RELATIVE DENSITY AND DISTRIBUTION OF TANTALUS MONKEY (*CERCOPITHECUS TANTALUS*) IN THE FOUR RANGES OF SAMBISA GAME RESERVE

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ABSTRACT

Tantalus monkey (Cercopithecus tantalus) was reported as widely abundant primate species in Sambisa Game Reserve. In order to provide information on the density of Tantalus monkey, this research was undertaken to study the abundance and distribution of the species in the Reserve. The line transects method of estimating animal population was used for the enumeration. An analysis of data was conducted using the software package DISTANCE 6.0 to determine population density estimate. Kwada, Yuwe, Jeltere and Balda are the four ranges within the reserve. Considering the number of species sighted, Tantalus monkey is widespread throughout the reserve where it was sighted in all the 4 ranges with the highest density of 10.84 km^{-2} (n=80) in Yuwe range. In Jeltere ecological habitat for the species survival is under threats. Habitat loss and habitat degradation in the area are principally due to illegal logging, forest fires and forest clearance for agriculture harbored very few individual of the species. The mean encounter rates (MERs) for the species 1.58km^{-1} with density estimate of about 11km^{-2}. There was a significant difference in the pattern of the species densities for morning and evening count indicating less activity in the evening with mean encounter rate of 0.54 km^{-1} (n=85) and 0.43 km^{-1} (n= 67) individual animals for morning and evening sightings respectively. The relative density for the species across the four ranges in the reserve revealed that Tantalus monkey was present in all the four ranges of the game reserve. A total of only 21 Tantalus monkey were sighted in the Balda range, this calls for close monitoring and control of its population particularly within the range.

Keywords: *Tantalus monkey Primate abundant, Sambisa ranges, Animal population*

INTRODUCTION

The nature of range to density relationship has been previously investigated in the other nonhuman Primates. Findings differ for tropical primate species, Arita *et al*. (1990) found no relationship between range size and average density and he found a negative relationship with minimum density. By contrast, Eeley and Lawes (1999) indicated a triangular relationship of density by geographical range in Africa for both species and genera, with peaks at intermediate geographical range (Harcourt *et al,* 2005). Wide varieties of primates, whose individuals constitute high local densities frequently, have relatively large geographical distributions (Hubbell, 2001). Many explanations exist for the positive relationship between range size and density. Census of nonhuman primates over time is necessary for monitoring population trends, which is important for designing and evaluating management practices. Census data also provide the baseline for more detailed socio-ecological and behavioral studies. Line transect census is the most commonly used method in forest primate abundance studies (Chapman and Lambert 2000). This study was primarily aimed at providing an initial assessment of the density estimate of Tantalus monkey in the ranges of the study area. Sambisa game reserve located in the Northeast horn of Nigeria is home to several primate species. Some of these include

Baboon (*Papio anubis*), Tantalus monkey (*Cercopithecus tantalus*) and Red patas monkey *(Erythrocebus patas*). Baboon and Tantalus monkey are both endemic to this reserve. Wildlife population survey in the reserve has been scarcely carried out with little or no information on the ecology and status of primates. Although primates appear to be relatively abundant, no quantitative data is available. Sambisa game reserve has a wide range of forest habitats with different levels of human activity, which is ideal for investigating anthropogenic influence on primate abundance and distribution.

METHODS

Sambisa Game Reserve is situated in the southern part of Borno state approximately 70 km by road from Maiduguri town. The study area lies between longitude 13º30^{1}–14º00^{1}E and latitude12º00^{1}–13º30^{1}N. It is bordered by Konduga, Gwoza and Bama Local Government Areas to the north, south and east respectively. The Reserve was the combination of two contiguous Northern and Southern Sambisa Native Authority Forest Reserves and was constituted and gazetted in 1977 as Game Reserve. It has an area of approximately 518 Square Kilometres (MAFR 1997).

The line transects method for surveying vertebrate reviewed by Buckland *et al,* (1993) was adopted for the determination of the relative density of the constituent species of primates in the study area. The sketch map of the reserve was used to select where transects were located. The streambed of river Yadzaram that cut across the 3 major ranges of the reserve was used as transect line and their orientation runs through East- West and West-East direction in Kwada, Jeltere and Yuwe and Balda range respectively. Starting point for transect was randomly selected and its bearing was determined using magnetic compass. Transect lines were run perpendicular to the streambed. There were 4 transect lines (T1–T4) in each range of the reserve of 3 km long and positioned 2 km apart. Each line was clearly distinguished by its unique number. Because of the savannah nature of vegetation clearance to facilitate movement along transect was very minimal. With the use of 50 meter tape every distance at 100 meter along the transect lines was marked by writing on marker tape and fastened to a tree or sapling by the side of the distance.

Survey for direct observation of primates was done in the morning and evening. Census data was obtained via line transects methods. Daytime walked census begins at 07:00–10:45hours at an average speed of about 1 km h^{-1}, including a pause at every 100 meters looking from side to side recording all sightings of primates. Additional repeated evening walked censuses were done between 16:00-19:45 hours. At the start of each transect walked the top part of the data sheet that contained information on observers names, name of transect, coordinate and date was filled. While running through the survey line, when primates were sighted or their presence was detected either by branch movement or alarm call, this was recorded immediately on the data form. For each primate sighting, the recorded parameters are the time, species, estimated number of individuals, closest distance from transect to the first individual sighted (perpendicular distance), and location of the observer along the transect. The estimated location on transect was obtained by referring to numbered tags placed every 100 meters along the trails. Perpendicular distance was determined by direct measurement using 50 meter tape. Transect line was surveyed twice (morning and evening) each and was repeated at fourth week. Total distance of 192 km of transect line was surveyed within 8 weeks and about 190 observations were made.

Data obtained from this study was organized for analysis. A comprehensive computer software package Microsoft excel (Ms excel) called *DISTANCE* version 6.0 was used. The software facilitates all the computations and plotting needed in the analysis. Analysis phase involves

exploratory phase that takes care of preparation of histograms of the distance data under several groupings to assess presence of heaping, evasive movement, outliers and the occasional gross error. The distance program allows explanatory option like grouping or truncation of data set prior to further analysis (Rebecca and Brigida, 2004).

RESULTS

In determining the relative density and distribution of Tantalus monkey (*Cercopithecus tantalus*) in the four ranges of Sambisa game reserve, *Distance* models with different adjustment factors were tried. The best model was selected based on *akaike* information criterion (AIC) value.

The relative density for Tantalus monkey across the four ranges in the study area is presented in Table 1. There were 21 Tantalus monkey sighted in *Balda* range. A total of 11 sightings were recorded in *Jeltere* range, 40 sightings were recorded in *Kwada* range. A total of 80 of the species were sighted in *Yuwe* range. Tantalus monkey has mean encounter rates of 0.58km^{-1}, 0.31km^{-1}, 1.11km^{-1}, and 1.67km^{-1} in *Balda*, *Jeltere*, *Kwada* and *Yuwe* ranges respectively. In the four ranges of the study area Tantalus monkey had relative estimated densities of 5.73km^{-2}, 2.11km^{-2}, 8.63km^{-2} and 10.85km^{-2} in *Balda*, *Jeltere*, *Kwada* and *Yuwe* respectively.

Table 1: Relative densities of Tantalus monkey across the four ranges of Sambisa game reserve

species / Range	Tantalus monkey		
	N	**MER**	**Dkm^{-2}**
Balda	21	0.58	5.73
Jeltere	11	0.31	2.11
Kwada	40	1.11	8.63
Yuwe	80	1.67	10.85
Total	152	3.67	27.32

N.B: n = observation; MER = mean encounter rate (nkm^{-1}); D = density

Table 2 presents the estimates of density and distribution for the Tantalus monkey in the study area. The result reveals that the species was sighted with a total number of 152 sightings after a survey effort of 96km. The mean encounter rates (MERs) for the species was 0.94km^{-1}. Tantalus monkey has the estimated density of about 11km^{-2}.

Table 2: Estimates of density and abundance of Tantalus in Sambisa game reserve

Species	n	% of total sightings	N	MER	Dkm^{-2}	CI	AIC
Tantalus monkey	152	36.19	4528	1.58	11.13	3.97-10.84	1321.6
Total	152	36.19	4528	1.58	11.13		

N.B: n = observation; N = estimated abundance; MER = mean encounter rate (nkm^{-1}); D =density; CI = confidence interval; AIC = akaike information criterion.

The result of sightings during diurnal and nocturnal surveys for species shows that 83 and 67 animals were sighted during the day and at night respectively. The results for the encounter rates and density reveal that it has mean encounter rates of 0.54km^{-1} and 0.43^{-1} with corresponding density of 3.55km^{-2} and 3.16km^{-2} during diurnal and nocturnal surveys respectively.

Table 3 presents the results of the analysis with respect to the sex and status of the species. The result shows that of the 152 total sightings of Tantalus monkey, 92 were adult female, 45 were adult male, 7 were juveniles and 8 other were sighted from a far distance, and as such could not be classified into the three known categories. Furthermore, the mean encounter rates for adult female, adult male and juvenile baboon were 0.58km^{-1}, 0.29km^{-1} and 0.045km^{-1} respectively.

Table 3: Populations structure of Tantalus monkey in Sambisa game reserve

Species / Sex/status	Tantalus monkey		
	n(%)	MER	Dkm^{-2}
Female (adult)	92(60.5)	0.58	4.12
Male (adult)	45(29.6)	0.29	1.99
Juvenile	7(4.6)	0.045	0.39
Unidentified	8(5.3)	0.051	0.33

N.B: n = observation; MER = mean encounter rate (nkm^{-1}); D = density.

DISCUSSION

The density and distribution of Tantalus monkey was estimated in the ranges of the study area using data analyzing protocols of the line transect method. *DISTANCE* selects the model that best fits to the data according to the *Akaikes* Information Criterion (AIC) (Buckland *et al*., 2001). The aggregate population density of the species was 11.13 individuals km^{-2}. Similarly, the estimated densities for Tantalus monkey (per square kilometer (km^{-2}) was $11km^{-2}$ (*n*=152). The distribution and abundance of Tantalus monkey in the 4 ranges are unevenly distributed. The overall result remains significantly lower in *Balda* range. The direction is not the same for all the ranges; Tantalus monkey is clearly high in *Kwada* and *yuwe* ranges. Considering the number of species sighted, Tantalus monkey is widespread throughout the reserve where it was sighted in all the 4 ranges with the highest density of 10.84 km^{-2} (n=80) in *Yuwe* range. In *Jeltere* ecological habitat for the species survival is under threats. Habitat loss and habitat degradation in the area are principally due to illegal logging, forest fires and forest clearance for agriculture. The trends of habitat disturbances are as a result of communities' settlement at the buffer zone of that part of the reserve. Carlos and Erwin (2004) noted that forest disturbance results in making patches and changing the tree composition and structure of the forest. The abundance and size of canopy gaps are increased and the proportion of larger trees is reduced. This is a real problem to many primate species, which are completely arboreal and might result in isolation of primate populations. This in turn will result in a loss of genetic variability due to genetic drift and inbreeding depression making all these populations more vulnerable to extinction. The floristic composition, and resulting spatial and temporal abundance of food resources, may have a large effect on the abundance and ranging ecology of primates (Felton *et al*, 2003). Not all reports, however, support the view that disturbance has a positive, if any, effect on primates generally. In Kibale, Chapman and Lumbert (2000) found higher guereza densities in heavily logged areas, while red tail densities were higher in unlogged and lightly logged areas; for blue monkeys, the differences between logged sites and unlogged sites were insignificant. The population structure of the species sighted in this study suggests that the number of adult females is greater than male adults and juveniles with the lowest ratio; Percentages of Tantalus monkey female adults to adult males and juveniles are 60.5%**,** 29.6% and 4.6% respectively, thus structure suggests declining population as number of juveniles is relatively lower than adult population. However, the relatively higher percentage of adult females may result in population growth, if majority of them are within the breeding age. Therefore, increase in population would be expected. Other factor that could affect population structure are predation and poaching while shortage of food can impair the productive capacity of the animals.

CONCLUSION

The relative density and distributional surveys at 4 ranges of the study area demonstrate that Tantalus monkey abundance in the reserve is high and the relative abundance and habitat disturbance is clear. Understanding the effect of disturbance on primate communities requires careful selection of control sites and documentation of primate abundance over a number of sites in the area. The reduction in the primate populations that could have resulted from forest clearing and degradation clearly illustrates the importance of protecting land. Hence, adequate protection against poaching, reduction of predators as well as proper habitat management can restore balance in the structure.

Increasing forest reduction and the consequent exposure of the Tantalus monkey to more savanna conditions and competition, especially is a threat. The species is likely to be completely out competed as it struggles to survive in conditions that are less conducive for an arboreal existence at *Balda* range which had been subjected to a history of hunting pressure and habitat disturbances due to its proximity to local community.

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