

Drett, K. (1988). Report on the suitability of the Pejeta Ranch sanctuary as Black Rhino Habitat with some observations on

INTRODUCTION

Holding capacity. Unpublished Report, Kenya Rhino

Rescue Project.

This report is based on general impressions gained during a visit to Ol Pejeta Ranch on September 19th, 1988, when the game reserve area was toured with John Henry Weller, John Poulton and Peter Jenkins. The aim of the visit was to assess the suitability of the reserve as black rhino habitat prior to planned translocations of black rhino into this fenced area, thus forming a new rhino sanctuary. The vegetation was very thick and green after good long rains, and most herbs were flowering or visible. John Poulton's map of the ranch is included (Figure 1), with letters added to the reserve area, indicating areas of interest mentioned in the text.

RESERVE AREA

The total area of the reserve was estimated to be 97 km² (24,000 acres) by John Henry Weller. An approximation of the area from the attached map gives 93 km². Given the relief of the land area, the former figure will be taken as the best estimate. // This area is more than sufficient for a fenced rhino sanctuary, far exceeding that of Solio G.R., and the Lewa Downs (Ngare Sirigoi), Meru, and Tsavo (Ngulia) rhino sanctuaries. In general, for long term breeding and ease of management of black rhino, the larger the area protected the better. //

VEGETATION

The reserve area has an estimated 70-80 per cent cover of whistling thorn (*Acacia drepanolobium*) and mukinyei (*Euclea* spp.) bushland; both of these dominants are popular and widely-used food-plants of black rhino in East Africa. The whistling thorn covers most of the intermediate and higher ground of the reserve area (e.g. area B), with several open areas of grassland within the thorn bushland on the tops of the 'ridges'. It is probably from these open areas that most black rhino will be best seen by visitors to the reserve. There is a belt of yellowthorn (*Acacia xanthophloea*) woodland lining the Uaso Nyiro river, which gives over to the mukinyei bushland away from the river on either side. The yellowthorn woodland appears to be old with relatively few young trees.

The riverine woodland does contain a good diversity of rhino food-plants (e.g. *Phyllanthus* sp. *Dichrostachys* sp.), and young yellowthorn bushes are popular. However, the belt of woodland is thin and quickly changes to the mukinyei bushland (e.g. area A). Mukinyei is a popular 'staple' browse plant, eaten all year round in Laikipia, though it is not the most palatable browse plant, and certainly less favoured than *Acacia* spp. Area A in general had little diversity of food plants, with few palatable herbs found in or around the mukinyei bushes. An area of whistling thorn inspected, B, was again rather barren of food-plants, with the exception of the thorn itself and large amounts of *Solanum incanum*. The thorn bushes themselves appeared to be noticeably age-divided into mature trees (well above rhino browse height), large numbers of bushes of ca. one metre high, and young or heavily-browsed plants at ground level.

Two other areas along drainage lines were visited: area C, around a dam, had good diversity and large amounts of rhino browse, in particular the favoured herbs and low shrubs (*Rhus*, *Hibiscus*, *Vigna*, *Lippia*, *Achyranthes* spp.); area D, along a seasonal water course, was

particularly rich for rhino browse, with large amounts of *Rhus* and *Grewia* spp. The latter was the richest area for rhino food-plants seen, with the possible exception of area F, an area of particularly thick mukinyei bushland outside the proposed reserve area, with greater diversity of plants and more cover. The latter is very similar to the areas of dense mukinyei/*Carissa* bushland on Solio, which hold the greatest densities of black rhino in the reserve.

The Ol Pejeta reserve area appears to have little or none of one habitat type which is greatly favoured by rhino particularly in dry season, namely swamp. Area E may have more swamp which was not seen during this visit.

The abundant whistling thorn and mukinyei bushland, covering the largest area of the reserve, will provide most of the total 'staple' rhino browse. The amount and density of whistling thorn bushland appears a more than adequate food resource for black rhino in the long term, although wise stocking and future management of rhino numbers in the reserve will be crucial to preserving these (see below). Whistling thorn and other *Acacia* spp. being favoured above mukinyei. If overbrowsing is ever seen in the future, it is the whistling thorn that will show it first.

It is strongly recommended that good photographs are taken in directions North, South, East and West from a number of fixed points located in representative areas of vegetation at time of introduction of rhino, and thereafter at regular intervals (minimum yearly), so that any important changes in vegetation status may be detected easily. Enclosure plots may also be considered.

WATER AND COVER

There is clearly no shortage of either of these resources for any wildlife species in the reserve area at present. Accompanying any possible overbrowsing of whistling thorn will obviously be a reduction in cover; this has again already occurred in Solio G.R.

HOLDING CAPACITY

The effects that overpopulation of black rhino can have on habitat are already clear to see in Solio G.R., particularly considering the depletion and damage to whistling thorn in the western area of the reserve, where the difference between the thorn bush inside and outside of the reserve is very striking. If more animals are not removed from Solio G.R., this overbrowsing may have serious consequences for the rhino population, particularly in time of drought, even though 15 animals have already been removed to stock Nakuru N.P. rhino sanctuary.

Given the likelihood that rhino on Ol Pejeta will rely heavily on the whistling thorn, probably even more than the rhino do on Solio (see above), particular concern should be given to correct stocking and management. The area of, and the number and density of rhino within, Solio G.R. are shown in the table below. The numbers of rhinos which, if introduced into Ol Pejeta reserve, would give lower or similar densities, are also given, and the probable effect on rhino browse (in parentheses).

Stocking Ol Pejeta reserve at one rhino per two km² (ca. 50 animals) should not deplete the whistling thorn. It is estimated that overbrowsing may start at one rhino per km² (thus carrying capacity for the vegetation), and a safe potential number of rhinos held in the

Giraffe
probs. ←

reserve would be 50-75% of carrying capacity (i.e. 50-75 rhino).

For the initial stock, from a genetic viewpoint a 1:1 sex ratio maximises genetic diversity in future generations. However, a sex ratio biased in favour of females will clearly speed up breeding. These effects are not discussed here, but it is clear that after the effects that increased densities of rhino have on vegetation (e.g. overbrowsing whistling thorn), overpopulation can affect breeding in several ways: firstly, by restricting the number of males that may breed in a given area; secondly, in increasing aggression and the incidence of fighting between rhino, particularly males; thirdly, by increasing the calving intervals of cows, and hence the cow/calf ratios observed.

These effects argue further for keeping rhino densities well below carrying capacities of fenced sanctuaries, either in terms of effects on food resources, or on breeding performance and genetic health, so that the former be maintained and the latter maximised.

RESERVE	AREA (km ²)	NUMBER OF RHINO	DENSITY (rhinos/km ²)	
Solio G.R. (early 1987)	55	91	1.7	(heavy overbrowsing)
Ol Pejeta G.R. (predicted)	97	50-75	0.5-0.75	(little effect on browse)
		100	1.0	(approx. carrying capacity)
		170	1.7	(probable overbrowsing)

FUTURE MANAGEMENT

The best guide or model for the potential future breeding performance of black rhino on Ol Pejeta is (again) Solio G.R., whose habitat Ol Pejeta most closely resembles out of all the present rhino sanctuaries. Although few if any systematic records of rhino numbers and breeding are available from Solio ranch, the difference between the present estimated numbers and the number of rhino believed to have been introduced to Solio G.R. in the 1960's allows calculation of probable breeding rates to be made.

I believe that approximately 20 rhino were put into Solio G.R. between 1960 and 1970. These rhino have bred very well and at the beginning of 1987 (before translocations to Nakuru, but after 5 animals had been already removed for Lewa Downs), the number was estimated by Major R.T. Elliot to be 91. This outstanding record has been the main demonstration of how successful breeding in a rhino sanctuary can be.

Repeating the approximate starting conditions of the Solio rhino, the predicted growth of a similar initial stock at Ol Pejeta is estimated below. The numbers of rhino that can be expected on Ol Pejeta in the future are obviously influenced by the net rate of reproduction and mortality, particularly that resulting from a carrying capacity for the sanctuary being reached or exceeded.

For these calculations the following assumptions are made: (1), sex ratio of initial stock and of rhino born is 1:1; (2), the ages of the

Rhino Demography

Introduced rhino are spread between 5 and 25 years of age as follows: 4 rhino of 5-10 y.o., 6 of 10-15 y.o., 6 of 15-20 y.o. and 4 of 20-25 y.o.; (3), cows have a 20-year calving span between 10 and 30 y.o., and (4), all rhino die at 35 y.o. The predicted growth in the population from 20 animals introduced into Ol Pejeta reserve in 1989 is shown in Figure 2, for two breeding rates: A, each cow calving once every 2½ years, and B, each cow calving once every three years.

It can be seen that if the Ol Pejeta population is adequately protected, and roughly follows the behaviour of the Solio rhino, at each rate (curve A or B) the population will probably double in less than eight years, and given the observations stated earlier about the holding capacity of the Ol Pejeta reserve, no removals of surplus animals would be necessary until 2004 to 2009 at the earliest. Numbers could be well over carrying capacity 30 years after stocking, when the founders have all died.

These net breeding rates are modest, and may easily be exceeded: the two adult cow rhino on Ol Jogi ranch have produced calves about every two years for the last six years. Assuming Solio G.R. was stocked with 10 males and 10 females in 1965, and taking into account mortality before old age, the Solio cows produced on average one calf every ca. 2½ years (i.e. curve A).

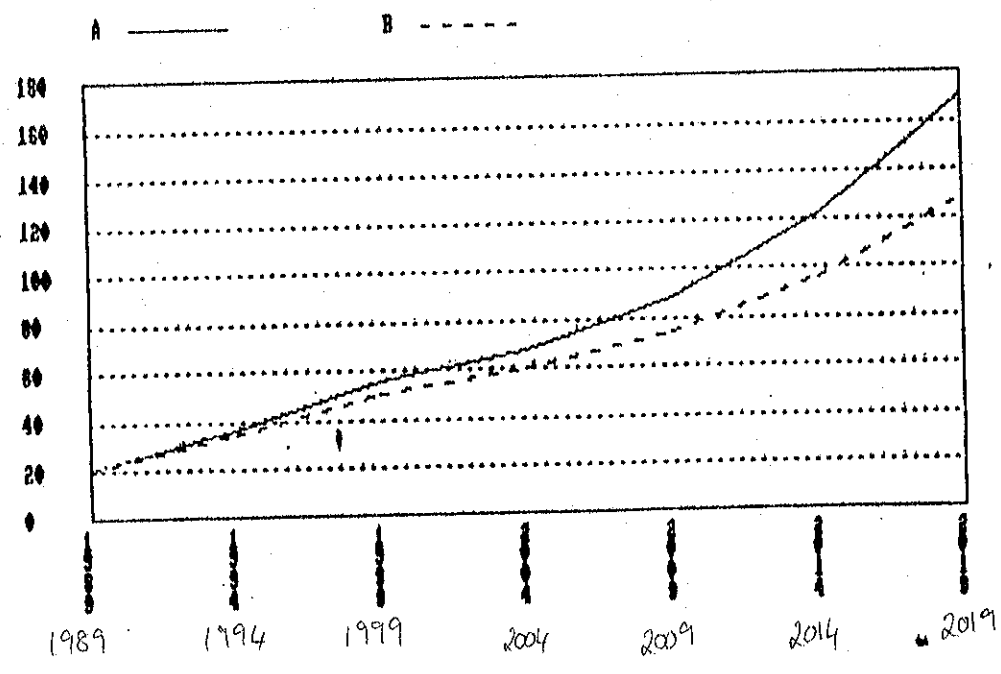


Figure 2: Potential increase in black rhino numbers on Ol Pejeta from an initial stock of 20 animals in 1989, at two breeding rates: A: each cow has 1 calf every 2½ years; B: each cow has 1 calf every 3 years.

SUMMARY

Ol Pejeta Reserve has excellent rhino habitat, very similar to that of the most successful black rhino sanctuary in Kenya, Solio G.R. Although the vegetation types and browse plants favoured by black rhino seen on Ol Pejeta are apparently less diverse than on Solio, because of its size and its huge potential for future breeding the area deserves high priority as a planned-rhino sanctuary as part of the Kenya Rhino Rescue Project.

Because of the potential for overbrowsing of whistling thorn when high rhino densities are reached through breeding, it is recommended that the black rhino density within the reserve should never exceed one rhino per km² (i.e. ca. 100 rhinos), and the eventual population bred up from the initial stock should ideally be kept between ca. 50 and 75 animals.