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POPULATION DENSITY ESTIMATE AND SPATIAL DISTRIBUTION OF MONA MONKEYS (*Cercopithecus mona* Schreiber, 1774) IN OKOMU NATIONAL PARK EDO STATE, NIGERIA

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ABSTRACT

The population density estimates and spatial distribution of Mona monkeys in Okomu National Park was carried out in this study using the line transect method. The mean density of Mona monkeys was observed to be high (26) in Okomu National park and the morning and evening censuses showed that there was significant statistical difference between the morning and evening censuses (P-value +2.45 at 0.05 threshold). The spatial distribution of Mona monkeys was observed to be more in Arakuan range than in any other range within the selected ranges due to the fact that Mona monkeys in this range are semi-habituated because of the high tourism activities in this range and the presence of the rangers camp which offered more protection to the animals and the proximity to Okomu oil palm estate.

Keywords: Mona monkeys, Population, Distribution, Okomu National Park

INTRODUCTION

Okomu National Park, Edo State, is a lowland rainforest area rich in biodiversity Olaleru *et al*., (2020). It is home to endemic white-throated monkeys (*Cercopithecus erythrogaster).* The rich rainforest of Okomu National park Edo state harbor an impressive assemblage of terrestrial species as well as fascinating array of ecological process. Gregory *et al* (2007) explained that forests services provided by ecological process of Okomu National Park Edo State include unique economic assets, recreation, spiritual quest, improving water quality, prevent soil erosion, regulating rainfall, providing food, energy and timber seen as rich sources of biodiversity.

The scattered populations of Mona monkey (*Cercopithecus mona*) found within the five (5) ranges of Okomu National Park is currently facing a lot of habitat challenges due to human dimensions and factors including illegal logging activities, poaching, habitat encroachment, deforestation and urbanization resulting in population decrease. Therefore there is need to estimate their population density and spatial distribution within the park boundaries, because of potential ecotourism interest of National and international concern in Okomu National Park.

The Mona monkey (*Cercopithecus mona*) is an Old World monkey that lives throughout western Africa. The Mona monkey can also be found on the island of Grenada as it was transported to the island aboard slave ships headed to the New World during the 18th century. This guenon lives in groups of up to 35 in arboreal regions. It mainly feeds on

fruit but sometimes eats insects and leaves. Olaleru et *al*, (2020).

The Mona monkey (*Cercopithecus mona*) is one of the Africa's most common guenon (Oates, 2011). Though the species is protected by the Nigeria endangered species decree number 11 of 1985, it is conserved and protected only in National Parks, Games Reserves and Wildlife Sanctuaries. Mona Monkeys have few wildlife species that are involved in food competition and no predators from the wild. However, they are always facing the major anthropogenic threat of persistent and intensive hunting by poachers. Over the years, these species of primates have been subjected to severe hunting for bush meat. Most times, adult monkeys are hunted for the purpose of using the young ones as pets. The Mona "sneeze" call, an alarm call that travels quickly through a group, is usually the first sign that Monas are in the nearby forest, apart from the loud call of the male. The alarm call is used to warn troop members of danger, usually predators such as snakes or eagles and man. A careful observer who remains undetected may also hear their contact call "nnneee", made at frequent intervals to help keep contact with each other in the thick vegetation. Hunters say in the mangrove areas, the large male also warns others of the incoming tide with his "boom" call, a two syllable resonant short call, often preceding the loud "hack" Mona monkeys are probably the most commonly held captive primate in Nigeria. Known generally as the most mischievous and curious of monkeys, as youngsters they unfortunately appear to make delightful pets.

MATERIALS AND METHOD

Study Area

Okomu National park is in Ovia South-West Local Government Area of Edo State, Nigeria and lies between latitude 6^0, 15' and 6^0, 25' North and Latitude 5^0, 9' and 5^0, 23' east. The park (approximately $112km^2$) is located within the confines of support zone communities such as Nikorowa, Udo, Asamara, Reuben enclave and mile 3 (N.C.F., 1985). The climate of the study area is typical of moist rainforest ecosystem with mean annual rainfall of about 2,100mm; mean monthly temperature of 30.20C and relative humidity of about 65% during the afternoon throughout the year (Happold, 1987; F.R.I.N 2000). The vegetation of the study area consists of mainly secondary high forest on well drained plateau sites. The tropical tree species in the study area include *Astonia boonei, Combretodendron africanum, Afzelia africana* and many other tree species.

The study area boasts of an impressive assemblage of wildlife resources, some of which are endemic, threatened or endangered in Nigeria (N.C.F., 2006). Apart from the Mona monkey, there are two other primates, the white throated monkey (Cercopithecus erythrogaster) and the putty-nose monkey (*Cercopithecus nictitans*) – (O.N.P., 2006). Besides primates, there are other species of fauna such as the forest elephants (*Loxodonta africana*), forest buffalos (*Syncerus caffer*), duiker (*Cephalophus spp*.) and an impressive species of butterflies including the large lurid gliders (*Cymotheo hypatha okomu*), which is endemic to the study area. Typical mammals and bird's species in the study area include pigmy hippopotamus (*Choeropsis liberiensis*), tree hyrax (*Dendrohyrax dosalis*) forest francolins (*Francolinus aquamatus*), hornbill (*Ceratogymna atrata*) and many other species of animals and birds (Figure 1).

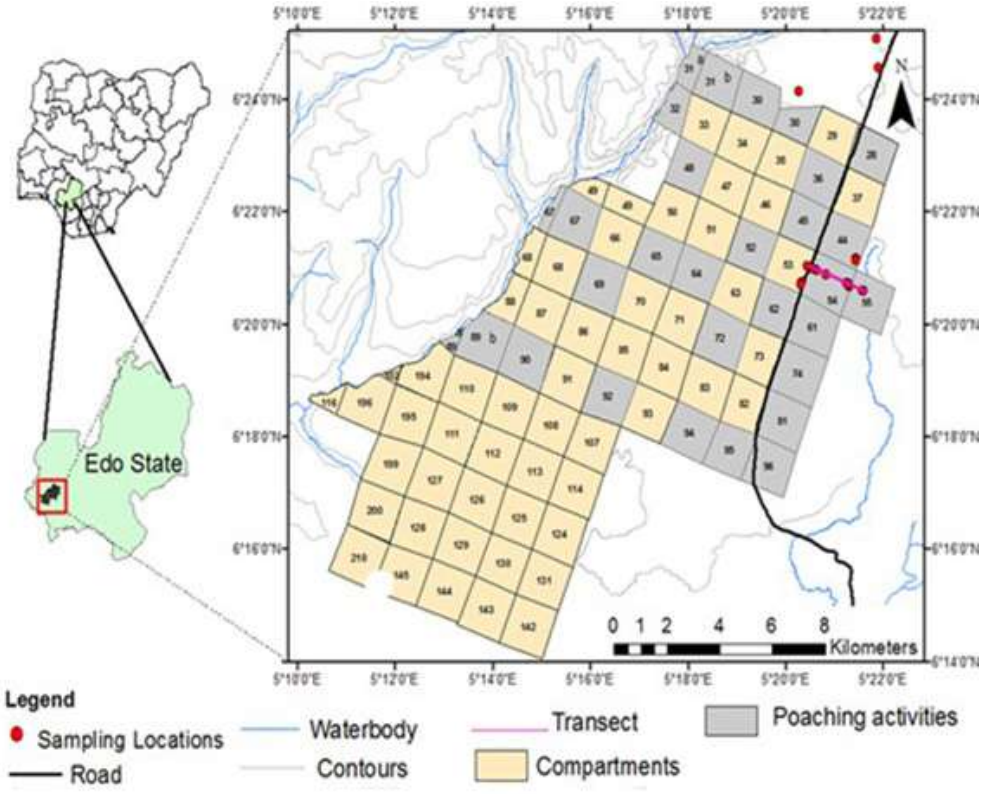


Figure 1: Map of Nigeria, showing the study site, the ranges and sampling locations

Method of Data Collection

Line transects method of data collection

The line transect method was used for population density estimate of the Mona Monkey (*Cercopithecus mona*), this method was also used by Ajayi *et al* (2011), Bukie, (2015) and Bukie *et al.*, (2016). Six transect (two from each of the three ranges in Arakhuan, Iron Bridge and Julius Creek) were randomly selected from the study area. Transect lengths of 1.0km and width of 0.02km was systematically spaced at approximately 1.0km from each other.

Distances along transects were marked with flagging tapes at intervals of 0.5km for easy identification of animal locations on transect. Each transect was covered by an observer and the census was carried out simultaneously in all the six transects. The census was started simultaneously the same time, date and pace, during the census, the observer was equipped with a binocular for easy observation and field book to record the following information Ajayi *et al*., (2011)

i. Transect number
ii. Right angle distance to the path of observation walked by observer
iii. Distance of observer to animals sighted
iv. Number of Mona monkeys sighted

Using the information above, the population density of the Mona monkey was determined by:

$$D = \frac{N}{2LW} \quad \ldots\ldots\ldots\ldots\ldots 1$$

Where:
D = Mona population density (Number/km^2)
N = Number of Mona sighted
L = Distance walked by observer (km)
W = Effective strip width (ESW) – Km.

Data analysis: The student's' test (test of independent means) was used to test the results of the Mona monkeys population density in the two censuses, the test criterion is given as:

$$t = \frac{X_1 - X_2}{\sqrt{Sp^2(1/n_1 + 1/n_2)}} \quad \ldots\ldots\ldots 2$$

Where

X_1 = mean density of first census (morning)

X_2 = mean density for second census (evening)

Sp^2 = Pooled variance

n_1= Frequency of first census

n_2 = Frequency of second census

RESULT

Population Density and spatial Distribution of Mona Monkey in Okomu National Park

The result of population density of Mona Monkeys in Okomu National Park is shown on table 1 for the morning census and table 2 for the evening census. However, the spatial distribution of the Mona monkeys in Okomu National Park was highest in Arakhuan range and lowest in Julius Creek range Figure 2.

Table 1: Population density of Mona monkeys (*Cercopithecus mona*) during the morning census

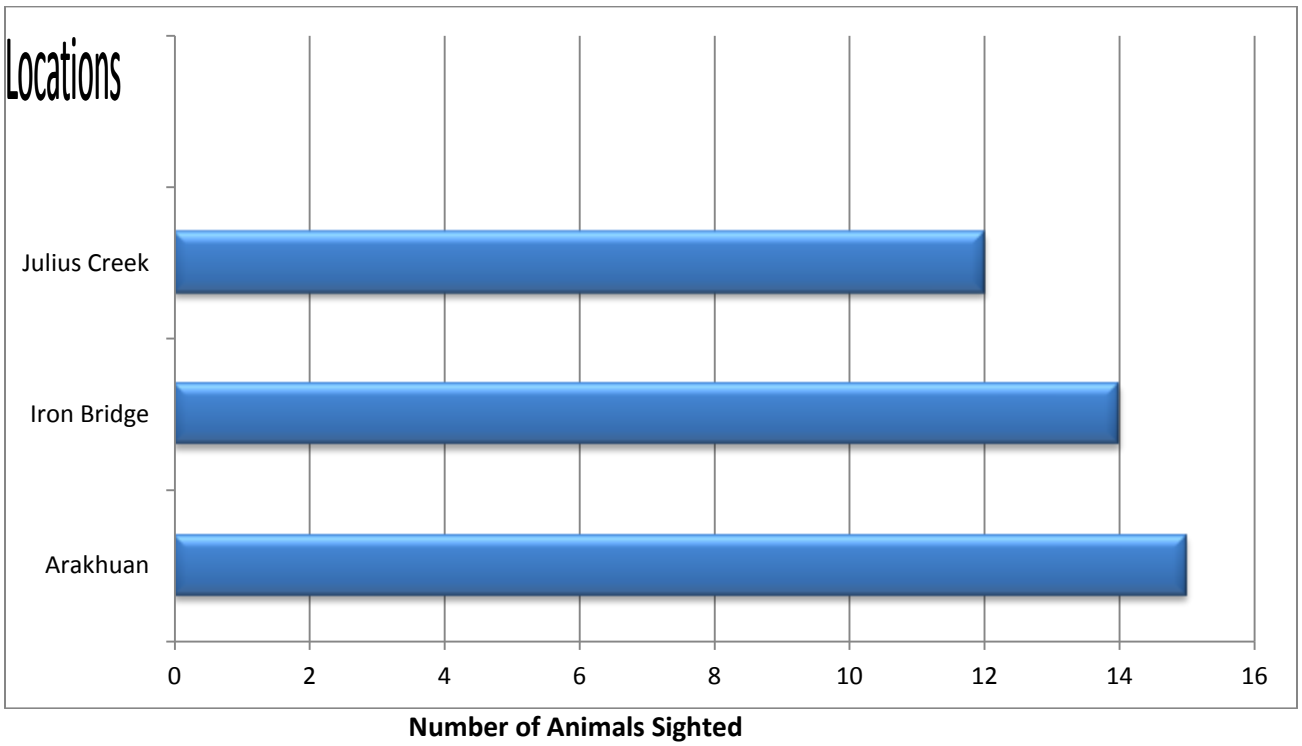
Transects	Transect Length (Km)	Distance Walked by Observer (Km)	Effective Strip Width (W)	Number of animals Sighted	Density (D)
A	1.00	0.20	0.15	9	150
B	1.00	1.00	0.00	0	00
C	1.00	0.80	0.20	12	38
D	1.00	1.00	0.00	0	00
E	1.00	0.50	0.15	9	60
F	1.00	1.00	0.00	0	00

Mean population density for the morning census = 41/km^2

Table 2: Population density of Mona monkey (*Cercopithecus mona*) during the evening census

Transect	Transect Length (Km)	Distance Walked by Observer (Km)	Effective Strip Width (W)	Number of animals Sighted	Density (D)
A	1.00	0.00	0.00	0	00
B	1.00	0.80	0.30	3	6
C	1.00	0.00	0.00	0	00
D	1.00	0.20	0.20	3	38
E	1.00	0.00	0.00	0	00
F	1.00	0.60	0.10	6	13

Mean population density for the evening census = 10/km^2



NOTE: Indicate the lebel for both Y and X axes

Figure 2: Spatial distribution of Mona monkeys in Okomu National Park

DISCUSSION

However, the statistical test of significance between the two population density means, showed a significant difference (*P-value +2.45 at 0.05 thresholds)*). From the two censuses, the overall density of Mona Monkeys in Okomu National Park was 26/km^2. A mean population density of twenty six (26) Mona Monkeys. Per square kilometer in Okomu National Park is greater than that of 14/km^2 of the White–Throated monkeys observed by Ajayi *et al*., (2011) in Okomu National Park.

It is also less than that observed by Dunn (1993) in Gashaka Gumti National Park. A mean population of density of twenty six (26) Mona monkeys per square Kilometer in Okomu National Park is also greater than that of four (4) Mona monkeys per Kilometer observed by Bukie *et al*., 2016 in Afi Mountain Wildlife Sanctuary. However, the group sizes of Mona monkeys observed in this study is small (3-12) monkeys per group. This group sizes are smaller than those observed by Bukie *et al*., (2016). However, Ogujemite *et al*., (2007) opined that these large groups could be a fusion of more than one (1) group as a survival strategy. The Mona monkey has been regarded as a weed species and often abundant Oates, (2011), this study has proven this to be so. The Mona monkeys were observed to be spatially distributed more in Arakhuan range and less on the other ranges surveyed. This spatial distribution at Arakhuan range is attributed to the fact that the Mona monkeys in Arakhuan range are semi habituated due to the regular presence of humans due to tourism activities and the constant presence of the rangers due to the resident ranger's camp in addition to the proximity of the range to the oil palm estate of Okomu oil, this is in agreement with the findings of Olaleru et al., (2020), that oil palm fruits constitutes an important diet items of Mona monkeys in Okomu National Park. Mona monkeys were less spatially distributed in Julius creek's range. This is likely because this range has the highest rate of anthropogenic activities in Okomu National

Park (O.N.P., 2006). However, the statistical test of significance showed no significance difference between the spatial distributions in the three ranges.

CONCLUSION

In conclusion, this study have shown the mean population density of Mona monkeys in the study area to be relatively high compared with that of Bukie, (2015) in Afi Mountain Wildlife Sanctuary and that of the white throated monkey in the same study area by Ajayi *et al* (2011). This is due to suitable habitat and high level of protection provided by the Park Management. Apart from Mona monkeys, physical observation and other indices reviled the presence of diverse fauna and flora species. Presently hunting, logging and collection of non-timber forest products are low as most of the offenders now operate within the buffer zones and the community forest. Okomu National Park is an asset that Nigerian Government can explore for its renewable potentials and richness in terms of flora and fauna resources and other natural features. It has the potentials of becoming a major source of revamping the local economy of the rural people and the state at large since the economy of most of the East African Countries depends on tourism. If only the Park will be given the needed attention, it will attract tourists from both within and outside the country.

RECOMMENDATION

Based on the above findings, the following recommendations are made:

i. A detailed and more comprehensive population density estimate of all the wild animals in the park should be carried out.
ii. There is need to carryout researches on the home range sex ratio ecological requirement and biology if the species
iii. The local communities should be empowered economically, so that they can have alternative sources of livelihood that are biodiversity friendly, thus reducing their dependence on the park.

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