market. The latter course, whilst being lucrative, accounts only for a small proportion of the captured game.

The numbers of antelope captured alive for redistribution are shown in Table 4, and the revenue derived therefrom in Table 5.

TABLE 4. NUMBERS OF ANTELOPE CAPTURED ALIVE BY THE METHODS DESCRIBED IN THE TEXT, FOR REDISTRIBUTION.

(H/U = Hluhluwe/Umfolozi, M = Mkuzi

Year	Warthog	Impala		Wildebeest		Nyala	Zebra	Waterbuck
	H/U.	H/U.	M.	H/U.	M.	H/U.	H/U.	H/U.
1960			462					
1961			666					
1962			1,213					
1963			1,352					
1964			849					
1965			671					
1966	50	100	374	15		131	64	16
1967	166	7	592	107		66	129	12
1968	8	308	301	510		5	171	8
1969	6	911	788	527	327	18	344	5
1970	28	1,055	1,353	1,037	251	75	328	72

The capture of square-lipped rhino in Natal has been well documented (Player, 1967), and suffice to say simply that the technique has changed little in the past seven years, other than in the form of slight changes in the drug combinations (Keep, pers. comm.). The operation has proved to be an exemplary success in the re-location of a large species, not only to a large portion of its former range, but also to zoos all over the world.

The problem today with the species is to develop techniques of mass translocation. Capture should pose little difficulty, but the transport of large numbers is an exercise that must be carefully studied, particularly since the taming process is lengthy (up to six weeks), and it is unwise to consider transporting wild-caught animals over very great distances. Rochat and Steele (1968) describe the translocation of 74 white rhino over a distance of over 1600 km (1000 miles), occupying 36 hours and more. It may be possible to extend both time and distance of transportation of untamed rhino

TABLE 5. REVENUE DERIVED FROM LIVE SALES OF ANTELOPE CAPTURED IN NATAL GAME RESERVES

Year	Revenue	
	Rands	Dollars (U.S.)
1961/62	1,232	1,720
1962/63	2,322	3,242
1963/64	1,558	2,172
1964/65	1,644	2,298
1965/66	13,229	18,490
1966/67	17,670	23,200
1967/68	6,460	9,000
1968/69	7,366	10,305
1969/70	37,931	52,820
1970/71	64,330	89,580

under sedation, but the logistics of such an operation are enormous. The destinations of square-lipped rhino that have been translocated are shown in Table 6, and the revenue derived from their sale in Table 7. Rhino sent to other conservation authorities in Africa are provided free of charge.

TABLE 6. DESTINATIONS OF RHINO CAPTURED IN UMFOLOZI GAME RESERVE SINCE 1961

Destination	Number		
	Male	Female	Total
Natal Reserves	26	23	49
Natal landowners	13	15	28
Other S. African reserves	133	106	239
Other S. African destinations	23	26	49
Other African reserves	90	109	199
Other African destinations	7	7	14
North America	36	48	84
Europe	34	43	77
Asia	8	7	15
Total	370	384	754

At present the management of large wild ungulates in Natal Game Reserves is a co-operative effort between the scientists and field staff. The latter are responsible for drawing attention to areas that are posing problems, and to the game species concerned. The scientists undertake continual monitoring of the habitat and of the population dynamics of the animals. Annual censuses by helicopter are carried out at the end of the dry season, in August or September, although it is hoped that in the near future sufficient understanding of the population processes will enable such counts to be held only every two years. Consultations between field officers and scientists

TABLE 7. REVENUE DERIVED FROM SALES OF SQUARE-LIPPED RHINO TO ALL BUT GAME CONSERVATION AUTHORITIES

Year	Revenue	
	Rands	Dollars (U.S.)
1962/63	48, 404	67, 600
1963/64	46, 545	65, 150
1964/65	38, 144	53, 510
1965/66	29, 122	40, 950
1966/67	15, 043	21, 010
1967/68	18, 012	25, 200
1968/69	3, 400	4, 750
1969/70	9, 289	13, 000
1970/71	140, 943	196, 900

result in the formulation of a policy for the ensuing calendar year, detailing the numbers of animals to be removed, and enabling the administrative staff to allocate live game to applicants.

Capture takes place between April and September, due consideration being given to the rutting seasons of the various species, so that reproduction is not disturbed, and animals are already pregnant when captured. The season ends before the animals are too heavily pregnant, as experience has shown that serious losses to adult and unborn animals may take place if stresses are imposed upon the females at too late a stage

THE FUTURE

No major changes in the present policies for the management of large ungulate species in Natal game reserves are envisaged in the foreseeable future, although research into behaviour and population dynamics may result in changes of emphasis.

In the highveld where the habitat is a limiting factor, manipulation thereof may be necessary to improve the 'turnover' of populations. Such manipulation may take the form of artificial 'licks' to supplement the nutritional value of the grasses, or it may involve management to encourage growth of woody species to provide winter browse, particularly for eland.

In the lowveld an increasing population of predators, particularly of lion and cheetah, will influence very significantly the numbers of ungulates to be controlled. This however, will entail merely the modification of an existing policy.

A further technique, which will involve the knowledge of a good deal more of the behaviour of ungulates, and which is well worth more consideration, is the establishment of temporary exclosures—possibly with the use of plastic as a fairly cheap and rapid means of providing a barrier—for the reclamation of areas that are showing signs of over-utilization.

Water is an effective means of moving ungulates from an overgrazed area to one that has not been utilized, and in the Kruger National Park in Transvaal Province, the provision of artificial waterpoints is an established policy. This technique of course depends upon the availability of natural sources of water.

Fire too has proved a useful management tool, although its efficacy extends only for the period that the regenerating grass retains its succulence, before the animals return to their more favoured areas. Used in conjunction with temporary exclosures, there is a good deal of potential for game managers to investigate.

The tendency for herbivores to favour certain areas for grazing seems to depend upon a number of features including cover, soils, grass composition and water. Such areas

may be maintained in a state suitable for themselves by suppressing the development of climax grasses and encouraging the often more palatable sub-climax and annual forms. Investigation of all aspects of this phenomenon as a manifestation of behaviour patterns is a necessary development for efficient management.

ACKNOWLEDGEMENTS

I am very grateful to the organisers of the conference for their continued encouragement in making this contribution possible. To the Natal Parks, Game and Fish Preservation Board I extend sincere thanks for their generous assistance. The tedious task of extracting figures from dusty records was performed by Mr. David Rowe-Rowe, whilst the manuscript was typed by Miss D. Morton.

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