Recruitment in a Small Black Rhino Population

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INTRODUCTION

A population of black rhino of the Kenyan **subspecies Diceros bicornis michaeli occurs** in the Addo Elephant National Park of South Africa. Times. animals (now a population of 17) are descended from four wild-caught Kenyan animals which were translocated in 1961 and 1962. The details of their introduction and initial management can be found in Hall-Martin and Penzhorn (1977). In late 1977 the park area available to these black rhino was enlarged to the present 8 596 ha. The rhino are free-ranging in this area which also supports populations of other large mammals (Table 1).

The population dynamics of this rhino group have been monitored and the observations are summarized below, since they have direct relevance to initiatives to build deli small rhino populations elsewhere.

MANAGEMENT

The animals are not handled in anyway. Routine management consists only of maintaining perennial water supplies and protection within the fenced area of the Park.

INTERFERENCE

During September 1977 a regrettable introduction of three bulls from Natal, of the subspecies D. b. minor, was made. One of these bulls had only one external ear. As this was thought to be due to a genetic condition (known from elsewhere in Africa — Goddard, 1969; Hitchins, this issue) the bull was immobilised and castrated in 1979. Later observations of the castrated bull attempting to mate with cows, and keeping other bul Is anway from them, led to him being shot. The other two D. **b.** minor bulls were removed in May 1981, im compliance with a resolu-tion of the African Rhino Specialist Group of IUCN/SSC taken at its Kilaguni, Kenya meeting in 1980.

A further consequence of the decision of the National Parks Board of Trustees of South Africato implement the SSC resolution was that three calves, possibly sired by Natal bulls, were removed from the Park in May 1983. These three animals were exchanged with the National Zoological Gardens in Pretoria for an adult cow of the subspecies D. b. michaeli. The transfer of this cow from a zoo to the wild was not successful and she died after three months at Addo.

The remaining animals, all pure **D. b. michaeli**, have been undisturbed since 198 I and their prospects for the future are good.

MONITORING

Because of the nature of the vegetation at Addo — which is a dense thicket of mainly evergreen and succulent shrubs and small trees (Hall-Martin, et al. 1982), in which visibility is limited, and access restricted to a few roads and elephant paths — it is difficult to keep records of the rhino. All animals were, therefore, darted in May1977 when they were still held in a relatively small fenced paddock, and were marked by ear tags ('Lone Star' type) and had notches cut in their ears.

The tags lasted a few years and then fell out. The notches, however, have allowed observations of known individuals to continue. A helicopter census of the Park (now carried out annually) during which all rhino are identified and photographed, is the major means of recording data on the reproductive performance of the populations. When calves reach the age of 2-3 years, before they leave their mothers, they are darted and marked by ear notches. Three young animals were caught and marked in 1986 and more will be marked in 1987. The ultimate objective is to have all animals marked.

Figure 1. Map showing location of Addo Elephant National Park.

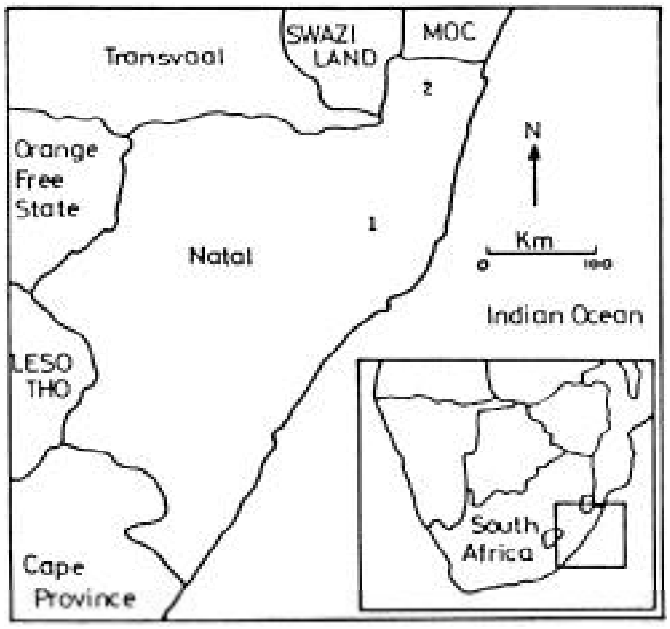

Table 1. The large mammals of the Addo Elephant N.P.

Species	Numbers					
	1978	1979	1981	1983	1985	1986
Elephant	92	102	108	116	117	118
Buffalo	247	269	75	120	42	52
BlackRhino	9	11	16	19	16	17
Kudu	152	203	192	493	361	361
Bushpig	22	38	26	23	11	3
Bushbuck	80	81	109	206	123	137
Duiker	193	384	392	489	194	238
Eland	119	138	52	37	49	54
Red Hartebeest	26	27	27	24	23	26

REPRODUCTIVE PERFORMANCE

From the records which have been kept some data can be derived to assess the reproductive performance of the population:

a. Age at first calving

Six cows born in the Park have calved and the ages of first conception and calving are shown in Table 2.

Table 2. Ages of cows at first conception and calving

Cow	Age Conception	First Calving
Lucky Star	7 years 2 months	8 years 5 months
Doreen	6 years 9 months	8 years
Blom	9 years 1 month	10 years 4 months
Slattery	3 years 10 months	5 years 1 month
Ida	6 years 3 months	7 years 6 months
Vega	4 years 10 months	6 years 1 month

The ages at first calving are higher than those given in the literature for wild black rhino (Goddard, 1970) but of the order reported for captives (Mentis, 1 972). The records for the first three cows given above (mean age at first calving 8 years 11 months) were derived from the period when the animals were living at an unnaturally high density and when only one adult bull, or no adult bull was available. The age at first calving for the second group of three cows is 6 years 3 months. Four adult bulls were available at the time when the first two of these cows conceived, and three when the third conceived. These latter records are, therefore, more likely to be representative of what may be expected from this population in the future.

b. Calving intervals

Intervals between successive calves have been recorded on 16 occasions. Records exist for seven cows (Table 3).

Table 3. Recorded calving intervals for cows in Addo Elephant N.P.

Cow	Calving interval (months)	Mean (months)
Brunni	27+32+52+34	36
Ida (Snr)	46+24	35
Doreen	33+28+33+58	38
LuckyStar	114 + 36	(75)
Blom	48	
Slattery	35	
Ida (Jnr)	39+28	33

Three of the four longest calving intervals (46,52 and 114 months) were associated with the initial period of poor conditions at Addo. The mean of the remaining 1 3 intervals is 35 months. If the two longest of these are regarded as unusually long, then the mean for the remaining 11 intervals is32 months. This mean is closer to others recorded in the literature (Mentis, 1972) but nevertheless somewhat longer than the 27 months suggested for wild black rhinoceros (Goddard, 1 967; Joubert and Eloff, 1971).

c. Sexual maturity of bulls

There is little evidence of the age of bulls at full 'sexual' maturity and first mating. One bull was killed by an older bull at the age of 8 years 5 months which suggests that he was regarded as a rival at that age. One successful mating, according to strong circumstantial evidence, occurred when another bull was 6 years old.

d. Observed rate of increase

For the purpose of this calculation the performance of the population at Addo from 1977 to 1986 was assessed. The hybrid animals (removed in 1983) were considered to be part of the population in the model, but the Natal bulls not. The population growth over the 9 years is described by the equation:

Log_e population = 2.11 +0.09 1 7t (where t is years)

This observed rate of increase r=0.091 7 (giving a finite rate of increase of 9.6% per annum) is slightly higher than the rate of 9.00/ 0 calculated for the Kruger National Park population (Hall-Martin, 1982), and is considerably higher than that of Hluhluwe Game Reserve in Natal (5.3%) (Hitchins and Anderson, 1983), or, historically, the 7.0% at Ngorongoro and 7.2% at Olduvai in Tanzania (Goddard, 1 967). Other Natal populations such as Umfolozi have a higher rate of increase of 11.0% (Hitchins and Anderson, 1983).

e. Seasonality of conception

The records of 28 conceptions at Addo are shown diagramatically relative to long term rainfall (Figure 3). There appears to be a clear spring to mid-summer peak in conception time.

FUTURE PROSPECTS

With the improvement in their circumstances t can be expected that the Addo black rhino population will increase at about 10% per annum. The carrying capacity for Addo has not yet been calculated. However, it would seem that a case could be made for the translocation of surplus black rhino from Addo within the next decade.

No firm decision has yet been taken on what could become of surplus animals from Addo. The demand for animals to found other populations in protected areas would most likely be regarded as sufficient justifi-

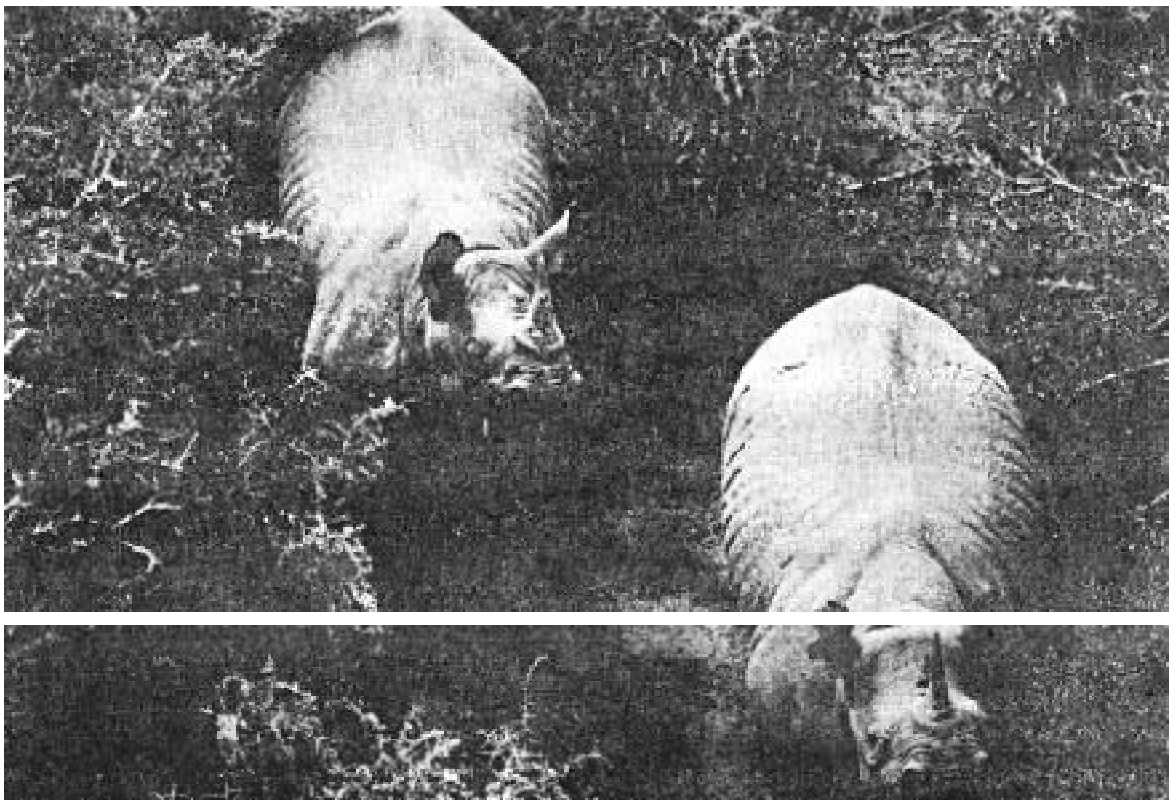

Figure 2. D.b.michaeli in Addo Elephant N.P. The skin on the sides of these animals appears more currugated than in Southern African sub-species.

(Figure4) which has total contact with its calf, whereas the black rhinoceros calf follows the mother with very little contact and therefore less protection (Figure 5). Both these relationships are related to the different habitat requirements of these two species.

THE WARNING:

In 1977 a black rhinoceros male lacking one pinna was introduced to the Addo Elephant National Park from Hluhluwe Game Reserve. It was later successfully castrated to prevent the possibility of an earless inducing gene being introduced into the Addo population (de Vos and Braack, 1980). Subsequently it has been destroyed as it no longer served a reproductive function in the park (J. Flamand, pers. comm.). The animal had been a familiar resident of Hluhluwe Game Reserve prior to its translocation and was known to have been born with both pinnae. Scars that were subsequently seen around its ear opening indicated that the animal was no exception to the general rule that earlessness in the Natal black rhinoceros is due to hyaena predation. The castration exercise was clearly ill-considered and the presumption that rhinoceros earlessness is necessarily a genetic condition is to be avoided in future.

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Re-Establishment of Elephant in the Hluhluwe and Umfolozi Game Reserves, Natal, South Africa

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Prior to the advent of European influence in Southern Africa, elephant were widely distributed throughout Natal and Zululand. The elephant populations in this area were decimated during the "Great White Hunter" era and the last elephant in the Hlabisa district of Zululand was reputedly shot in 1890. It is only in the unspoilt Mozi swamps and Sihangwane forests in the very northern part of Zululand that a remnant population of elephant survives. This population numbers between 75-150 and moves back amid forth across the international boundary between Mocambique and South Africa. Fortunately, the elephants are now protected on the South African side of the border with the recent proclamation of the Tembe Elephant Reserve, which falls under the control of the KwaZulu Legislative Assembly.

Tine Natal Parks, Game and Fish Preservation Board (henceforth termed the Board) controls a number of conservation areas in Zululand, the largest being the Hluhluwe and Umfolozi Game Reserves; these are joined by a corridor of state land (the whole area being approximately 900 square kilometres). The Board's primary objectives for these areas are to conserve a wide variety of habitat types and their associated indigenous species and to allow ecological processes to operate without interference (except where these processes have been impaired in some way). In line with these objectives it is the Board's policy to re-establish species in conservation areas where they have been eradicated.

Three major factors motivated the Board to re-establish elephant in the Hluhluwe and Umfolozi Game Reserves. (1) Elephant occurred naturally in the reserves and have been locally extinct for just under 100 years. (2) Since the reserves were proclaimed in 1985, the tree and shrub component of the vegetation has increased to the extent that the thicket, woodland and forest habitats are encroaching severely upon the more open savanna, grassland and wetland habitats. One of the major ecological factors that was removed from the area is the destructive feeding habit of elephant, and it is thought that the increased woody component is due, at least im part, to their absence. (3) Since elephant are classified asa special caseof threatened species by IUCN, the establishment of two interlinked populations of elephant in Natal would improve the status of this species in Africa. Furthermore, this would add considerably to the biological and conservation status of the reserves.

POTENTIAL PROBLEMS

During the planning of the re-establishment programme three potential problems were identified:

1. Would elephant break through die reserves' boundary fence?
   In some parts of Africa elephants move over large distances. If the re-introduced elephant were to exhibit this type of movement pattern and break through the fence they might cause socio-political problems by: (i) damaging the property of the adjacent subsistence farming community, or (ii) allowing other animals (particularly large carnivores such as lion, leopard, hyaena and cheetah) to leave the reserves.
2. Would the elephant damage the reserves' vegetation to an unacceptable level?
   This question may seem contradictory to one of the motivations for re-establishing elephant in the reserve, but it refers specifically to the possibility of the elephant selecting strongly for endangered or endemnic plant species which have higher priority for conservation than elephant.